



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
2405 GUN SHED ROAD
FORT SAM HOUSTON, TEXAS 78234-1223

August 17, 2012

Safety Office

Dr. Thomas G. McLaughlin
US Nuclear Regulatory Commission
Mailstop T-8-F-5
FSME/DWMEP/DURLD/MD
Washington, DC 20555-0001

Dear Dr. McLaughlin:

In accordance with the US Army Jefferson Proving Ground License SUB-1435 requirements, we are submitting six hard copies and four electronic copies on compact disk-read only memory (CD-ROM) of the Radiation Monitoring Report for License SUB-1435 Jefferson Proving Ground, Summary of Results for the April 2011 Sampling Event.

You may reach me by telephone at (210) 466-0368 or by email at robert.cherry@us.army.mil.

Sincerely,

A handwritten signature in black ink that reads "Robert N. Cherry, Jr." in a cursive style.

Robert N. Cherry, Jr.
Radiation Safety Staff Officer

Enclosures

**RADIATION MONITORING REPORT
FOR LICENSE SUB-1435
JEFFERSON PROVING GROUND**

**Summary of Results for
April 2011 Sampling Event**

FINAL

Submitted to:

**U.S. Nuclear Regulatory Commission
Washington, DC**

Prepared by:

**U.S. Department of Army
U.S. Army Garrison, Rock Island Arsenal
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August 2012

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	Degrees Celsius
μR/hr	Microrentgens per Hour
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
MDC	Minimum Detectable Concentration
mg/L	Milligrams per Liter
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
U-234	Uranium-234
U-235	Uranium-235
U-238	Uranium-238
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 1985).

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 2011 sampling event, which is the first of two planned sampling events in 2011 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), data validation summary (Appendix C) and graph of the "Relative Uranium-238/Uranium-234 Activity Ratios for Mixtures of Depleted and Natural Uranium" (Appendix D). 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 Institute for Public Health's (formerly 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 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 2011. 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, 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. Results are reported with two significant digits. Data uncertainties are reported with two standard deviations (95 percent confidence level). 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). Information relative to uranium-238/uranium-234 (U-238/U-234) activity ratios for mixtures of depleted and natural uranium is provided in Appendix D.

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. Groundwater quality parameter measurements are presented in Table 3-2.

Total uranium concentrations in the April 2011 groundwater samples ranged from 0.12 ± 0.08 picocuries per liter (pCi/L) to $2.8 \text{ pCi/L} \pm 0.4$ with an average concentration of 1.2 ± 0.9 pCi/L, computed using the average value for duplicates.

In addition to the individual isotopic concentrations, Table 3-1 presents the U-238/U-234 ratios for each sample, which ranged from 0.29 ± 0.14 to 0.81 ± 0.47 . A U-238/U-234 ratio of 3.0 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 3.0 are investigated further to validate if the sample is representative of DU or natural uranium. No sample exceeded this criterion with the highest ratio encountered being the above stated result for MW-DU-005.

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. Surface water quality parameter measurements are presented in Table 3-4. Total uranium concentrations ranged from 0.21 ± 0.09 pCi/L for SW-DU-006 and 0.21 ± 0.09 pCi/L for SW-DU-007 to 3.5 ± 0.5 pCi/L for SW-DU-003 with an average concentration of 0.87 ± 0.63 pCi/L, computed using the average values for duplicates. The U-238/U-234 ratios for surface samples ranged from 0.048 ± 0.030 to 0.93 ± 0.77 . As noted, no surface water sample exhibited a U-238/U-234 ratio exceeding the investigation level of 3.0.

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 0.37 ± 0.08 picocuries per gram (pCi/g) for SD-DU-005 to 1.5 ± 0.2 pCi/g for both SD-DU-006 and SD-DU-007, with an average concentration of 0.11 ± 0.42 pCi/g, computed using the average value for duplicates.

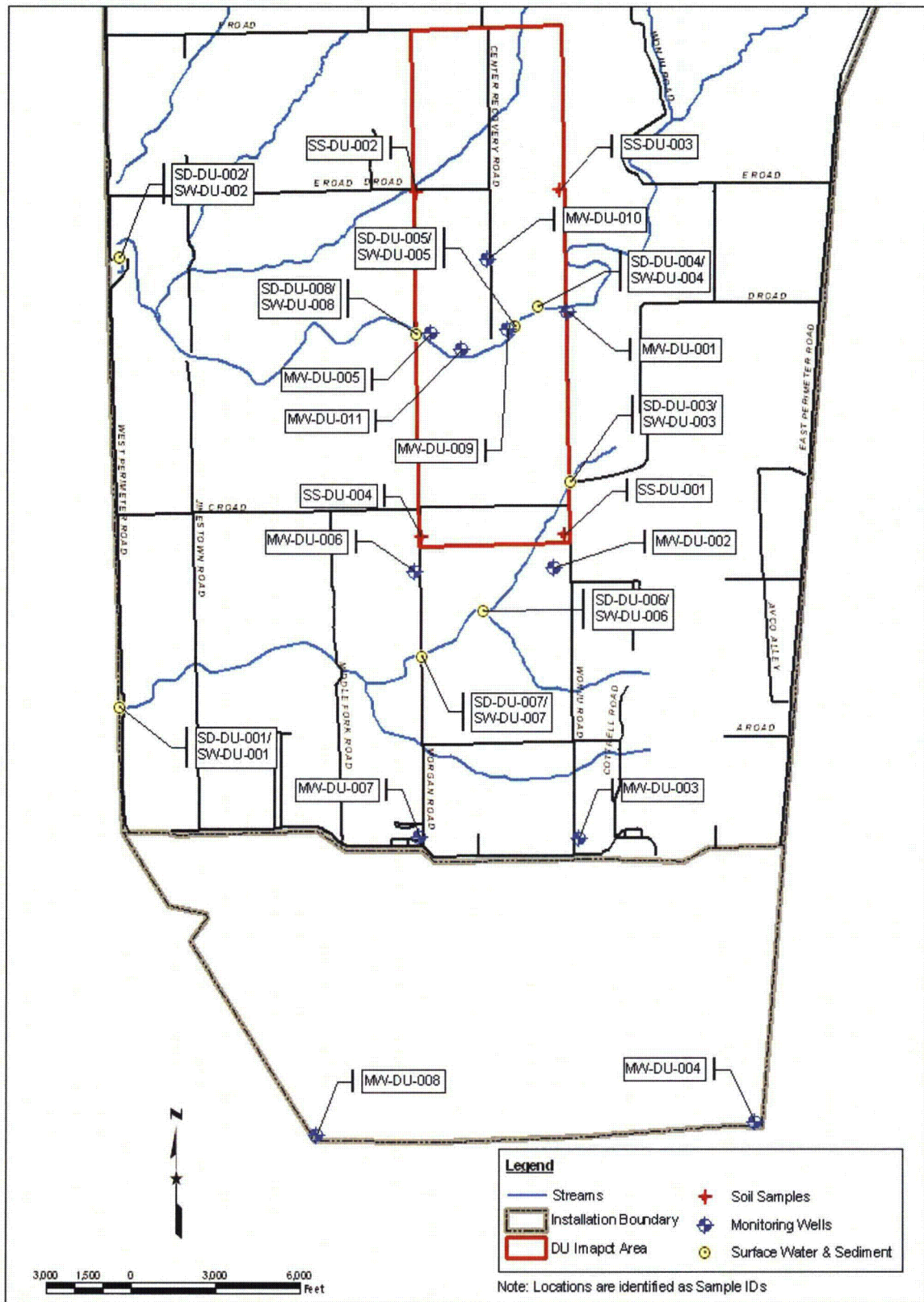


Figure 3-1. Sampling Locations

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

JPG Sample Designation ^a	Sample I.D. ^b	Analyte	Result (pCi/L) ^c
MW01	MW-DU-001	U-234	0.34 ± 0.12
MW01	MW-DU-001	U-235	0.045 ± 0.045 J
MW01	MW-DU-001	U-238	0.12 ± 0.07 J
Total Uranium			0.51 ± 0.15
U-238/U-234 Ratio ^d			0.36 ± 0.24
MW02	MW-DU-002	U-234	0.33 ± 0.12
MW02	MW-DU-002	U-235	0.017 ± 0.034 U
MW02	MW-DU-002	U-238	0.24 ± 0.10
Total Uranium			0.59 ± 0.16
U-238/U-234 Ratio ^d			0.72 ± 0.39
MW03	MW-DU-003	U-234	0.85 ± 0.20
MW03	MW-DU-003	U-235	0.047 ± 0.05 U
MW03	MW-DU-003	U-238	0.38 ± 0.13
Total Uranium			1.3 ± 0.2
U-238/U-234 Ratio ^d			0.45 ± 0.19
MW04	MW-DU-004	U-234	0.37 ± 0.12
MW04	MW-DU-004	U-235	0.0 ± 0.01U
MW04	MW-DU-004	U-238	0.20 ± 0.08
Total Uranium			0.57 ± 0.15
U-238/U-234 Ratio ^d			0.53 ± 0.28
MW05	MW-DU-005	U-234	0.24 ± 0.09
MW05	MW-DU-005	U-235	0.015 ± 0.030 U
MW05	MW-DU-005	U-238	0.19 ± 0.08
Total Uranium			0.44 ± 0.13
U-238/U-234 Ratio ^d			0.81 ± 0.47
MW06	MW-DU-006	U-234	1.6 ± 0.3
MW06	MW-DU-006	U-235	0.046 ± 0.047 J
MW06	MW-DU-006	U-238	1.2 ± 0.2
Total Uranium			2.8 ± 0.4
U-238/U-234 Ratio ^d			0.70 ± 0.18
MW07	MW-DU-007	U-234	1.4 ± 0.3
MW07	MW-DU-007	U-235	0.052 ± 0.064 U
MW07	MW-DU-007	U-238	0.69 ± 0.19
Total Uranium			2.1 ± 0.3
U-238/U-234 Ratio ^d			0.49 ± 0.17
MW07D	MW-DU-007D	U-234	1.9 ± 0.3
MW07D	MW-DU-007D	U-235	0.034 ± 0.047 U
MW07D	MW-DU-007D	U-238	0.76 ± 0.19
Total Uranium			2.7 ± 0.6
U-238/U-234 Ratio ^d			0.39 ± 0.12
Merged MW07 and MW07D ^e		U-234	1.7 ± 0.2
Merged MW07 and MW07D ^e		U-235	0.043 ± 0.040
Merged MW07 and MW07D ^e		U-238	0.73 ± 0.13
Total Uranium			2.5 ± 0.6
U-238/U-234 Ratio ^d			0.44 ± 0.10

