RADIATION MONITORING REPORT FOR LICENSE SUB-1435 JEFFERSON PROVING GROUND

Summary of Results for April 2009 Sampling Event

FINAL

Submitted to:

U.S. Department of Army
Installation Support Management Agency
Aberdeen Proving Ground, Maryland

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LIST OF ACRONYMS AND ABBREVIATIONS

µg/L	Micrograms per Liter
ASTM	American Society for Testing and Materials
CFR	Code of Federal Regulations
CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
DQO	Data Quality Objective
DU	Depleted Uranium
ERM	Environmental Radiation Monitoring
ERMP	Environmental Radiation Monitoring Program
I.D.	Identification
JPG	Jefferson Proving Ground
LCL	Lower Control Limit
mS/cm	MilliSiemens per Centimeter
NRC	Nuclear Regulatory Commission
pCi/g	PicoCuries per Gram
pCi/L	PicoCuries per Liter
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
SAIC	Science Applications International Corporation
SOP	Standard Operating Procedure
UCL	Upper Control Limit

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1. INTRODUCTION

Environmental monitoring activities are being conducted at Jefferson Proving Ground (JPG), Madison, Indiana, to ensure that depleted uranium (DU), present within the DU Impact Area as a result of the Army's past DU testing program, does not pose a threat to human health and the environment through inadvertent or unanticipated release or migration. The Environmental Radiation Monitoring Program (ERMP), described in the standard operating procedure (SOP) in Appendix A (CHPPM 2000), is designed to meet the requirements of applicable Federal and state regulations, including Nuclear Regulatory Commission (NRC) regulations and requirements under Radioactive Materials License SUB-1435 (NRC 1988).

The overall goals of JPG's ERMP are to provide:

- A historical and current perspective of DU levels in various media
- A timely indication of the magnitude and extent of any DU release or migration from past operations.

This report summarizes the methodology, results, and conclusions of the April 2009 sampling event, which is the first of two planned sampling events in 2009 for this biannual program. The sampling requirements and approach are presented in Section 2. The results of the multimedia sampling event are presented and discussed in Section 3. Historical data from the ERMP are discussed in Section 4. Conclusions and recommendations are summarized in Section 5. References cited are identified in Section 6. The appendices of this report include the SOP (Appendix A), field logbook (Appendix B), and data validation summary (Appendix C). All tables and figures are presented at the end of their respective sections.

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2. SAMPLING REQUIREMENTS AND APPROACH

The ERMP (U.S. Army 2000) specifies the U.S. Army Center for Health Promotion and Preventive Medicine's (CHPPM's) protocol for the collection and analysis of 11 groundwater, 8 surface water, 8 sediment, and 4 soil samples (with appropriate duplicates) in the DU Impact Area. The plan has been approved by the NRC and is described in an SOP, which is provided in Appendix A. Science Applications International Corporation (SAIC) executes the plan and reports the findings in an effort to fulfill the Army's responsibilities for monitoring under NRC Radioactive Material License SUB-1435.

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3. RESULTS

An SAIC field crew prepared for and conducted sampling at JPG in April 2009. Appendix B contains a copy of the field logbook, which documents environmental monitoring report field activities during the sampling effort.

No unusual or abnormal conditions (e.g., soil or water discoloration, odd odors, or elevated radiation levels) were observed during the sampling effort.

The sample locations for the groundwater, surface water, sediment, and soil samples are depicted in Figure 3-1. Sections 3.1 through 3.4 summarize the sampling results for each medium, respectively. The results of the data validation are presented in Appendix C. All data were determined to meet data quality objectives (DQOs) and criteria presented in the SOP (as provided in Appendix A). Environmental data with a negative value for the total uranium concentrations are conservatively carried forward as being zero (0).

3.1 GROUNDWATER

The concentrations of total dissolved uranium in groundwater at the 11 monitoring wells plus 1 duplicate sample are presented in Table 3-1. Water quality parameter measurements are presented in Table 3-2. (There was insufficient water at MW09; thus, water quality measurements were not obtained for this location.) Total uranium concentrations of the April 2009 groundwater samples ranged from 0.36 to 2.91 picocuries per liter (pCi/L) with an average concentration of 1.42 pCi/L.

In addition to the individual isotopic concentrations, Table 3-1 presents the U-238/U-234 ratios for each sample, which ranged from 0.27 ± 0.23 to 0.88 ± 0.43. A U-238/U-234 ratio of 3 or less is representative of natural uranium, whereas higher ratios are potentially indicative of DU (U.S. Army 2002). For the purposes of this report, samples with U-238/U-234 ratios in excess of 3 are investigated further to validate if the sample is representative of DU or natural uranium. No sample exceeded this criterion.

3.2 SURFACE WATER

The concentrations of total dissolved uranium in surface water at eight sampling locations plus one duplicate sample are presented in Table 3-3. Water quality parameter measurements are presented in Table 3-4. Total uranium concentrations ranged from 0.19 to 0.35 pCi/L, with an average concentration of 0.25 pCi/L. The U-238/U-234 ratios ranged from 0.38 ± 0.42 to 1.25 ± 1.10. As no result had a U-238/U-234 ratio exceeding 3, no additional investigations were required and it is concluded that no sample exhibited evidence of the presence of DU.

3.3 SEDIMENT

The concentrations of total uranium in sediment at eight sampling locations plus one duplicate sample are presented in Table 3-5. Sediment samples were collected at the same locations as surface water samples, as shown in Figure 3-1. Total uranium concentrations ranged from 0.38 to 1.91 picocuries per gram (pCi/g), with an average concentration of 1.16 pCi/g. The U-238/U-234 ratio for the samples ranged from 0.79 ± 0.20 to 1.78 ± 0.51.

As indicated by the relatively low total uranium results and the U-238/U-234 ratios, there is no evidence of the presence of DU in the sediment samples.

3.4 SOIL

The concentrations of total uranium in surface soil at four surface soil sample locations plus one duplicate sample are presented in Table 3-6. Total uranium concentrations ranged from 1.36 to 1.83 with an average concentration of 1.58 pCi/g. The U-238/U-234 ratios ranged from 0.86 ± 0.21 to 1.14 ± 0.28.

As indicated by the relatively low total uranium results and the U-238/U-234 ratios, there is no evidence of the presence of DU in the surface soil samples.

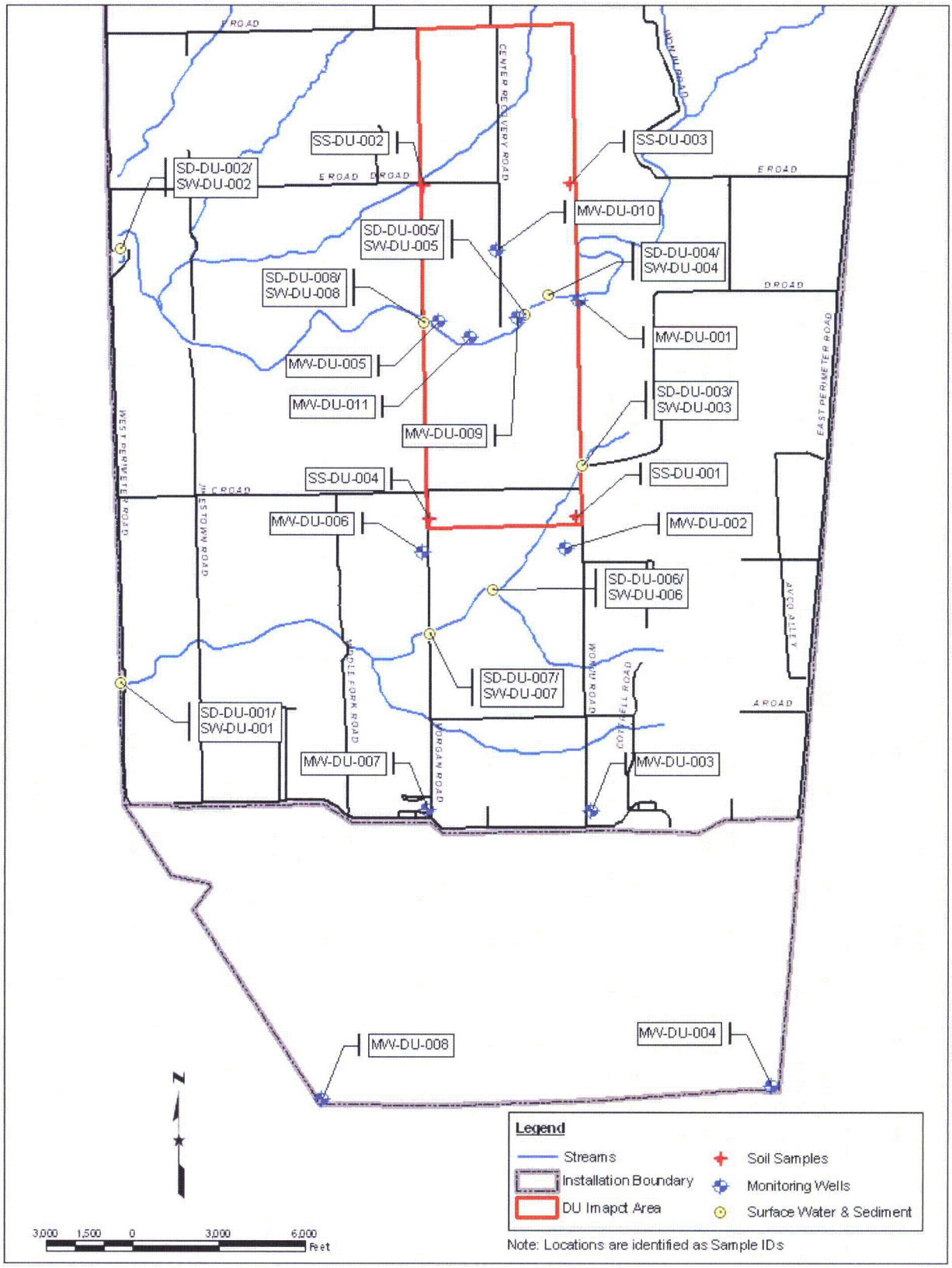

Figure 3-1. Sampling Locations for the JPG ERM Program

Table 3-1. Uranium in Groundwater
Jefferson Proving Ground, Madison, Indiana

JPG Sample Designation[a]	Sample I.D.	Analyte	Result (pCi/L)
MW01	MW-DU-001	U-234	0.30 J
MW01	MW-DU-001	U-235	0.051J
MW01	MW-DU-001	U-238	0.20 J
		Total Uranium	**0.55**
		U-238/U-234 Ratio[b]	0.67
MW02	MW-DU-002	U-234	1.36
MW02	MW-DU-002	U-235	0.21 J
MW02	MW-DU-002	U-238	0.61
		Total Uranium	**2.18**
		U-238/U-234 Ratio[b]	0.45
MW03	MW-DU-003	U-234	0.65 J
MW03	MW-DU-003	U-235	0.041 U
MW03	MW-DU-003	U-238	0.34
		Total Uranium	**1.03**
		U-238/U-234 Ratio[b]	0.52
MW04	MW-DU-004	U-234	0.42 J
MW04	MW-DU-004	U-235	0.013 U
MW04	MW-DU-004	U-238	0.37
		Total Uranium	**0.80**
		U-238/U-234 Ratio[b]	0.88
MW05	MW-DU-005	U-234	0.29 J
MW05	MW-DU-005	U-235	0.012 U
MW05	MW-DU-005	U-238	0.20 J
		Total Uranium	**0.50**
		U-238/U-234 Ratio[b]	0.69
MW06	MW-DU-005	U-234	1.21
MW06	MW-DU-005	U-235	0.119 J
MW06	MW-DU-005	U-238	1.05
		Total Uranium	**2.38**
		U-238/U-234 Ratio[b]	0.87
MW07	MW-DU-007	U-234	1.42
MW07	MW-DU-007	U-235	0.100 J
MW07	MW-DU-007	U-238	0.86
		Total Uranium	**2.38**
		U-238/U-234 Ratio[b]	0.61
MW07D	MW-DU-007	U-234	1.28
MW07D	MW-DU-007	U-235	0.079 J
MW07D	MW-DU-007	U-238	0.78
		Total Uranium	**2.14**
		U-238/U-234 Ratio[b]	0.61
MW08	MW-DU-008	U-234	0.24 J
MW08	MW-DU-008	U-235	0.046 U
MW08	MW-DU-008	U-238	0.184 J
		Total Uranium	**0.47**
		U-238/U-234 Ratio[b]	0.77

Table 3-1. Uranium in Groundwater
Jefferson Proving Ground, Madison, Indiana (Continued)

JPG Sample Designation[a]	Sample I.D.	Analyte	Result (pCi/L)
MW09	MW-DU-009	U-234	0.86
MW09	MW-DU-009	U-235	0.089 J
MW09	MW-DU-009	U-238	0.40
		Total Uranium	**1.35**
		U-238/U-234 Ratio[b]	0.47
MW010	MW-DU-010	U-234	1.99
MW010	MW-DU-010	U-235	0.109 J
MW010	MW-DU-010	U-238	0.81
		Total Uranium	**2.91**
		U-238/U-234 Ratio[b]	0.41
MW011	MW-DU-011	U-234	0.27 J
MW011	MW-DU-011	U-235	0.021 U
MW011	MW-DU-011	U-238	0.072 J
		Total Uranium	**0.36**
		U-238/U-234 Ratio[b]	0.27

[a] Represents sample designation developed in previous sampling programs.
[b] Unitless.
J – Indicates that the radionuclide was positively identified; the associated numerical value is the approximate concentration of the radionuclide in the sample.
U – Indicates that the data met all QA/QC requirements and the radionuclide was analyzed for but was not detected above the reported sample quantification limit.

Table 3-2. Groundwater Water Quality Parameters and Exposure Readings
Jefferson Proving Ground, Madison, Indiana

JPG Sample Designation[a]	Sample I.D.	pH	Temp (°C)	Conductivity (microSiemens/cm)	Dissolved Oxygen (mg/L)	Rad (µR/hr)
MW01	MW-DU-001	6.58	12.5	61.3	--[b]	6
MW02	MW-DU-002	5.92	10.3	76.1	--[b]	5
MW03	MW-DU-003	6.42	10.4	73.8	--[b]	5
MW04	MW-DU-004	6.66	11.9	65.0	--[b]	5.5
MW05	MW-DU-005	5.88	10.9	0.416	--[b]	5
MW06	MW-DU-006	6.26	12.6	61.5	--[b]	5
MW07	MW-DU-007	6.37	10.8	81.9	--[b]	6
MW08	MW-DU-008	6.78	12.4	46.1	--[b]	6
MW09[c]	MW-DU-009	--[c]	--[c]	--[c]	--[b,c]	5
MW10	MW-DU-0010	6.26	10.2	85.8	--[b]	5
MW11	MW-DU-0011	6.64	10.0	35.3	--[b]	6

[a] Represents sample designation developed in previous sampling programs.
[b] Dissolved oxygen not measured.
[c] Insufficient water present to collect water quality parameters.

Table 3-3. Uranium in Surface Water
Jefferson Proving Ground, Madison, Indiana

JPG Sample Designation[a]	Sample I.D.	Analyte	Result (pCi/g)
SWS01	SW-DU-001	U-234	0.106 J
SWS01	SW-DU-001	U-235	0.019 U
SWS01	SW-DU-001	U-238	0.071 J
		Total Uranium	**0.20**
		U-238/U-234 Ratio[b]	0.67
SWS02	SW-DU-002	U-234	0.142 J
SWS02	SW-DU-002	U-235	0.013 U
SWS02	SW-DU-002	U-238	0.054 J
		Total Uranium	**0.21**
		U-238/U-234 Ratio[b]	0.38
SWS03	SW-DU-002D	U-234	0.071 U
SWS03	SW-DU-002D	U-235	0.029 U
SWS03	SW-DU-002D	U-238	0.153 J
		Total Uranium	**0.25**
		U-238/U-234 Ratio[b]	ND
SWS04	SW-DU-004	U-234	0.221 J
SWS04	SW-DU-004	U-235	-0.012 U
SWS04	SW-DU-004	U-238	0.095 J
		Total Uranium	**0.32**
		U-238/U-234 Ratio[b]	0.43
SWS04D	SW-DU-004D	U-234	0.133 J
SWS04D	SW-DU-004D	U-235	0.010 U
SWS04D	SW-DU-004D	U-238	0.050 J
		Total Uranium	**0.19**
		U-238/U-234 Ratio[b]	0.38
SWS05	SW-DU-005	U-234	0.187 J
SWS05	SW-DU-005	U-235	-0.009 U
SWS05	SW-DU-005	U-238	0.174 J
		Total Uranium	**0.36**
		U-238/U-234 Ratio[b]	0.93
SWS06	SW-DU-006	U-234	0.089 U
SWS06	SW-DU-006	U-235	0.025 U
SWS06	SW-DU-006	U-238	0.137 J
		Total Uranium	**0.25**
		U-238/U-234 Ratio[b]	ND
SWS07	SW-DU-007	U-234	0.113 J
SWS07	SW-DU-007	U-235	0.041 J
SWS07	SW-DU-007	U-238	0.141 J
		Total Uranium	**0.30**

Table 3-3. Uranium in Surface Water
Jefferson Proving Ground, Madison, Indiana (Continued)

JPG Sample Designation[a]	Sample I.D.	Analyte	Result (pCi/g)
		U-238/U-234 Ratio[b]	1.25
SWS08	SWS-DU-008	U-234	0.093 J
SWS08	SWS-DU-008	U-235	0.037 J
SWS08	SWS-DU-008	U-238	0.093 J
		Total Uranium	**0.22**
		U-238/U-234 Ratio[b]	1.00

[a] Represents sample designation developed in previous sampling programs.
[b] Unitless.

J – Indicates that the radionuclide was positively identified; the associated numerical value is the approximate concentration of the radionuclide in the sample.
ND – Indicates that one or more isotopes were not detected; therefore, the calculation was not performed.
U – Indicates that the data met all QA/QC requirements and the radionuclide was analyzed for but was not detected above the reported sample quantitation limit.

Table 3-4. Surface Water Quality Parameters and Exposure Readings
Jefferson Proving Ground, Madison, Indiana

JPG Sample Designation*	Sample I.D.	pH	Temp (°C)	Conductivity (microSiemens/cm)	Dissolved Oxygen (mg/L)	Rad (µR/hr)
SWS01	SW-DU-001	7.20	10.2	0.131	10.03	5
SWS02	SW-DU-002	6.86	10.0	0.147	9.72	5
SWS03	SW-DU-003	6.15	11.3	0.09	9.07	5
SWS04	SW-DU-004	6.57	8.9	0.153	9.23	6
SWS05	SW-DU-005	6.50	9.6	0.162	9.44	6
SWS06	SW-DU-006	5.68	11.2	0.081	9.93	5
SWS07	SW-DU-007	6.90	11.0	0.048	9.38	5
SWS08	SW-DU-008	6.30	11.0	0.145	9.92	5

*Represents sample designation developed in previous sampling programs.

Table 3-5. Uranium in Sediment
Jefferson Proving Ground, Madison, Indiana

JPG Sample Designation[a]	Sample I.D.	Analyte	Result (pCi/g)
SES01	SD-DU-001	U-234	0.90
SES01	SD-DU-001	U-235	0.081 J
SES01	SD-DU-001	U-238	0.93
		Total Uranium	**1.91**
		U-238/U-234 Ratio[b]	1.03
SES02	SD-DU-002	U-234	0.58
SES02	SD-DU-002	U-235	0.054 J
SES02	SD-DU-002	U-238	0.66
		Total Uranium	**1.29**

Table 3-5. Uranium in Sediment
Jefferson Proving Ground, Madison, Indiana (Continued)

JPG Sample Designation[a]	Sample I.D.	Analyte	Result (pCi/g)
		U-238/U-234 Ratio[b]	1.14
SES03	SD-DU-003	U-234	0.71
SES03	SD-DU-003	U-235	0.018 U
SES03	SD-DU-003	U-238	0.56
		Total Uranium	**1.29**
		U-238/U-234 Ratio[b]	0.79
SES03D	SD-DU-003D	U-234	0.82
SES03D	SD-DU-003D	U-235	0.024 U
SES03D	SD-DU-003D	U-238	0.81
		Total Uranium	**1.65**
		U-238/U-234 Ratio[b]	0.99
SES04	SD-DU-004	U-234	0.206
SES04	SD-DU-004	U-235	0.057 J
SES04	SD-DU-004	U-238	0.224
		Total Uranium	**0.49**
		U-238/U-234 Ratio[b]	1.09
SES05	SD-DU-005	U-234	0.141
SES05	SD-DU-005	U-235	0.015 J
SES05	SD-DU-005	U-238	0.227
		Total Uranium	**0.38**
		U-238/U-234 Ratio[b]	1.61
SES06	SD-DU-006	U-234	0.363
SES06	SD-DU-006	U-235	0.058 J
SES06	SD-DU-006	U-238	0.366
		Total Uranium	**0.79**
		U-238/U-234 Ratio[b]	1.01
SES07	SD-DU-007	U-234	0.72
SES07	SD-DU-007	U-235	0.073 J
SES07	SD-DU-007	U-238	0.78
		Total Uranium	**1.57**
		U-238/U-234 Ratio[b]	1.08
SES08	SD-DU-008	U-234	0.383
SES08	SD-DU-008	U-235	0.044 J
SES08	SD-DU-008	U-238	0.68
		Total Uranium	**1.11**
		U-238/U-234 Ratio[b]	1.78

[a] Represents sample designation developed in previous sampling programs.
[b] Unitless.
J – Indicates that the radionuclide was positively identified; the associated numerical value is the approximate concentration of the radionuclide in the sample.
U – Indicates that the data met all QA/QC requirements and the radionuclide was analyzed for but was not detected above the reported sample quantitation limit.

Table 3-6. Uranium in Surface Soil
Jefferson Proving Ground, Madison, Indiana

JPG Sample Designation[a]	Sample I.D.	Analyte	Result (pCi/g)
SOS01	SS-DU-001	U-234	0.63
SOS01	SS-DU-001	U-235	0.019 U
SOS01	SS-DU-001	U-238	0.71
		Total Uranium	**1.36**
		U-238/U-234 Ratio[b]	1.13
SOS02	SS-DU-002	U-234	0.91
SOS02	SS-DU-002	U-235	0.074 J
SOS02	SS-DU-002	U-238	0.85
		Total Uranium	**1.83**
		U-238/U-234 Ratio[b]	0.93
SOS03	SS-DU-003	U-234	0.73
SOS03	SS-DU-003	U-235	0.034 J
SOS03	SS-DU-003	U-238	0.83
		Total Uranium	**1.59**
		U-238/U-234 Ratio[b]	1.14
SOS04	SS-DU-004	U-234	0.79
SOS04	SS-DU-004	U-235	0.059 J
SOS04	SS-DU-004	U-238	0.68
		Total Uranium	**1.53**
		U-238/U-234 Ratio[b]	0.86
SOS04D	SS-DU-004D	U-234	0.78
SOS04D	SS-DU-004D	U-235	0.055 J
SOS04D	SS-DU-004D	U-238	0.77
		Total Uranium	**1.61**
		U-238/U-234 Ratio[b]	0.99

[a] Represents sample designation developed in previous sampling programs.
[b] Unitless.
J – Indicates that the radionuclide was positively identified; the associated numerical value is the approximate concentration of the radionuclide in the sample.
U – Indicates that the data met all QA/QC requirements and the radionuclide was analyzed for but was not detected above the reported sample quantification limit.

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4. HISTORICAL DATA ASSESSMENT AND TREND ANALYSIS

Historical data from the ERMP are reviewed and discussed in this section in the context of existing action levels and corrective actions for environmental media documented in the SOP for the Environmental Radiation Monitoring (ERM). The SOP action levels and associated corrective actions are provided in Table 4-1.

Table 4-1. Action Levels and Corrective Actions for Total Uranium in Environmental Media Jefferson Proving Ground, Madison, Indiana

Medium	Total Uranium Action Level	Corrective Action
Groundwater and Surface Water	≥ 150 pCi/L*	Resample. If activity verified, notify NRC and assess results. The findings and recommended corrective actions will be documented for the Army's Radiation Control Committee. The Committee will provide recommendations to the Commander based on its evaluation.
	Less than 150 pCi/L	No action.
Soil and Sediment:		
Perimeter and Background Samples	≥ 35 pCi/g	Collect five additional samples in a 1-meter grid. If average activity exceeds 35 pCi/g, decontaminate to 35 pCi/g.
	Less than 35 pCi/g	No corrective action.

* Effluent concentration limit for uranium is 300 pCi/L in 10 CFR 20, Appendix B, Table 2, Column 2.
Source: U.S. Army 1999 and CHPPM 2000 (see Appendix A, pages A-6 and A-7).

An assessment of historical trends for ERMP data was first provided in the April 2006 Radiation Monitoring Report (SAIC 2006). That assessment focused on available sampling data for groundwater, surface water, sediment, and soil since 1998. Quality assurance/quality control (QA/QC) records for data collected prior to 1998 were not available to support the trend analyses. In addition, there were changes to analytical methods that were implemented beginning in December 2004.[1] Therefore, while historical data are reported since 1998, trend analyses included in this ERM report address the time period from December 2004 to the present. Surface water and groundwater results for the April 2004 sampling event also were not trended, given that the results were provided in units of micrograms per liter (µg/L) rather than pCi/L.

As noted above, the April 2006 Radiation Monitoring Report (SAIC 2006) provided detailed information about the trending methods employed and why certain data were or were not included in the initial trend analysis. To avoid confusion, that information is not repeated in this report. This report section re-examines the ERMP data for historical trends following the addition of the ERMP data collected during the October 2008 sampling event. Stated numbers of samples and summary statistics are based on data generated since December 2004 (when laboratory analytical methods were revised and standardized).

4.1 GROUNDWATER

For 106 discrete samples available from 11 monitoring wells (MW01 to MW11) during the period from 2004 through April 2009, the average total uranium activity-concentration is 1.41 pCi/L, the standard deviation is 1.12 pCi/L, and the maximum detected activity-concentration is 5.27 pCi/L. The activity-concentrations at each well are well below the 150 pCi/L action level for groundwater.

[1] Total uranium is now analyzed by alpha spectroscopy using American Society for Testing and Materials (ASTM) Method D3972-90M rather than the fluorometry and gamma spectroscopy methods applied previously.

Data for each monitoring well are summarized in run charts, as shown in Figures 4-1 through 4-11. Total uranium results are displayed along with each measurement's associated error bars. The error bars are expressed at 1.96 standard deviations and represent a 95 percent confidence interval. Where trend lines are provided, the associated coefficient of correlation also is provided (the R^2 value listed on each figure). An R^2 value that approaches 1.0 suggests a strong relationship between the sample results and the sampling dates. The figures for all 11 individual monitoring wells indicate no significant trends. In addition, no monitoring wells exhibited trend lines with R^2 values greater than 0.5 (i.e., somewhat significant).

In addition to the aforementioned run charts (Figures 4-1 through 4-11), individual variable control charts were created in April 2006 for each monitoring well, with the upper control limit (UCL) and the lower control limit (LCL) defined at 3 standard deviations above or below the mean. The control charts were created to determine if any single sample result warranted further examination. These control charts were re-examined in this report. All total uranium results at each sampling location for the April 2009 sampling effort were within 3 standard deviations of the mean concentration. An example individual control chart is provided in Figure 4-12.

The 11 monitoring wells also were examined in aggregate to determine if some wells or particular sampling events were distinctive. A simple individual control chart was created using the pooled data for all monitoring wells and all data collected after December 2004 (Figure 4-13).

Figure 4-13 indicates five points that lie above the UCL applicable to the full data set. Each of the five points is for MW-DU-006. Clearly, this well has exhibited (and continues to exhibit) total uranium results exceeding that of the other wells. The U-238/U-234 ratio for each of these samples suggests that DU is not a likely cause. This well will continue to be monitored closely.

4.2 SURFACE WATER

For 87 discrete samples available from 8 surface water sampling locations (SW01 to SW08) during the period from 2004 through April 2009, the average total uranium activity-concentration is 0.59 pCi/L, the standard deviation is 1.01 pCi/L, and the maximum detected activity-concentration is 6.91 pCi/L. The activity-concentrations at each sample location are well below the 150 pCi/L action level for surface water.

Data for each surface water sampling location are summarized in run charts, as shown in Figures 4-14 through 4-21. Total uranium results are displayed along with each measurement's associated error bars. The error bars are expressed at 1.96 standard deviations and represent a 95 percent confidence interval. Where trend lines are provided, the associated coefficient of correlation also is provided (the R^2 value listed on each figure). As noted in Section 4.1, an R^2 value that approaches 1.0 suggests a strong relationship between the sample results and the sampling dates. The figures for all eight individual surface water sampling locations indicate no significant trends. In addition, none of the samples exhibited trend lines with R^2 values greater than 0.5 (i.e., somewhat significant).

The eight surface water sampling locations also were examined in aggregate to determine if some locations or particular sampling events were distinctive. A simple individual control chart was created using the pooled data for all surface water sampling locations and all data collected after December 2004 (Figure 4-22).

Figure 4-22 indicates that only the data point from SW-DU-005 exceeded the UCL or was below the LCL.

All of the surface water results for the April 2009 sampling event were below the mean. These data will continue to be monitored to determine if there is a seasonal trend. Surface water sample SW-DU-005 exhibited a total uranium concentration of total uranium of 6.91 pCi/L for the October 2008 sampling

effort. This result is about a factor of three higher than the 2.33 pCi/L UCL for the total population of surface water samples and is also slightly above the UCL of 6.78 pCi/L applicable to this sample location. Results for this sample were also above the UCL in October 2005 (SAIC 2006) and the October 2007 result for SW-DU-005 was a factor of about 2 higher than any previous result for this location. The result for April 2009 sampling (0.35 pCi/L) fell below the UCL. In addition, the U-238:U-234 isotopic ratio is 7.02 for this location for the October 2008 sampling, but the ratio for the April 2009 sampling is 0.93. Although the total uranium concentration of this sample location (0.36 pCi/L) was significantly lower during this sampling event, the results, being historically higher than would be expected, will continue to be closely monitored.

4.3 SEDIMENT

For 98 discrete samples available from 8 sediment sampling locations (SD01 to SD08) during the period from 2004 through April 2009, the average total uranium activity-concentration is 1.00 pCi/g, the standard deviation is 0.54 pCi/g, and the maximum detected activity-concentration is 2.80 pCi/g. The activity-concentrations at each location are well below the 35 pCi/g action level.

Data for each sediment sampling location are summarized in run charts, as shown in Figures 4-23 through 4-30. Total uranium results are displayed along with each measurement's associated error bars. The error bars are expressed at 1.96 standard deviations and represent a 95 percent confidence interval. Where trend lines are provided, the associated coefficient of correlation also is provided (the R^2 value listed on each figure). As noted in Section 4.1, an R^2 value that approaches 1.0 suggests a strong relationship between the sample results and the sampling dates. The figures for all eight individual sediment sampling locations indicate no significant trends.

The eight sediment sampling locations also were examined in aggregate to determine if some locations or particular sampling events were distinctive. None of the samples exhibited trend lines with R^2 values greater than 0.5 (i.e., somewhat significant).

A simple individual control chart was created using the pooled data for all sediment sampling locations and all data collected after December 2004 (Figure 4-31). Figure 4-31 indicates no new points above the UCL or below the LCL. The April 2009 sediment sampling results vary around the mean, as expected.

4.4 SOILS

For 56 discrete samples available from 4 surface soil sampling locations (SS01 to SS04) during the period from 2004 through April 2009, the average total uranium activity-concentration is 1.60 pCi/g, the standard deviation is 0.29 pCi/g, and the maximum detected activity-concentration is 2.25 pCi/g. The activity-concentrations at each location are well below the action level of 35 pCi/g. The October 2008 surface soil sampling results vary around the mean, as expected.

Data for each surface soil sampling location are summarized in run charts, as shown in Figures 4-32 through 4-35. Total uranium results are displayed along with each measurement's associated error bars. The error bars are expressed at 1.96 standard deviations and represent a 95 percent confidence interval. Where trend lines are provided, the associated coefficient of correlation also is provided (the R^2 value listed on each figure). As noted in Section 4.1, an R^2 value that approaches 1.0 suggests a strong relationship between the sample results and the sampling dates. The figures for all four individual surface soil sampling locations indicate no significant trends. Surface soil sampling location SS-DU-002 exhibited trend lines with an R^2 value of 0.53. R^2 values greater than 0.5 indicate that the correlation is somewhat significant. The slope of the trend line for SS-DU-002 suggests an increase in the total uranium concentration at this location.

The four surface soil sampling locations also were examined in aggregate to determine if some locations or particular sampling events were distinctive. A simple individual control chart was created using the pooled data for all surface soil sampling locations and all data collected after December 2004 (Figure 4-36). As data are added to the control chart, the UCL, mean, and LCL are automatically recalculated. Figure 4-36 reflects that one point, the result for SS-DU-002 (i.e., 0.36 pCi/g), fell below the LCL for a previous sampling event (October 2008). A single low result has no immediate significance to the project. In addition, no sampling points for the April 2009 sampling event exceeded the UCL or were below the LCL.