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

JPG Sample Designation ^a	Sample I.D. ^b	Analyte	Result (pCi/L) ^c
MW08	MW-DU-008	U-234	0.21 ± 0.09
MW08	MW-DU-008	U-235	0.020 ± 0.032 U
MW08	MW-DU-008	U-238	0.16 ± 0.08
Total Uranium			0.39 ± 0.12
U-238/U-234 Ratio ^d			0.76 ± 0.49
MW09	MW-DU-009	U-234	1.0 ± 0.2
MW09	MW-DU-009	U-235	0.066 ± 0.040 J
MW09	MW-DU-009	U-238	0.28 ± 0.12
Total Uranium			1.4 ± 0.3
U-238/U-234 Ratio ^d			0.29 ± 0.14
MW010	MW-DU-010	U-234	1.5 ± 0.3
MW010	MW-DU-010	U-235	0.048 ± 0.048 J
MW010	MW-DU-010	U-238	0.72 ± 0.18
Total Uranium			2.3 ± 0.3
U-238/U-234 Ratio ^d			0.47 ± 0.14
MW011	MW-DU-011	U-234	0.072 ± 0.055 J
MW011	MW-DU-011	U-235	0.008 ± 0.023 U
MW011	MW-DU-011	U-238	0.041 ± 0.046 U
Total Uranium			0.12 ± 0.08 U
U-238/U-234 Ratio ^d			0.57 ± 0.77

- ^a Represents sample designation developed in previous sampling programs
- ^b I.D. Identification
- ^c Laboratory uncertainties are specified with two standard deviations (95% confidence level)
- ^d Unitless
- ^e Merged data represents the mean and weighted total propagated uncertainty for the sample and its duplicate
- 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 quality assurance/quality control (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*	Sample I.D.	pH	Temp (°C)	Conductivity (Siemens/cm)	Dissolved Oxygen (mg/L)	Exposure Rate (μR/hr)
MW01	MW-DU-001	7.8	13	0.26	11	6
MW02	MW-DU-002	7.8	13	0.37	7.8	6
MW03	MW-DU-003	7.6	13	0.58	5.7	6
MW04	MW-DU-004	7.5	15	0.37	6.4	6
MW05	MW-DU-005	6.7	10	0.93	8.9	6
MW06	MW-DU-006	7.4	15	9.6	7.2	5
MW07	MW-DU-007	7.4	13	0.60	3.6	9
MW08	MW-DU-008	7.6	14	0.34	12	6
MW09	MW-DU-009	7.2	13	8.8	4.4	7
MW10	MW-DU-0010	8.0	13	1.1	6.3	6
MW11	MW-DU-0011	8.1	13	0.24	11	5

*Represents sample designation developed in previous sampling programs.

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

JPG Sample Designation ^a	Sample I.D.	Analyte	Result (pCi/L) ^c
SWS01	SW-DU-001	U-234	0.22 ± 0.09 J
SWS01	SW-DU-001	U-235	0.019 ± 0.031 U
SWS01	SW-DU-001	U-238	0.017 ± 0.036 U
Total Uranium			0.26 ± 0.10 U
U-238/U-234 Ratio ^d			0.08 ± 0.16
SWS02D	SW-DU-002D	U-234	0.31 ± 0.11
SWS02D	SW-DU-002D	U-235	0.0 ± 0.01 U
SWS02D	SW-DU-002D	U-238	0.18 ± 0.09 J
Total Uranium			0.49 ± 0.14
U-238/U-234 Ratio ^d			0.56 ± 0.36
SWS02	SW-DU-002	U-234	0.17 ± 0.08
SWS02	SW-DU-002	U-235	0.015 ± 0.029 U
SWS02	SW-DU-002	U-238	0.067 ± 0.048 J
Total Uranium			0.25 ± 0.10
U-238/U-234 Ratio ^d			0.39 ± 0.33
Merged SW02 and SW02D ^e		U-234	0.24 ± 0.06
Merged SW02 and SW02D ^e		U-235	0.01 ± 0.01
Merged SW02 and SW02D ^e		U-238	0.12 ± 0.04
Total Uranium			0.37 ± 0.07
U-238/U-234 Ratio ^d			0.50 ± 0.22
SWS03	SW-DU-003	U-234	3.3 ± 0.47
SWS03	SW-DU-003	U-235	0.060 ± 0.061 U
SWS03	SW-DU-003	U-238	0.16 ± 0.08 J
Total Uranium			3.5 ± 0.5
U-238/U-234 Ratio ^d			0.05 ± 0.03
SWS04	SW-DU-004	U-234	0.73 ± 0.17
SWS04	SW-DU-004	U-235	0.021 ± 0.030 U
SWS04	SW-DU-004	U-238	0.081 ± 0.053 J
Total Uranium			0.83 ± 0.18
U-238/U-234 Ratio ^d			0.11 ± 0.08
SWS05	SW-DU-005	U-234	0.17 ± 0.09 J
SWS05	SW-DU-005	U-235	0.021 ± 0.034 U
SWS05	SW-DU-005	U-238	0.13 ± 0.08 J
Total Uranium			0.31 ± 0.12
U-238/U-234 Ratio ^d			0.74 ± 0.60
SWS06	SW-DU-006	U-234	0.18 ± 0.08
SWS06	SW-DU-006	U-235	0.0090 ± 0.0230 U
SWS06	SW-DU-006	U-238	0.018 ± 0.026 U
Total Uranium			0.21 ± 0.09 U
U-238/U-234 Ratio ^d			0.10 ± 0.15
SWS07	SW-DU-007	U-234	0.11 ± 0.06 J
SWS07	SW-DU-007	U-235	-0.0026 ± 0.0050 U
SWS07	SW-DU-007	U-238	0.10 ± 0.06 J
Total Uranium			0.21 ± 0.09
U-238/U-234 Ratio ^d			0.93 ± 0.77

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

JPG Sample Designation ^a	Sample I.D. ^b	Analyte	Result (pCi/L) ^c
SWS08	SW-DU-008	U-234	1.1 ± 0.2
SWS08	SW-DU-008	U-235	0.014 ± 0.034 U
SWS08	SW-DU-008	U-238	0.21 ± 0.091 J
Total Uranium			1.3 ± 0.2
U-238/U-234 Ratio ^d			0.19 ± 0.86

- ^a Represents sample designation developed in previous sampling programs
 - ^b I.D. Identification
 - ^c Laboratory uncertainties are specified with two standard deviations (95% confidence level)
 - ^d Unitless
 - Merged data represents the mean and weighted total propagated uncertainty for the sample and its duplicate
- 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 3-4. Surface Water Quality Parameters and Exposure Readings
Jefferson Proving Ground, Madison, Indiana**

JPG Sample Designation*	Sample I.D.	pH	Temp (°C)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Exposure Rate (μR/hr)
SWS01	SW-DU-001	7.9	17	0.96	11	5
SWS02	SW-DU-002	7.9	17	0.099	11	5
SWS03	SW-DU-003	6.8	20	0.078	9.5	6
SWS04	SW-DU-004	7.4	13	0.11	9.4	6
SWS05	SW-DU-005	6.7	15	0.11	10	6
SWS06	SW-DU-006	6.7	18	0.038	9.7	6
SWS07	SW-DU-007	5.9	12	0.14	9.6	5
SWS08	SW-DU-008	6.7	16	0.11	9.7	7

- *Represents sample designation developed in previous sampling programs.
- C - Degrees Celsius
- μR/hr – Microrentgens per hour
- mg/L – Milligrams per liter
- mS/cm – MilliSiemens per centimeter

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

JPG Sample Designation ^a	Sample I.D.	Analyte	Result (pCi/g) ^c
SES01	SD-DU-001	U-234	0.19 ± 0.05
SES01	SD-DU-001	U-235	0.014 ± 0.018 U
SES01	SD-DU-001	U-238	0.20 ± 0.06
Total Uranium			0.41 ± 0.09
U-238/U-234 Ratio ^d			1.1 ± 0.5
SES02D	SD-DU-002D	U-234	0.50 ± 0.10
SES02D	SD-DU-002D	U-235	0.031 ± 0.027 J
SES02D	SD-DU-002D	U-238	0.66 ± 0.12
Total Uranium			1.2 ± 0.1