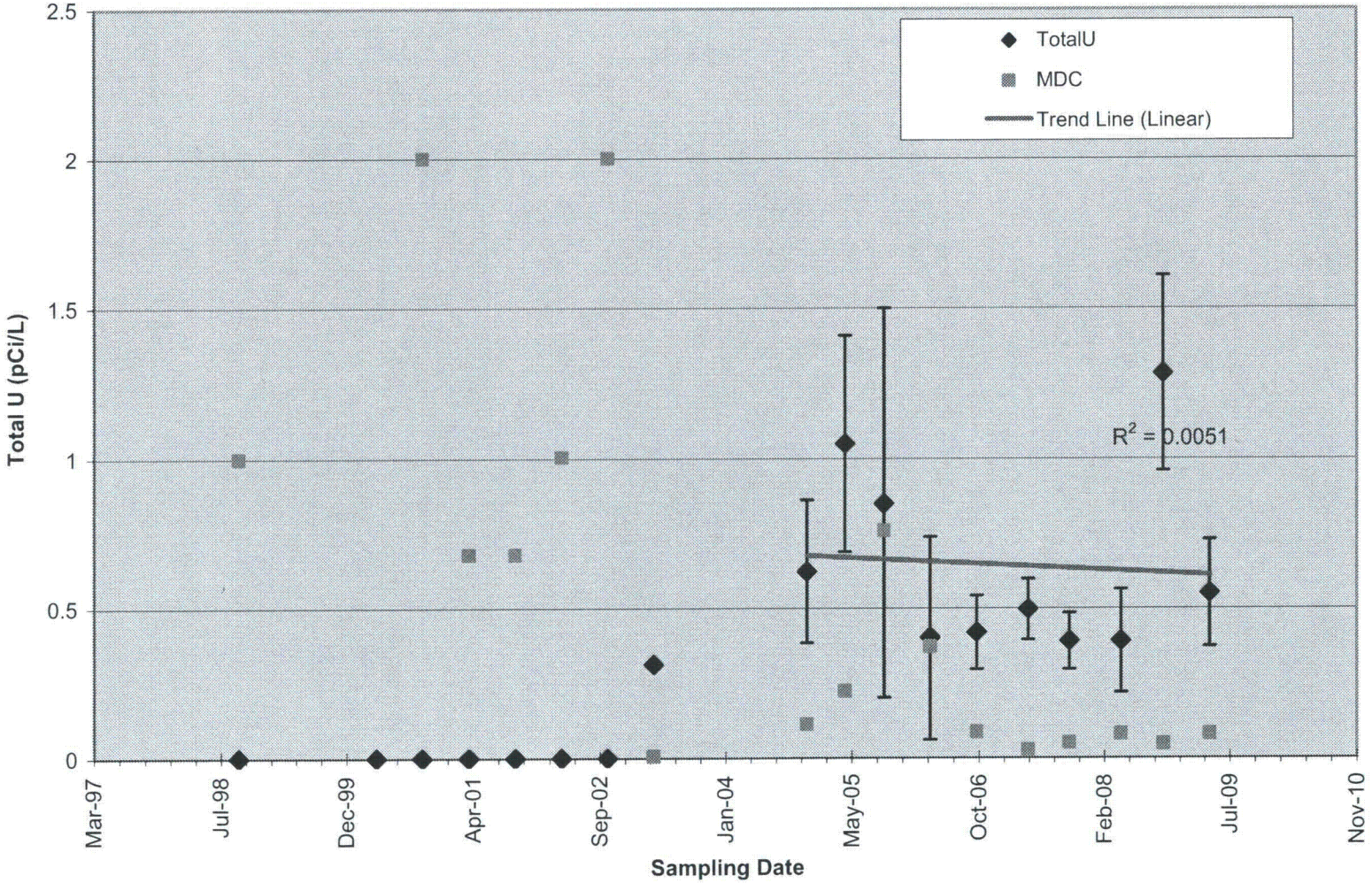


Figure 4-1. Total Uranium in MW-DU-001 (1998-2009)

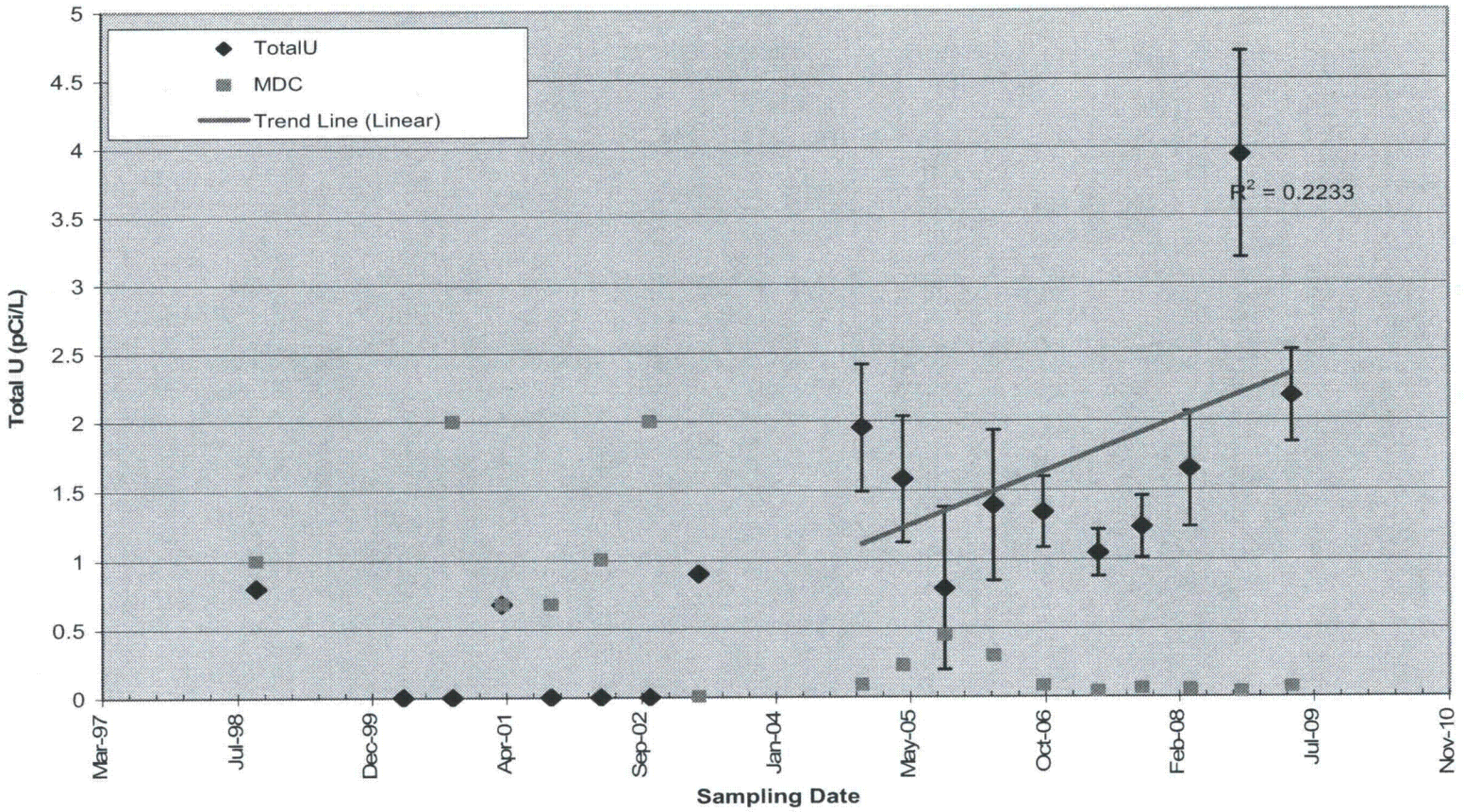


Figure 4-2. Total Uranium in MW-DU-002 (1998-2009)

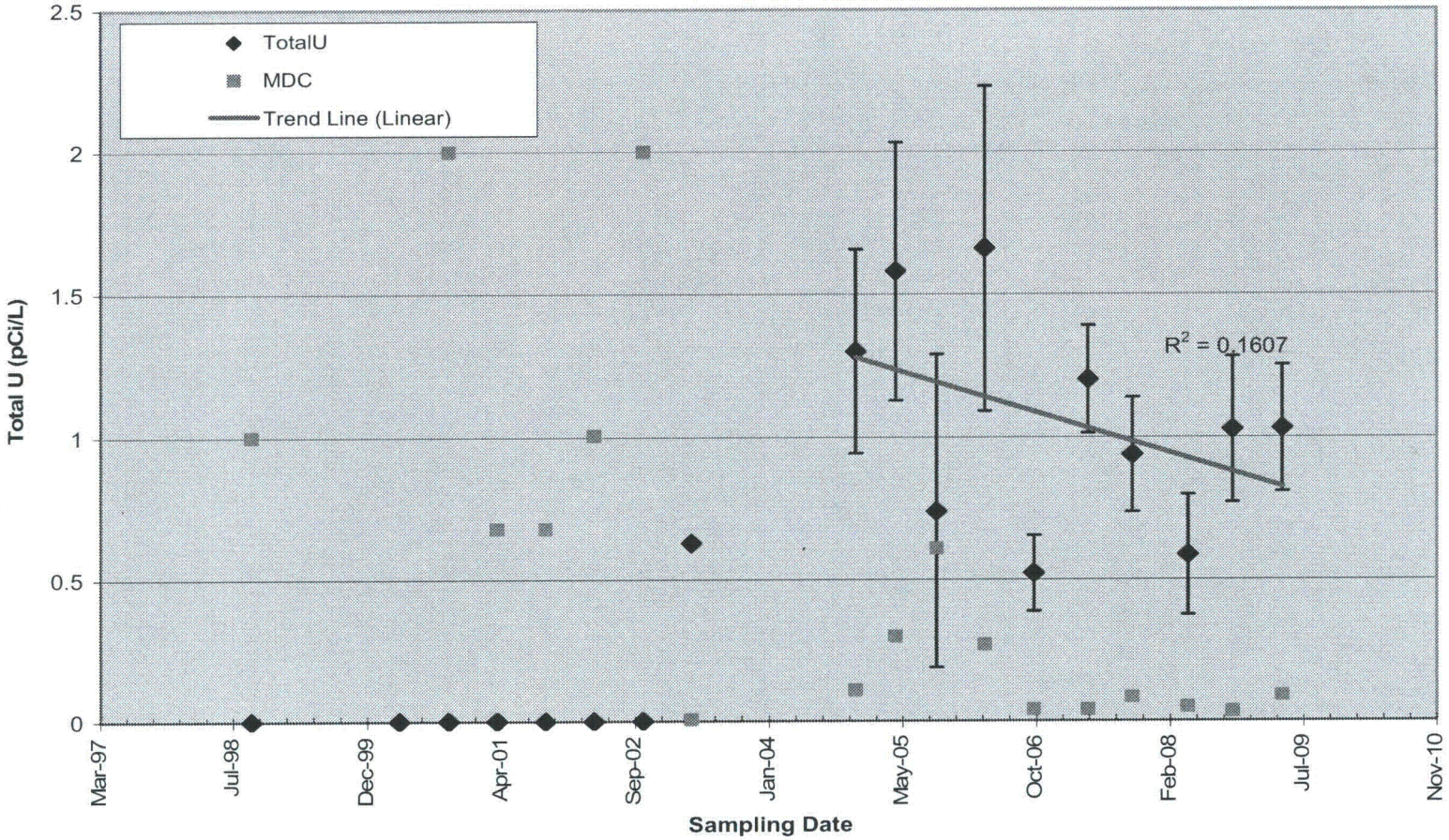


Figure 4-3. Total Uranium in MW-DU-003 (1998-2009)

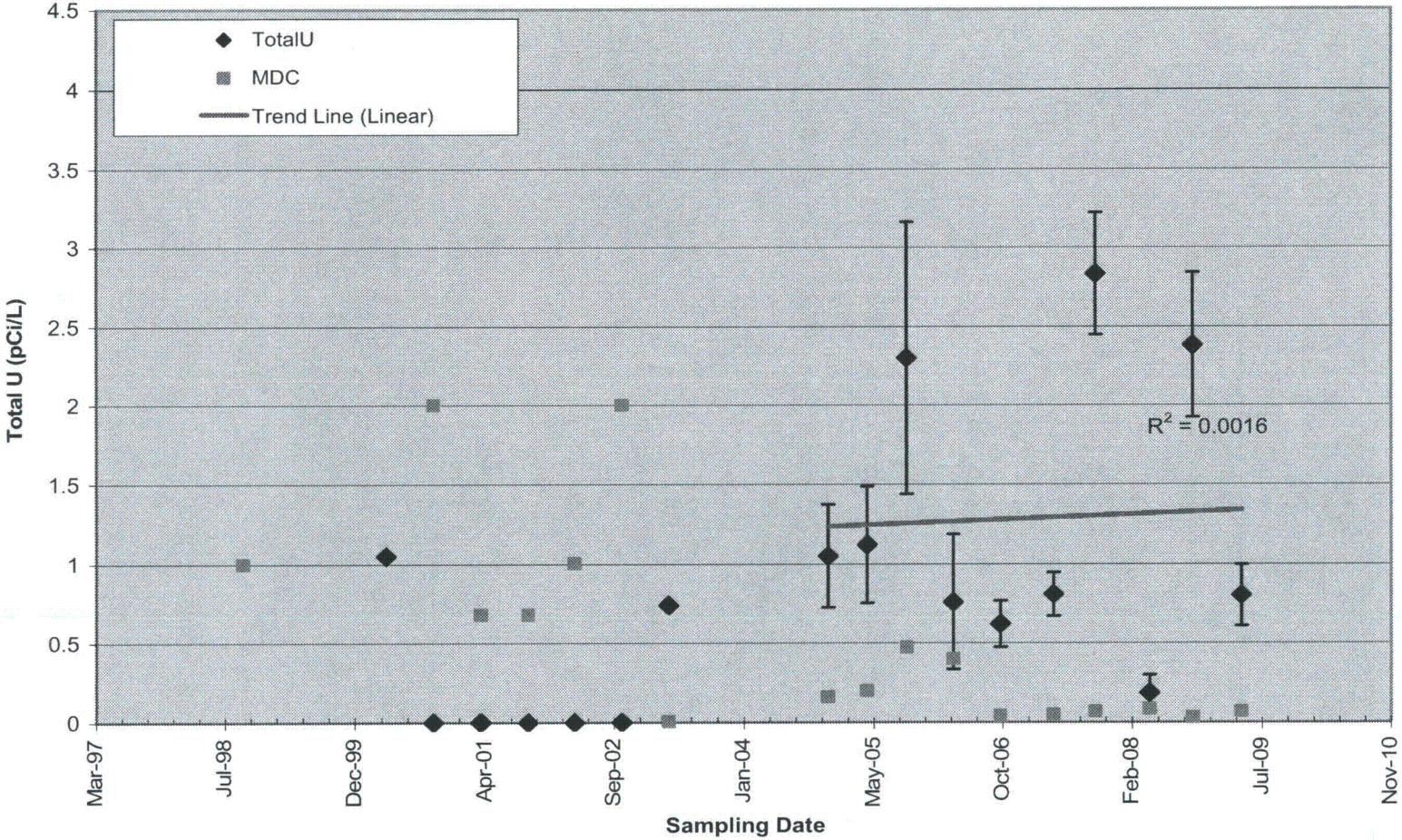


Figure 4-4. Total Uranium in MW-DU-004 (1998-2009)

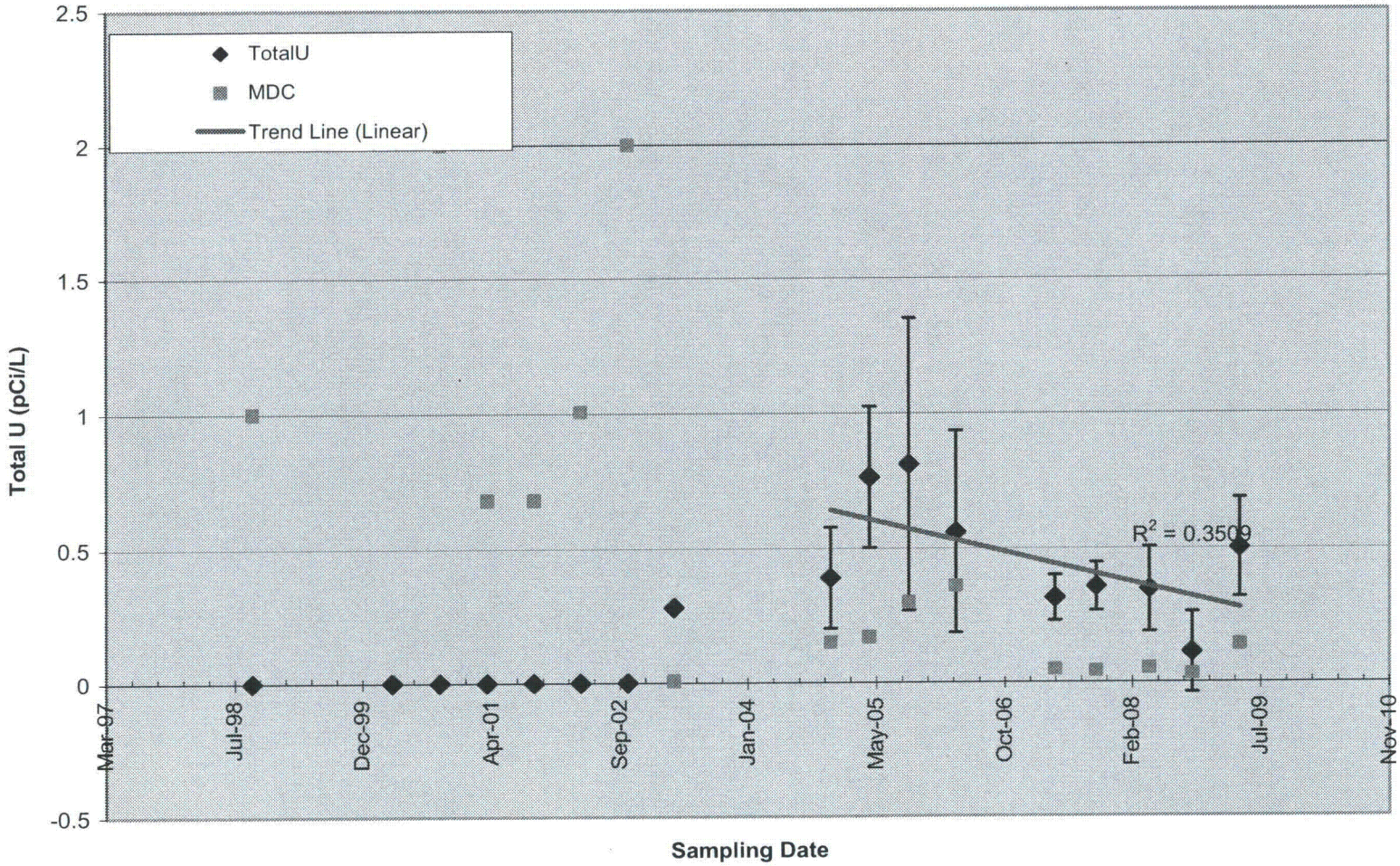
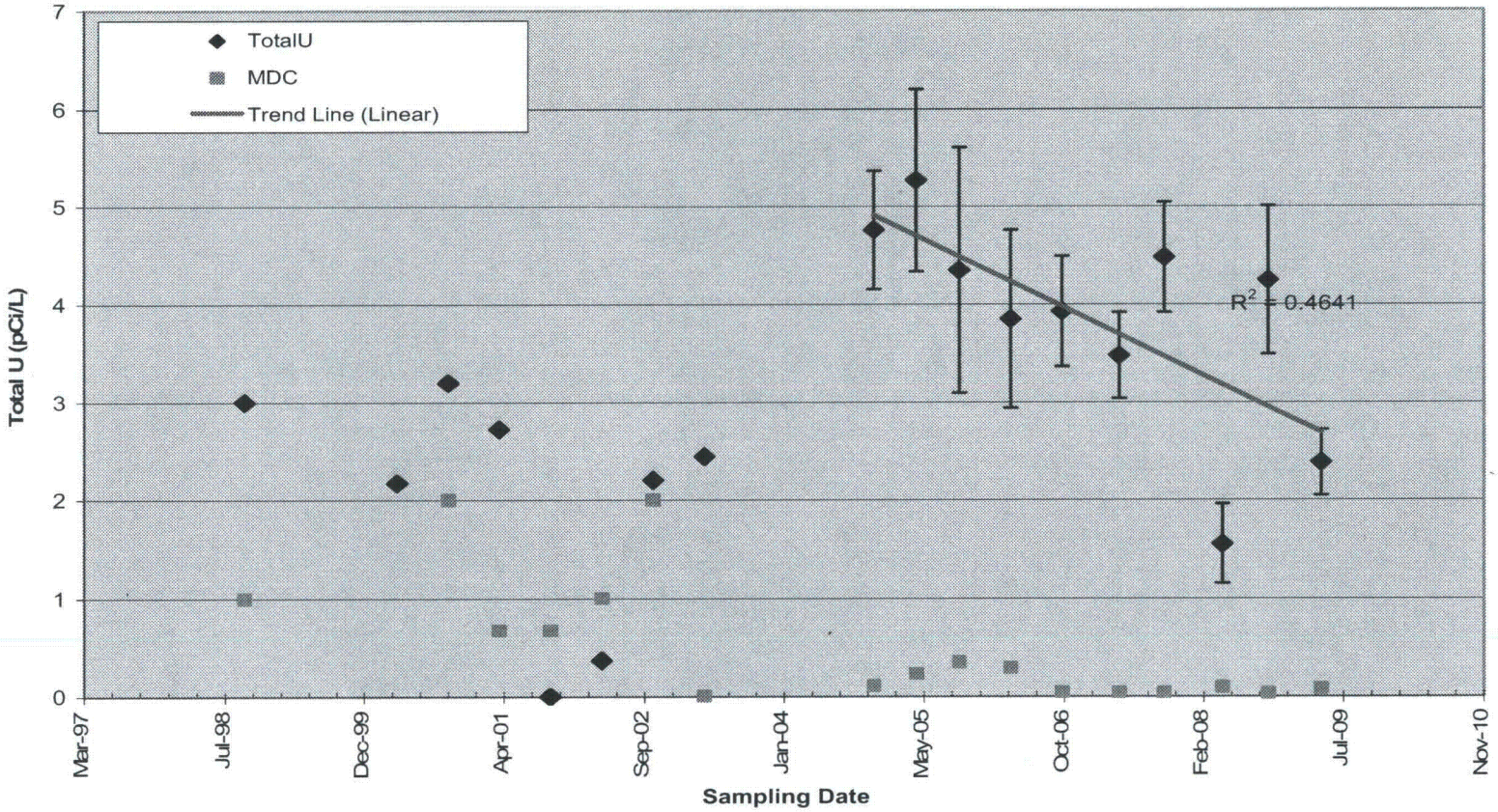


Figure 4-5. Total Uranium in MW-DU-005 (1998-2009)



NOTE: No sample was collected in October 2006 because the well was dry.

Figure 4-6. Total Uranium in MW-DU-006 (1998-2009)

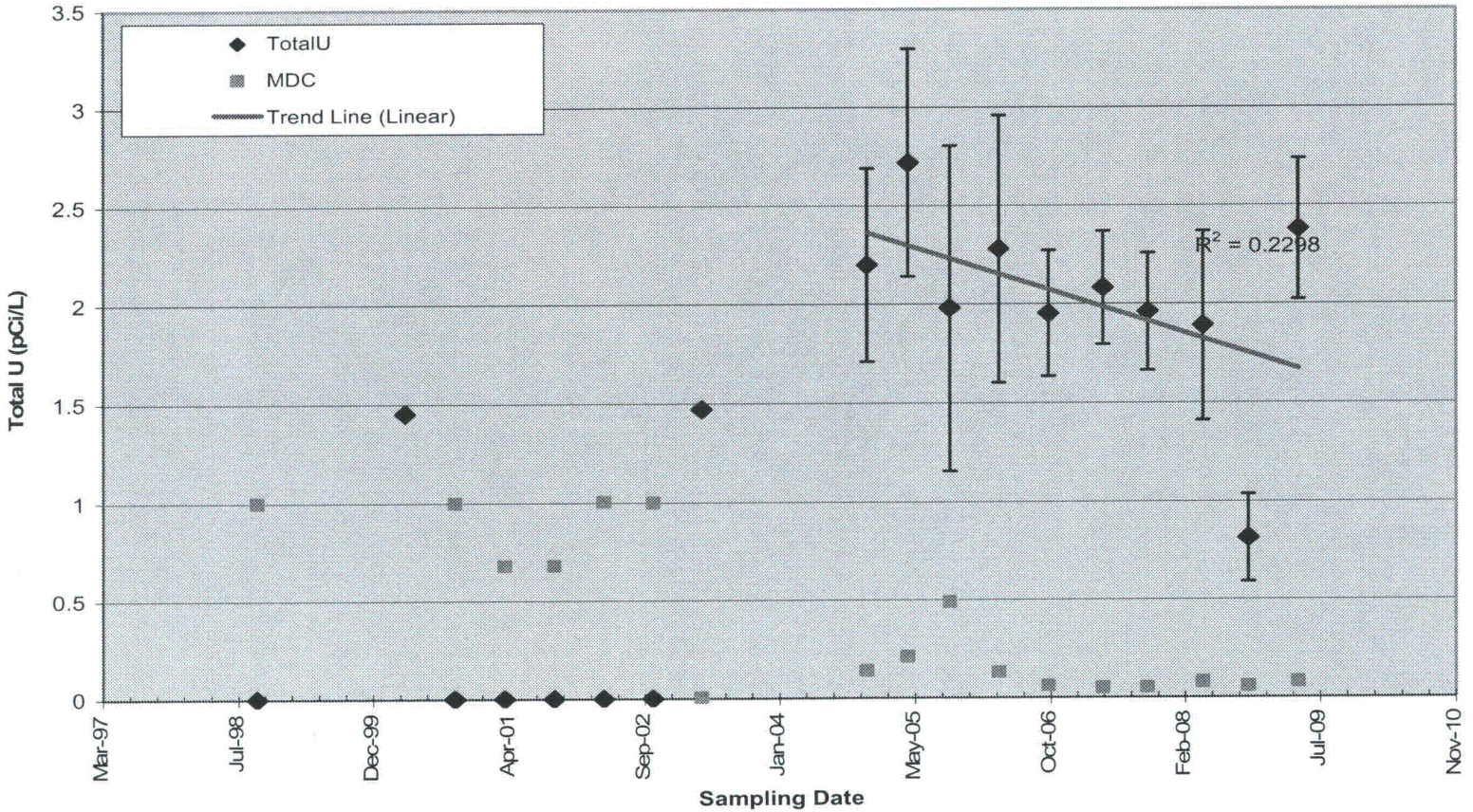


Figure 4-7. Total Uranium in MW-DU-007 (1998-2009)

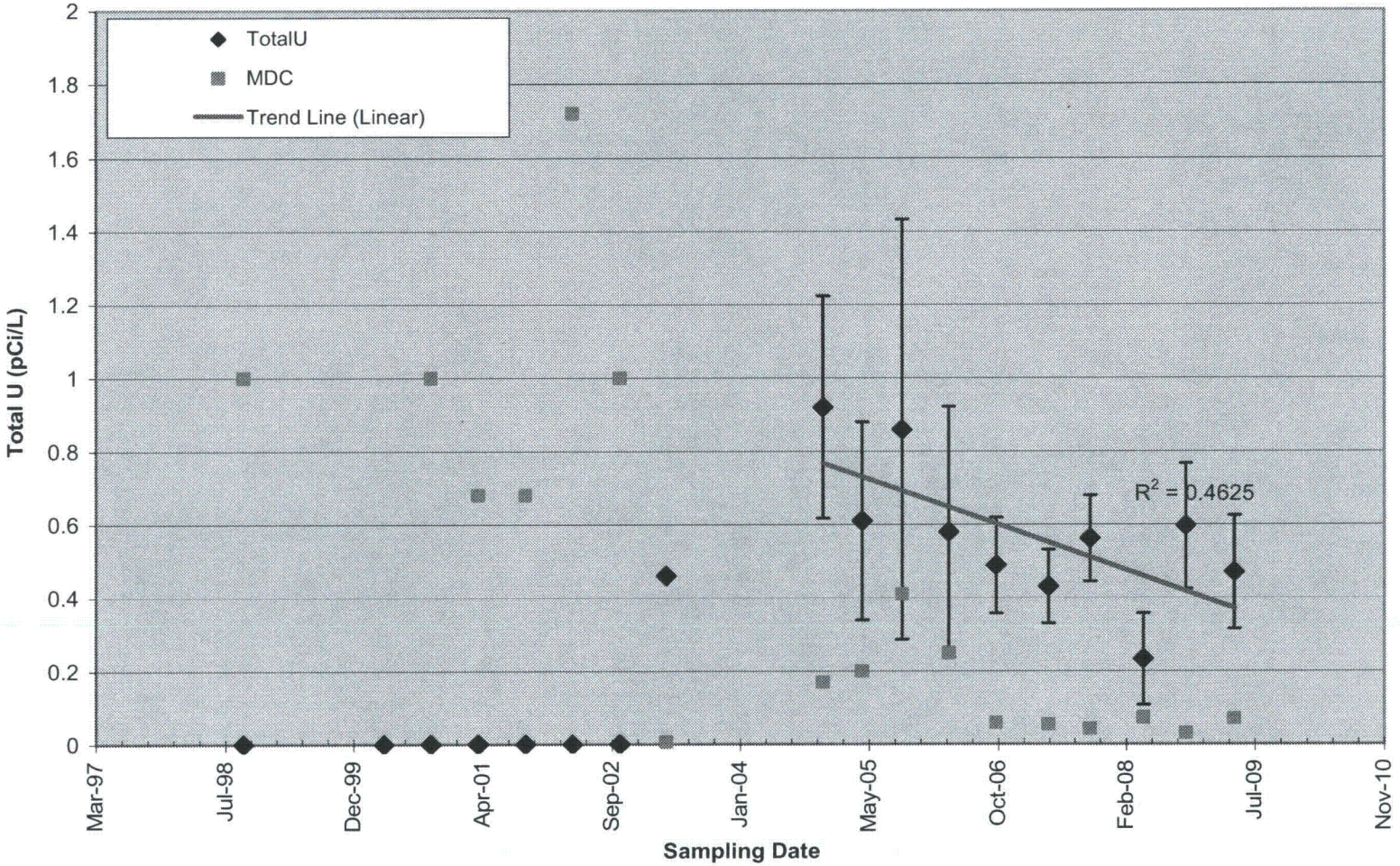


Figure 4-8. Total Uranium in MW-DU-008 (1998-2009)

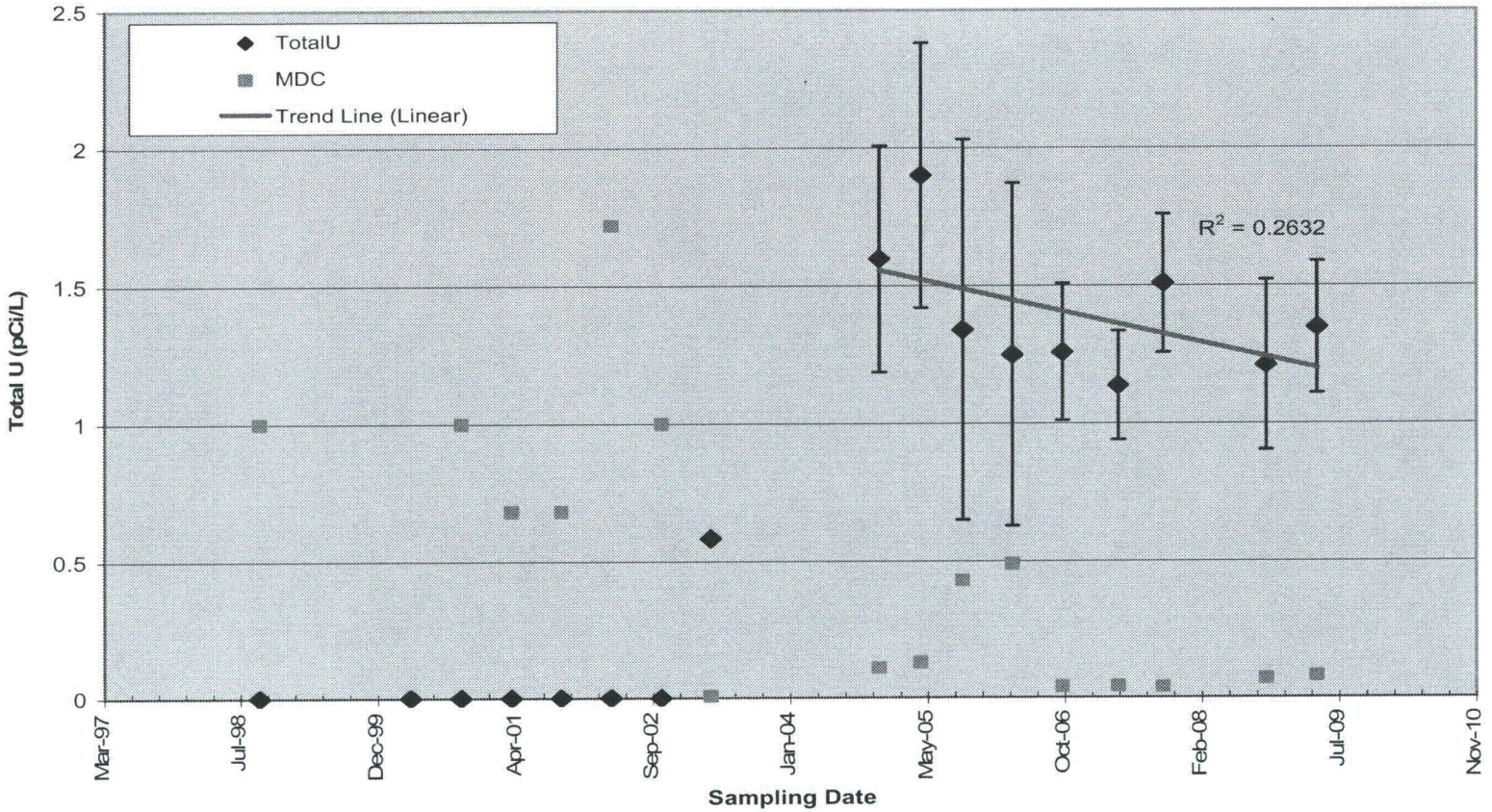


Figure 4-9. Total Uranium in MW-DU-009 (1998-2009)