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

JPG Sample Designation ^a	Sample I.D.	Analyte	Result (pCi/g) ^c
U-238/U-234 Ratio ^d			1.3 ± 0.4
SES02	SD-DU-002	U-234	0.48 ± 0.10
SES02	SD-DU-002	U-235	0.034 ± 0.028 J
SES02	SD-DU-002	U-238	0.70 ± 0.13
Total Uranium			1.2 ± 0.2
U-238/U-234 Ratio ^d			1.5 ± 0.4
Merged SD02 and SD02D ^e		U-234	0.49 ± 0.07
Merged SD02 and SD02D ^e		U-235	0.03 ± 0.02
Merged SD02 and SD02D ^e		U-238	0.68 ± 0.09
Total Uranium			1.2 ± 0.1
U-238/U-234 Ratio ^d			1.4 ± 0.3
SES03	SD-DU-003	U-234	0.69 ± 0.12
SES03	SD-DU-003	U-235	0.040 ± 0.029 J
SES03	SD-DU-003	U-238	0.75 ± 0.13
Total Uranium			1.5 ± 0.2
U-238/U-234 Ratio ^d			1.1 ± 0.3
SES04	SD-DU-004	U-234	0.16 ± 0.05
SES04	SD-DU-004	U-235	0.018 ± 0.018 J
SES04	SD-DU-004	U-238	0.45 ± 0.09
Total Uranium			0.63 ± 0.10
U-238/U-234 Ratio ^d			2.9 ± 1.1
SES05	SD-DU-005	U-234	0.13 ± 0.05
SES05	SD-DU-005	U-235	0.010 ± 0.014 U
SES05	SD-DU-005	U-238	0.22 ± 0.06
Total Uranium			0.37 ± 0.08
U-238/U-234 Ratio ^d			1.7 ± 0.8
SES06	SD-DU-006	U-234	0.77 ± 0.13
SES06	SD-DU-006	U-235	0.033 ± 0.029 J
SES06	SD-DU-006	U-238	0.74 ± 0.13
Total Uranium			1.5 ± 0.2
U-238/U-234 Ratio ^d			0.96 ± 0.23
SES07	SD-DU-007	U-234	0.72 ± 0.13
SES07	SD-DU-007	U-235	0.026 ± 0.025 J
SES07	SD-DU-007	U-238	0.77 ± 0.13
Total Uranium			1.5 ± 0.2
U-238/U-234 Ratio ^d			1.1 ± 0.3
SES08	SD-DU-008	U-234	0.45 ± 0.10
SES08	SD-DU-008	U-235	0.041 ± 0.030 J
SES08	SD-DU-008	U-238	0.82 ± 0.14
Total Uranium			1.3 ± 0.2
U-238/U-234 Ratio ^d			1.8 ± 0.5

^a Represents sample designation developed in previous sampling programs

^b I.D. Identification

^c Laboratory uncertainties are specified with two standard deviations (95% confidence level)

^d Unitless

^e Merged data represents the mean and weighted total propagated uncertainty for the sample and its duplicate

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.

The U-238/U-234 ratio for the samples ranged from 0.96 ± 0.23 to 2.9 ± 1.1 . Although no sample had a U-238/U-234 ratio exceeding 3.0 for this sampling event, SD-DU-04 exhibited a U-238/U-234 ratio of 2.9 ± 1.1 . Given that this result may range from 1.8 to 4.0 at the 95% confidence level and could exceed the investigational criterion of 3.0, the sample was subjected to additional investigation, which failed to provide explanatory information for the result. Review of gamma walkover survey results in the immediate vicinity of SD-DU-004 did not reflect the presence of DU, although penetrators were observed in the creek upstream from the sample location. In addition, review of analytical results for this sample reflects total uranium of 0.63 pCi/g, consisting of 0.45, 0.018, and 0.26 pCi/g for U-238, uranium-235 (U-235), and U-234, respectively. Using Figure D-1, these sample results for U-238 and U-234 suggest that the sample contained 40 to 45 percent DU. The Army will continue to closely monitor results from SD-DU-004.

3.4 SOILS

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 0.95 ± 0.14 to 1.9 ± 0.2 , with an average concentration of 1.4 ± 0.4 pCi/g, computed using the average value for duplicates. The U-238/U-234 ratios ranged from 0.84 ± 0.23 to 1.0 ± 0.3 . 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.

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

JPG Sample Designation ^a	Sample I.D.	Analyte	Result (pCi/g) ^c
SOS01	SS-DU-001	U-234	0.71 ± 0.13
SOS01	SS-DU-001	U-235	0.023 ± 0.025
SOS01	SS-DU-001	U-238	0.65 ± 0.12 U
Total Uranium			1.4 ± 0.2
U-238/U-234 Ratio ^d			0.92 ± 0.24
SOS02	SS-DU-002	U-234	0.88 ± 0.15
SOS02	SS-DU-002	U-235	0.057 ± 0.037 J
SOS02	SS-DU-002	U-238	0.92 ± 0.15
Total Uranium			1.9 ± 0.2
U-238/U-234 Ratio ^d			1.1 ± 0.2
SOS03	SS-DU-003	U-234	0.65 ± 0.12
SOS03	SS-DU-003	U-235	0.051 ± 0.033 J
SOS03	SS-DU-003	U-238	0.61 ± 0.11
Total Uranium			1.3 ± 0.2
U-238/U-234 Ratio ^d			0.94 ± 0.24
SOS04D	SS-DU-004D	U-234	0.49 ± 0.10
SOS04D	SS-DU-004D	U-235	0.0090 ± 0.0140 U
SOS04D	SS-DU-004D	U-238	0.45 ± 0.09
Total Uranium			0.95 ± 0.14
U-238/U-234 Ratio ^d			0.93 ± 0.27
SOS04	SS-DU-004	U-234	0.64 ± 0.12
SOS04	SS-DU-004	U-235	0.026 ± 0.025 J
SOS04	SS-DU-004	U-238	0.54 ± 0.11
Total Uranium			1.2 ± 0.1

**Table 3-6: Uranium in Surface Soil
Jefferson Proving Ground, Madison, Indiana (Continued)**

JPG Sample Designation ^a	Sample I.D.	Analyte	Result (pCi/g) ^c
U-238/U-234 Ratio ^d			0.84 ± 0.23
Merged SS04 and SS04D ^e		U-234	0.56 ± 0.08
Merged SS04 and SS04D ^e		U-235	0.02 ± 0.01
Merged SS04 and SS04D ^e		U-238	0.50 ± 0.07
Total Uranium			0.90 ± 0.11
U-238/U-234 Ratio ^d			0.88 ± 0.17

^a Represents sample designation developed in previous sampling programs

^b I.D. Identification

^c Laboratory uncertainties are specified with two standard deviations (95% confidence level)

^d Unitless

^e Merged data represents the mean and weighted total propagated uncertainty for the sample and its duplicate
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 JPG License Holder 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 Title 10, Code of Federal Regulations (CFR), Part 20 (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. Therefore, although historical data are reported beginning in 1998, trend analyses included in this ERM report addresses the time period from December 2004 to the present. In addition, surface water and groundwater results for the April 2004 sampling event were not trended, given that the results were provided in units of micrograms per liter 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 April 2011 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 154 discrete samples available from 11 monitoring wells (MW01 to MW11) during the period from 2004 through April 2011, the average total uranium activity-concentration is 1.4 pCi/L, the standard deviation is 1.1 pCi/L, and the maximum detected activity-concentration is 5.7 pCi/L. The activity-concentrations at each well are below the 150 pCi/L action level for groundwater.

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 three 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 updated with new data and re-examined in this report. All total uranium results at each sampling location for the April 2011 sampling effort were within two 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. Four of the five data points are for MW-DU-006 with the lone exception being MW-DU-002 for the October 2008 sampling effort. Each of these results was for the fall sampling periods such that the results may have been impacted to some extent by the volume of water present. Clearly, MW-DU-006 has exhibited, and continues to exhibit, total uranium results exceeding that of the other wells. This tendency is reflected in the fact that the MW-DU-006 result for the April 2011 sampling event, although not exceeding the UCL, exhibits the highest total uranium activity. The Army will continue to closely monitor results from MW-DU-006. As reflected in Figure 4-13, individual sample results vary about the mean as expected and, with the exception of MW-DU-002, based on the slope of the trend lines for each well, generally exhibit decreasing activity. Notably, the U-238/U-234 ratios for the groundwater samples exhibit a maximum of 0.81 and, thus suggesting that significant concentrations of depleted uranium were not encountered. (See graph of the "Relative Uranium-238/Uranium-234 Activity Ratios for Mixtures of Depleted and Natural Uranium" in Appendix D.)