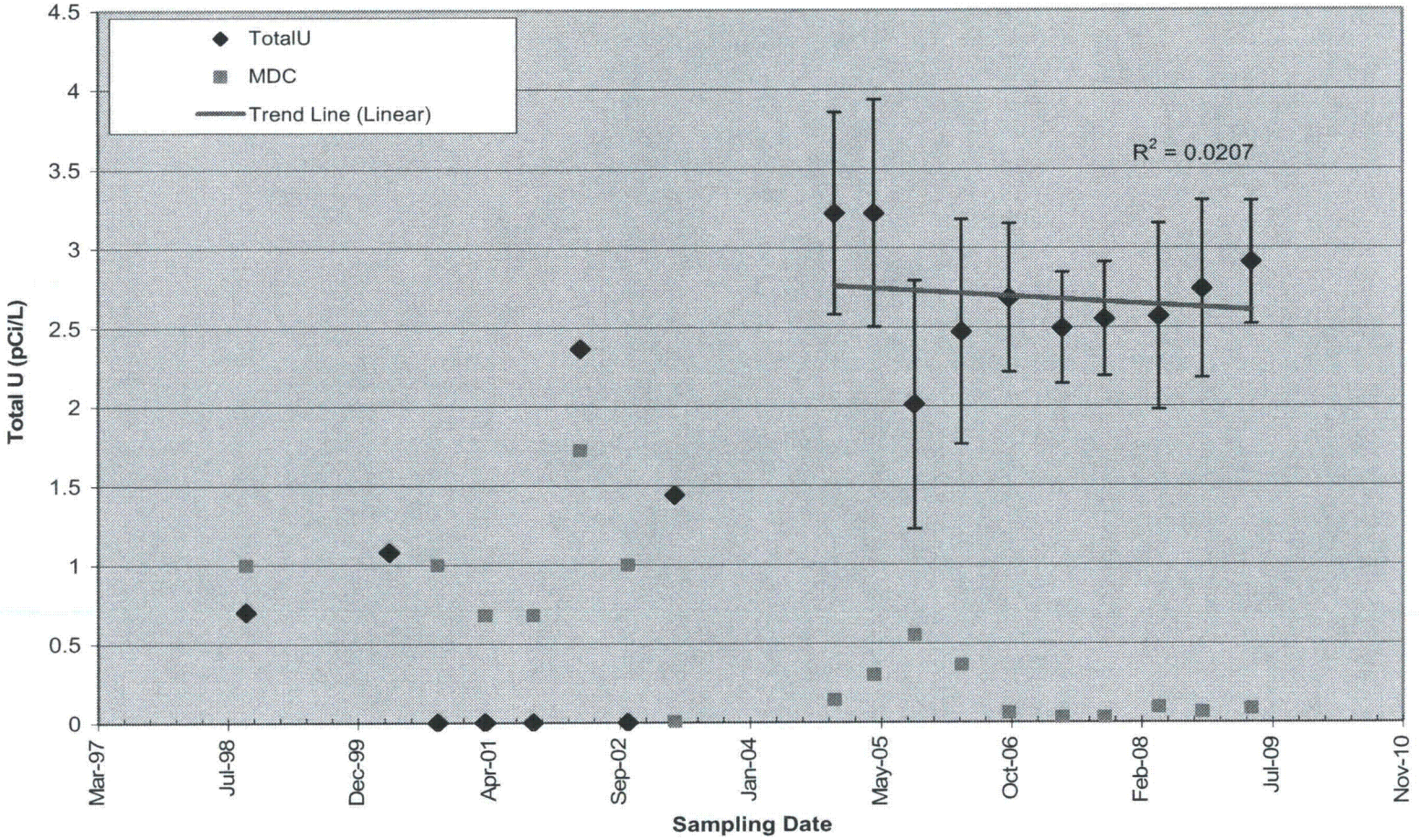
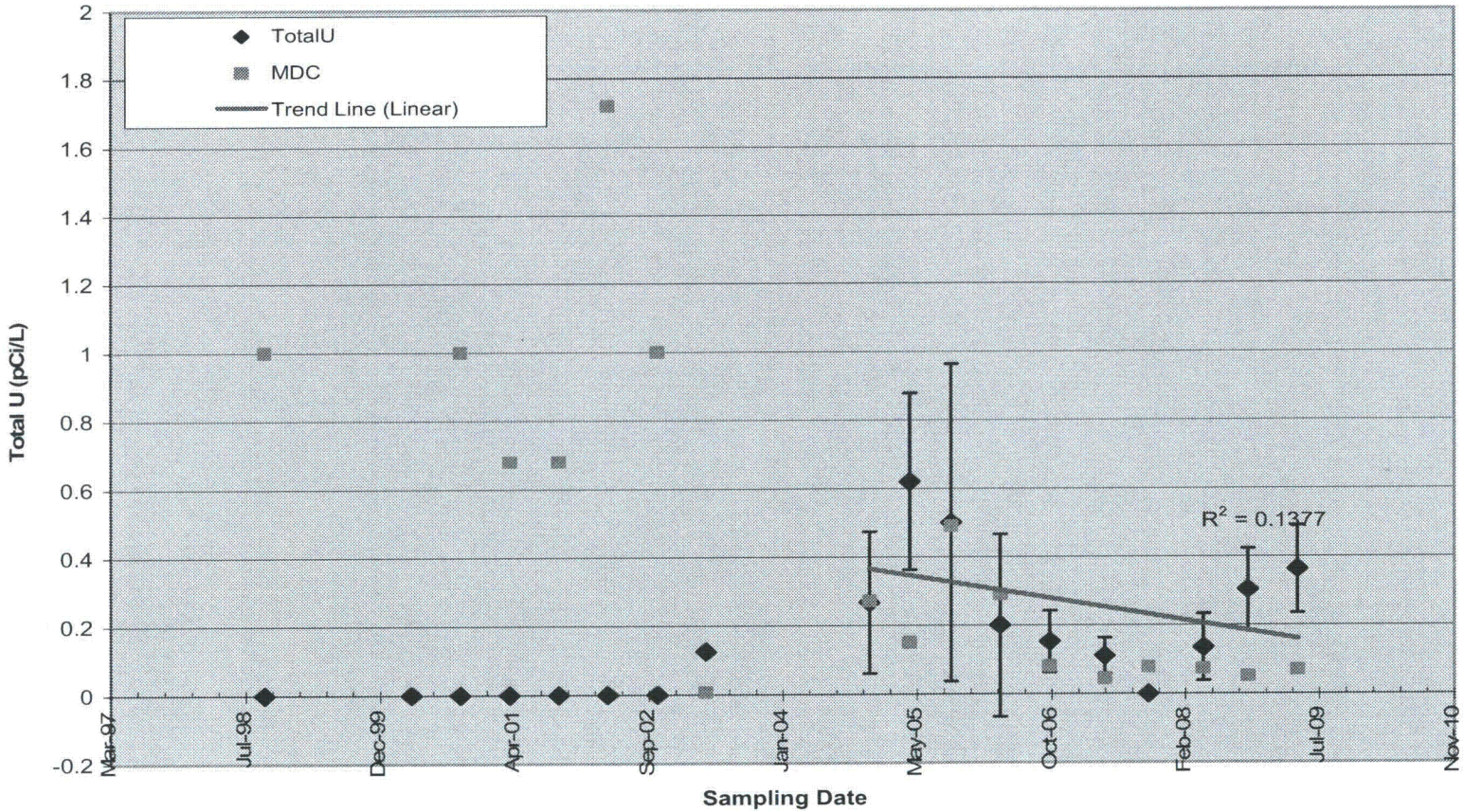


Figure 4-10. Total Uranium in MW-DU-010 (1998-2009)



NOTE: Uranium was not detected in the October 2007 sample.

Figure 4-11. Total Uranium in MW-DU-011 (1998-2009)

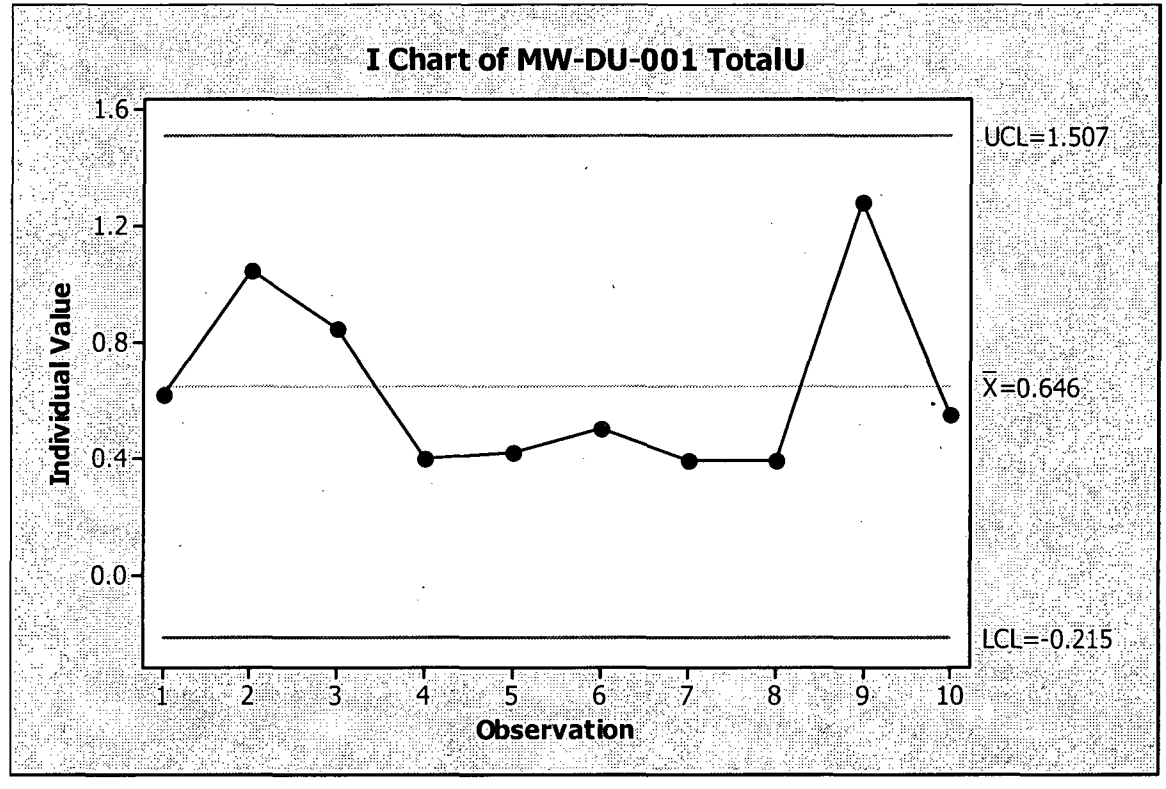


Figure 4-12. Variable Control Chart for Total Uranium in MW-DU-001 (2004-2009)

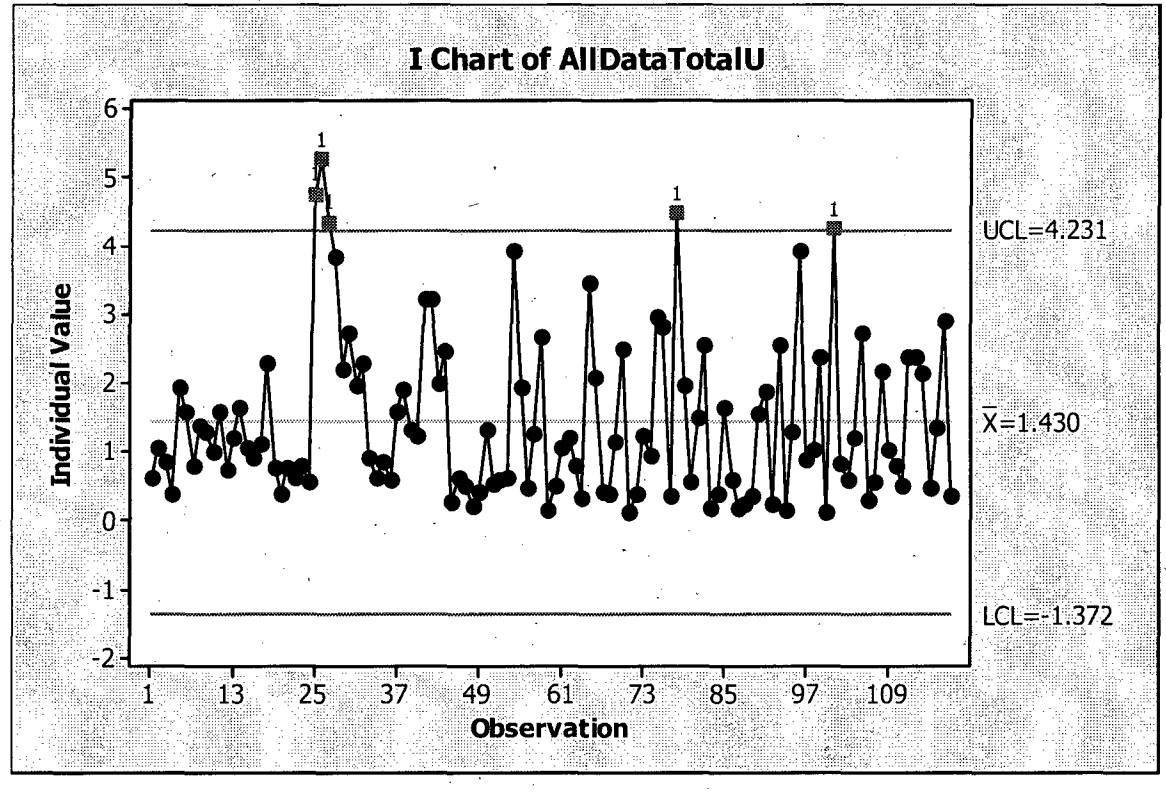


Figure 4-13. Control Chart for All Monitoring Well Data (2004-2009)

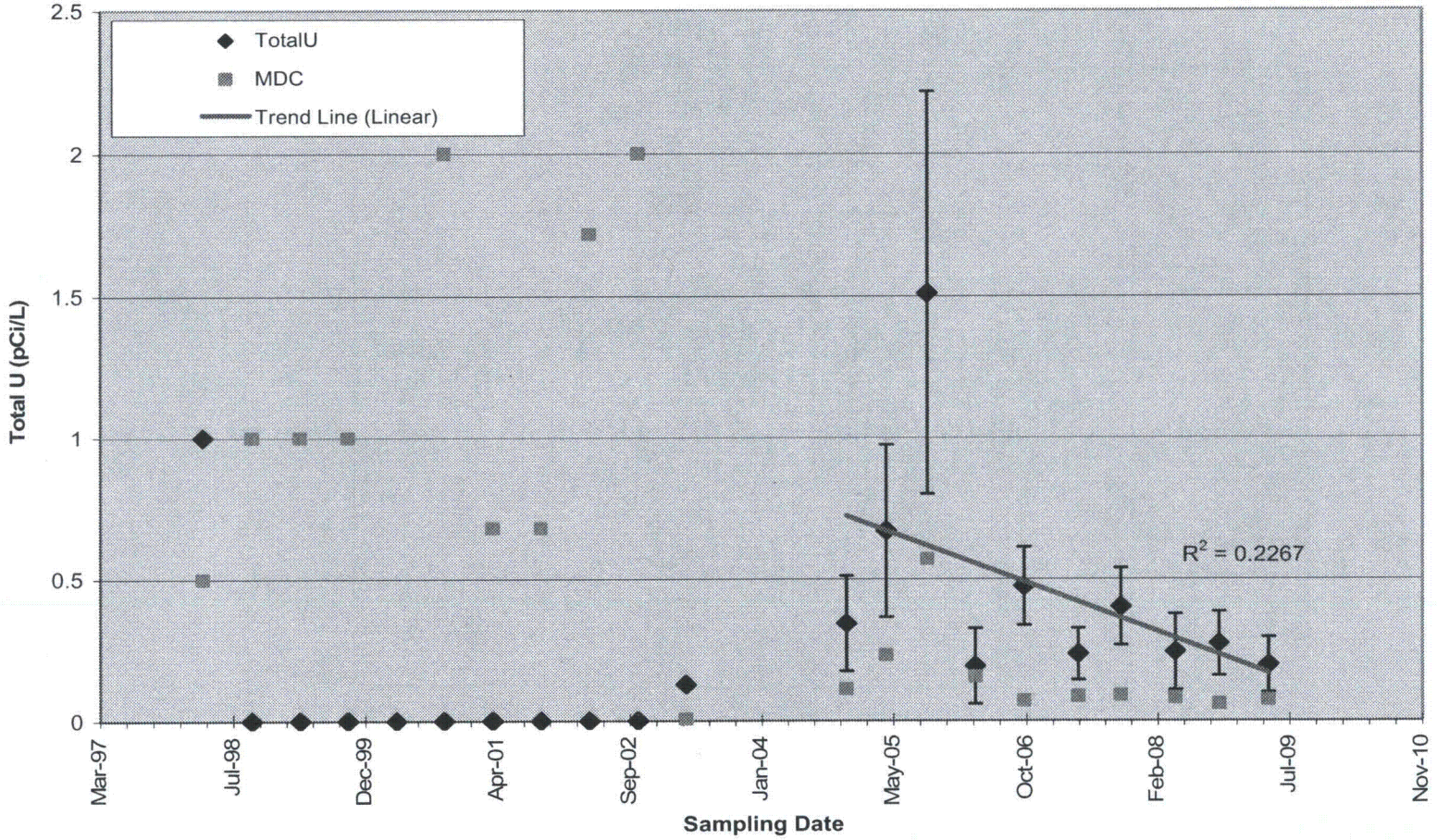


Figure 4-14. Total Uranium in SW-DU-001 (1998-2009)

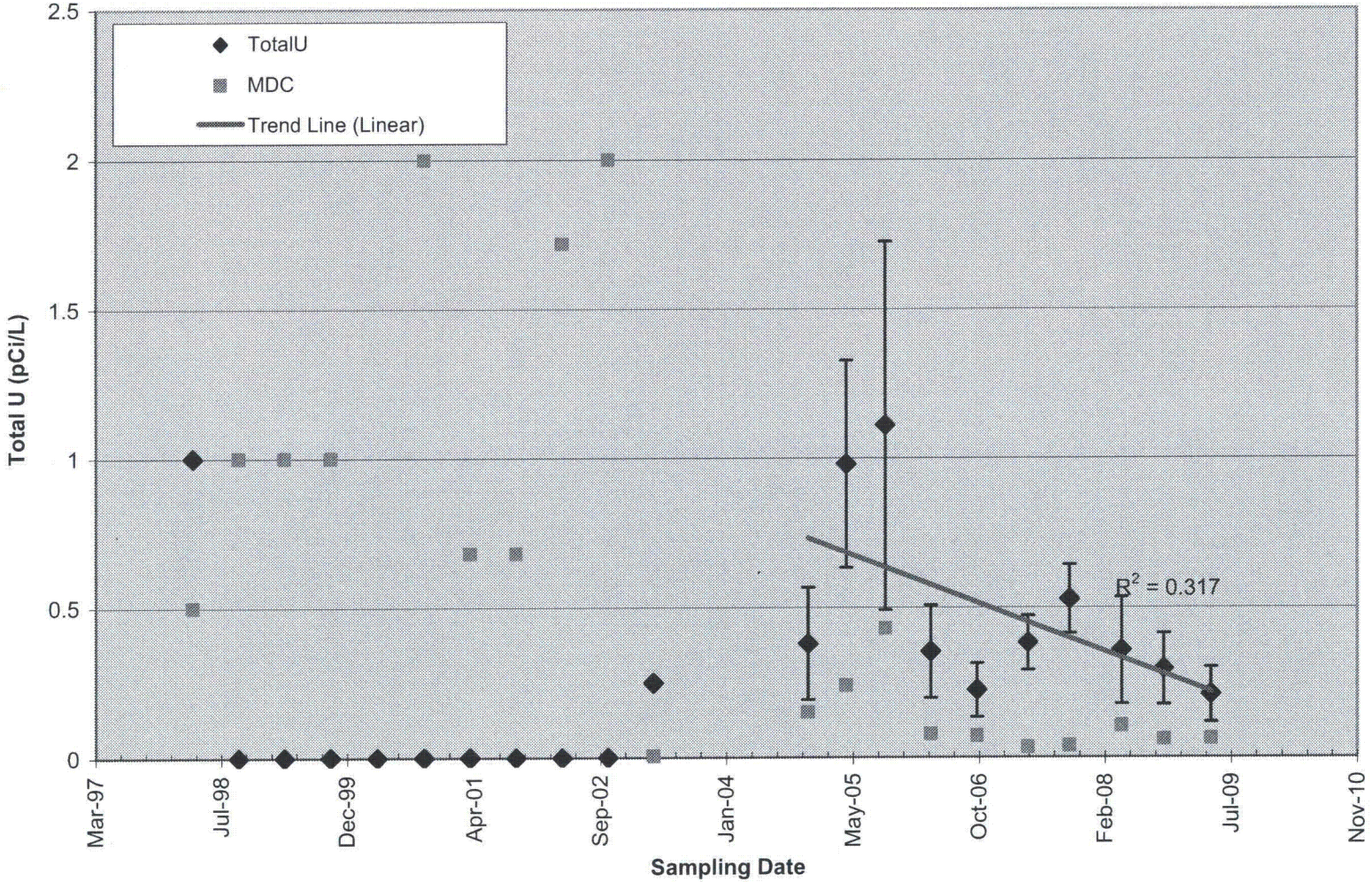
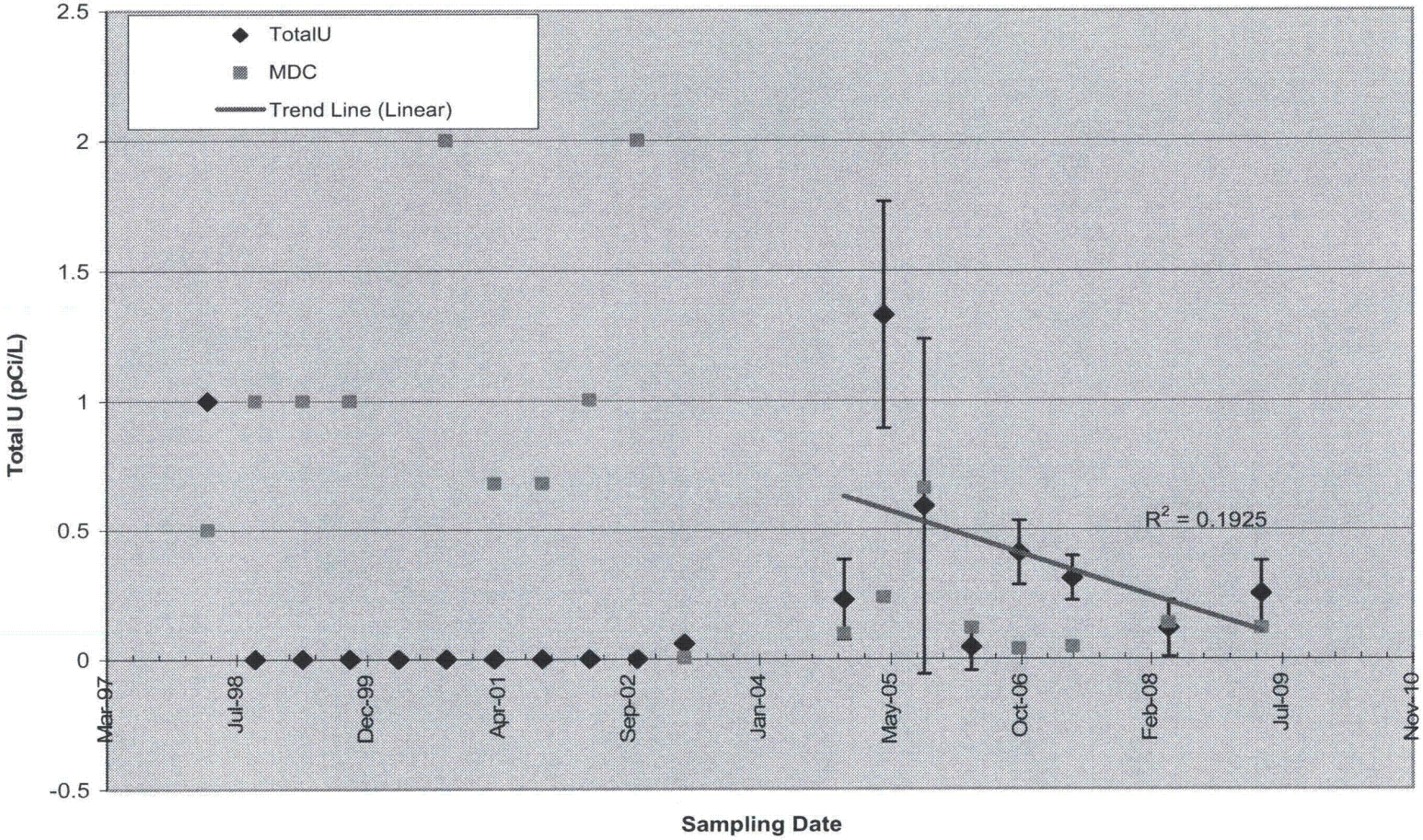


Figure 4-15. Total Uranium in SW-DU-002 (1998-2009)



NOTE: No sample collected in October 2007 or October 2008 as the creek was dry.

Figure 4-16. Total Uranium in SW-DU-003 (1998-2009)

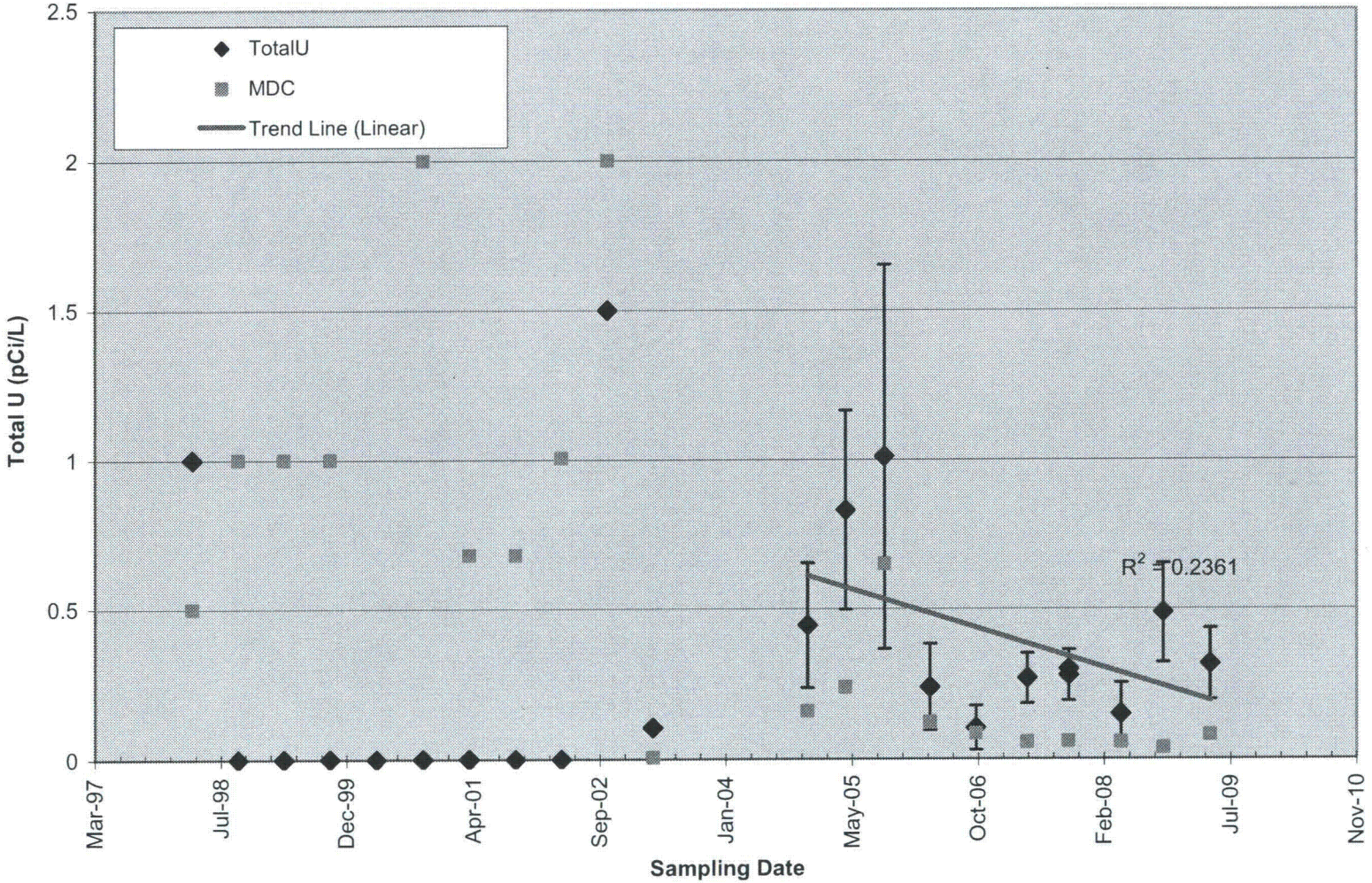
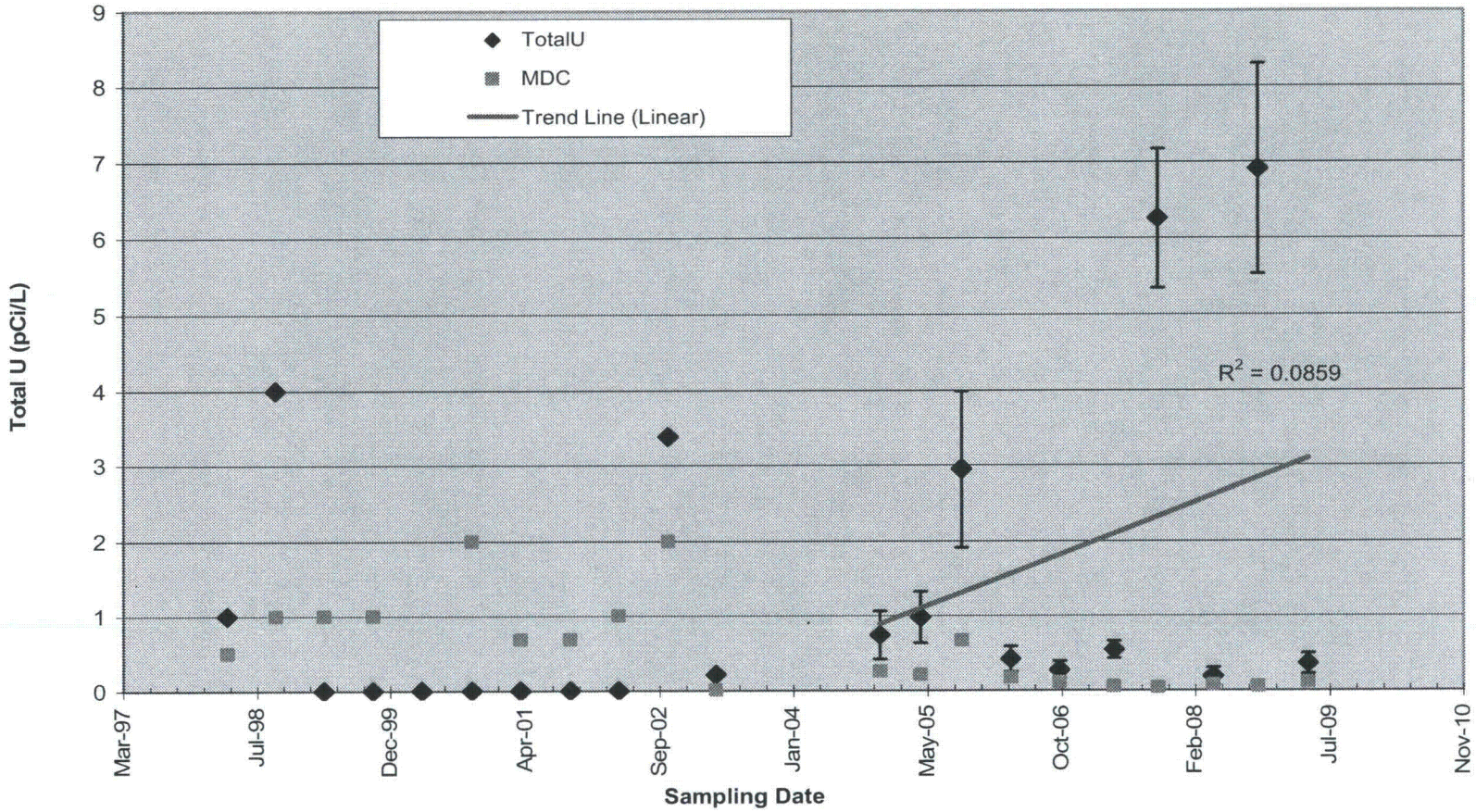
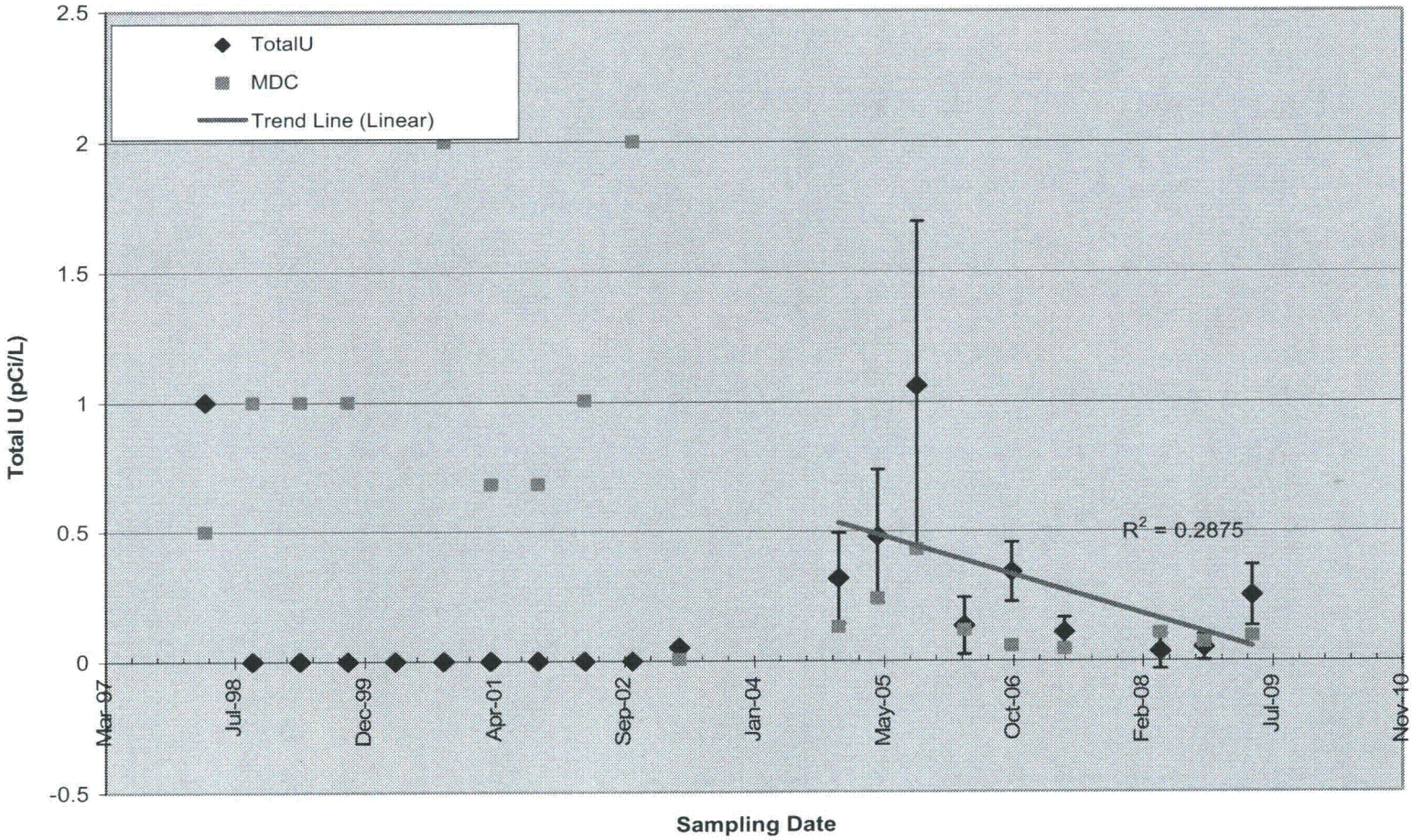


Figure 4-17. Total Uranium in SW-DU-004 (1998-2009)



NOTE: A large value of 29 pCi/g in October 1999 was removed because it was causing a compression of the Y axis scale.

Figure 4-18. Total Uranium in SW-DU-005 (1998-2009)



NOTE: No sample collected in October 2007 as the creek was dry.

Figure 4-19. Total Uranium in SW-DU-006 (1998-2009)

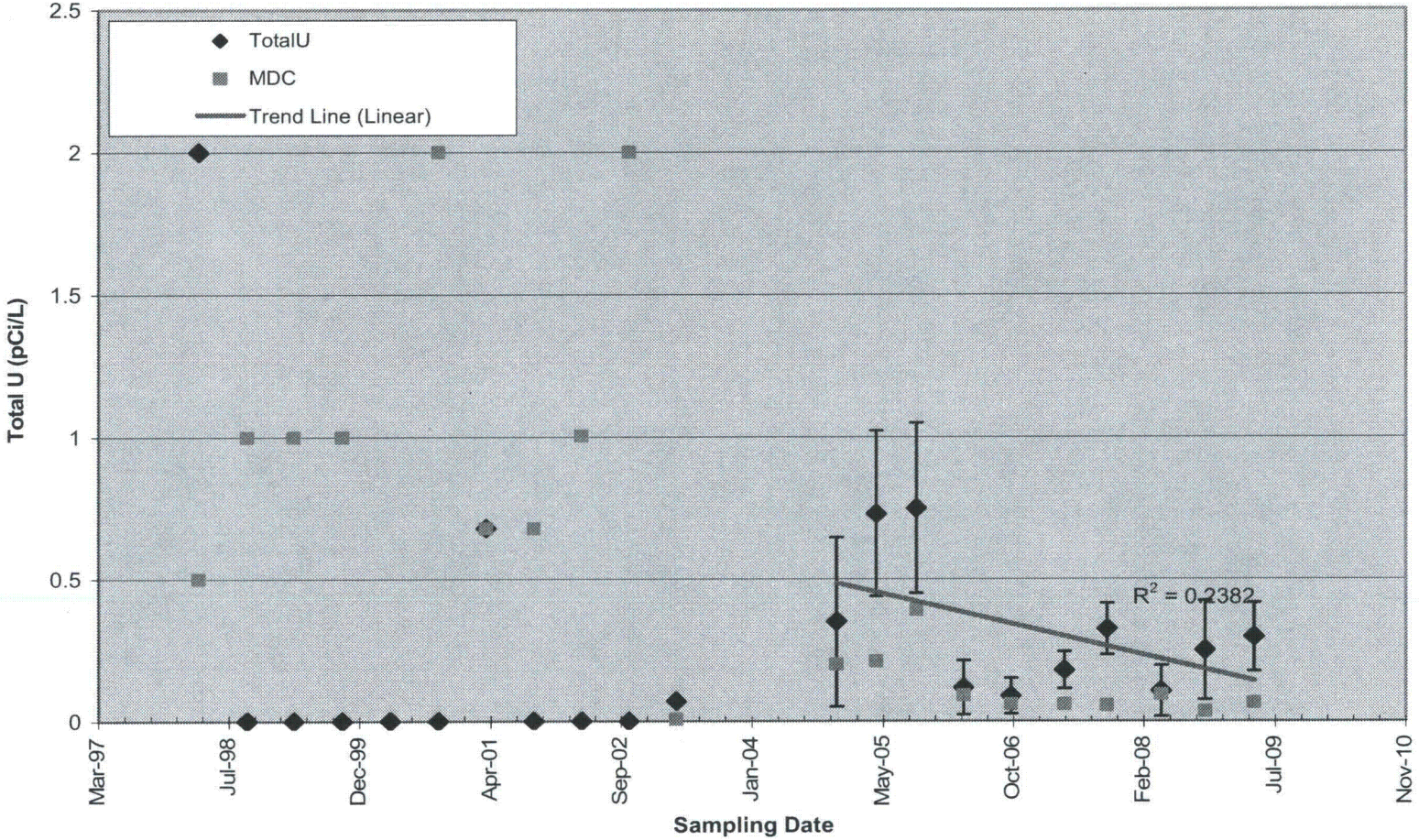


Figure 4-20. Total Uranium in SW-DU-007 (1998-2009)

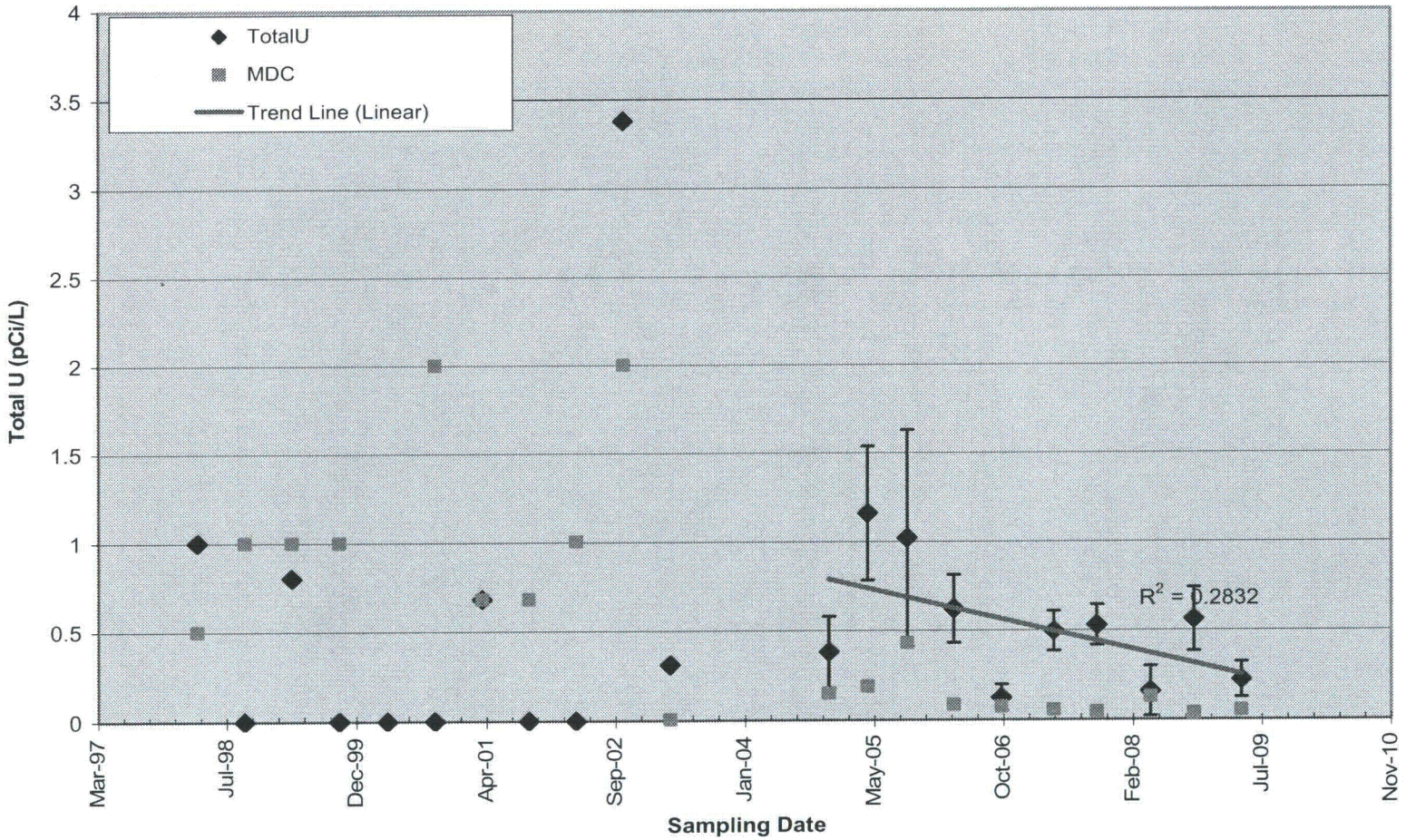


Figure 4-21. Total Uranium in SW-DU-008 (1998-2009)

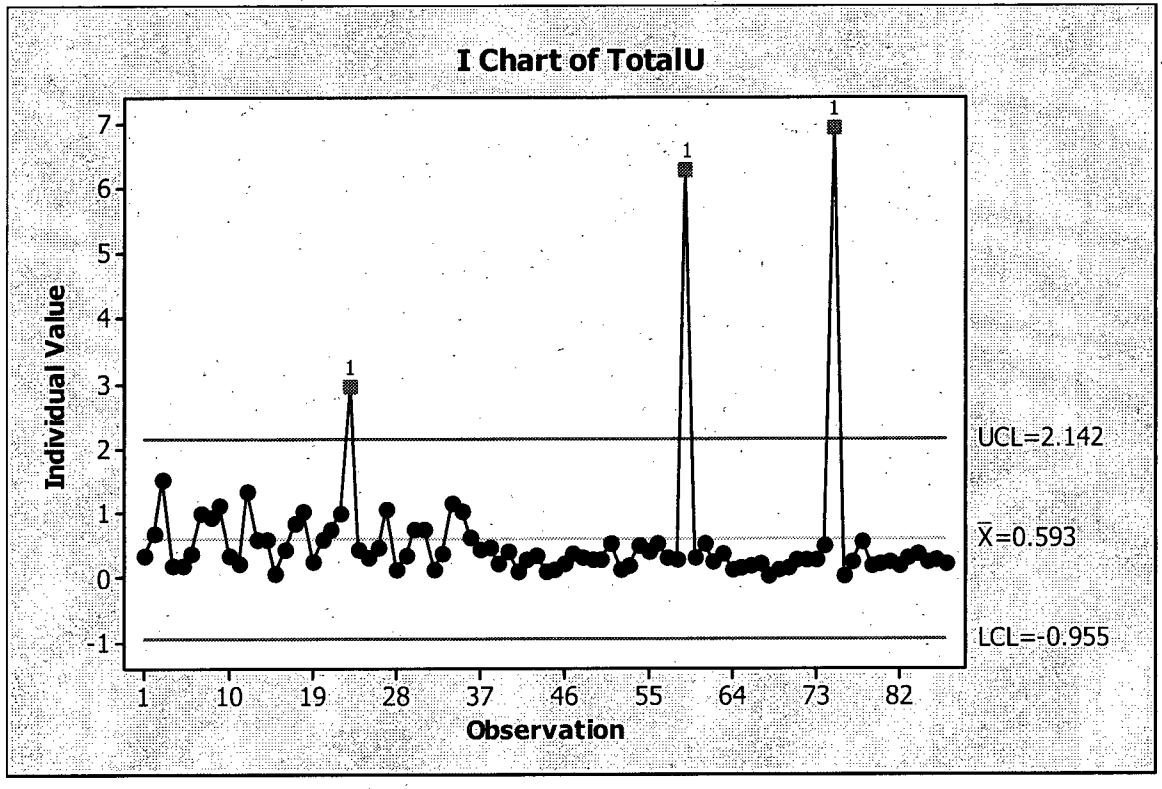


Figure 4-22. Control Chart for All Surface Water Data (2004-2009)

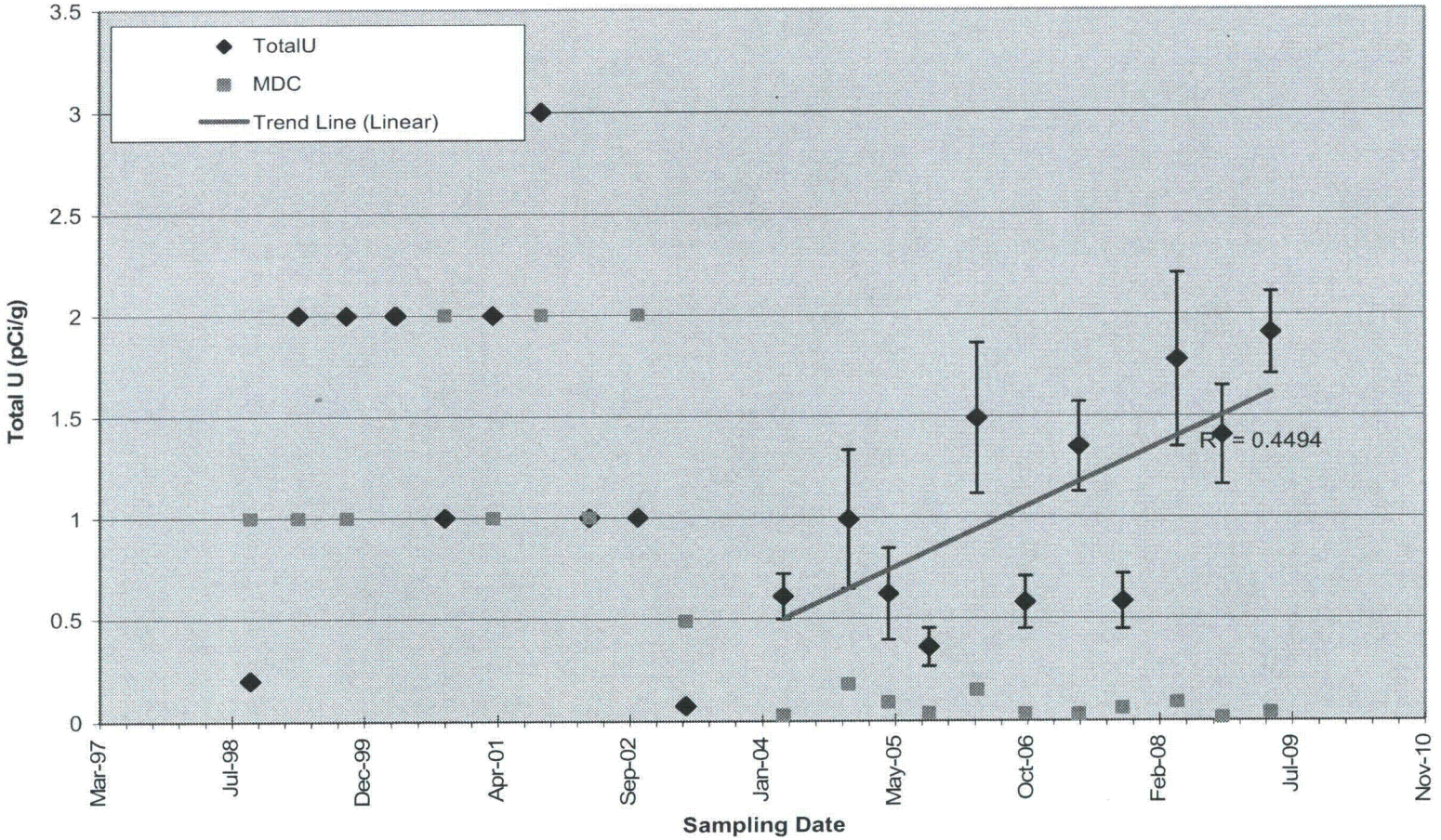


Figure 4-23. Total Uranium in SD-DU-001 (1998-2009)

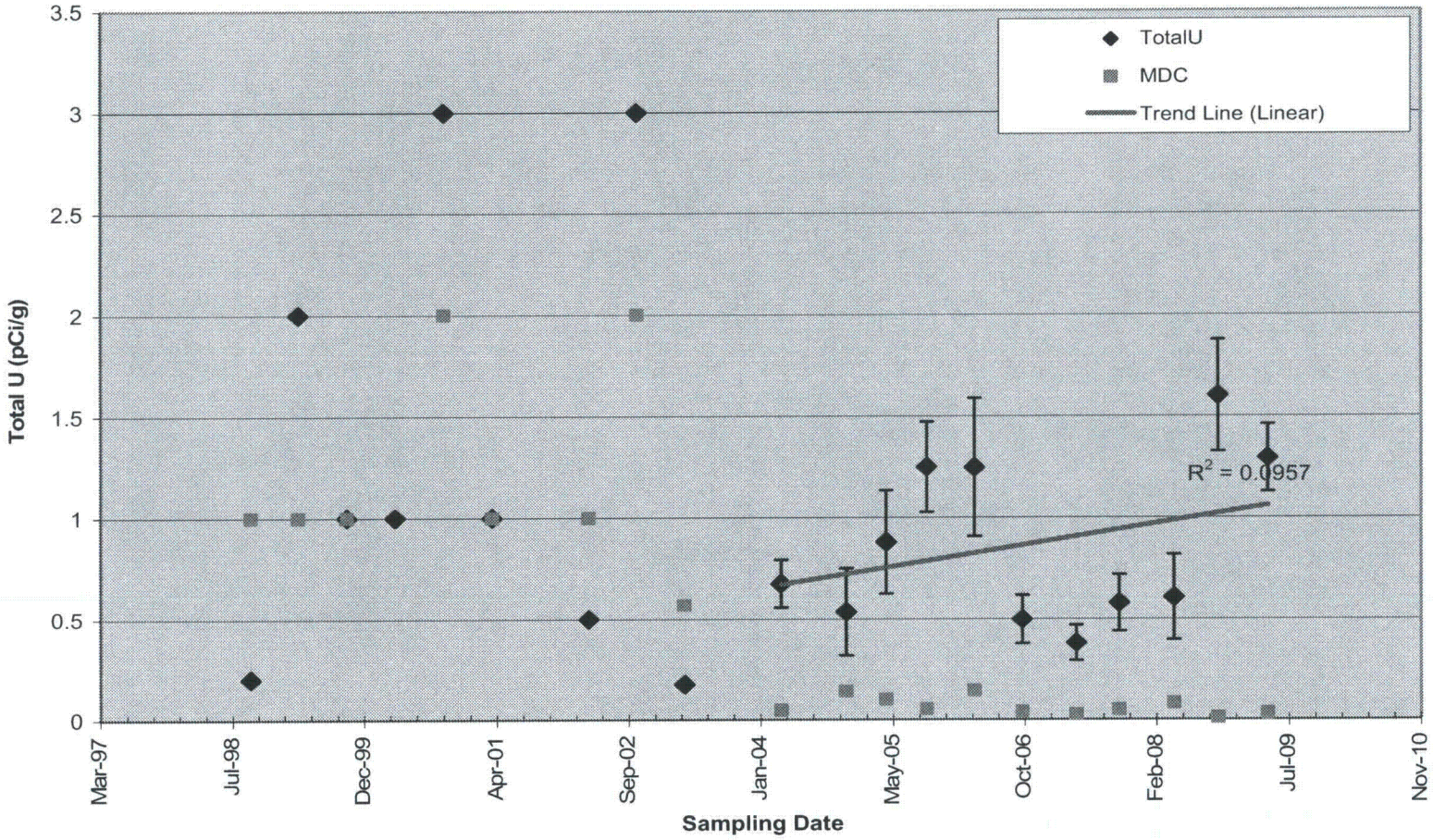


Figure 4-24. Total Uranium in SD-DU-002 (1998-2009)

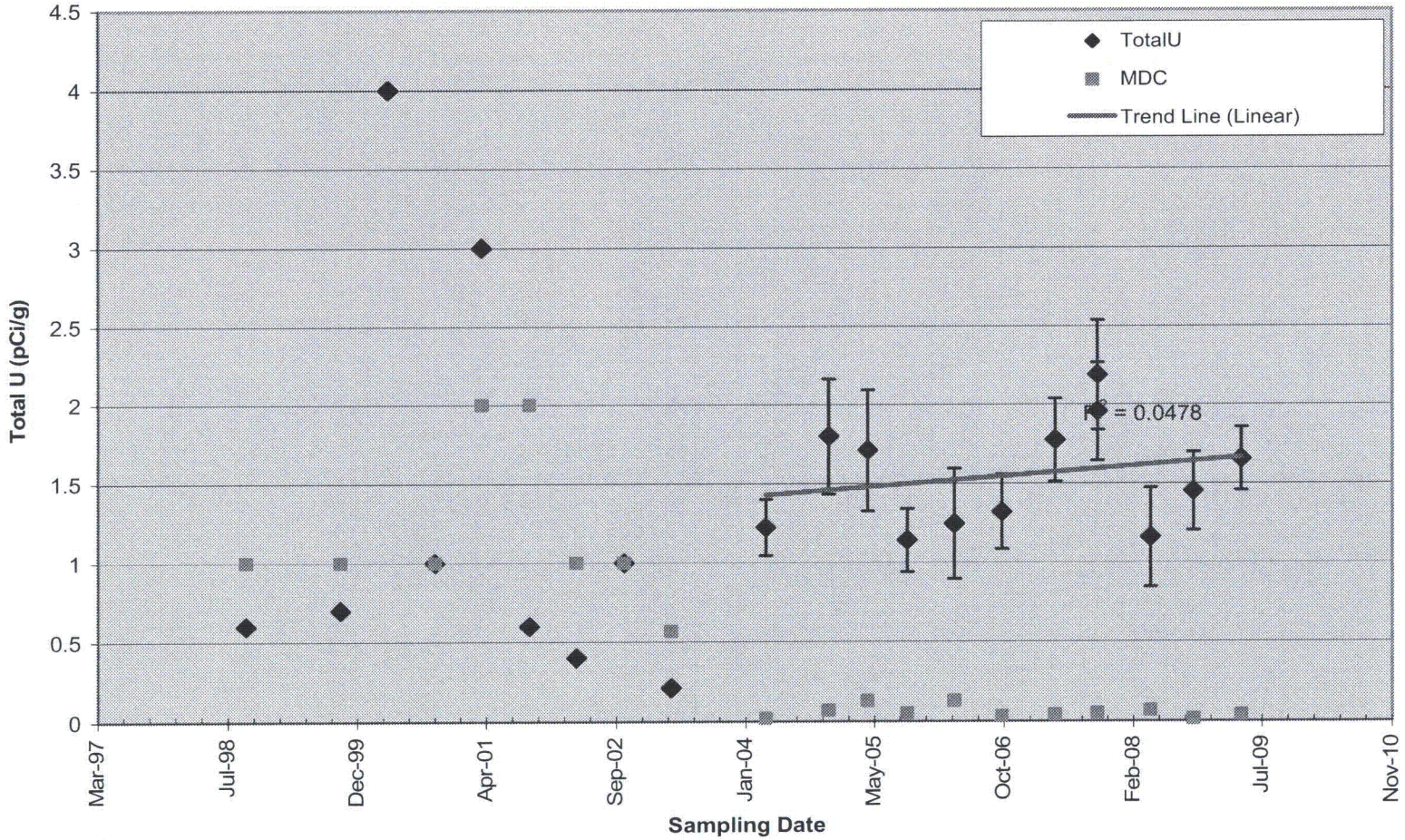


Figure 4-25. Total Uranium in SD-DU-003 (1998-2009)

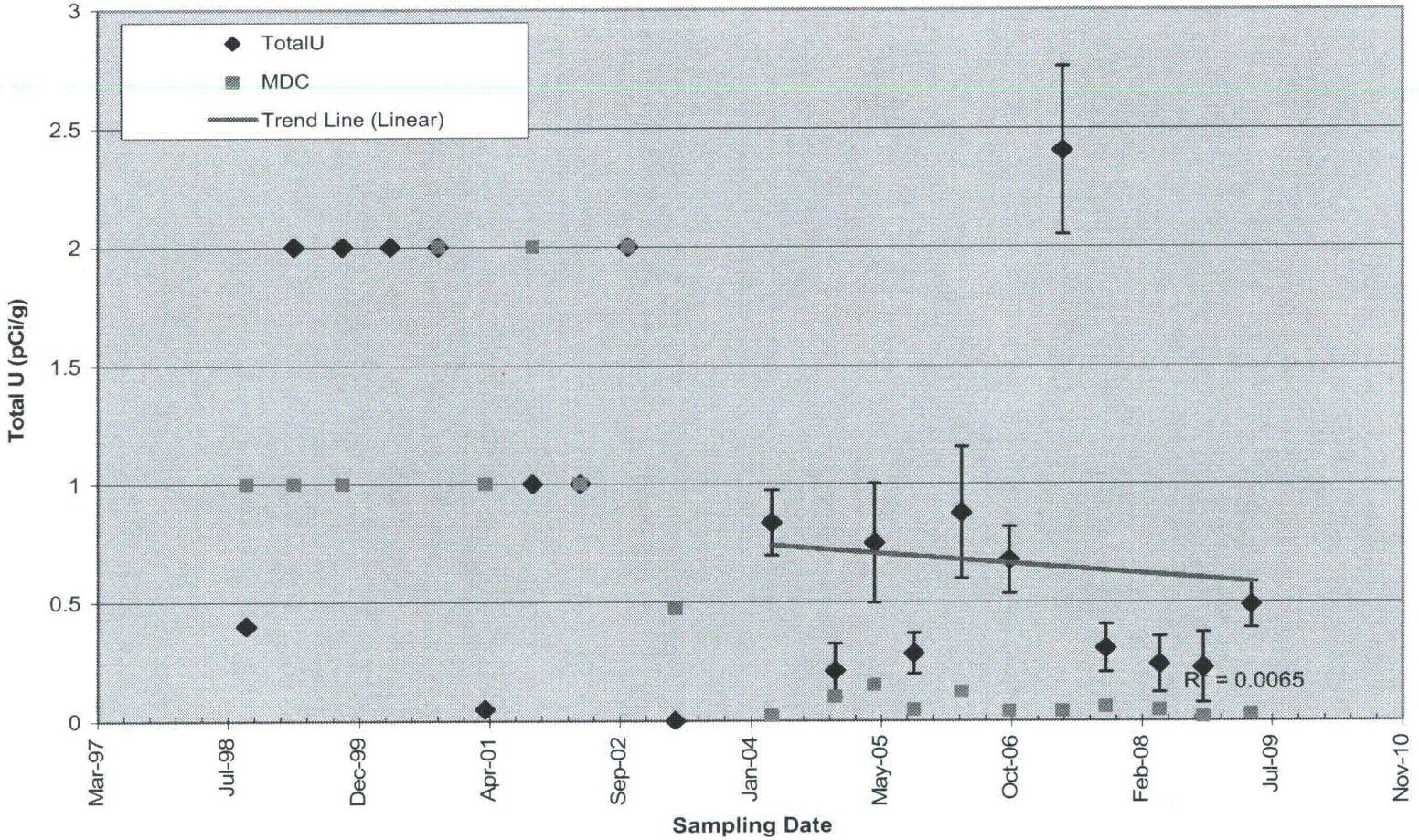


Figure 4-26. Total Uranium in SD-DU-004 (1998-2009)

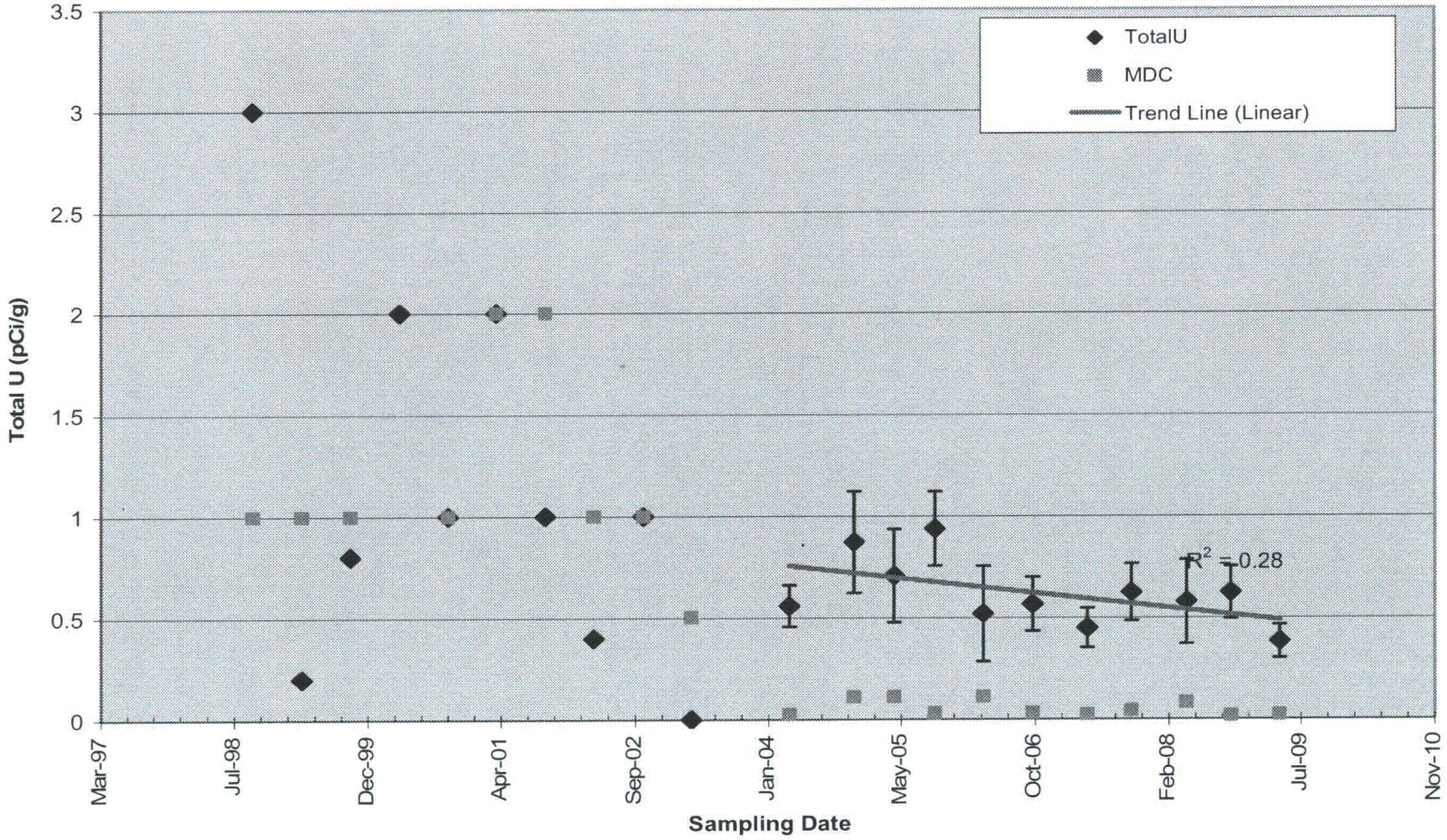


Figure 4-27. Total Uranium in SD-DU-005 (1998-2009)