4.2 SURFACE WATER

For 112 discrete samples available from 8 surface water sampling locations (SW01 to SW08) during the period from 2004 through April 2011, the average total uranium activity-concentration is 0.95 pCi/L, the standard deviation is 2.7 pCi/L, and the maximum detected activity-concentration is 19 pCi/L. The highest total uranium concentration among surface water samples was 3.5 pCi/L reflecting activity-concentrations at each sample location that 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 six data points exceeded the UCL. SW-DU-005 exhibited total uranium concentrations of 6.3, 6.9, and 19 pCi/L in October 2007, October 2008, and October 2010, respectively, with each of these concentrations exceeding the UCL. Analytical results for SW-DU-004 reflected concentrations of 14 and 16 pCi/L for the sample and duplicate, respectively, for the October 2010 sampling event and SW-DU-003 exhibited total uranium activity of 3.5 pCi/L for the April 2011 sampling event. Each of these values exceeded the UCL of 3.2 pCi/L. Results for each of these locations will continue to be monitored closely.

4.3 SEDIMENT

For 134 discrete samples available from 8 sediment sampling locations (SD01 to SD08) during the period from 2004 through April 2011, the average total uranium activity-concentration is 0.98 pCi/g, the standard deviation is 0.52 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).

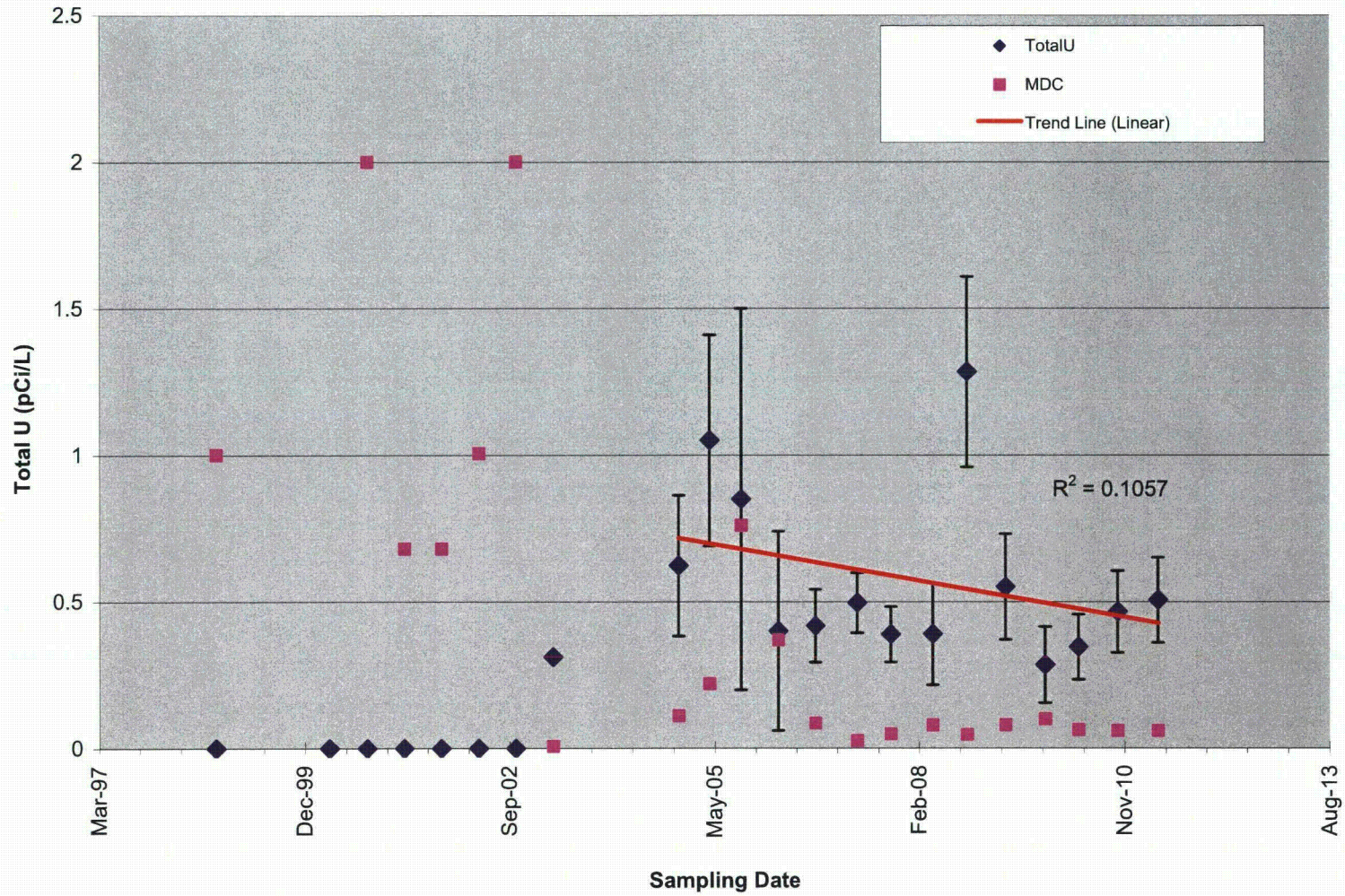
A simple individual control chart was created using the pooled data for all sediment sampling locations and all data collected after December 2004 (Figure 4-31). Figure 4-31 indicates no new points above the UCL or below the LCL. The April 2011 sediment sampling results vary around the mean, as expected.

4.4 SOILS

For 76 discrete samples available from 4 surface soil sampling locations (SS01 to SS04) during the period from 2004 through April 2011, the average total uranium activity-concentration is 1.6 pCi/g, the standard deviation is 0.30 pCi/g, and the maximum detected activity-concentration is 2.2 pCi/g. The activity-concentrations at each location are well below the action level of 35 pCi/g.

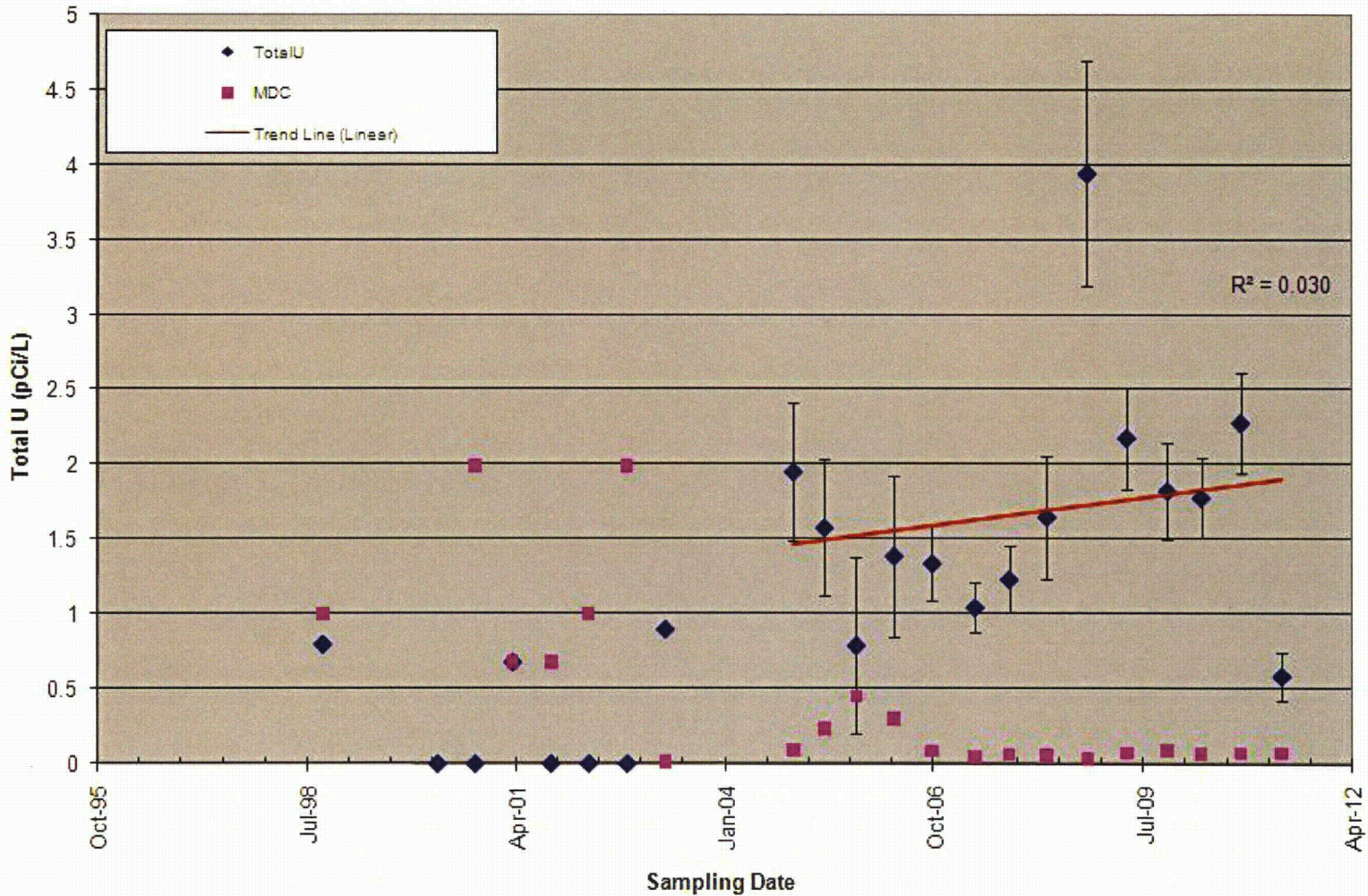
Data for each surface soil sampling location are summarized in run charts, as shown in Figures 4-32 through 4-35. Total uranium results are displayed along with each measurement's associated error bars. The error bars are expressed at 1.96 standard deviations and represent a 95 percent confidence interval. 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. In addition, the figures indicate that none of the sample locations exhibited trend lines such that the correlation is somewhat significant. Although the slope of the trend line for SS-DU-002 continues to suggest a possible increase in the total uranium concentration at this location, the current R^2 value of 0.43 is within normal parameters. Nonetheless, results from this location will continue to be monitored closely.