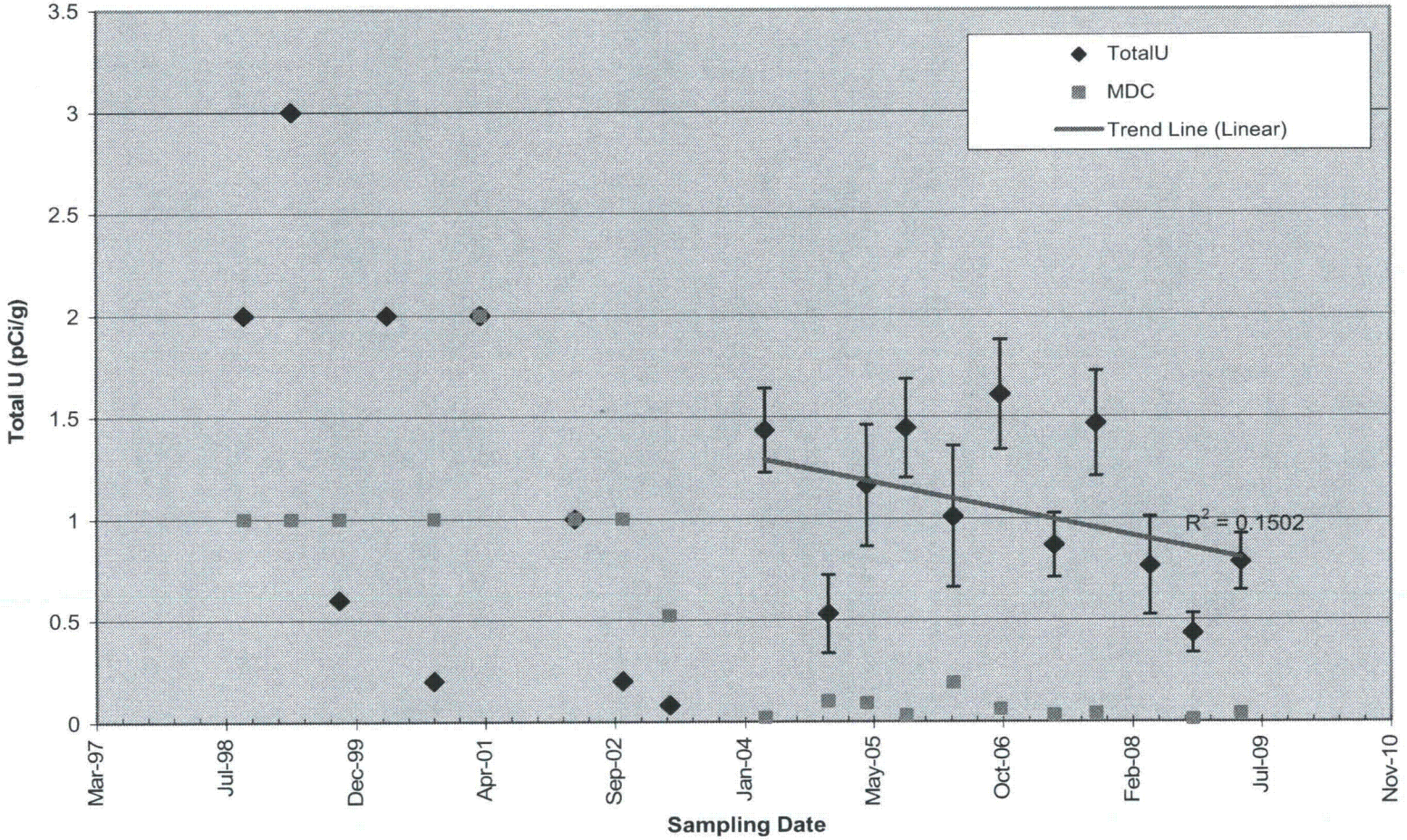


Figure 4-28. Total Uranium in SD-DU-006 (1998-2009)

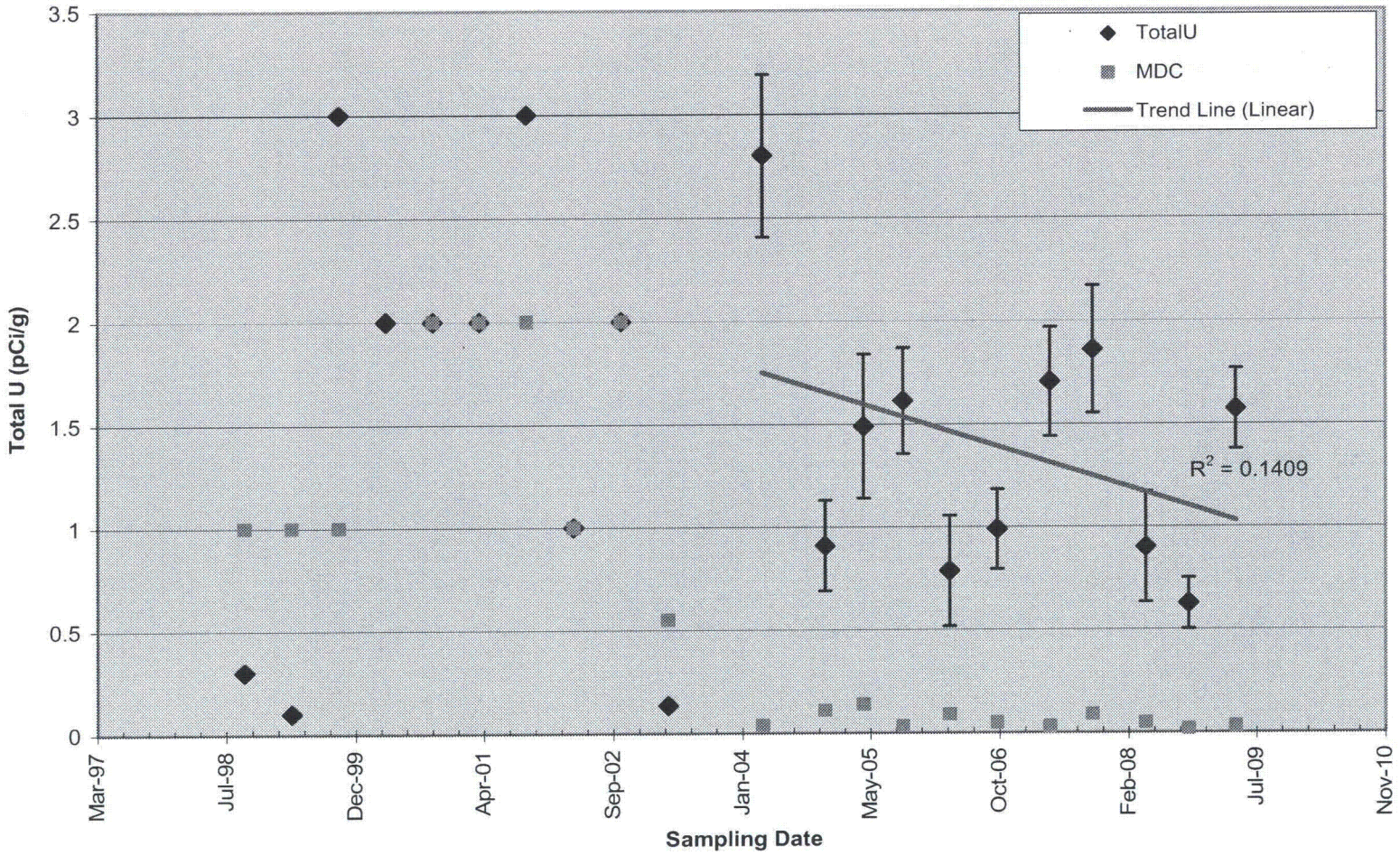


Figure 4-29. Total Uranium in SD-DU-007 (1998-2009)

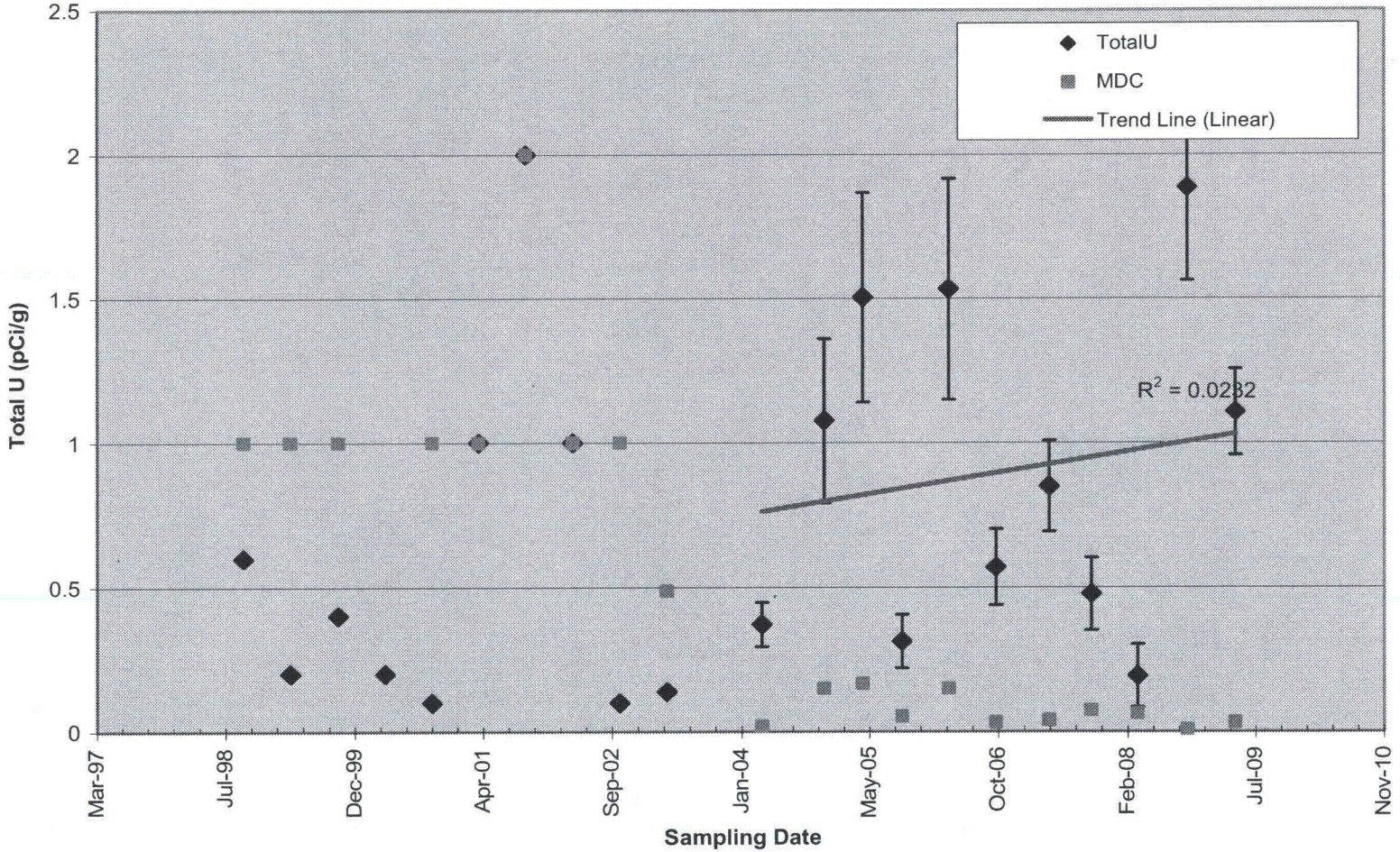


Figure 4-30. Total Uranium in SD-DU-008 (1998-2009)

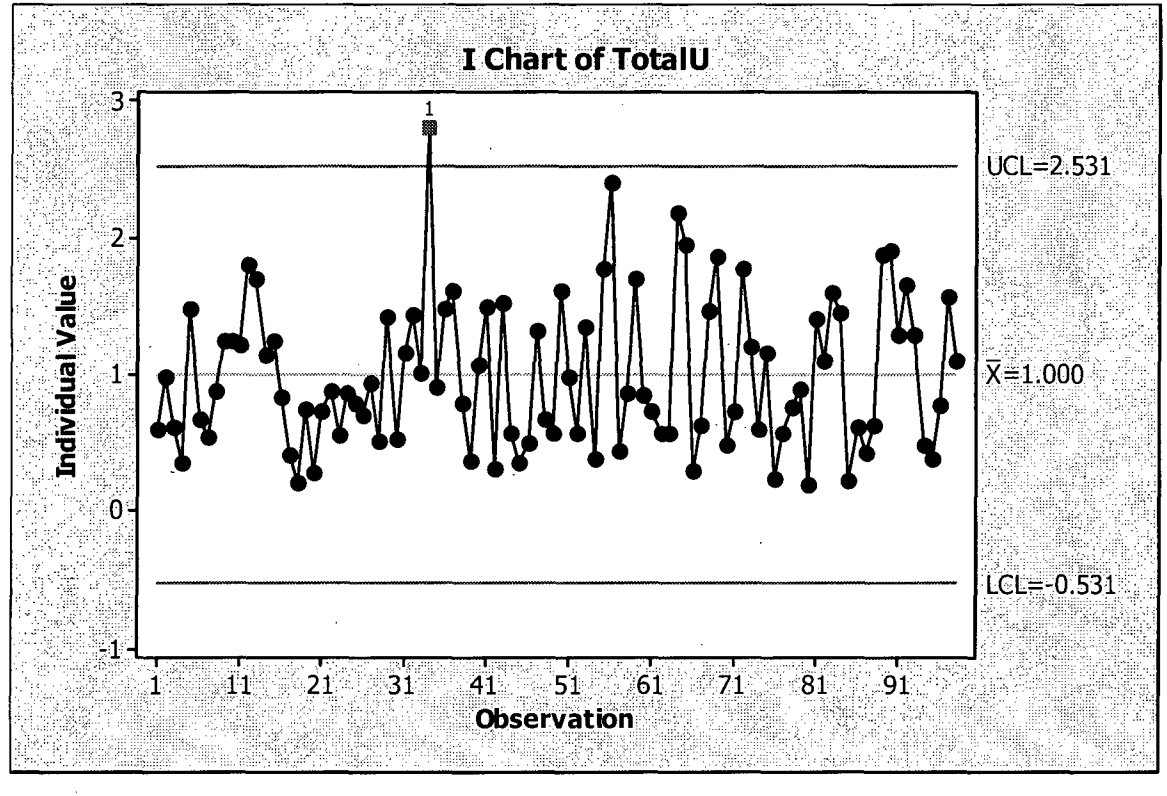


Figure 4-31. Control Chart for All Sediment Data (2004-2009)

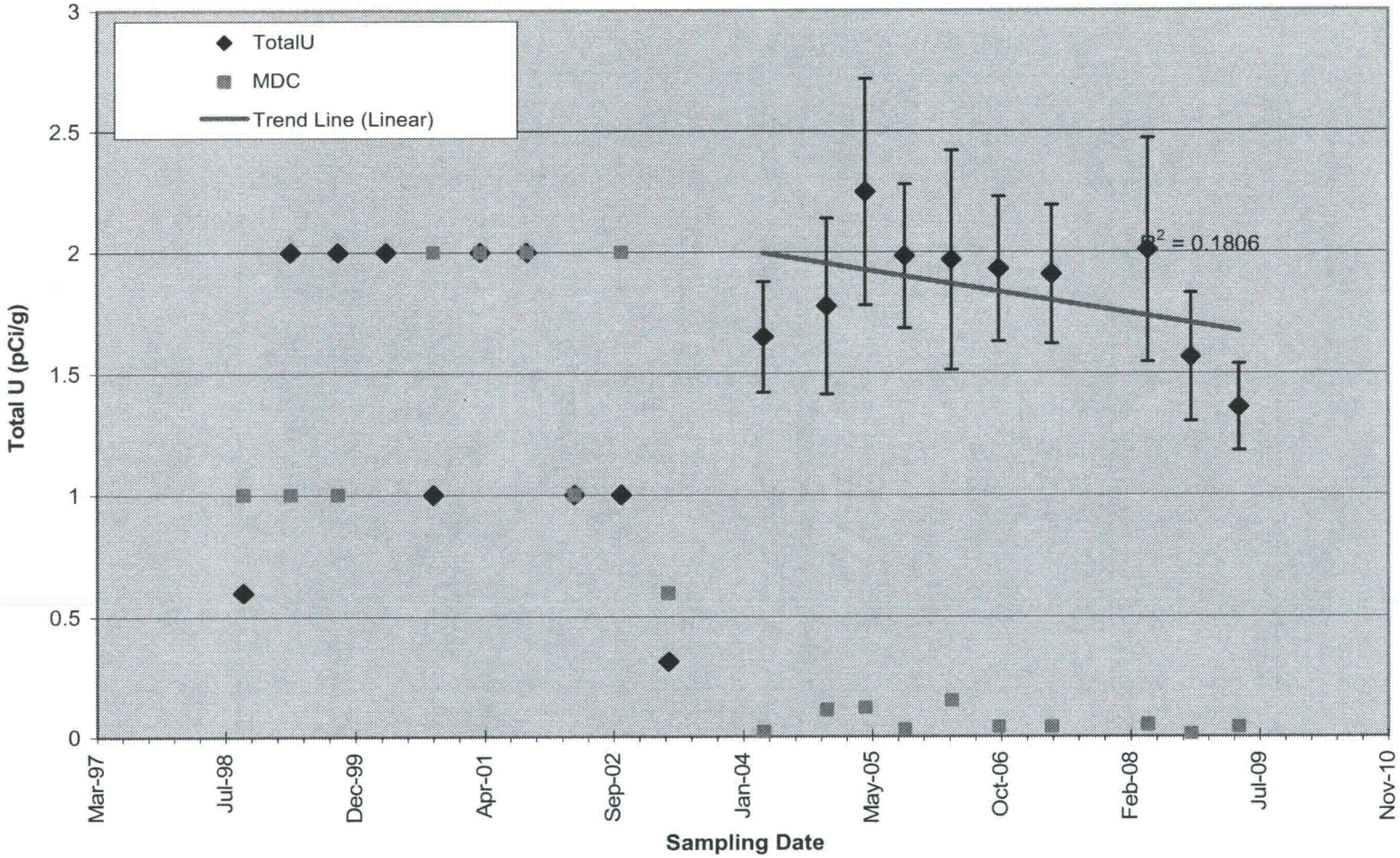


Figure 4-32. Total Uranium in SS-DU-001 (1998-2009)

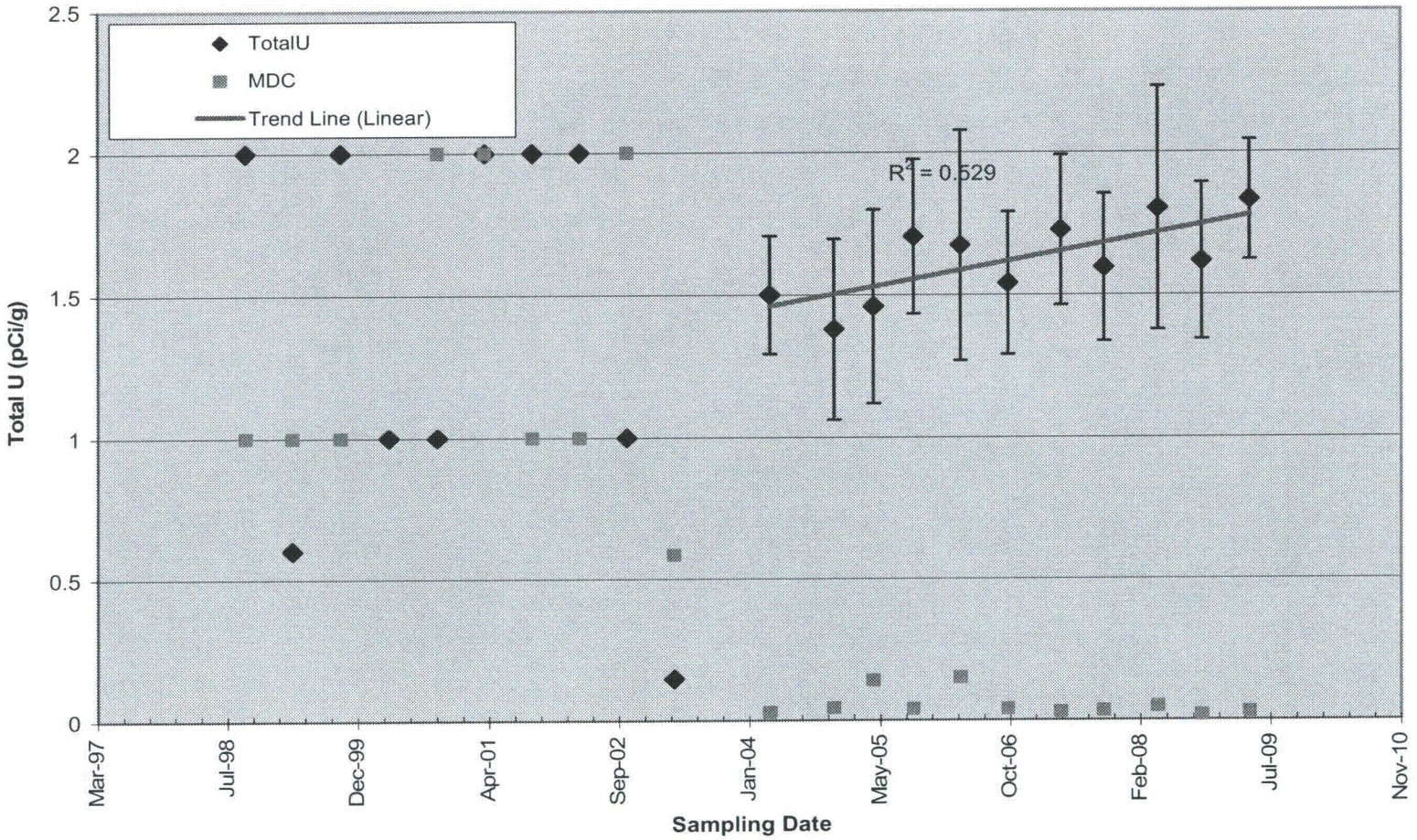


Figure 4-33. Total Uranium in SS-DU-002 (1998-2009)

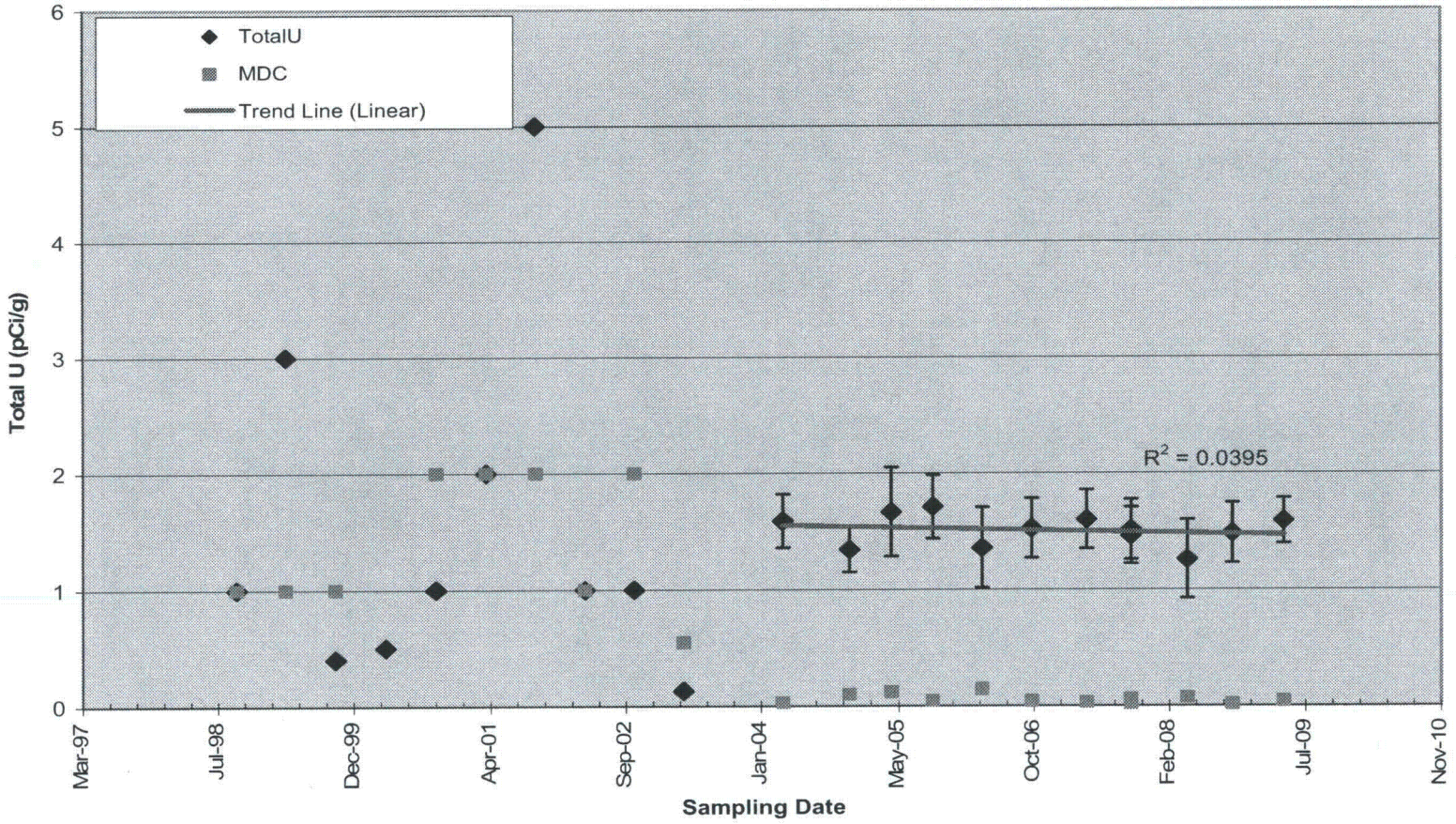


Figure 4-34. Total Uranium in SS-DU-003 (1998-2009)

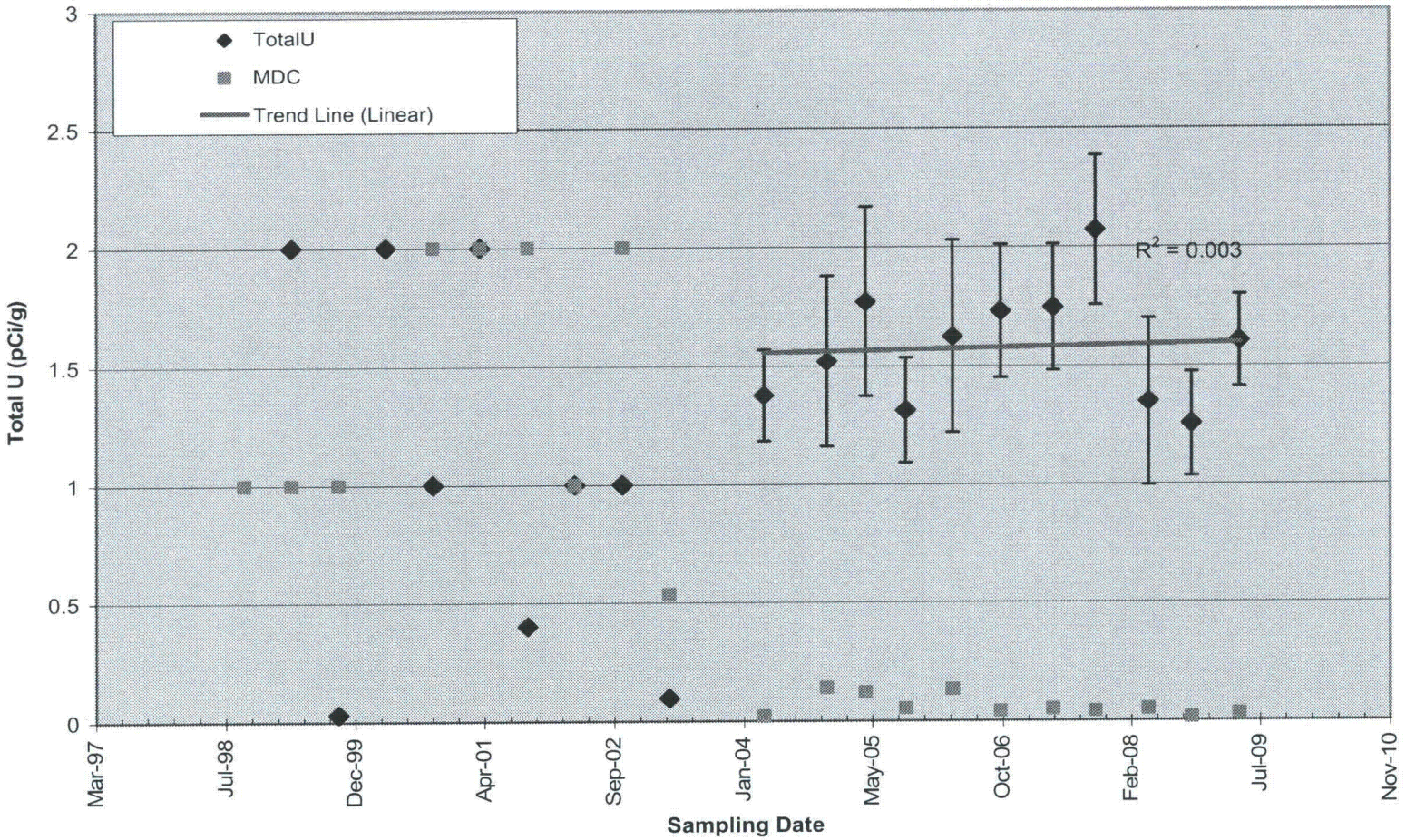


Figure 4-35. Total Uranium in SS-DU-004 (1998-2009)

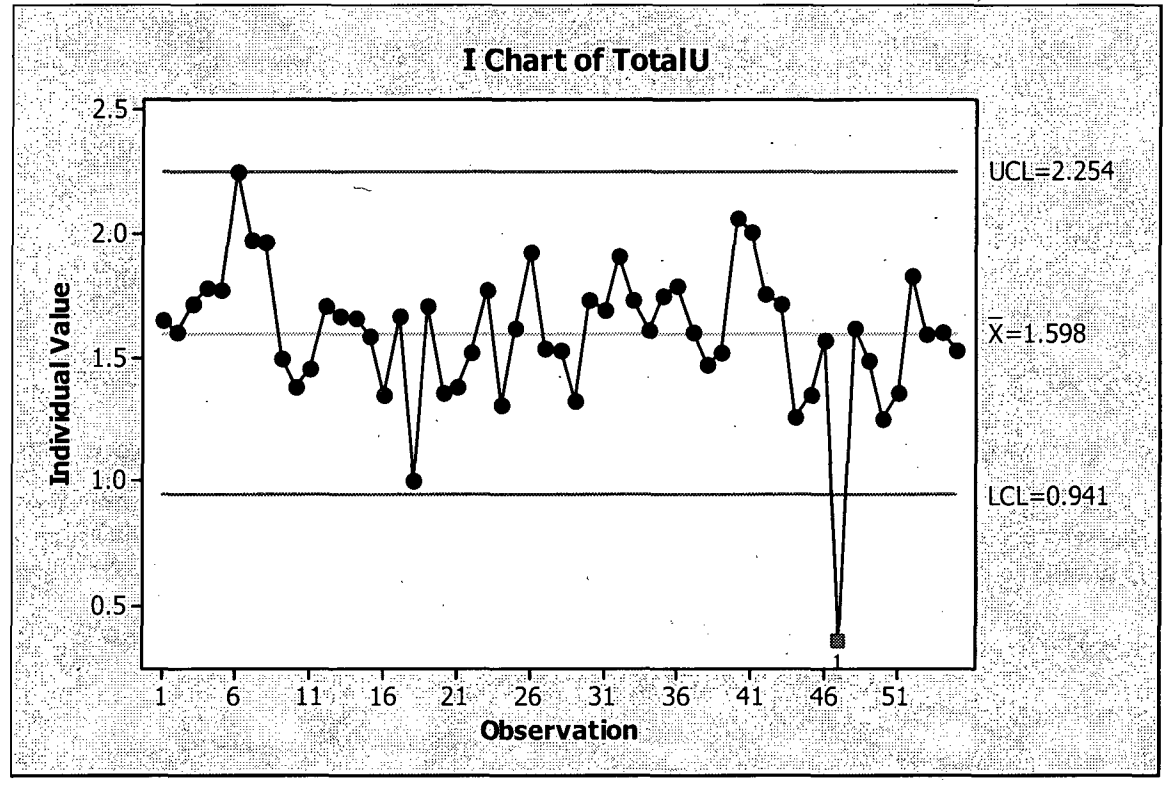


Figure 4-36. Control Chart for All Surface Soil Data (2004-2009)

5. CONCLUSIONS AND RECOMMENDATIONS

The April 2009 sampling event was conducted in accordance with the SOP (CHPPM 2000), and all data were determined to comply with the requirements of the Quality Assurance Project Plan (QAPP) (see Appendix A). The environmental media sample results are generally a small fraction of the action levels (see Table 4-1) established in the SOP. For the purposes of this report, samples with U-238/U-234 ratios in excess of 3 are investigated further to validate whether a sample result is representative of DU or natural uranium. No ratios exceeding 3 were encountered for any sample collected as part of the April 2009 sampling event. Trend analysis completed did not provide evidence of any notable increasing or decreasing trends in the environmental media sampled. . Furthermore, no action levels defined in the Army's license were exceeded. Future environmental monitoring will continue to be completed in accordance with the SOP.

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6. REFERENCES

CHPPM (U.S. Army Center for Health Promotion and Preventative Medicine). 2000. Standard Operating Procedure, Depleted Uranium Sampling Program, Environmental Radiation Monitoring Program. SOP No. OHP 40-2. 10 March.

CFR (Code of Federal Regulations). 2008. 10 CFR 20. Energy. Nuclear Regulatory Commission. Standards for Protection Against Radiation.

NRC (Nuclear Regulatory Commission). 1988. License Number SUB-1435 and Subsequent Amendments, Jefferson Proving Ground, Madison, Indiana. U.S. Army, TECOM, Aberdeen Proving Ground, Maryland. 8 May.

SAIC (Science Applications International Corporation). 2006. Radiation Monitoring Report for License SUB-1435 Jefferson Proving Ground, Summary of Results for 10-13 April 2006 Sampling Event. Final. October.

U.S. Army. 1999. U.S. Army Test and Evaluation Command, Environmental Radiation Monitoring (ERM) Plan for Jefferson Proving Ground. Memorandum to Mr. Larry W. Camper, Chief, Decommissioning Branch, Division of Waste Management, Office of Nuclear Material Safety and Safeguards, United States Nuclear Regulatory Commission, Washington, DC 20555-001 from Dal M. Nett, Chief, Safety Division, Directorate for Mission Support.

U.S. Army. 2000. Standing Operating Procedure, Depleted Uranium Sampling Program, Environmental Radiation Monitoring Program, Jefferson Proving Ground, Madison, Indiana. MCHB-TS-OH. SOP No. OHP 40-2. Effective date, 10 March 2000.

U.S. Army. 2002. Decommissioning Plan for License SUB-1435. Jefferson Proving Ground, Madison, Indiana. Prepared for the U.S. Army SBCCOM by SAIC. June.

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APPENDIX A
STANDARD OPERATING PROCEDURE

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SOP No. OHP 40-2

Effective Date 10 Mar 00
Date Removed from Service _____

STANDING OPERATING PROCEDURE

Depleted Uranium Sampling Program
Environmental Radiation Monitoring Program
Jefferson Proving Ground, Madison, IN

This SOP supersedes, in its entirety, the SOP of the same name dated April 1998.

1. **Purpose.** This Standing Operating Procedure (SOP) prescribes policies, responsibilities, and procedures for administration and execution of the Health Physics Program (HPP), USACHPPM support of the Soldier and Biological Chemical Command (SBCCOM) biannual Environmental Radiation Monitoring (ERM) Program conducted at the Jefferson Proving Ground, Madison, Indiana.

2. **Authority.**

a. US Nuclear Regulatory Commission License No. SUB-1435.

b. Program Services Meeting, 14 September 1999, between SBCCOM and HPP, USACHPPM.

3. **Scope.** This SOP applies to Health Physics Program personnel performing the collection of environmental samples in support of the ERM.

4. **Definitions, Abbreviations.** A list of terms and abbreviations used in this SOP can be found in Annex A.

5. **Forms, Labels, and Worksheets.** A sample of all forms, sample labels, and sample collection worksheets can be found in Annex B.

6. **Point(s) of Contact for Program Coordination:**

a. **Soldier and Biological Chemical Command**
Ms. Joyce Kuykendall, SBCCOM Health Physicist
Comm: 410-436-7118
DSN : 584-7118
email: joyce.kuykendall@sbccom.apgea.army.mil

b. **US Army Center for Health Promotion and Preventive Medicine**
Health Physics Program (Pgm 26)
Comm: 410-436-3502
DSN : 584-3502
fax : 410-436-8261/8263

Radiologic, Classic and Clinical Chemistry Division (RCCCD)
Comm: 410-436-3983/8235
DSN: 584-8235

c. **Jefferson Proving Ground**
Mr. Ken Knouf, Site Manager
Mr. Phil Mann
Ms. Yvette Hayes
Comm: 812-273-2551/2522/6075

7. **Survey Coordination.**

a. Pre-Survey Coordination: 60 days prior to scheduled sample date.

1) Initial Coordination: - made through the SBCCOM Health Physicist. Close coordination with the site management team at JPG will be required to ensure support will be onsite at the time of sampling.

2) USACHPPM HPP Program Assistant, (410) 436-1303,(if call from the Edgewood Arsenal: 5-1303) will be contacted to initiate travel orders. Due to the nature of the sampling program, a four-wheel drive vehicle is required to perform this project. The project and associated report number will be 26-MA-8260-R#-YY. The R# will be a "1" for the October and "2" for the April survey, and the YY will be the current fiscal year.

3) Prepare CHPPM Form 330-R-E (Request for Laboratory Services. (See Annex B) This form can be found on the USACHPPM Web Site or through intranet FormFlow program. Current DLS Test Codes being used are as follows:

Evaluations for Uranium in Soils for the soil and sediment samples, DLS Test Code: 803; STD Method: G-002.

Evaluations for Uranium in Water for the ground and surface water samples, DLS Test Code: 586; STD Method: U-002.

Note: Sample containers for all medium except soils, are provided by SBCCOM and will be onsite however sample labels should be requested from the lab.

Ensure that sample bags, labels and coolers are shipped to the following address:

US Army Jefferson Proving Ground
1661 West J.P.G. Niblo Road (Bldg. 125)
Madison, IN 47250
(812) 273-2551

4) Request for instrumentation to support the sampling program should be made no later than 30 days prior to the scheduled departure date.

Radiation detection instrumentation and soil sampling tools will be coordinated through the HPP Instrumentation Coordinator, ext. 8228. Electronic message will be used for coordination.

Water Quality Instrumentation (pH meter, temperature, and conductivity) will be coordinated through the Surface Water and Waste Water Program (Pgm 32) at extension 3310/4211.

5) Final coordination for project should be completed no later than 14 days prior to departure date.

Contact the site management personnel at JPG and schedule dates for purging of wells prior to arrival. Purging should be accomplished no later than the Friday preceding and no earlier than 14 days prior to the scheduled start date of the sampling visit.

b. Field instrument quality control. Upon receipt of field instruments from the HPP Instrument Coordinator and the Surface Water and Waste Water Program, appropriate instrument quality control checks will be conducted to ensure proper operation prior to departure.

1) Radiation detection instrumentation will be checked for response against a radiation check source. This check source should also be shipped to the survey site for instrument verification on

site. The radiation check source used need not be a calibrated source as instrument response is the parameter being evaluated.

2) Water quality instruments should also be verified using guidance provided by water program personnel. At a minimum, verify the accuracy of the pH meter using the certified pH solution packets.

8. **Sample Collection.** Four separate sample matrixes will be collected in support of the ERM. Methodologies for sampling can be found in US Army Environmental Hygiene Agency (the predecessor to USACHPPM) Technical Guide 155, Environmental Sampling Guide, February 1993.

a. Ground Water Samples. A total of 11 monitoring wells have been established to be used for the Environmental Monitoring Program. Wells are indicated on the ground water sample map (figure 1, Anne C) using an alphanumeric code containing the letters MW and a two digit sample number (01-11).

1) Sample will be collected using a new hand bailer for each sample. Care will be taken when lowering the bailer into the well to prevent unnecessary aeration or contamination of the sample.

2) A total quantity to be collected will be 1 US gallon.

3) A portion of the first bailer full of water will be placed into a clean beaker, or other suitable container, and an evaluation of radiation level, temperature, pH and conductivity will be conducted and recorded.

4) Sample information will be recorded on the Ground Water Sample Collection Worksheet. (Annex B)

5) Samples will not be filtered or persevered in the field.

b. Soil Samples. A total of 4 soil samples will be collected, one from each corner of the trapezoidal impact area. Sample locations are indicated on the soil sample map (figure 2, Annex C).

1) Sample will be collected using a new or properly cleaned scoop, trowel, or other suitable tool. Sample will be placed in a self sealing (Ziploc®) bag.

2) A sample quantity of approximately 1000 grams will be collected.

3) Radiation dose rate measurements will be taken at 1 meter above the sample location and recorded on the Soil Sample Collection Worksheet (Annex B).

c. Surface Water Samples. A total of 8 sample locations have been identified for the collection of water sample from the two creeks that run through the DU impact area (figure 3, Annex C).

1) Sample will be collected using the grab method. Sample container will be positioned pointing upstream and below the surface of the water.

2) A sample quantity of 1 US gallon will be collected.

3) Radiation dose rate measurements will be taken at 1 meter above the sample location and recorded on the Surface Water Sample Worksheet (Annex B).

4) Water sample will not be filtered or preserved in the field.

d. Sediment Sample. A total of 8 sample locations have been identified for the collection of sediment samples from the two creeks that run through the DU impact area. Sediment samples will be collected at the sites selected for surface water collection (figure 3, Annex C).

1) Sample will be collected using a new or properly cleaned scoop, trowel, or other suitable tool. Sample will be placed in a glass sample jar.

2) Sediment sample will be collected only after the water sample has been collected.

3) While a sediment sample is usually considered a solid sample matrix, a certain amount of water is expected in the sample. The sample should not be drained of water that is collected as part of the sample.

4) Radiation dose rate measurements will be taken at 1 meter above the sample location and recorded on the Sediment Sample Worksheet (Annex B).

9. **Sample Management.** Since sample collected are in support of NRC License commitments, chain-of-custody procedures will be followed.

a. Samples will be secured from unauthorized access during the period of sampling.

b. Prior to shipment of samples to USACHPPM, a properly completed CHPPM Form 235-R-E, Chain of Custody Record (Annex B), will be placed in each shipping container. Survey personnel will maintain a copy of the Chain of Custody Record for verification of sample transport.

c. Water samples must reach RCCCD no later than 4 days from the time of sampling. To ensure this time frame is met and that the laboratory has time to filter and preserve the sample if necessary, water samples should be collected on the first day of the sampling trip and shipped the following day. It is not necessary to ship the water, sediments, and soils together.

10. **Sample Analysis.** Sample analysis of all environmental samples will be performed through the USACHPPM RCCCD.

a. Samples will be analyzed in accordance with RCCCD established protocols and procedures. All environmental samples will be coordinated with the SBCCOM RPO for disposal instructions.

1) Water samples will be analyzed fluorometrically for dissolved total uranium.

2) Soil and sediment samples will be analyzed using gamma spectroscopy, keying on the isotopic peaks of the Thorium-234. The thorium is the daughter of U-238 and is considered to be in equilibrium therefore the activity would be equal.

b. The QC for laboratory instruments will be performed by RCCCD.

c. Reports of analysis will be forwarded to the USACHPPM project officer responsible for requesting the sampling. Electronic as well as hard copy reports will be requested.

11. **Action Levels.** Every effort will be made to maintain radiation exposures and releases of radioactive and non-radioactive toxic metals to unrestricted areas as low as is reasonable achievable (ALARA).

a. The following criteria for the restricted area will be used to limit DU exposure. (Limits were established in the NRC Approved ERM)

SOIL:

- Perimeter and background samples:

  ≤ 35 pCi/g - no corrective action.

  > 35 pCi/g - collect 5 additional samples in a 1 meter square grid. If average > 35 pCi/g is confirmed, recommendation to decontaminate soil to ≤ 35 pCi/g will be made to the SBCCOM RPO.

- Sample locations along the lines of fire:

  < 100 pCi/g - no corrective action

  100-300 pCi/g - collect 5 additional samples in a 1 meter square grid. If average > 100 pCi/g is confirmed, investigate to determine reason for the high level.

  > 300 pCi/g - collect 5 additional samples in a 1 meter square grid. If average > 300 pCi/g is confirmed, investigate to determine reason for the high level and immediately notify the SBCCOM RPO to initiate notification to the NRC.

WATER:

- Uranium limit established in 10 CFR 2, Annex B is 3.0×10^{-1} pCi/ml

  < 1.5×10^{-1} pCi/ml - no corrective action.

  > 1.5×10^{-1} pCi/ml - resample; if results above 1.5×10^{-1} pCi/ml is confirmed, investigate to determine reason for the high level and immediately notify the SBCCOM RPO to initiate notification to the NRC.

b. Basis for Action. If any of the action levels are exceeded, an evaluation of cause will be performed by the SBCCOM RPO. The RPO will provide a report of findings to the RCC. Based on their determination, recommendations to the commander on corrective action will be made.

GARY J. MATCEK
MAJ, MS
Program Manager, Health Physics Program

ANNEX A

DEFINITIONS AND ABBREVIATION

1. **Definitions:**

a. **Action Level:** The numerical value that will cause the decision maker to choose one of the alternative actions. The action level may be a regulatory standard or may be a level set to ensure that corrective action is initiated before regulatory standards are met.

b. **Area:** A general term referring to any portion of a site, up to and including the entire site.

c. **Background Sample:** A sample collected from an area similar to the one being studied, but in an area thought to be free of contaminant of concern.

d. **Calibration:** Comparison of a measurement standard, instrument, or item with a standard or instrument of higher accuracy to detect and quantify inaccuracies and to report or eliminate those inaccuracies by adjustments.

e. **Chain-of-Custody:** Documentation of the possession and handling of a sample from the time it is collected to the final disposition.

f. **Detection Limit:** The lowest concentration at which given analytical procedures can identify.

e. **Duplicate Samples:** Samples collected simultaneously from the same source, under identical conditions, into separate containers.

g. **Ground Water Sample:** A sample of water taken from an established monitoring well.

h. **Preservation:** Techniques which retard physical and/or chemical changes in a sample after it has been collected.

i. **Quality Assurance:** A monitoring program which ensures the production of quality data and identifies and quantifies all sources of error associated with each step of the sampling and analytical effort.

j. **Sample:** A part or selection from a medium located in a survey area that represents the quality or quantity of a given parameter or nature of the whole area.

k. **Sediment:** A sample of the mineral and/or organic matter deposited by surface waters.

l. **Soil Sample:** A sample of the soil taken from the first 15 centimeters (6 inches) of surface soil.

m. **Split Sample:** A sample, which has been portioned into two or more containers from a single sample container.

n. **Surface Water:** Water found above the surface of the soil, particularly water contained in creeks and streams.

2. **Abbreviations:**

a.	DU	Depleted Uranium
b.	ERM	Environmental Radiation Monitoring Program
c.	g	gram
d.	HPP	Health Physics Program
e.	JPG	Jefferson Proving Ground
f.	ml	milliliter
g.	NRC	Nuclear Regulatory Commission
h.	pCi	pico-Curie

i.	QC	Quality Control
j.	RCCCD	Radiologic, Classic and Clinical Chemistry Division
k.	RPO	Radiation Protection Officer
l.	SBCCOM	Soldier and Biological, Chemical Command
m.	SOP	Standing Operating Procedure
n.	USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine

ANNEX B

FORMS, LABELS AND WORKSHEETS

Request for Laboratory Services

Directorate of Laboratory Sciences
REQUEST FOR LABORATORY SERVICES

PLEASE PRINT OR TYPE ALL REQUESTED INFORMATION

For DLS Use Only
LIMS JOB# _____
Date Received _____

PART 1: PROJECT INFORMATION

1. DATE OF REQUEST: 08/03/2000
2. PROJECT #: (CHPPM only) 26 MA 8260 XO# _____
3. FUND SOURCE: ☐ P84 ☐ DERA ☐ OTHER Supplemental *(Specify)* _____
4. DIVISION/PROGRAM: Health Physics Program
5. INSTALLATION: Jefferson Proving Ground
6. STATE WHERE SAMPLES TO BE COLLECTED: Indiana
7. NAME OF PROJECT OFFICER(s): Mr. David Collins
   TELEPHONE: (410) 436-3502 FAX# (410) 436-8261
   E-MAIL: david.collins@apg.amedd.army.mil
8. NAME OF SAMPLE COLLECTOR: Mr David Collins
9. PROJECT DESCRIPTION/OBJECTIVE *(Screen, Monitoring, Regulatory or Health Concern, Etc.)*:
   Sampling required as part of the Environmental Radiation Monitoring Plan
10. SAMPLE OR SITE HISTORY (High Toxicity, Etc):
    DU Firing Range
11. PROJECT COORDINATOR/DLS TECHNICAL CONSULTANT - Was project coordinated with DLS? ☒ YES ☐ NO
    Name of Person in DLS: Mr. Gary Wright ext. 8235

PART 2: TURNAROUND TIME REQUESTED

1. DATE RESULTS REQUIRED: _____
2. INDICATE THE APPROPRIATE SAMPLE OR PROJECT DESIGNATION:
   ☒ STANDARD
   (Note: All samples are routinely processed as Standard Analyses Unless Arrangements Have Been Made with DLS for High-Priority or Top-Priority Analyses.)
   ☐ HIGH-PRIORITY ☐ TOP-PRIORITY
   (Note: High-Priority and Top-Priority Requests should be Coordinated with DLS and are Subject to Cost Surcharges.)

PART 3: REPORT DISTRIBUTION OPTIONS

1. REPORT RESULTS BY: *(Indicate Preference)*
   ☒ cc:MAIL/E-MAIL TO ADDRESS: david.collins@apg.amedd.army.mil
   ☐ FAX TO *(Write Fax#)*: _____
   ☒ MAIL:

REQUESTED BY: Mr. David Collins
PRINT NAME: _____ SIGNATURE: _____
(Note: Signature Required if Submitted by Hard Copy)

CHPPM Form 330-R-E, 1 May 96, (MCHB-DC-LLI) Replaces AEHA Form 330-R, Jul 93, which is obsolete.

Figure B-1a

PART 4: PROJECT COORDINATION INFORMATION

1. DATE SAMPLES TO ARRIVE AT DLS: 12/04/2000

(Note: Prior Arrangements Must Be Made with SML for Samples That Will Arrive Outside of Routine Duty Hours which are M-F 0730 -1700)

Special Comments: Samples will arrive from the field without preservation or filtration.

2. SPECIAL HANDLING REQUIREMENTS:

- [x] CHAIN-OF-CUSTODY (COC)
- [ ] SAFETY CONSIDERATION/HAZARDOUS MATERIALS (Specify):
- [x] ANALYSES WITH SHORT-HOLDING TIMES (List Specific Analyses):
  Filter water samples and test for dissolved U-238, No preservative add in the field.
- [ ] OTHER (Specify):

3. SAMPLE COLLECTION KIT:

DATE REQUIRED: 07/04/2000

CHECK PREFERENCE:

- [ ] 1. TO BE PICKED UP AT DLS BY PROJECT OFFICER
- [x] 2. SHIP TO:
  (Please include Bldg # and Phone #)

3 large coolers and bags for soil samples need to be shipped to site
U.S. Army Hefferson Proving Ground
1661 West J.P.G. Niblo Road (Bldg 125)
Madison, IN 47250
(812) 273-2551

PART 5: SAMPLE ANALYSIS INFORMATION

DLS TEST CODE	PROCEDURE DESCRIPTION	STD METHOD	MATRIX	NUMBER OF SAMPLES	SPECIAL REQUIREMENTS/COMMENTS (REQUESTS FOR EXTRA BLANKS OR
803	Uranium in Soil	G-002	Soil	5	Soil
586	Uranium in Water	U-002	Water	9	Surface Water (1 gal Cubitainer)
803	Uranium in Soil	G-002	Soil	9	Sediment
586	Uranium in Water	U-002	Water	12	Ground Water (1 gal Cubitainer)

Table May Be Continued on Next Page if Additional Space is Required.

Figure B-1b

Sample Labels

Below is an example of a label to placed on each sample container.

PROJECT #:
INSTALLATION:
POC:
SAMPLE #:
DATE COLLECTED:
TIME COLLECTED:
SAMPLE PRESERVED:
ANALYSIS REQUIRED:

Figure B-2

Effective Date _____
Date Removed from Service _____

JEFFERSON PROVING GROUND
DU SAMPLING PROGRAM
PROJECT NUMBER: 26-MA-R_-8260-__

GROUND WATER SAMPLES						
Sample ID	Sample Date	Exposure Reading (µR/hr)	Sample Locations	Comments		
				pH	Temp (°C)	Conductivity (µMHOS)
MW01			Well @ D-Road and Wonju Road (perimeter DU impact area)			
MW02			Well between C-Road & Wonju Road (perimeter DU impact area)			
MW03			Well between A-Road & gate on Wonju Road (perimeter DU impact area)			
MW04			Well on South Perimeter Rd. (Along south border of JPG)			
MW05			Well @ D-Road & Morgan Road (across Bridge No. 13) perimeter DU impact area			
MW06			Well @ C-Road & Morgan Road (perimeter DU impact area)			

SOP No. OHP 40-2

Effective Date _____
Date Removed from Service _____

JEFFERSON PROVING GROUND
DU SAMPLING PROGRAM
PROJECT NUMBER: 26-MA-R_-8260-__

GROUND WATER SAMPLES						
Sample ID	Sample Date	Exposure Reading (µR/hr)	Sample Locations	Comments		
				pH	Temp (°C)	Conductivity (µMHOS)
MW07			Well @ Oakdale School House on Morgan Road (perimeter DU impact area)			
MW08			Well @ Southwest Corner of JPG (Along south border of JPG)			
MW09			Well @ D-Road and Bridge No. 22 (inside DU impact area)			
MW10			Well on Center Recovery Road (inside DU impact area)			
MW11			Well on D-Road between Morgan and C Recovery Road (inside impact area)			
MW12			Duplicate or Split Sample _____			

JEFFERSON PROVING GROUND
DU SAMPLING PROGRAM
PROJECT NUMBER: 26-MA-R_-8260-__

SOIL SAMPLES				
Sample ID	Sample Date	Exposure Reading (µR/hr)	Sample Locations	JPG ID Code
SOS1			Vicinity at intersection of C-Road and Wonju Road)	(S44)
SOS2			Vicinity at intersection of E-Road and Morgan Road	(S48)
SOS3			0.5 miles east of intersection at C-Road & East Recovery Road	(S43)
SOS4			Corner of Morgan Road and C-Road	(S47)
SOS5			Duplicate or Split of ____	
SOS6			Well on south perimeter road along south border of JPG	B-1
SOS7			West Perimeter Road at Fork Creek	B-3
SOS8			South Perimeter Road of JPG	B-5
SOS9			Well on SW Corner of JPG	B-6

NOTE: Per letter from the NRC dated 7 Sep 99, soil sample locations S6 and S8 that were previously sampled will no longer require sampling. No other changes to the ERM Plan have been approved.

Effective Date _____
Date Removed from Service _____

JEFFERSON PROVING GROUND
DU SAMPLING PROGRAM
PROJECT NUMBER: 26-MA-R_-8260-__

SURFACE WATER SAMPLES				
Sample ID	Sample Date	Exposure Reading (μR/hr)	Sample Locations	JPG ID Code
SWS1			West Perimeter Road Middle Fork Creek (exits JPG property)	SWBS (M1)
SWS2			Big Creek (exits JPG property)	SWBN (M2)
SWS3			Wonju Road Middle Fork Creek (enters DU impact area)	SWSE (M3)
SWS4			Big Creek (enters DU impact area)	SWNE (M4)
SWS5			Bridge No. 22 Big Creek	SWM (M5)
SWS6			Line of Fire Middle Fork Creek	SWS (M6)
SWS7			Bridge No. 12 @ Morgan Road Middle Fork Creek	SWSW (M7)
SWS8			Bridge No. 13 @ Morgan Road Big Creek	SWNW (M8)
SWS9			Duplicate or Split of SWS_	SWNE (M4)

SOP No. OHP 40-2

Effective Date _____
Date Removed from Service _____

JEFFERSON PROVING GROUND
DU SAMPLING PROGRAM
PROJECT NUMBER: 26-MA-R_-8260-__

SEDIMENT SAMPLES				
Sample ID	Sample Date	Exposure Reading (µR/hr)	Sample Locations	JPG ID Code
SES1			West Perimeter Road Middle Fork Creek (exits JPG property)	(M1)
SES2			Big Creek (exits JPG property)	(M2)
SES3			Wonju Road Middle Fork Creek (enters DU impact area)	(M3)
SES4			Big Creek (enters DU impact area)	(M4)
SES5			Bridge No. 22 Big Creek	(M5)
SES6			Line of Fire Middle Fork Creek	(M6)
SES7			Bridge No. 12 @ Morgan Road Middle Fork Creek	(M7)
SES8			Bridge No. 13 @ Morgan Road Big Creek	(M8)
SES9			Duplicate or Split of SES_	(M4)

ANNEX C

SAMPLE LOCATION MAPS

Jefferson Proving Ground: DU Sampling
GROUNDWATER MONITORING WELLS

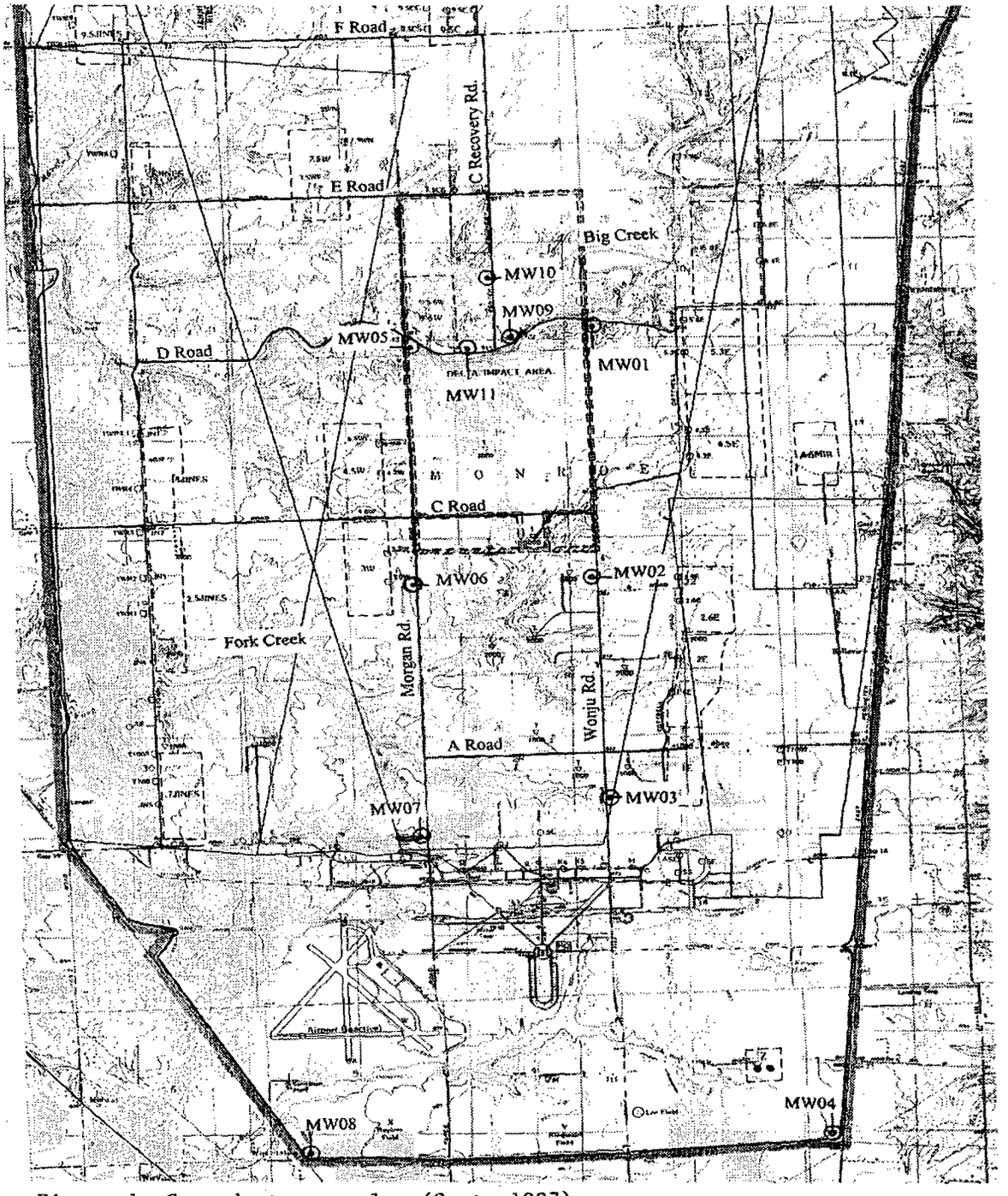

Figure 1: Groundwater samples (Sept. 1997)

Jefferson Proving Ground: DU Sampling
SOIL SAMPLES

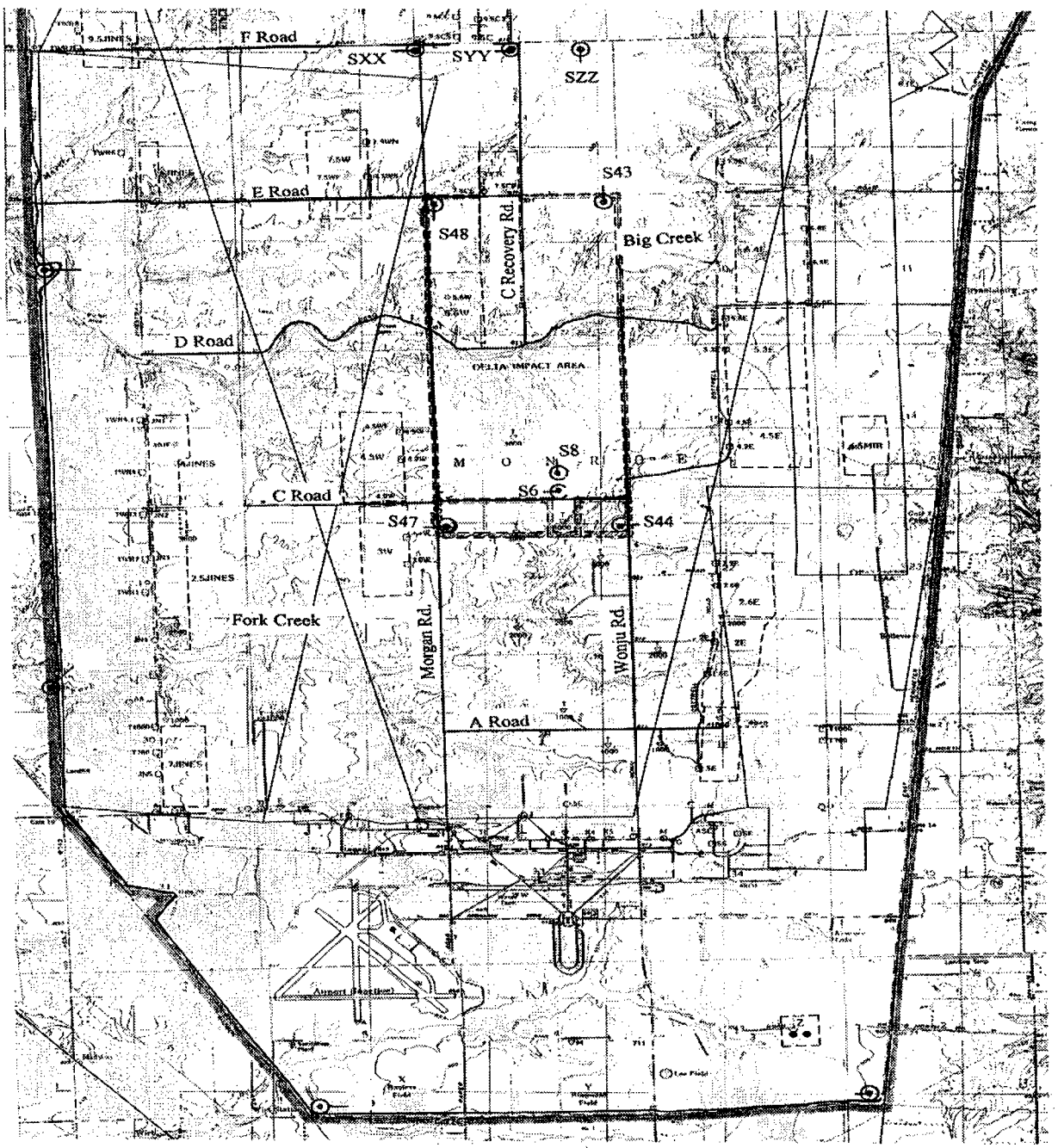

Figure 2: Soil Samples (Sept. 1997)

Jefferson Proving Ground: DU Sampling
SURFACEWATER & SEDIMENT SAMPLES

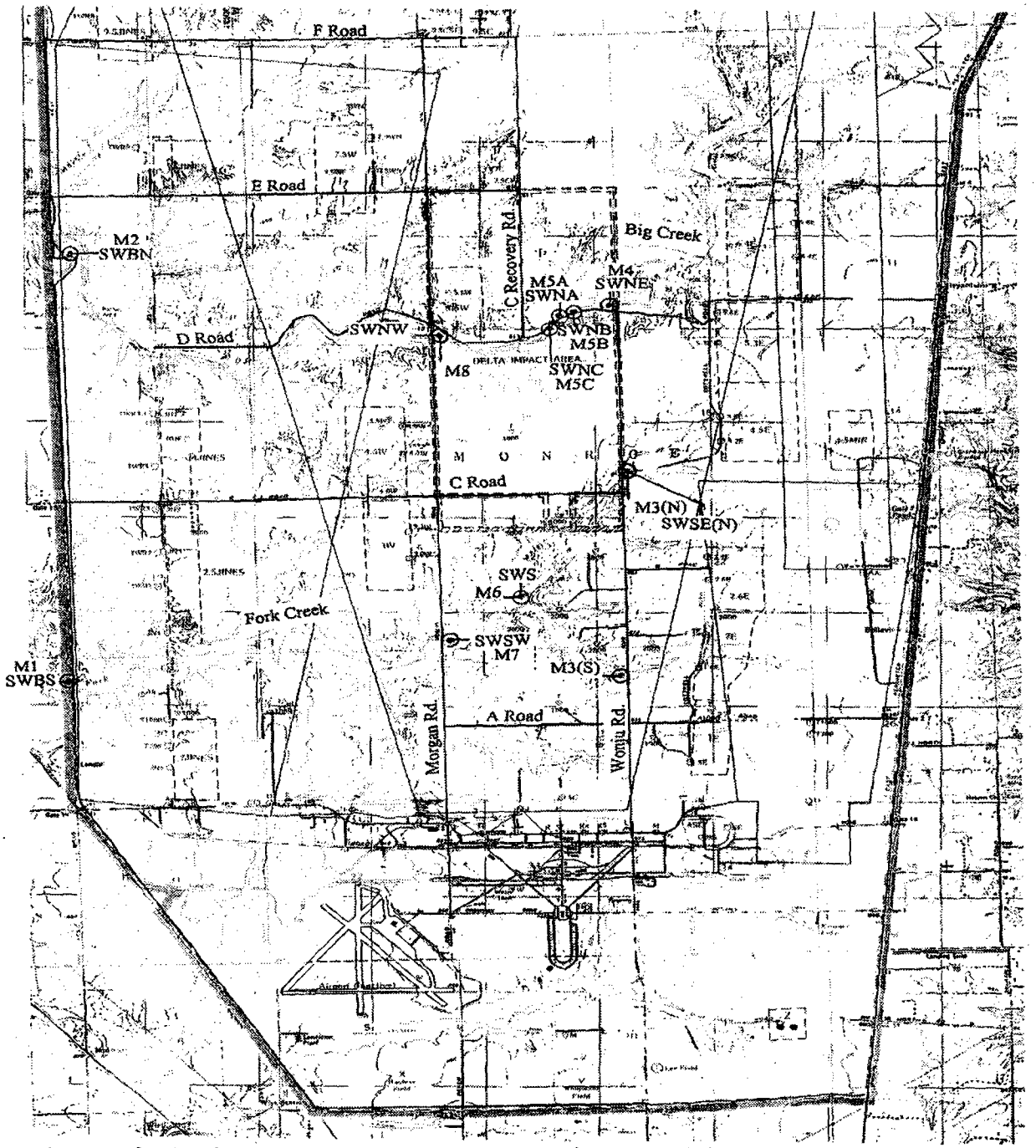

Figure 3: Surfacewater & Sediment Samples (Sept. 1997)

APPENDIX B
FIELD LOGBOOK

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Location: Jefferson Proving Ground Date: 10/27/08

Project/Client: ERM Sampling - MW-DU-011, MW-DU-010, MW-DU-006

1135 Arrived at MW-11 to bail sample of groundwater due to low water level.

1200 Collect sample MW-DU-011 (SAILIKE) for Total/Isotopic Uranium.

1300 Arrived at MW-10 to bail groundwater sample due to low water level.

1330 Collect sample MW-DU-010 (SAILIKE) for Total/Isotopic Uranium.

1540 Arrived at MW-6 to bail groundwater sample due to low water level.

1550 Collect sample MW-DU-006 (SAILIKE) for Total/Isotopic Uranium.

SF 10/27/08

10/27/08

143

Location: Jefferson Proving Ground Date: 4/13/09

Project/Client: 01-0835-04-4220-310, ERM Sampling

Mobilization

1700 Simon Fong (SAIC) left the Dulles Int'l Airport for Cincinnati Int'l Airport.

1845 Simon arrived at Cincinnati Airport. Getting the rental vehicle and bags.

1915 Left Cincinnati Airport for Madison, IN

2045 Arrived at Madison, IN motel. Checking in. Matt Logan (SAIC) field manager, called Simon and told him to meet at motel lobby the next day at 0700.