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), previously fell below the LCL for a prior sampling event (October 2008). One point, the result for SS-DU-001D, exhibited a concentration of 2.3, which essentially equaled the UCL of 2.2 for the May 2005 sampling event.



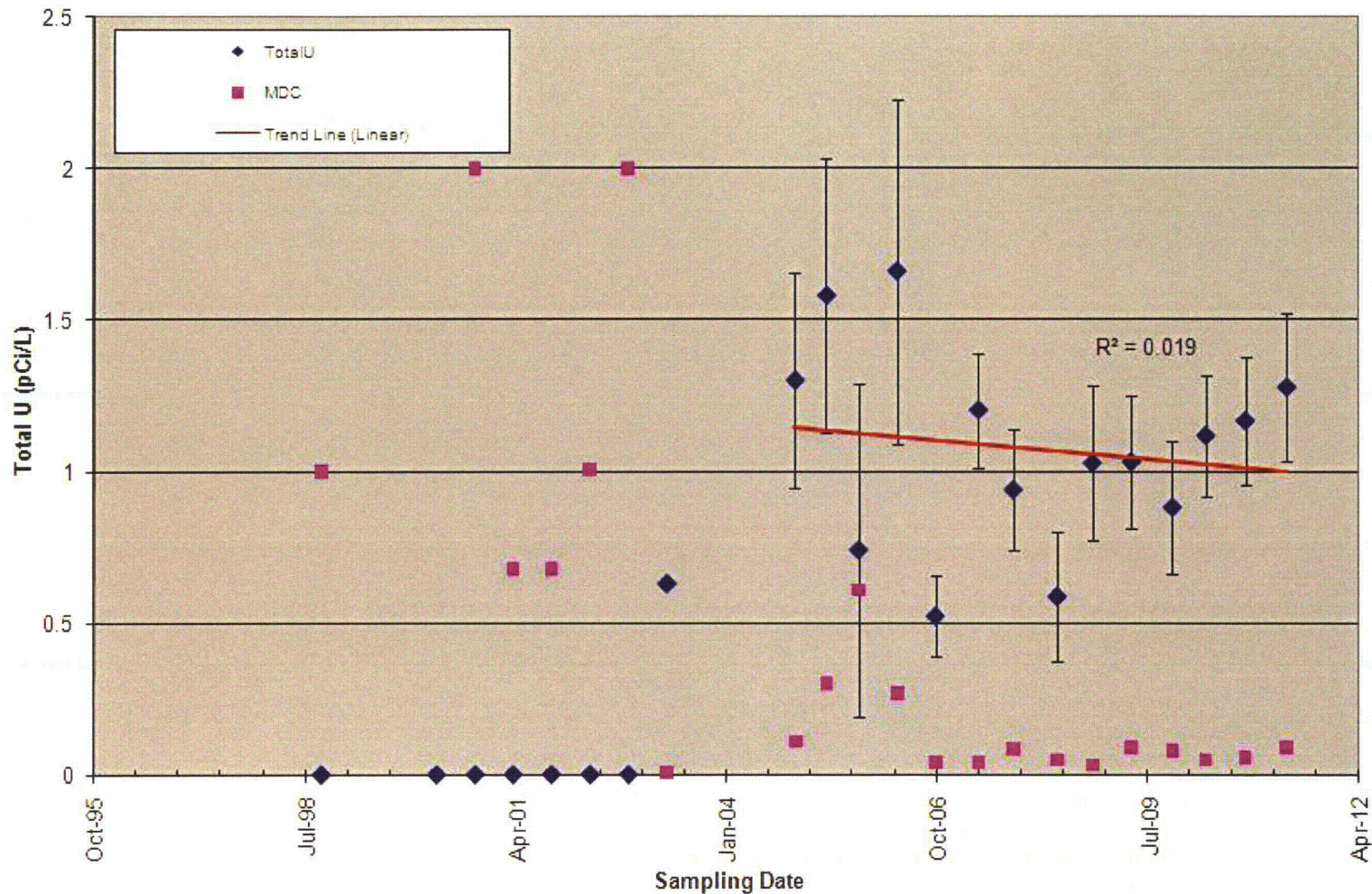
MDC - Minimum Detectable Concentration

Figure 4-1. Total Uranium in MW-DU-001 (1998-2011)



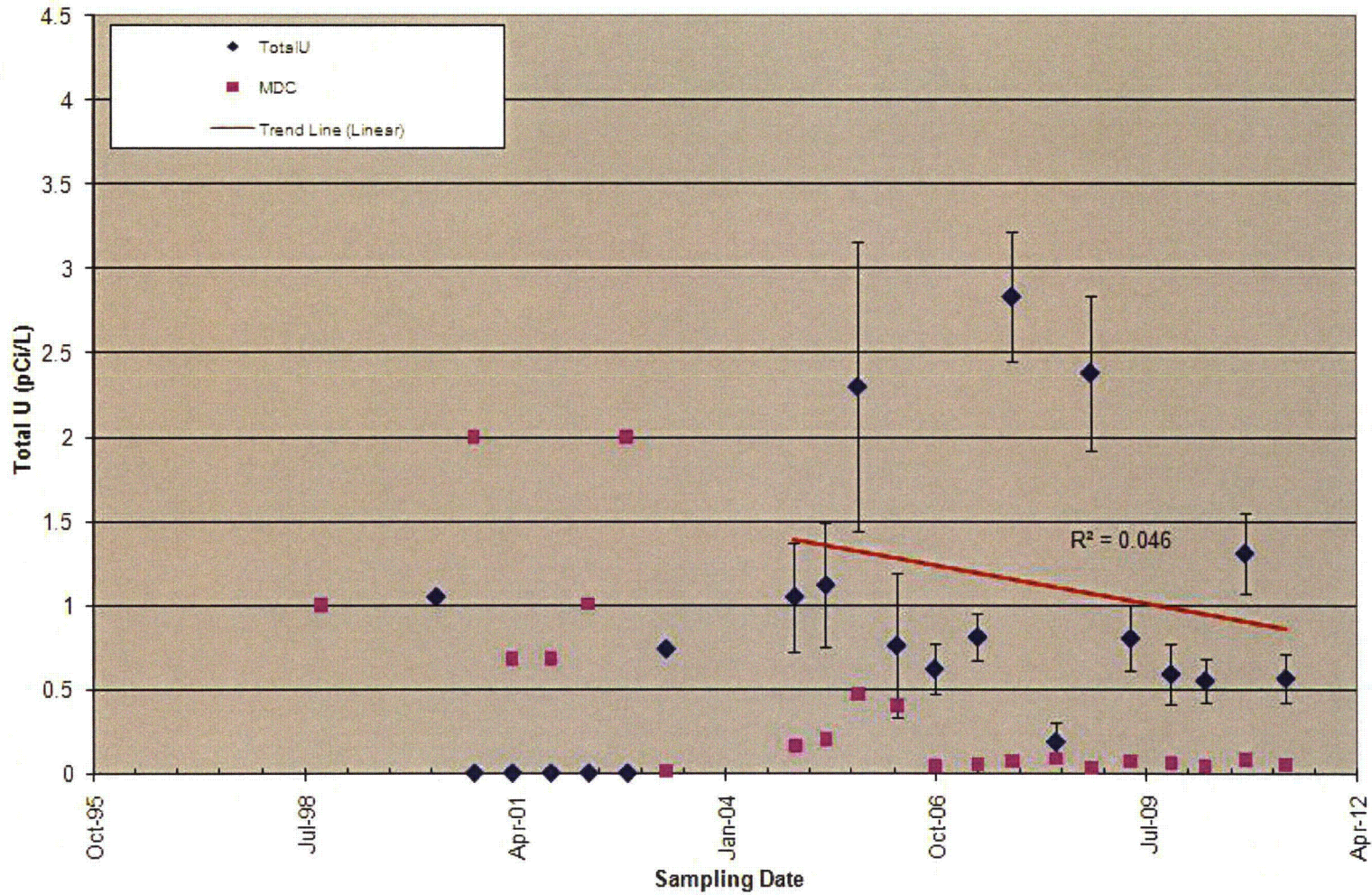
MDC – Minimum Detectable Concentration

Figure 4-2. Total Uranium in MW-DU-002 (1998-2011)