SF 4/13/09

4/13/09

144

Location: Jefferson Proving Ground Date: 4/14/09

Project Code: 01-0833-04-4220-310, ERM

ERM Sampling, Calibration of Equipment

0645 Simon Fong (SAIC) arrived at motel lobby. Met with Matt Logan (SAIC), Todd Ecoby (SAIC), Project Manager for field activities, and Eric Schrumpf.

0705 Left the motel for Jefferson Proving Ground field office; Building 125.

0715 Arrived at IPG Building 125. Unloading items. Met with Alan Miller (SAIC), GIS personal. Checking on bottles for Sampling. Alan Miller is opening coolers for Simon.

0740 Simon is calibrating Horiba U-22 water quality measurers (# 15509 and # 15498) from Harrisburg Equipment & Supply. Autocalibration solution is Lot # 6685 (Expires 11/12/09) from Harrisburg Equipment and Supply.

For Horiba # 15509

	Pre-Calibration Reading	Post Calibration Reading	Standard
pH	5.55	3.97	4.000
Turbidity (NTU)	2.1	0.0	0.0
Conductivity (S/cm)	0.369	0.451	0.449

JL-T3 4/14/09

Location: Jefferson Proving Ground Date: 4/14/09

Project Code: 01-0833-04-4220-310, ERM

ERM Sampling, Calibration of Equipment, Troll Download

For Horiba # 15498

pH SF 4/14/09	Pre-Calibration Reading	Post-Calibration Reading	Standard
pH	4.31	3.97	4.000
Turbidity (NTU)	2.4	0.1	0.0
Conductivity (S/cm)	0.444	0.451	0.449

0755 Matt Logan is conducting the health & safety plan/training with DU issues, wet weather, slips, trips, and falls.

0810 Todd, Alan, and two SAIC UXO personnel left the field office to check out Big Creek. Simon, Matt, and Eric are working to pack items for sampling.

0845 Todd and crew came back to field office.

0900 It is observed that weather today is cool and rainy. Temperature is about 49°F. Skies are overcast and misty.

0950 Simon, Todd, and Jim Snyder (SAIC) left the field office for MW-2 to download troll.

1006 The depth to water at MW-2 (with troll is 9.48 feet BTOC. Todd downloads troll data. Troll is pulled.

JL-T3 4/14/09

Location: Jefferson Proving Ground Date: 4/14/09

Project / Client: 01-0833-04-4220-318, ERM

Troll Download, ERM Well Sampling (MW-DU-005)

1015 Leave MW-2 for MW-11.

1041 Arrived at MW-11. The initial water level at MW-11 (with troll in well) is 6.35 feet BPVC. Todd is downloading the troll. Troll is pulled and a new compression cap is replaced.

1053 Leave MW-11 for MW-9.

1100 Arrived at MW-9. The initial water level at MW-9 (with troll in well) is 35.75 feet BPVC. Todd is downloading the troll. Troll is pulled and a new compression cap is replaced.

1108 Leave MW-9 for MW-5.

1135 Arrived at MW-5. The water level at MW-5 is 19.18 feet BPVC. The water quality parameters at MW-5 are:

pH = 5.88

Conductivity = 0.416 S/cm

Turbidity = 2.0 NTU

Temperature = 16.9 °C

1145 Collect sample MW-DU-005 (at MW-5) for Total / Isotopic Uranium (2, 1L plastic - unfiltered & unpreserved) using a disposable bailer. Sample field ID is SAJC11E

[signature] 4/14/09

Common Field Data Error Codes

Error Codes Are Used to Explain Common Mistakes and Are Written Above or Close to the Mistake. Commonly Used Error Codes Include:

- RE Recording Error
- CE Calculation Error
- TE Transcription Error
- SE Spelling Error
- CL Changed for Clarity
- DC Original Sample Description Changed After Further Evaluation
- WO Write Over
- NI Not Initialed and Dated at Time of Entry
- OB Not Recorded at the Time of Initial Observation

Note: Error Code Should Be Circled, Dated And Initialed When Recorded

Hazard Classifications

- Class 1 Explosives
- Class 2 Gas
- Class 3 Flammable Liquid
- Class 4 Flammable Solids (Potential spontaneous combustion, or emission of flammable gases when in contact with water)
- Class 5 Oxidizing Substances and Organic Peroxides
- Class 6 Toxic (poisonous) and infectious substances
- Class 7 Radioactive material
- Class 8 Corrosives
- Class 9 Miscellaneous dangerous goods

Container type abbreviations (for sampling guidelines):

- BR - Boston Round
- ABR - Amber Boston Round
- AJ - Amber Jug
- CWM - Clear Wide Mouth
- AWM - Amber Wide Mouth
- Poly - Polyethylene Bottles
- BOD Bottle

Jefferson Proving Ground 4/14/09
01-0833-04-4228-310, ERM
MW-DU-006, MW-DU-007
ERM Well Sampling (MW-006, MW-007)
SF 4/14/09 SF 4/14/09

1148 Leave MW-5 for MW-6.

1202 Arrived at MW-6. The water level at MW-6 is 21.21 feet BPVC. The water quality parameters at MW-6 are:
pH = 6.26
Conductivity = 61.5 S/cm
Turbidity = 5.1 NTU
Temperature = 12.6 °C

1210 Collect sample MW-DU-006 (at MW-6) for Total / Isotopic Uranium (2, 1L plastic - unfiltered & unpreserved) using a disposable bailer. Sample field ID is SAIC11E.

1217 Leave MW-6 for MW-7.

1225 Arrived at MW-7. The water level at MW-7 is 9.86 feet BPVC. The water quality parameters at MW-7 are:
pH = 6.37
Conductivity = 81.9 S/cm
Turbidity = 17.4 NTU
Temperature = 10.8 °C

1232 Collect sample MW-DU-007 (at MW-7)(SAIC11E) for Total / Isotopic Uranium (2, 1L plastic - unfiltered & unpreserved) using a disposable bailer. Also collect duplicate sample (SAIC11DE).

Jefferson Proving Ground 4/14/09
01-0833-04-4228-310, ERM
ERM well Sampling (MW-DU-003)

1247 Leave MW-7 for MW-3.

1256 Arrived at MW-3. The water level at MW-3 is 8.92 feet BPVC. Simon is unsure that Ken Knauf bailed this well after comparing data from previous sampling activities. Todd decides to go back to field office and see if Ken is around.

1305 Leave MW-3 for field office.

1307 Arrived back at field office. Todd is going to inquire with Ken Knauf on which wells he purged.

1322 Leave field office and going back to MW-3 as Ken Knauf actually purged it this morning.

1330 Arrived back at MW-3. The water level at MW-3 is 8.60 feet BPVC. The water quality parameters at MW-3 are:
pH = 6.42
Conductivity = 73.8 S/cm
Turbidity = 9.3 NTU
Temperature = 10.4 °C

4/14/09

Location: Jefferson Proving Ground Date: 4/14/09

Project/Client: 01-0833-04-4228-30, ERM

ERM well Sampling (MW-DU-003, MW-DU-001)

1345 Collect sample MW-DU-003 (at MW-3) (SAIC IIE) for Total/Isotopic Uranium (2, 1L plastic - unfiltered & unpreserved) using a disposable bailer.

1353 Leave MW-3 for MW-1.

1402 Arrived at MW-1. The ~~water~~ level at MW-1 is 28.63 feet BPVC. The water quality parameters at MW-1 are:
pH = 6.58
Conductivity = 61.3 S/cm
Turbidity = 9.3 NTU
Temperature = 12.5 °C

1414 Collect sample MW-DU-001 (at MW-1) (SAIC IIE) for Total / Isotopic Uranium (2, 1L plastic - unfiltered & unpreserved) Using a disposable bailer.

1424 Leave MW-1 for MW-4.

1442 Arrived at MW-4. The water level at MW-4 is 3.64 feet BPVC. The water quality parameters at MW-4 are:
pH = 6.66
Conductivity = 65.0 S/cm
Turbidity = 27.9 NTU
Temperature = 11.9 °C

1-5 4/14/09

Location: Jefferson Proving Ground Date: 4/14/09

Project/Client: 01-0833-04-4228-316, ERM

ERM Sampling (MW-DU-004, MW-DU-008)

1455 Collect sample MW-DU-004 (at MW-4) (SAIC IIE) for Total / Isotopic Uranium (2, 1L plastic - unfiltered & unpreserved) using a disposable bailer.

1503 Leave MW-4 for MW-8.

1515 Arrived at MW-8. The water level at MW-8 is 23.25 feet BPVC. The water quality parameters at MW-8 are:
pH = 6.78
Conductivity = 46.1 S/cm
Turbidity = 1.5 NTU
Temperature = 12.4 °C

1538 Collect sample MW-DU-008 (at MW-8) (SAIC IIE) for Total/Isotopic Uranium (2, 1L plastic - unfiltered & unpreserved) Using a disposable bailer.

1546 Leave MW-8 for field office.

1602 Arrived at field office.

1612 Todd decides to check Big Creek's condition. Therefore, Todd, Simon, and Jim leave the field office for Big Creek around MW-5.

1628 Arrived at MW-5's Big Creek. Todd is observing the creek flow.

Jefferson Proving Ground 4/14/09
01-0833-04-8527-600, Gain/loss Survey

Stream Gauge Check

1640 Left the stream gauge at bridge north of MW-5 and going back to field office. Met up with Matt's team en route.
1710 Arrived at field office. Unloading equipment
1726 Simon leaves the field office. Meet next day at field office at 0700.

SF 4/14/09

SF 4/14/09

Jefferson Proving Ground 4/15/09
01-0833-04-8527-600, Gain/Loss Survey

Gain/Loss Study

0700 Simon Fong (SAIC) arrived at field office at Jefferson Proving Ground. Rainy. Loading equipment for Gain/Loss Study
0745 Everyone leave field office for Big Creek.
0810 Arrived at bridge that connects MW-5 and JPG-DU-021 / JPG-DU-020 wells. Todd is downloading stream gauge data.
0820 Everyone leave the bridge area for the intersection of west recovery road and D road. Everyone walk down the bank toward Big Creek to start Gain/Loss Study. Simon is teamed with Alan Miller (SAIC) and Jim Struter (SAIC). Simon is doing the stream flow-rates.
1305 Matt Logan (SAIC) dropped by to inform Simon, Alan, and Jim that it is time for Jim to go. Jim and Simon leave the Big Creek area near MW-11 for the field office.
1338 Jim and Simon arrived at field office. Jim is getting ready for the airport.
1400 Simon and Jim leave field office for Louisville Airport.

D-M 4/15/09

10

Location: Jefferson Proving Ground Date: 4/15/09

Project/Client: 01-0833-04-4220-310, ERM

ERM Well Sampling - Equipment Calibration

1517 Arrived at Louisville Airport. Simon dropped Jim Strader off. Simon is going back to Jefferson Proving Ground.

1637 Simon arrived back at JPG field office. Simon informed Todd Ecley (SAIC) that since he is not needed to finish the Gain/Loss study, Simon will boil the remaining monitoring wells for samples.

1642 Simon is calibrating the Horiba U-22 water quality checker (# 15509) from Harrisburg Equipment & Supply. Calibration is done using Auto Calibration Solution from Harrisburg Equipment & Supply (Lot # 6685, Expires 11/12/09).

4/15/09 Horiba # 15509

	Pre-Calibrate Reading	Post-Calibrate Reading	Standard
pH	3.95	3.99	4.000
Turbidity (NTU)	1.3	0.0	0.0
Conductivity (S/cm)	0.427	0.451	0.449

1646 Simon left the field office for MW-2.

1654 Simon arrived at MW-2. The water level at MW-2 is 9.85 feet BPVC. The water quality parameters at MW-2 are:

4/15/09

11

Location: Jefferson Proving Ground Date: 4/15/09

Project/Client: 01-0833-04-4220-310, ERM

ERM Well Sampling (MW-DU-0002, MW-DU-0010)

1654 (continued) pH = 5.92
Conductivity = 76.1 S/cm
Turbidity = 5.9 NTU
Temperature = 10.3 °C

1705 Collect sample MW-DU-0002 (at MW-2) (SAIC IIE) for Total/Isotopic Uranium (2, 1L plastic - unfiltered & unpreserved) using a disposable bailer.

1728 Leave MW-2. TRM is reinserted back down well MW-2 but not restarted. Going to MW-10.

1800 Arrived at MW-10. The water level at MW-10 is 3.82 feet BPVC. The water quality parameters at MW-10 are:
pH = 6.26
Conductivity = 85.8 S/cm
Turbidity = 6.9 NTU
Temperature = 10.2 °C

1807 Collect Sample MW-DU-0010 (at MW-10) (SAIC IIE) for Total/Isotopic Uranium (2, 1L plastic - unfiltered & unpreserved) using a disposable bailer.

1818 Leave MW-10 for MW-9.

4/15/09

Jefferson Proving Ground 4/15/09
01-0833-04-4220-310, ERM
ERM well Sampling (MW-DU-011)

1821 Arrived at MW-9. The water level at MW-9 is 37.26 feet BTVC. The bottom of the well is 38.58 feet BTVC. Simon decides to not sample this well due to a lack of water.

1829 Leave MW-9 for MW-11.

1832 Arrived at MW-11. The water level at MW-11 is 7.92 feet BTIC. The water quality parameters at MW-11 are:
pH = 6.64
Conductivity = 35.3 S/cm
Turbidity = 2.0 NTU
Temperature = 10.0 °C

1838 Collect Sample MW-DU-011 (at MW-11) (SAIC 11E) for Total / Isotopic Uranium (2, 1L plastic - unpreserved & unfiltered) Using a disposable bailer.

1853 Leave MW-11 and going back to field office.

1715 Arrived back at field office. Matt Logan (SAIC) said it'll be another hour before his team gets back.

2000 Matt's team arrived back to field office. Unloading.

4/15/09

Jefferson Proving Ground 4/15/09
01-0833-04-4220-310, ERM
ERM well Sampling

2010 Everyone leave the field office. Meet next day at field office at 0700.

Sf 4/15/09

4/15/09

Location: Jefferson Proving Ground Date: 4/16/09

Project / Client: #1-0833-04-4220-310, ERM

ERM Surface Water/Sediment Sampling

0705 Simon Fong (SAIC) arrived at field office. Checking on samples collected the last two days. Weather is dry but cool. Highs in 60s.

0720 Matt Logan (SAIC) conducted the safety meeting.

0800 Everyone left the field office for starting the ERM Surface Water and Sediment Sampling

1120 Everyone arrived back at field office. Unloading ERM equipment items and getting Slug test items ready.

1130 Lunch break

1132 Matt Logan already calibrated the Horiba U-22 water quality checker (# 15498) this morning. These are the results:

15498 Horiba

	Pre-Calibration Reading	Post-Calibration Reading	Standard
pH	3.90	3.99	4.00
Conductivity (S/cm)	0.431	0.452	0.449
Turbidity (NTU)	0.2	0.0	0.0

1200 Simon left field office for MW-9.

1218 Arrived at MW-9. The water level at MW-9 is 37.32 feet BTOC. Since the bottom of the well is 38.58 feet BTOC, there is not enough water to take water quality parameters and for required sample volume of 2 L plastic

4/16/09

Location: Jefferson Proving Ground Date: 4/16/09

Project / Client: #1-0833-04-4220-310, ERM

ERM Well Sampling (MW-DU-0009), Sample Management

1225 Collect sample MW-DU-0009 (at MW-9) (SAIC IIE) for Total/Isotopic Uranium (2, 1L plastic - unfiltered & unpreserved) using a disposable bailer.

1242 Simon bailed the well MW-9 dry but was only able to get about 1.7 L of groundwater for samples.

1251 Leave MW-9 to rendevous with Eric Schumpf's team at JP6-DU01D.

1258 Arrived at JP6-DU-01D. Dropped off water tape. Eric & Simon are going back to field office to manage samples and rad scan equipment.

1327 Arrived back at field office. Sample management.

1605 Eric and Simon left the field office. Simon dropped Eric off at the Madison, IN motel before going to Columbus, IN FedEx

1730 Arrived at Columbus, IN FedEx. Dropping off 3 sample coolers for test America-St. Louis Lab:

Tracking #s - 7965 2602-3191
7965-2602-3228
7975-1388-1150

4/16/09

Jefferson Proving Ground 4/16/09
01-0833-04-4220-310, ERM
Sample Management.

1740 Simon left FedEx and is going back to Madison, IN.

1900 Arrived back at Madison, IN motel. Meet next day at 0700 at Jefferson Proving Ground field office.

SF 4/16/09

1 - 7 4/16/09

Jefferson Proving Ground 4/17/09
01-0833-04-9381-210, Slug Testing
Slug-Testing, Demobilization

0700 Simon Fong (SAIC) arrived at field office. Got 6 bags of ice. Discussing plan about slug testing.

0740 Everyone leave the field office for JPG-DU-011. Weather today is sunny & dry with highs in low 70s. Currently it is cool at 40°F.

0800 Arrived at JPG-DU-011. Commence slug testing. Slug testing involves taking an initial depth to water; adding a datalogger to track the changes in water levels; waiting for displaced water to get back to initial levels; insert the slug (a long pole about 4 feet with sand inside them) into well and check for changes in displaced water and the time it takes for displaced water to go back to initial levels.

0945 Simon left the slug-test team for field office.

1008 Arrived at field office. Dropping off items and returning gate key to Ken Knott's office.

1020 Leave Jefferson Proving Ground for Cincinnati Airport.

1400 Fly out of Cincinnati Int'l Airport for Dallas Int'l Airport.

1 - 7 4/16/09

18

Location: Jefferson Proving Ground Date: 4/10/09

Project / Client: 01-0833-04-4220-310, ERM

ERM Well Purging (Ken Knauf)

The following information were compiled by Ken Knauf (JPG Site Manager). It is copied to this logbook.

1040 Ken Knauf (JPG Site Manager) started to purge wells as part of the Environmental Radiation Monitoring (ERM) Sampling Site. The weather on 4/10/09 was cloudy and the temperature is around 59°F. At well MW-7, Ken bailed the well (purged using a disposable bailer) 35 times. The wal did not go dry.

1103 Ken stopped purging MW-7. Proceeded to MW-6.

1111 Ken purged well MW-6 with 21 bails and dried the well.

1130 Ken completed purging MW-6. Proceeded to MW-5.

1151 Ken purged well MW-5 with 10 bails and dried the well.

1200 Ken completed purging MW-5.

1 of 3 4/10/09

19

Location: Jefferson Proving Ground Date: 4/14/09

Project / Client: 01-0833-04-4220-310, ERM

ERM Well Purging (Ken Knauf)

The following information were compiled by Ken Knauf (JPG Site Manager). It is copied to this logbook.

0801 Ken Knauf (JPG Site Manager) continued purging wells for ERM sampling. Weather on 4/14/09 is rainy and the temperature is around 56°F. Ken purged these ERM wells using a disposable bailer. Ken purged the wells to dry. At MW-3, Ken bailed the well 25 times before it went dry.

0823 Ken completed purging MW-3. Proceeded to MW-1.

0838 Ken purged MW-1 with 15.5 bails and dried the well.

0850 Ken completed purging MW-1. Proceed to MW-4

1100 Ken purged well MW-4 with 31 bails. MW-4 never went dry.

1119 Ken stopped purging MW-4. Proceeded to MW-8.

1130 Ken purged well MW-8 with 5 bails and dried the well.

1139 Ken completed purging MW-8.

2 of 3 4/14/09

Jefferson Proving Ground 4/14/09

01-0833-04-4220-310, ERM

ERM Well Purging (Ken Knauf)

1404 Ken purged MW-11 with 23.5 bails and dried the well. Weather is still raining around 40s °F.

1423 Ken completed purging MW-11. Proceeded to MW-10.

1434 Ken purged well MW-10 with 33 bails and dried the well.

1455 Ken completed purging MW-10. Proceeded to MW-9

1502 Ken purged well MW-9 with 4 bails and dried the well.

1505 Ken completed purging MW-9. Proceeded to MW-2

1539 Ken purged well MW-2 with 9 bails and dried the well.

1546 Ken completed purging MW-2.

4/14/09

Jefferson Proving Ground 4/14/09

01-0833-04-4220-310, ERM

ERM Well Purging Table (summary)

Well ID	Date of Purge	Purge Start Time	Purge End Time	Number of Bails	Notes / Weather
MW-7	4/10/09	1040	1103	35	Did not purge well dry / 59°F cloudy
MW-6	4/10/09	1111	1130	21	well purged dry / 59°F cloudy
MW-5	4/10/09	1151	1200	10	well purged dry / 59°F cloudy
MW-3	4/14/09	801	823	25	well purged dry / 56°F Rainy
MW-1	4/14/09	838	850	15.5	well purged dry / 56°F Rainy
MW-4	4/14/09	1100	1119	31	Did not purge well dry / 56°F Rainy
MW-8	4/14/09	1130	1139	5	well purged dry / 56°F Rainy
MW-11	4/14/09	1404	1423	23.5	well purged dry / 40s °F Rainy
MW-10	4/14/09	1434	1455	33	well purged dry / 40s °F Rainy
MW-9	4/14/09	1502	1505	4	well purged dry / 40s °F Rainy
MW-2	4/14/09	1539	1546	9	well purged dry / 40s °F Rainy

4/14/09

SAMPLE LOG SHEET

PROJECT NAME: JPG **PROJECT NO:**

SAMPLE ID NUMBER: SD/SW-JM-0001 DATE COLLECTED (MM/DD/YY): 4-16-09
TIME: 1100 / 1105
SW / SD

SAMPLING LOCATION CODE: ____________
DESCRIPTION: Surface water / sediment sample

SAMPLING POINT CODE: ____________
DESCRIPTION ____________

NORTHING: ________ EASTING: ________ ELEVATION: ________

SAMPLE DEPTH CODE: ____ : ____ TO ____________ BLS
SAMPLE MEDIA CODE: ________ DESCRIPTION: ________

WEATHER: Partly cloudy 50°F ACTIVITIES IN AREA: ________
FIELD OBSERVATIONS: Water dipped directly from stream. Collected silty seds upstream of bridge.

44-9 "C" Bkgd 48 cpm

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	47	cpm		
TEMPERATURE:	10.2	°C		
pH:	7.20	std units		
CONDUCTIVITY:	0.131	mS/cm		
REDOX:	260	mV		
DO:	10.03	mg/L		
ORGANIC VAPORS:	–	–		
TURBIDITY:	8.5	NTU		
OTHER dose:	5	µR/hr		

SAMPLE TYPE: ☒ GRAB ☐ SPATIAL COMPOSITE ☐ TIME COMPOSITE
☐ QC TRIP BLANK ☐ QC RINSATE ☐ QC FIELD BLANK
☐ OTHER (SPECIFY) ____________

SAMPLE COLLECTED: ☒ YES ☐ NO SAP SAMPLING PROCEDURE WAS FOLLOWED: ☒ YES ☐ NO
IF SAP WAS NOT FOLLOWED, SPECIFY WHAT DEVIATIONS WERE NECESSARY AND WHY:

Recorded By: [signature] (Signature) QC Checked By: ____________ (Signature)

SAMPLE LOG SHEET

PROJECT NAME: JPG **PROJECT NO:**

SAMPLE ID NUMBER: SD/SW-01-000 DATE COLLECTED (MM/DD/YY): 4-16-09
TIME: 1035/1040
SW/SD

SAMPLING LOCATION CODE:
DESCRIPTION:

SAMPLING POINT CODE:
DESCRIPTION Surface water / sediment sample

NORTHING: EASTING: ELEVATION:

SAMPLE DEPTH CODE: ____ : ____ TO ____ BLS
SAMPLE MEDIA CODE: DESCRIPTION:

WEATHER: Mostly cloudy, 50°F ACTIVITIES IN AREA:
FIELD OBSERVATIONS: Water dipped directly from stream. U fn sand-silt collected on N bank of BC ~ 30' upstream of bridge.

Background 44-9C, 38 cpm

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	35	cpm		
TEMPERATURE:	10.0	°C		
pH:	6.86	std units		
CONDUCTIVITY:	0.147	mS/cm		
REDOX:	264	mV		
DO:	4.72	mg/L		
ORGANIC VAPORS:	—	—		
TURBIDITY:	12.2	NTU		
OTHER dose:	5	µR/hr		

SAMPLE TYPE:
- [x] GRAB
- [ ] SPATIAL COMPOSITE
- [ ] TIME COMPOSITE
- [ ] QC TRIP BLANK
- [ ] QC RINSATE
- [ ] QC FIELD BLANK
- [ ] OTHER (SPECIFY)

SAMPLE COLLECTED: [x] YES [ ] NO SAP SAMPLING PROCEDURE WAS FOLLOWED: [x] YES [ ] NO
IF SAP WAS NOT FOLLOWED, SPECIFY WHAT DEVIATIONS WERE NECESSARY AND WHY:

Recorded By: [signature] (Signature) QC Checked By: (Signature)

SAMPLE LOG SHEET

PROJECT NAME: **PROJECT NO:**

SAMPLE ID NUMBER: SDISW-DW-003 DATE COLLECTED (MM/DD/YY): 4-14-09

TIME: 1230/1235

SW/SD DUP of sediment

SAMPLING LOCATION CODE: ____________

DESCRIPTION: SW / Sed sample

SAMPLING POINT CODE: ____________

DESCRIPTION ____________

NORTHING: ________ EASTING: ________ ELEVATION: ________

SAMPLE DEPTH CODE: ____ : ____ TO ____________ BLS

SAMPLE MEDIA CODE: ________ DESCRIPTION: ________

WEATHER: Cloudy 50°F ACTIVITIES IN AREA: ________

FIELD OBSERVATIONS: Creek at high stage, muddy. Collected sample ~15' [illegible] of stream of bridge at [illegible] (Coffee) where flow eddies behind tree. Seds are v.fn-med sand w/ silt.

44-9B Background 26 uR/hr

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	32	cpm		
TEMPERATURE:	11.3	°C		
pH:	6.15	std units		
CONDUCTIVITY:	0.089	mS/cm		
REDOX:	218	mV		
DO:	9.07	mg/L		
ORGANIC VAPORS:	—	—		
TURBIDITY:	31.1	NTU		
OTHER dose :	5	uR/hr		

SAMPLE TYPE: ☒ GRAB ☐ SPATIAL COMPOSITE ☐ TIME COMPOSITE ☐ QC TRIP BLANK ☐ QC RINSATE ☐ QC FIELD BLANK ☐ OTHER (SPECIFY) ____________

SAMPLE COLLECTED: ☒ YES ☐ NO SAP SAMPLING PROCEDURE WAS FOLLOWED: ☒ YES ☐ NO

· IF SAP WAS NOT FOLLOWED, SPECIFY WHAT DEVIATIONS WERE NECESSARY AND WHY:

Recorded By: [signature] (Signature) QC Checked By: ____________ (Signature)

SAMPLE LOG SHEET

PROJECT NAME: JAC **PROJECT NO:**

SAMPLE ID NUMBER: SD/SW-DU-0004 DATE COLLECTED (MM/DD/YY): 4-16-09

TIME: ~~0830/0900~~ SW/SD

SAMPLING LOCATION CODE: _____ Dup of water

DESCRIPTION: Surface Water / sediment sample

SAMPLING POINT CODE: _____

DESCRIPTION _____

NORTHING: _____ EASTING: _____ ELEVATION: _____

SAMPLE DEPTH CODE: _____ : _____ TO _____ BLS

SAMPLE MEDIA CODE: _____ DESCRIPTION: _____

WEATHER: Cloudy 45°F ACTIVITIES IN AREA: _____

FIELD OBSERVATIONS: Water dipped directly from stream. Collected grab sand-silt sediment at S bank of Big Creek, ~30' downstream of BC-03

44-9C background = 44 mR/hr

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	43	cpm		
TEMPERATURE:	8.9	°C		
pH:	6.57	standards		
CONDUCTIVITY:	0.153	mS/cm		
REDOX:	245	mV		
DO:	9.73	mg/L		
ORGANIC VAPORS:	—	—		
TURBIDITY:	+14.9	NTU		
OTHER dose:	6	mR/hr		

SAMPLE TYPE: ☒ GRAB ☐ SPATIAL COMPOSITE ☐ TIME COMPOSITE
☐ QC TRIP BLANK ☐ QC RINSATE ☐ QC FIELD BLANK
☐ OTHER (SPECIFY) _____

SAMPLE COLLECTED: ☒ YES ☐ NO SAP SAMPLING PROCEDURE WAS FOLLOWED: ☒ YES ☐ NO
IF SAP WAS NOT FOLLOWED, SPECIFY WHAT DEVIATIONS WERE NECESSARY AND WHY:

Recorded By: _____ QC Checked By: _____
(Signature) (Signature)

SAMPLE LOG SHEET

PROJECT NAME: JPG **PROJECT NO:**

SAMPLE ID NUMBER: SD/SW-DN-0005 DATE COLLECTED (MM/DD/YY): 4.16.09
TIME: 0955/1000
SW/SD

SAMPLING LOCATION CODE: _____
DESCRIPTION: Surface water / Sediment sample

SAMPLING POINT CODE: _____
DESCRIPTION _____

NORTHING: _____ EASTING: _____ ELEVATION: _____

SAMPLE DEPTH CODE: _____ : _____ TO _____ BLS
SAMPLE MEDIA CODE: _____ DESCRIPTION: _____

WEATHER: Cloudy 50°F ACTIVITIES IN AREA: _____
FIELD OBSERVATIONS: Creek at normal stage. Water dipped directly from stream. Collected fine red sand on S bank of Big Creek, across from DC-09

Background 44.9C = 38 cpm

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	35	cpm		
TEMPERATURE:	9.6	°C		
pH:	6.50	SU units		
CONDUCTIVITY:	0.163	mS/cm		
REDOX:	370	mV		
DO:	9.44	mg/L		
ORGANIC VAPORS:	—	—		
TURBIDITY:	12.9	NTU		
OTHER dose:	6	mR/hr		

SAMPLE TYPE: ☒ GRAB ☐ SPATIAL COMPOSITE ☐ TIME COMPOSITE
☐ QC TRIP BLANK ☐ QC RINSATE ☐ QC FIELD BLANK
☐ OTHER (SPECIFY) _____

SAMPLE COLLECTED: ☒ YES ☐ NO SAP SAMPLING PROCEDURE WAS FOLLOWED: ☒ YES ☐ NO
IF SAP WAS NOT FOLLOWED, SPECIFY WHAT DEVIATIONS WERE NECESSARY AND WHY:

Recorded By: _____ QC Checked By: _____
(Signature) (Signature)

SAMPLE LOG SHEET

PROJECT NAME: JPG **PROJECT NO:**

SAMPLE ID NUMBER: SD/SW-01-006 DATE COLLECTED (MM/DD/YY): 4.14.09

TIME: SW / SD
1105 / 1110

SAMPLING LOCATION CODE: _____

DESCRIPTION: SW / sediment sample

SAMPLING POINT CODE: _____

DESCRIPTION _____

NORTHING: _____ EASTING: _____ ELEVATION: _____

SAMPLE DEPTH CODE: _____: _____ TO _____ BLS

SAMPLE MEDIA CODE: _____ DESCRIPTION: _____

WEATHER: Cloudy 50°F ACTIVITIES IN AREA: _____

FIELD OBSERVATIONS: Creek at high stage. Collected fn-med sand w/ some gravel downstream of where N trib enters into S trib. Water sample dipped directly from stream

44.98 · background · 37 cpm, 5-7 mR/hr

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	24	cpm		
TEMPERATURE:	11.2	°C		
pH:	5.68	SU units		
CONDUCTIVITY:	0.081	mS/cm		
REDOX:	217	mV		
DO:	9.93	mg/L		
ORGANIC VAPORS:	—	—		
TURBIDITY:	39.9	NTU		
OTHER dose:	5	mR/hr		

SAMPLE TYPE: ☒ GRAB ☐ SPATIAL COMPOSITE ☐ TIME COMPOSITE
☐ QC TRIP BLANK ☐ QC RINSATE ☐ QC FIELD BLANK
☐ OTHER (SPECIFY) _____

SAMPLE COLLECTED: ☒ YES ☐ NO SAP SAMPLING PROCEDURE WAS FOLLOWED: ☒ YES ☐ NO
IF SAP WAS NOT FOLLOWED, SPECIFY WHAT DEVIATIONS WERE NECESSARY AND WHY:

Recorded By: _____ QC Checked By: _____
(Signature) (Signature)

SAMPLE LOG SHEET

PROJECT NAME: JPG **PROJECT NO:**

SAMPLE ID NUMBER: SD/SW-DN-007 DATE COLLECTED (MM/DD/YY): 4-14-09
TIME: 1650 / 1655
SD / SW

SAMPLING LOCATION CODE: ____
DESCRIPTION: Surface water / sediment sample

SAMPLING POINT CODE: ____
DESCRIPTION ____

NORTHING: ____ EASTING: ____ ELEVATION: ____

SAMPLE DEPTH CODE: ____:____ TO ____ BLS
SAMPLE MEDIA CODE: ____ DESCRIPTION: ____

WEATHER: Cloudy 50°F ACTIVITIES IN AREA: ____
FIELD OBSERVATIONS: Collected UFn sand - silt w/ gravel W of bridge on Middle Fork. Water at same location.