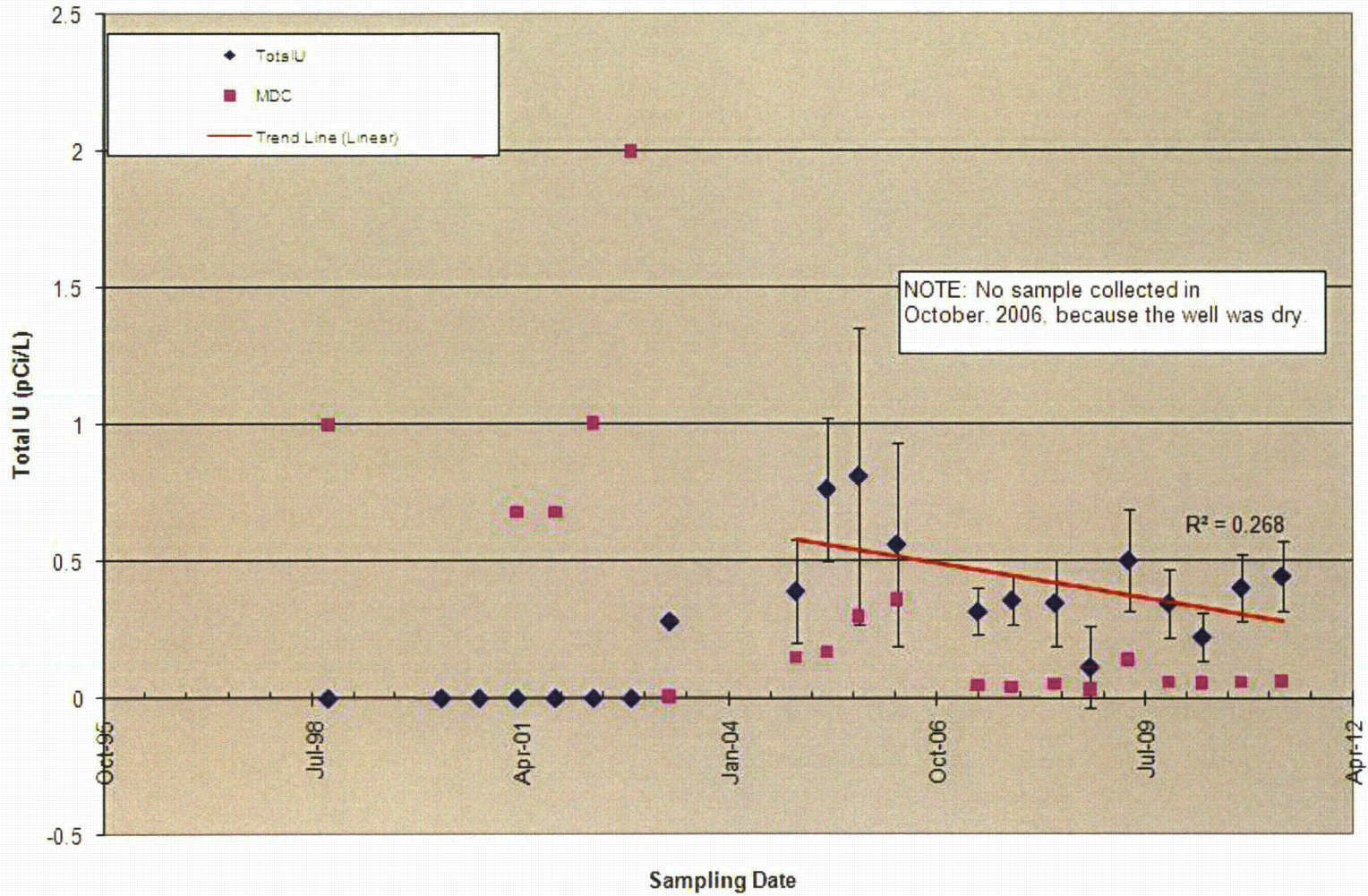
MDC - Minimum Detectable Concentration

Figure 4-3. Total Uranium in MW-DU-003 (1998-2011)



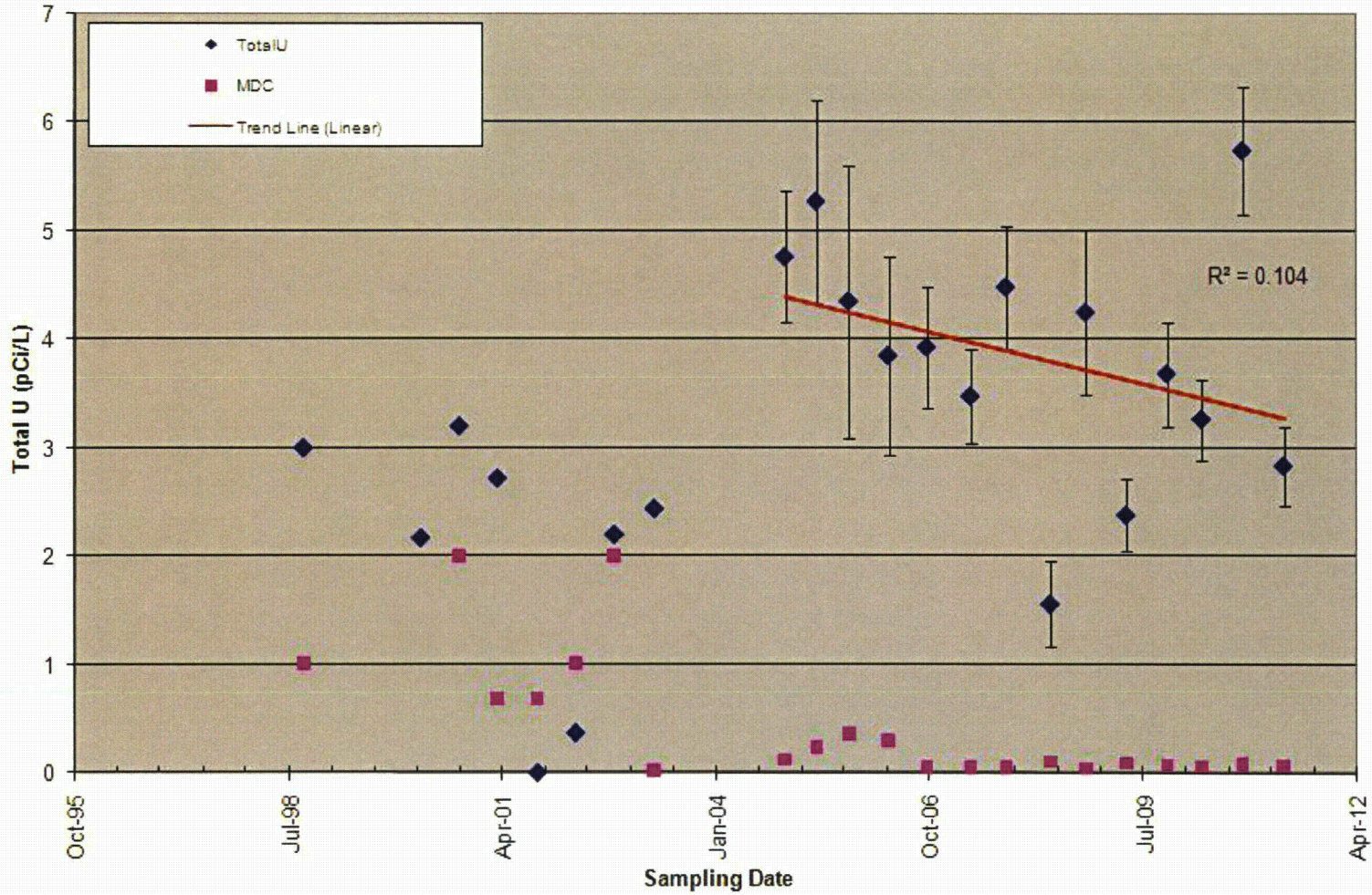
MDC - Minimum Detectable Concentration

Figure 4-4. Total Uranium in MW-DU-004 (1998-2011)



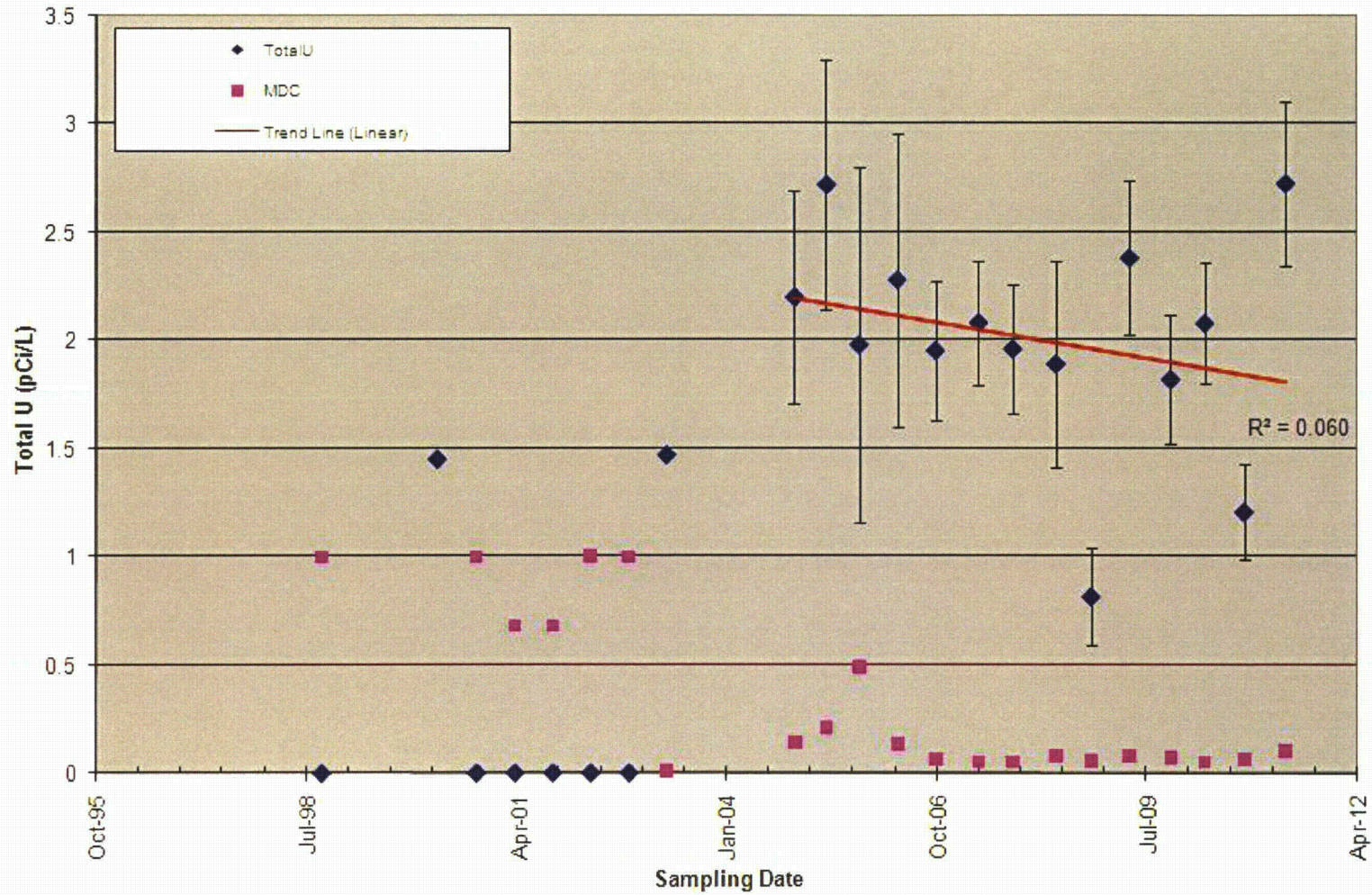
MDC - Minimum Detectable Concentration

Figure 4-5. Total Uranium in MW-DU-005 (1998-2011)



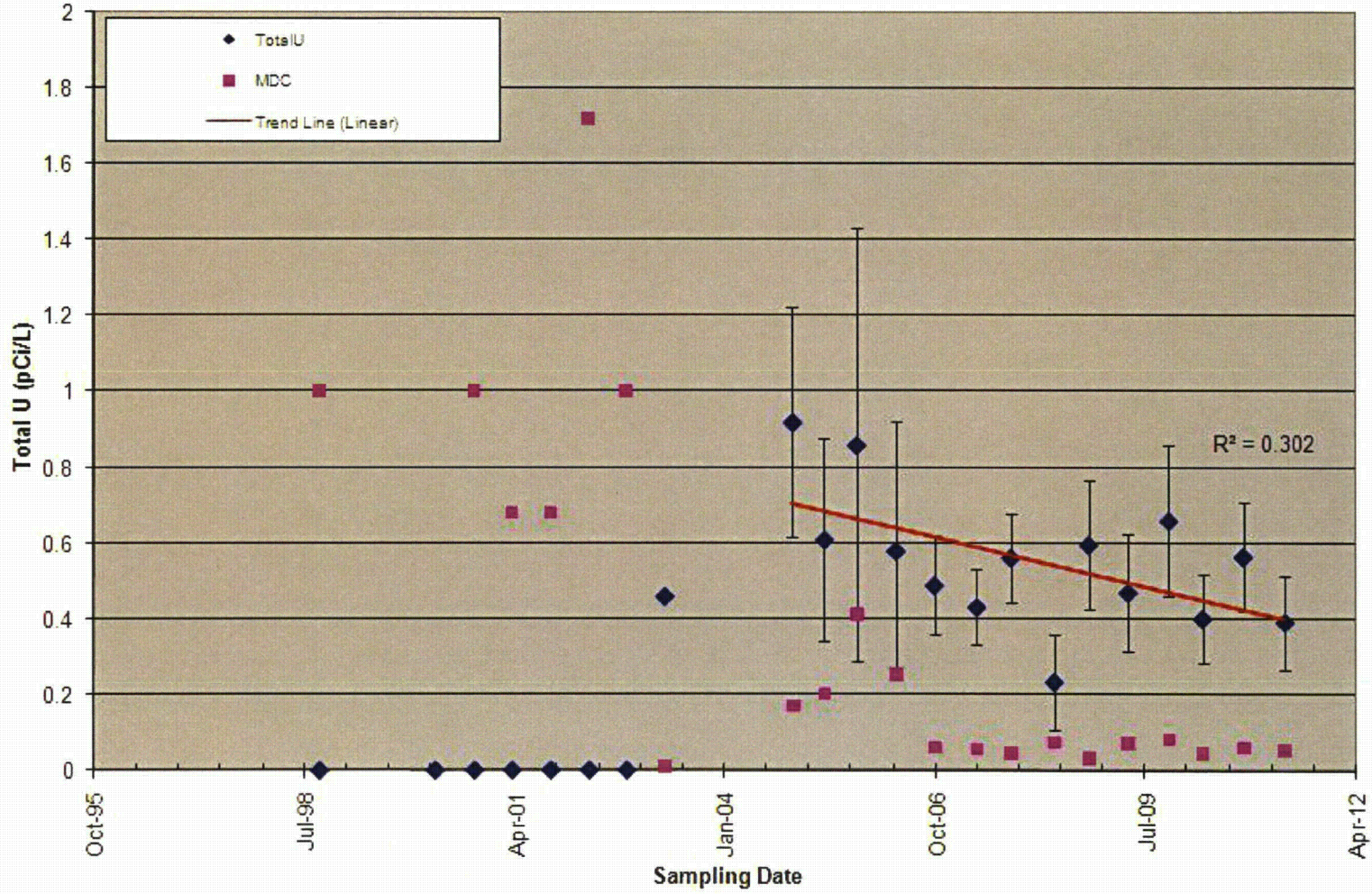
MDC – Minimum Detectable Concentration
NOTE: No sample was collected in October 2006 because the well was dry.

Figure 4-6. Total Uranium in MW-DU-006 (1998-2011)



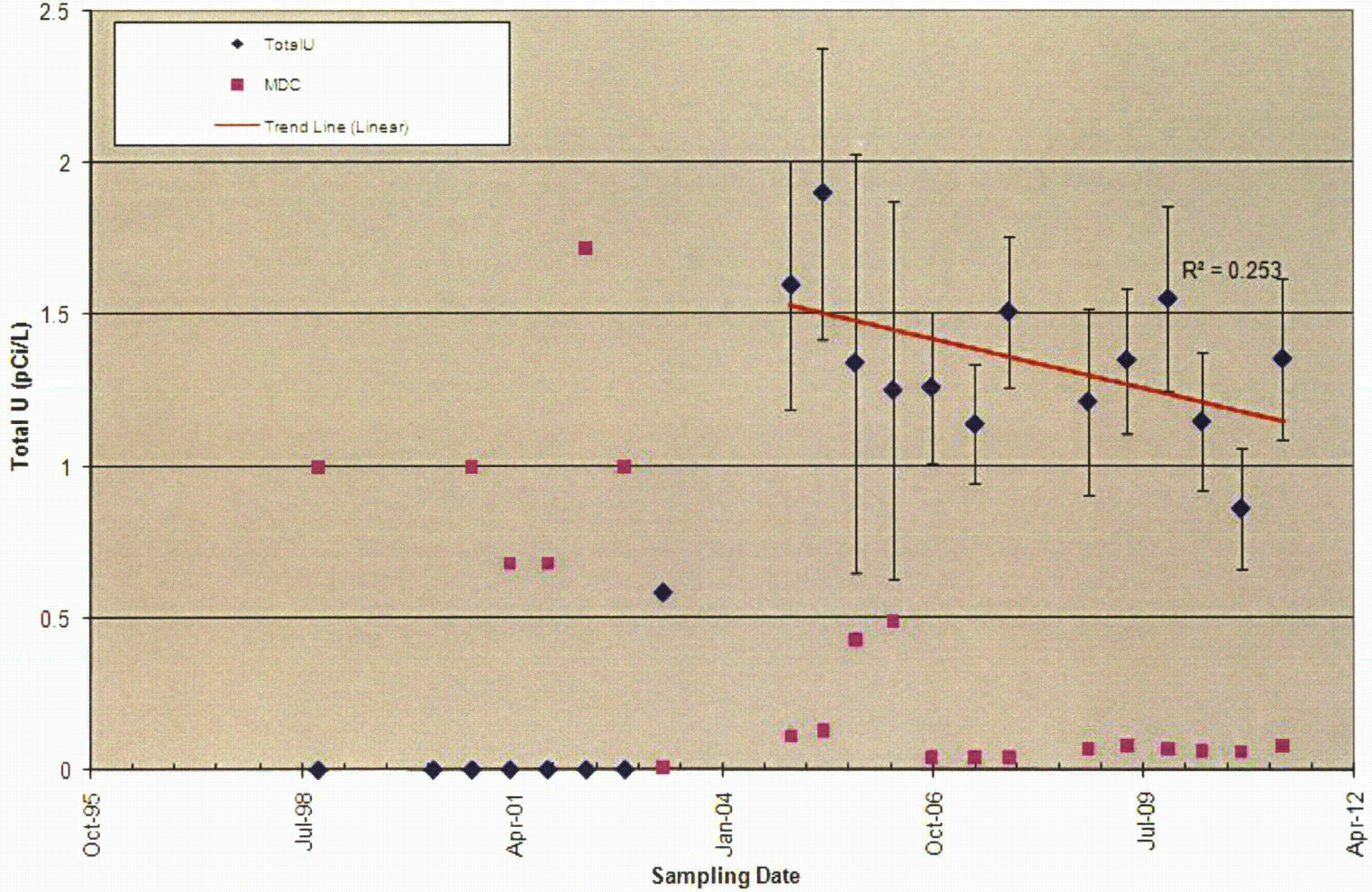
MDC - Minimum Detectable Concentration

Figure 4-7. Total Uranium in MW-DU-007 (1998-2011)