44-9B background = 32 cpm

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	40	cpm		
TEMPERATURE:	11.0	°C		
pH:	6.90	SU units		
CONDUCTIVITY:	0.048	mS/cm		
REDOX:	249	mV		
DO:	9.38	mg/L		
ORGANIC VAPORS:	—	—		
TURBIDITY:	23.4	NTU		
OTHER dose :	5	uR/hr		

SAMPLE TYPE: ☒ GRAB ☐ SPATIAL COMPOSITE ☐ TIME COMPOSITE
☐ QC TRIP BLANK ☐ QC RINSATE ☐ QC FIELD BLANK
☐ OTHER (SPECIFY) ____

SAMPLE COLLECTED: ☒ YES ☐ NO SAP SAMPLING PROCEDURE WAS FOLLOWED: ☒ YES ☐ NO
IF SAP WAS NOT FOLLOWED, SPECIFY WHAT DEVIATIONS WERE NECESSARY AND WHY:

Recorded By: [signature] QC Checked By: ____
(Signature) (Signature)

SAMPLE LOG SHEET

PROJECT NAME: JP6 **PROJECT NO:**

SAMPLE ID NUMBER: SD/SW-DU-008 DATE COLLECTED (MM/DD/YY): 4.14.09

TIME: 1510 / 1520

SW / SD

SAMPLING LOCATION CODE: _____

DESCRIPTION: SW/Sediment location

SAMPLING POINT CODE: _____

DESCRIPTION _____

NORTHING: _____ EASTING: _____ ELEVATION: _____

SAMPLE DEPTH CODE: _____ : _____ TO _____ BLS

SAMPLE MEDIA CODE: _____ DESCRIPTION: _____

WEATHER: Cloudy, 50°F ACTIVITIES IN AREA: _____

FIELD OBSERVATIONS: Creek at high flow, turbid. Collected w/ trowel. Silt on N bank of RC, E of bridge at Morgan and D Road. Water at same location.

44.98 background = 44 uR/hr

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	52	cpm		
TEMPERATURE:	11.0	°C		
pH:	6.30	SU		
CONDUCTIVITY:	0.145	S/cm		
REDOX:	235	mV		
DO:	9.92	g/L		
ORGANIC VAPORS:	-	-		
TURBIDITY:	67.8	NTU		
OTHER ~~DAP~~ dose:	~~253~~ 5	~~mR/hr~~ uR/hr		

SAMPLE TYPE: ☒ GRAB ☐ SPATIAL COMPOSITE ☐ TIME COMPOSITE
☐ QC TRIP BLANK ☐ QC RINSATE ☐ QC FIELD BLANK
☐ OTHER (SPECIFY) _____

SAMPLE COLLECTED: ☒ YES ☐ NO SAP SAMPLING PROCEDURE WAS FOLLOWED: ☒ YES ☐ NO
IF SAP WAS NOT FOLLOWED, SPECIFY WHAT DEVIATIONS WERE NECESSARY AND WHY:

Recorded By: _____ QC Checked By: _____
(Signature) (Signature)

SAMPLE LOG SHEET

PROJECT NAME: JPG **PROJECT NO:**

SAMPLE ID NUMBER: SS-DU-001 DATE COLLECTED (MM/DD/YY): 4-14-09
TIME: 1200

SAMPLING LOCATION CODE: _____
DESCRIPTION: Surface soil sample

SAMPLING POINT CODE: _____
DESCRIPTION _____

NORTHING: _____ EASTING: _____ ELEVATION: _____

SAMPLE DEPTH CODE: _____ : _____ TO _____ BLS
SAMPLE MEDIA CODE: _____ DESCRIPTION: _____

WEATHER: Cloudy 50°F ACTIVITIES IN AREA: _____
FIELD OBSERVATIONS: Collected just N of southern end of DU area of eastern perimeter of DU area, along Wagon road. Silty soil w/ some material moist

4-9-09 background = 43uR/hr

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	61	cpm		
TEMPERATURE:				
pH:				
CONDUCTIVITY:				
REDOX:				
DO:				
ORGANIC VAPORS:				
TURBIDITY:				
OTHER dose :	6	uR/hr		

SAMPLE TYPE: ☒ GRAB ☐ SPATIAL COMPOSITE ☐ TIME COMPOSITE
☐ QC TRIP BLANK ☐ QC RINSATE ☐ QC FIELD BLANK
☐ OTHER (SPECIFY) _____

SAMPLE COLLECTED: ☐ YES ☐ NO SAP SAMPLING PROCEDURE WAS FOLLOWED: ☐ YES ☐ NO
IF SAP WAS NOT FOLLOWED, SPECIFY WHAT DEVIATIONS WERE NECESSARY AND WHY:

Recorded By: _____ QC Checked By: _____
(Signature) (Signature)

SAMPLE LOG SHEET

PROJECT NAME: JPG **PROJECT NO:**

SAMPLE ID NUMBER: SS-OU-002 DATE COLLECTED (MM/DD/YY): 4-14-09
TIME: 1440

SAMPLING LOCATION CODE: _____
DESCRIPTION: Surface soil

SAMPLING POINT CODE: _____
DESCRIPTION _____

NORTHING: _____ EASTING: _____ ELEVATION: _____

SAMPLE DEPTH CODE: _____ : _____ TO _____ BLS
SAMPLE MEDIA CODE: _____ DESCRIPTION: _____

WEATHER: Cloudy 50°F ACTIVITIES IN AREA: _____
FIELD OBSERVATIONS: Collected silty soil w/ some soot material E of western perimeter of OU, impact area, E of Morgan & E. Road

44-98 background: 40 uR/hr

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	60	cpm		
TEMPERATURE:				
pH:				
CONDUCTIVITY:				
REDOX:				
DO:				
ORGANIC VAPORS:				
TURBIDITY:				
OTHER dose:	6	uR/hr		

SAMPLE TYPE: ☒ GRAB ☐ SPATIAL COMPOSITE ☐ TIME COMPOSITE
☐ QC TRIP BLANK ☐ QC RINSATE ☐ QC FIELD BLANK
☐ OTHER (SPECIFY) _____

SAMPLE COLLECTED: ☒ YES ☐ NO SAP SAMPLING PROCEDURE WAS FOLLOWED: ☒ YES ☐ NO
IF SAP WAS NOT FOLLOWED, SPECIFY WHAT DEVIATIONS WERE NECESSARY AND WHY:

Recorded By: _____ QC Checked By: _____
(Signature) (Signature)

SAMPLE LOG SHEET

PROJECT NAME: JPG **PROJECT NO:**

SAMPLE ID NUMBER: SS-DU-003 DATE COLLECTED (MM/DD/YY): 4-14-09
TIME: 1345

SAMPLING LOCATION CODE: ____
DESCRIPTION: Surface soil

SAMPLING POINT CODE: ____
DESCRIPTION ____

NORTHING: ____ EASTING: ____ ELEVATION: ____

SAMPLE DEPTH CODE: ____:____ TO ____ BLS
SAMPLE MEDIA CODE: ____ DESCRIPTION: ____

WEATHER: Cloudy 50°F ACTIVITIES IN AREA:
FIELD OBSERVATIONS: Collected silty sand w/ some root material just W of eastern perimeter of DU impact area. Followed old road from E: Wonju Rd. Soils moist

44-9B background = 36 uR/hr

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	51	cpm		
TEMPERATURE:				
pH:				
CONDUCTIVITY:				
REDOX:				
DO:				
ORGANIC VAPORS:				
TURBIDITY:				
OTHER dose:	6	uR/hr		

SAMPLE TYPE: ☒ GRAB ☐ SPATIAL COMPOSITE ☐ TIME COMPOSITE
☐ QC TRIP BLANK ☐ QC RINSATE ☐ QC FIELD BLANK
☐ OTHER (SPECIFY) ____

SAMPLE COLLECTED: ☒ YES ☐ NO SAP SAMPLING PROCEDURE WAS FOLLOWED: ☒ YES ☐ NO
IF SAP WAS NOT FOLLOWED, SPECIFY WHAT DEVIATIONS WERE NECESSARY AND WHY:

Recorded By: [signature] (Signature) QC Checked By: ____ (Signature)

SAMPLE LOG SHEET

PROJECT NAME: JPG **PROJECT NO:**

SAMPLE ID NUMBER: SS-DU-004 DATE COLLECTED (MM/DD/YY): 4-14-09

TIME: 1630

Dup at location

SAMPLING LOCATION CODE: _____

DESCRIPTION: Surface soil

SAMPLING POINT CODE: _____

DESCRIPTION _____

NORTHING: _____ EASTING: _____ ELEVATION: _____

SAMPLE DEPTH CODE: _____ : _____ TO _____ BLS

SAMPLE MEDIA CODE: _____ DESCRIPTION: _____

WEATHER: Cloudy 50°F ACTIVITIES IN AREA: _____

FIELD OBSERVATIONS: Collected moist, wet silty soil, just N of southern limit of DU impact area, E of Morgan Rd.

44-90 background: 38 uR/hr

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	46	cpm		
TEMPERATURE:				
pH:				
CONDUCTIVITY:				
REDOX:				
DO:				
ORGANIC VAPORS:				
TURBIDITY:				
OTHER dose:	5	uR/hr		

SAMPLE TYPE: ☒ GRAB ☐ SPATIAL COMPOSITE ☐ TIME COMPOSITE
☐ QC TRIP BLANK ☐ QC RINSATE ☐ QC FIELD BLANK
☐ OTHER (SPECIFY) _____

SAMPLE COLLECTED: ☒ YES ☐ NO SAP SAMPLING PROCEDURE WAS FOLLOWED: ☒ YES ☐ NO
IF SAP WAS NOT FOLLOWED, SPECIFY WHAT DEVIATIONS WERE NECESSARY AND WHY:

Recorded By: _____ QC Checked By: _____
(Signature) (Signature)

APPENDIX C
DATA VALIDATION SUMMARY

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C. DATA VALIDATION SUMMARY

C.1 TestAmerica SDG F9D170271

This report contains the results from the data validation technical review for the Jefferson Proving Ground (JPG) Environmental Radiation Monitoring (ERM) April 2009 samples and analyses that are associated with the above-referenced laboratory and sample delivery group (SDG) number. These data points have been selected for data validation, and the sample data summary sheets on the following pages specifically identify the samples and analyses associated with this validation review.

The JPG validation technical review was conducted in accordance with the U.S. Environmental Protection Agency (USEPA) *Contract Laboratory Program* (CLP) *National Functional Guidelines for Inorganic Data Review* (July 2002) and Science Applications International Corporation (SAIC) Quality Assurance Technical Procedure (QATP) No. TP-DM-300-7, *Data Validation* (Revision 0, 2/2004). The validation technical review was based on the information and documentation supplied by the associated laboratory. The analyses were evaluated against criteria established in the related analytical procedures and the JPG data quality requirements.

The attachment to this report provides the sample data summary sheets for the samples associated with the above-referenced SDGs. These summary sheets identify the analytical values and the qualifiers for each sample and parameter. The attachment also outlines the validation qualifiers and reason codes used in the validation of the data.

Report Summary	
Total Number of Samples	35
Total Number of Data Points	140
Total Number of Rejected Data Points	0
Percent Completeness (approval to rejection ratio)	100%

C.1.1 ANALYTICAL CATEGORY: RADIOCHEMICAL

- Uranium-234 (U-234), Uranium-235 (U-235), and Uranium-238 (U-238) were determined by alpha spectrometry (U.S. Department of Energy [DOE] HASL-300 Methods Compendium A-01-R). Total uranium was calculated using a published specific activity value for U-238 and assuming all of the mass originates from U-238.

- All samples were analyzed with SDG F9D170271.

1. The following items (as applicable) have been addressed during the validation review:

    - Sample custody, integrity, and preservation
    - Sample handling and preparation
    - Holding times
    - Instrument calibration and performance
    - Dilution factors
    - Detection limits
    - Laboratory background and carry-over
    - Overall assessment of the data
    - Quality control (QC)
        - Calibration checks and background
        - Preparation blanks
        - Laboratory control samples
        - Field blanks (if available)
        - Field duplicates (if available)
        - Chemical yield (tracer recovery)
        - Laboratory duplicates.

2. The above items were found to be acceptable, except as follows:

- ***Overall Assessment of Data***—U-234, U-235, and U-238 sample data with results greater than the minimum detectable concentration (MDC) were qualified as estimated, *J*, reason code 37 in instances where the associated error was greater than 50 percent of the sample result.
- ***Method Blank Evaluation***—U-234 was present in the associated water method blanks at 0.05 ± 0.044 and 0.044 ± 0.04 picocuries per liter (pCi/L). This may indicate that contamination could have been introduced during the laboratory preparation. Those samples where the normalized absolute difference (NAD) between the sample and the method blank was less than 2.58 were qualified as estimated, *J,* with a reason code 6 for the U-234 results via alpha spectroscopy. Although the blank contamination required qualification of associated sample data, the contamination was below the requested MDC of 0.1 pCi/L.

The attached sample data summary for soil and water samples provides the qualifiers and the appropriate validation code for all samples.

SAMPLE INDEX	
Laboratory: **TestAmerica Laboratories, Inc.**	*SDG #:* **F9D170271**

Client Sample I.D.	Laboratory Sample I.D.	Date Collected	Analyses Performed
MW-DU-001 SAIC11E	F9D170271-006	04/14/09	Total and Isotopic Uranium
MW-DU-002 SAIC11E	F9D170271-009	04/15/09	Total and Isotopic Uranium
MW-DU-003 SAIC11E	F9D170271-005	04/14/09	Total and Isotopic Uranium
MW-DU-004 SAIC11E	F9D170271-007	04/14/09	Total and Isotopic Uranium
MW-DU-005 SAIC11E	F9D170271-001	04/14/09	Total and Isotopic Uranium
MW-DU-006 SAIC11E	F9D170271-002	04/14/09	Total and Isotopic Uranium
MW-DU-007 SAIC11E	F9D170271-003	04/14/09	Total and Isotopic Uranium
MW-DU-007 SAIC11DE	F9D170271-004	04/14/09	Total and Isotopic Uranium
MW-DU-008 SAIC11E	F9D170271-008	04/14/09	Total and Isotopic Uranium
MW-DU-009 SAIC11E	F9D170271-012	04/16/09	Total and Isotopic Uranium
MW-DU-010 SAIC11E	F9D170271-010	04/15/09	Total and Isotopic Uranium
MW-DU-011 SAIC11E	F9D170271-011	04/15/09	Total and Isotopic Uranium
SW-DU-001 SAIC11E	F9D170271-034	04/16/09	Total and Isotopic Uranium
SW-DU-002 SAIC11E	F9D170271-032	04/16/09	Total and Isotopic Uranium
SW-DU-003 SAIC10E	F9D170271-016	04/14/09	Total and Isotopic Uranium
SW-DU-004 SAIC11E	F9D170271-027	04/16/09	Total and Isotopic Uranium
SW-DU-004 SAIC11DE	F9D170271-028	04/16/09	Total and Isotopic Uranium
SW-DU-005 SAIC11E	F9D170271-030	04/16/09	Total and Isotopic Uranium
SW-DU-006 SAIC11E	F9D170271-013	04/14/09	Total and Isotopic Uranium
SW-DU-007 SAIC11E	F9D170271-025	04/14/09	Total and Isotopic Uranium
SW-DU-008 SAIC11E	F9D170271-021	04/14/09	Total and Isotopic Uranium
SS-DU-001 SAIC11E	F9D170271-015	04/14/09	Total and Isotopic Uranium
SS-DU-002 SAIC11E	F9D170271-020	04/14/09	Total and Isotopic Uranium
SS-DU-003 SAIC11E	F9D170271-019	04/14/09	Total and Isotopic Uranium
SS-DU-004 SAIC11E	F9D170271-023	04/14/09	Total and Isotopic Uranium
SS-DU-004 SAIC11DE	F9D170271-024	04/14/09	Total and Isotopic Uranium
SD-DU-001 SAIC11E	F9D170271-035	04/16/09	Total and Isotopic Uranium
SD-DU-002 SAIC11E	F9D170271-033	04/16/09	Total and Isotopic Uranium
SD-DU-003 SAIC11E	F9D170271-017	04/14/09	Total and Isotopic Uranium
SD-DU-003 SAIC11DE	F9D170271-018	04/14/09	Total and Isotopic Uranium
SD-DU-004 SAIC11E	F9D170271-029	04/16/09	Total and Isotopic Uranium
SD-DU-005 SAIC11E	F9D170271-031	04/16/09	Total and Isotopic Uranium
SD-DU-006 SAIC11E	F9D170271-014	04/14/09	Total and Isotopic Uranium
SD-DU-007 SAIC11E	F9D170271-026	04/14/09	Total and Isotopic Uranium
SD-DU-008 SAIC11E	F9D170271-022	04/14/09	Total and Isotopic Uranium

NA - Not applicable. Sample could not be collected because sample location was dry.

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ATTACHMENT

JEFFERSON PROVING GROUND
SAMPLE DATA SUMMARY SHEETS

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SAMPLE DATA SUMMARY – SOILS	
Laboratory: **TestAmerica Laboratories, Inc.**	*SDG #:* **F9D170271**

Isotopic Uranium
ASTM D3972-90M

Sample I.D.	Analyte	Result	Error	MDC	Units	Qualifier	Reason Code
SS-DU-001 SAIC11E	U-234	0.63	0.12	0.04	pCi/g		
SS-DU-001 SAIC11E	U-235	0.019	0.024	0.035	pCi/g	U	
SS-DU-001 SAIC11E	U-238	0.71	0.13	0.04	pCi/g		
SS-DU-001 SAIC11E	Total U	2.13	0.39	0.11	µg/g		
SS-DU-002 SAIC11E	U-234	0.91	0.15	0.03	pCi/g		
SS-DU-002 SAIC11E	U-235	0.074	0.042	0.026	pCi/g	J	37
SS-DU-002 SAIC11E	U-238	0.85	0.14	0.02	pCi/g		
SS-DU-002 SAIC11E	Total U	2.56	0.43	0.06	µg/g		
SS-DU-003 SAIC11E	U-234	0.73	0.13	0.04	pCi/g		
SS-DU-003 SAIC11E	U-235	0.034	0.028	0.027	pCi/g	J	37
SS-DU-003 SAIC11E	U-238	0.83	0.14	0.04	pCi/g		
SS-DU-003 SAIC11E	Total U	2.49	0.41	0.11	µg/g		
SS-DU-004 SAIC11E	U-234	0.79	0.13	0.02	pCi/g		
SS-DU-004 SAIC11E	U-235	0.059	0.036	0.027	pCi/g	J	37
SS-DU-004 SAIC11E	U-238	0.68	0.12	0.02	pCi/g		
SS-DU-004 SAIC11E	Total U	2.05	0.36	0.07	µg/g		
SS-DU-004 SAIC11DE	U-234	0.78	0.14	0.03	pCi/g		
SS-DU-004 SAIC11DE	U-235	0.055	0.035	0.015	pCi/g	J	37
SS-DU-004 SAIC11DE	U-238	0.77	0.13	0.02	pCi/g		
SS-DU-004 SAIC11DE	Total U	2.32	0.40	0.06	µg/g		
SD-DU-001 SAIC11E	U-234	0.90	0.14	0.04	pCi/g		
SD-DU-001 SAIC11E	U-235	0.081	0.041	0.022	pCi/g	J	37
SD-DU-001 SAIC11E	U-238	0.93	0.14	0.03	pCi/g		
SD-DU-001 SAIC11E	Total U	2.80	0.43	0.09	µg/g		
SD-DU-002 SAIC11E	U-234	0.58	0.11	0.03	pCi/g		
SD-DU-002 SAIC11E	U-235	0.054	0.034	0.023	pCi/g	J	37
SD-DU-002 SAIC11E	U-238	0.66	0.12	0.02	pCi/g		
SD-DU-002 SAIC11E	Total U	2.00	0.35	0.07	µg/g		
SD-DU-003 SAIC11E	U-234	0.71	0.12	0.04	pCi/g		
SD-DU-003 SAIC11E	U-235	0.018	0.024	0.037	pCi/g	U	

Isotopic Uranium ASTM D3972-90M							
Sample I.D.	**Analyte**	**Result**	**Error**	**MDC**	**Units**	**Qualifier**	**Reason Code**
SD-DU-003 SAIC11E	U-238	0.56	0.11	0.05	pCi/g		
SD-DU-003 SAIC11E	Total U	1.68	0.32	0.14	µg/g		
SD-DU-003 SAIC11DE	U-234	0.82	0.14	0.04	pCi/g		
SD-DU-003 SAIC11DE	U-235	0.024	0.024	0.029	pCi/g	U	
SD-DU-003 SAIC11DE	U-238	0.81	0.14	0.03	pCi/g		
SD-DU-003 SAIC11DE	Total U	2.44	0.41	0.09	µg/g		
SD-DU-004 SAIC11E	U-234	0.206	0.063	0.023	pCi/g		
SD-DU-004 SAIC11E	U-235	0.057	0.036	0.029	pCi/g	J	37
SD-DU-004 SAIC11E	U-238	0.224	0.065	0.020	pCi/g		
SD-DU-004 SAIC11E	Total U	0.69	0.19	0.06	µg/g		
SD-DU-005 SAIC11E	U-234	0.141	0.049	0.018	pCi/g		
SD-DU-005 SAIC11E	U-235	0.015	0.017	0.013	pCi/g	J	37
SD-DU-005 SAIC11E	U-238	0.227	0.063	0.021	pCi/g		
SD-DU-005 SAIC11E	Total U	0.68	0.19	0.06	µg/g		
SD-DU-006 SAIC11E	U-234	0.363	0.094	0.040	pCi/g		
SD-DU-006 SAIC11E	U-235	0.058	0.040	0.030	pCi/g	J	37
SD-DU-006 SAIC11E	U-238	0.366	0.094	0.034	pCi/g		
SD-DU-006 SAIC11E	Total U	1.12	0.28	0.10	µg/g		
SD-DU-007 SAIC11E	U-234	0.72	0.13	0.03	pCi/g		
SD-DU-007 SAIC11E	U-235	0.073	0.041	0.015	pCi/g	J	37
SD-DU-007 SAIC11E	U-238	0.78	0.14	0.03	pCi/g		
SD-DU-007 SAIC11E	Total U	2.36	0.41	0.08	µg/g		
SD-DU-008 SAIC11E	U-234	0.383	0.086	0.032	pCi/g		
SD-DU-008 SAIC11E	U-235	0.044	0.030	0.023	pCi/g	J	37
SD-DU-008 SAIC11E	U-238	0.68	0.12	0.03	pCi/g		
SD-DU-008 SAIC11E	Total U	2.04	0.36	0.08	µg/g		

SAMPLE DATA SUMMARY – WATERS	
Laboratory:	*SDG #:*
TestAmerica Laboratories, Inc.	**F9D170271**

Isotopic Uranium ASTM D3972-90M							
Sample I.D.	**Analyte**	**Result**	**Error**	**MDC**	**Units**	**Qualifier**	**Reason Code**
MW-DU-001 SAIC11E	U-234	0.30	0.13	0.08	pCi/L	J	6
MW-DU-001 SAIC11E	U-235	0.051	0.059	0.046	pCi/L	J	37
MW-DU-001 SAIC11E	U-238	0.20	0.11	0.06	pCi/L	J	37
MW-DU-001 SAIC11E	Total U	0.62	0.32	0.18	µg/L		
MW-DU-002 SAIC11E	U-234	1.36	0.27	0.07	pCi/L		
MW-DU-002 SAIC11E	U-235	0.21	0.11	0.07	pCi/L	J	37
MW-DU-002 SAIC11E	U-238	0.61	0.17	0.07	pCi/L		
MW-DU-002 SAIC11E	Total U	1.91	0.52	0.21	µg/L		
MW-DU-003 SAIC11E	U-234	0.65	0.18	0.09	pCi/L	J	6
MW-DU-003 SAIC11E	U-235	0.041	0.052	0.074	pCi/L	U	
MW-DU-003 SAIC11E	U-238	0.34	0.12	0.07	pCi/L		
MW-DU-003 SAIC11E	Total U	1.03	0.37	0.21	µg/L		
MW-DU-004 SAIC11E	U-234	0.42	0.14	0.07	pCi/L	J	6
MW-DU-004 SAIC11E	U-235	0.013	0.027	0.036	pCi/L	U	
MW-DU-004 SAIC11E	U-238	0.37	0.13	0.07	pCi/L		
MW-DU-004 SAIC11E	Total U	1.11	0.39	0.22	µg/L		
MW-DU-005 SAIC11E	U-234	0.29	0.14	0.14	pCi/L	J	6
MW-DU-005 SAIC11E	U-235	0.012	0.047	0.11	pCi/L	U	
MW-DU-005 SAIC11E	U-238	0.20	0.11	0.09	pCi/L	J	37
MW-DU-005 SAIC11E	Total U	0.60	0.32	0.28	µg/L		
MW-DU-006 SAIC11E	U-234	1.21	0.24	0.08	pCi/L		
MW-DU-006 SAIC11E	U-235	0.119	0.078	0.055	pCi/L	J	37
MW-DU-006 SAIC11E	U-238	1.05	0.22	0.07	pCi/L		
MW-DU-006 SAIC11E	Total U	3.19	0.66	0.20	µg/L		
MW-DU-007 SAIC11E	U-234	1.42	0.28	0.07	pCi/L		
MW-DU-007 SAIC11E	U-235	0.100	0.076	0.039	pCi/L	J	37
MW-DU-007 SAIC11E	U-238	0.86	0.21	0.08	pCi/L		
MW-DU-007 SAIC11E	Total U	2.60	0.64	0.23	µg/L		
MW-DU-007 SAIC11DE	U-234	1.28	0.25	0.07	pCi/L		
MW-DU-007 SAIC11DE	U-235	0.079	0.062	0.053	pCi/L	J	37
MW-DU-007 SAIC11DE	U-238	0.78	0.18	0.07	pCi/L		
MW-DU-007 SAIC11DE	Total U	2.36	0.55	0.2	µg/L		
MW-DU-008 SAIC11E	U-234	0.24	0.11	0.07	pCi/L	J	6
MW-DU-008 SAIC11E	U-235	0.046	0.054	0.070	pCi/L	U	

Isotopic Uranium ASTM D3972-90M							
Sample I.D.	**Analyte**	**Result**	**Error**	**MDC**	**Units**	**Qualifier**	**Reason Code**
MW-DU-008 SAIC11E	U-238	0.184	0.094	0.069	pCi/L	J	37
MW-DU-008 SAIC11E	Total U	0.57	0.28	0.21	µg/L		
MW-DU-009 SAIC11E	U-234	0.86	0.19	0.08	pCi/L		
MW-DU-009 SAIC11E	U-235	0.089	0.065	0.052	pCi/L	J	37
MW-DU-009 SAIC11E	U-238	0.40	0.13	0.07	pCi/L		
MW-DU-009 SAIC11E	Total U	1.23	0.38	0.20	µg/L		
MW-DU-010 SAIC11E	U-234	1.99	0.33	0.08	pCi/L		
MW-DU-010 SAIC11E	U-235	0.109	0.081	0.085	pCi/L	J	37
MW-DU-010 SAIC11E	U-238	0.81	0.19	0.05	pCi/L		
MW-DU-010 SAIC11E	Total U	2.45	0.57	0.14	µg/L		
MW-DU-011 SAIC11E	U-234	0.27	0.11	0.07	pCi/L	J	6
MW-DU-011 SAIC11E	U-235	0.021	0.034	0.054	pCi/L	U	
MW-DU-011 SAIC11E	U-238	0.072	0.055	0.051	pCi/L	J	37
MW-DU-011 SAIC11E	Total U	0.22	0.16	0.15	µg/L		
SW-DU-001 SAIC11E	U-234	0.106	0.072	0.073	pCi/L	J	6, 37
SW-DU-001 SAIC11E	U-235	0.019	0.037	0.067	pCi/L	U	
SW-DU-001 SAIC11E	U-238	0.071	0.054	0.027	pCi/L	J	37
SW-DU-001 SAIC11E	Total U	0.22	0.16	0.09	µg/L		
SW-DU-002 SAIC11E	U-234	0.142	0.072	0.046	pCi/L	J	6, 37
SW-DU-002 SAIC11E	U-235	0.013	0.032	0.063	pCi/L	U	
SW-DU-002 SAIC11E	U-238	0.054	0.046	0.051	pCi/L	J	37
SW-DU-002 SAIC11E	Total U	0.17	0.14	0.15	µg/L		
SW-DU-003 SAIC10E	U-234	0.071	0.079	0.12	pCi/L	U	
SW-DU-003 SAIC10E	U-235	0.029	0.042	0.040	pCi/L	U	
SW-DU-003 SAIC10E	U-238	0.153	0.090	0.075	pCi/L	J	37
SW-DU-003 SAIC10E	Total U	0.47	0.27	0.22	µg/L		
SW-DU-004 SAIC11E	U-234	0.221	0.099	0.064	pCi/L	J	6
SW-DU-004 SAIC11E	U-235	-0.012	0.013	0.080	pCi/L	U	
SW-DU-004 SAIC11E	U-238	0.095	0.064	0.053	pCi/L	J	37
SW-DU-004 SAIC11E	Total U	0.28	0.19	0.16	µg/L		
SW-DU-004 SAIC11DE	U-234	0.133	0.080	0.071	pCi/L	J	6, 37
SW-DU-004 SAIC11DE	U-235	0.010	0.027	0.059	pCi/L	U	
SW-DU-004 SAIC11DE	U-238	0.050	0.047	0.047	pCi/L	J	37
SW-DU-004 SAIC11DE	Total U	0.15	0.14	0.14	µg/L		
SW-DU-005 SAIC11E	U-234	0.187	0.099	0.10	pCi/L	J	6, 37
SW-DU-005 SAIC11E	U-235	-0.009	0.010	0.071	pCi/L	U	
SW-DU-005 SAIC11E	U-238	0.174	0.096	0.11	pCi/L	J	37
SW-DU-005 SAIC11E	Total U	0.51	0.29	0.32	µg/L		
SW-DU-006 SAIC11E	U-234	0.089	0.075	0.094	pCi/L	U	

Isotopic Uranium ASTM D3972-90M							
Sample I.D.	**Analyte**	**Result**	**Error**	**MDC**	**Units**	**Qualifier**	**Reason Code**
SW-DU-006 SAIC11E	U-235	0.025	0.041	0.065	pCi/L	U	
SW-DU-006 SAIC11E	U-238	0.137	0.080	0.031	pCi/L	J	37
SW-DU-006 SAIC11E	Total U	0.42	0.24	0.1	µg/L		
SW-DU-007 SAIC11E	U-234	0.113	0.075	0.065	pCi/L	J	6, 37
SW-DU-007 SAIC11E	U-235	0.041	0.048	0.037	pCi/L	J	37
SW-DU-007 SAIC11E	U-238	0.141	0.081	0.050	pCi/L	J	37
SW-DU-007 SAIC11E	Total U	0.44	0.24	0.15	µg/L		
SW-DU-008 SAIC11E	U-234	0.093	0.063	0.052	pCi/L	J	6, 37
SW-DU-008 SAIC11E	U-235	0.037	0.042	0.033	pCi/L	J	37
SW-DU-008 SAIC11E	U-238	0.093	0.063	0.052	pCi/L	J	37
SW-DU-008 SAIC11E	Total U	0.29	0.19	0.16	µg/L		

KEY TO THE DATA VALIDATION QUALIFIERS

QUALIFIERS	
U	Indicates that the data met all quality assurance/quality control (QA/QC) requirements, and that the radionuclide was analyzed for but was not detected above the reported sample quantitation limit.
J	Indicates that the radionuclide was positively identified; the associated numerical value is the approximate concentration of the radionuclide in the sample.
UJ	Indicates that the radionuclide was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
N	The analysis indicates the presence of a radionuclide for which there is presumptive evidence to make a "tentative identification."
R	Indicates that the sample results for the radionuclide are rejected or unusable due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the radionuclide cannot be verified.

Data Validation Reason Codes

6 Method Blank Contamination.
37 Associated error was greater than 50 percent of the sample result.