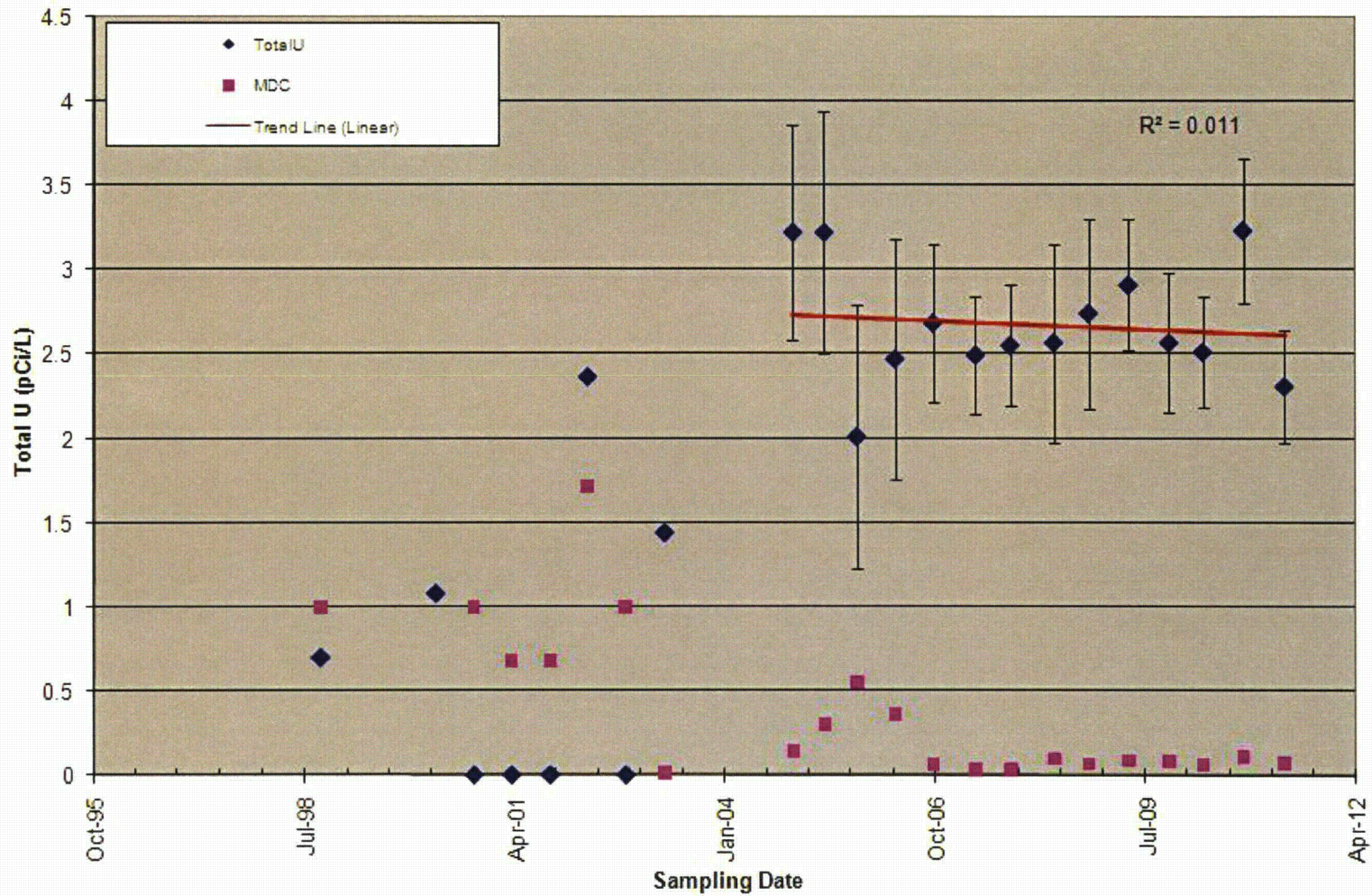
MDC – Minimum Detectable Concentration

Figure 4-8. Total Uranium in MW-DU-008 (1998-2011)



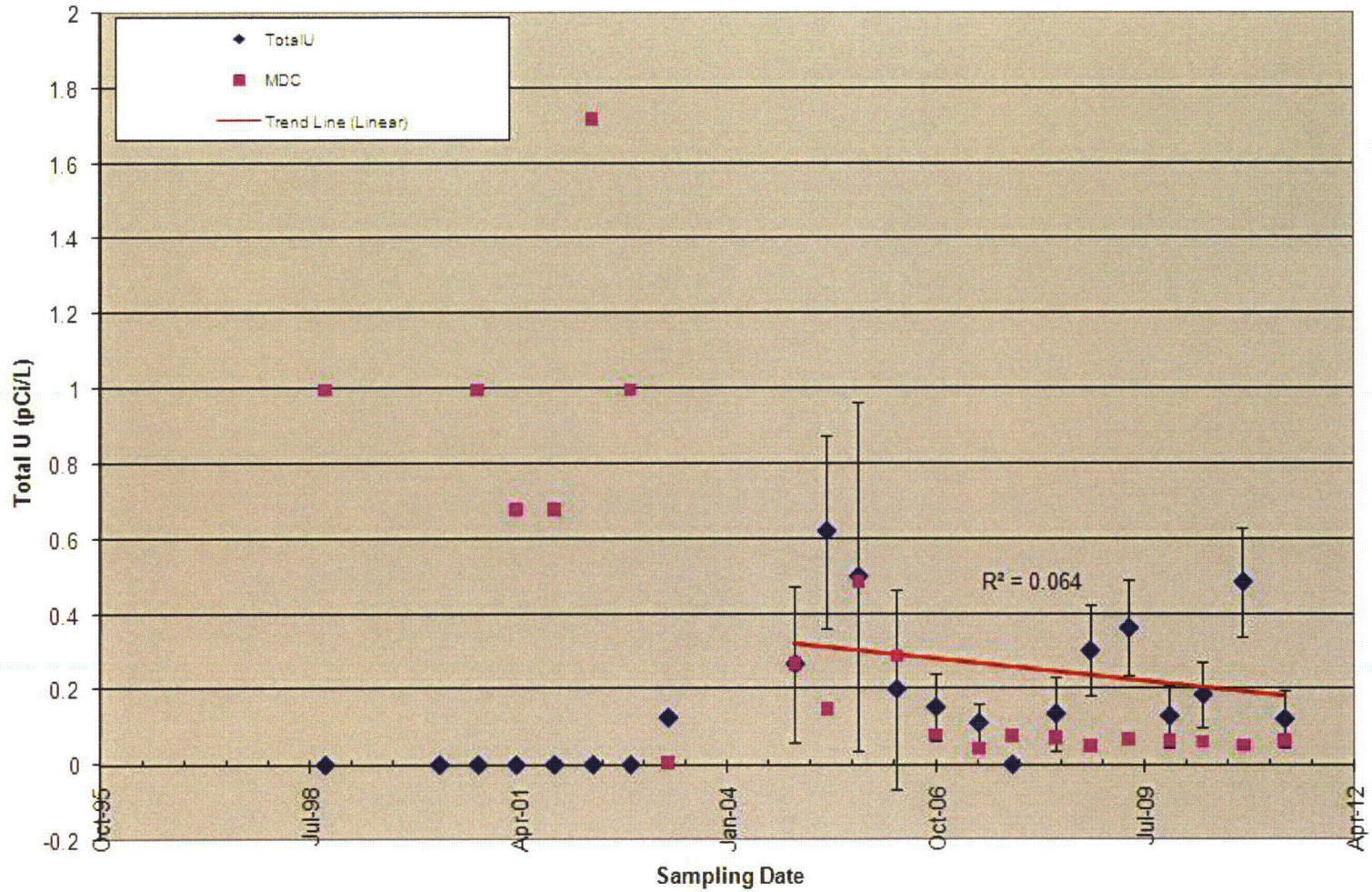
MDC - Minimum Detectable Concentration

Figure 4-9. Total Uranium in MW-DU-009 (1998-2011)



MDC - Minimum Detectable Concentration

Figure 4-10. Total Uranium in MW-DU-010 (1998-2011)



MDC - Minimum Detectable Concentration
NOTE: Uranium was not detected in the October 2007 sample.

Figure 4-11. Total Uranium in MW-DU-011 (1998-2011)

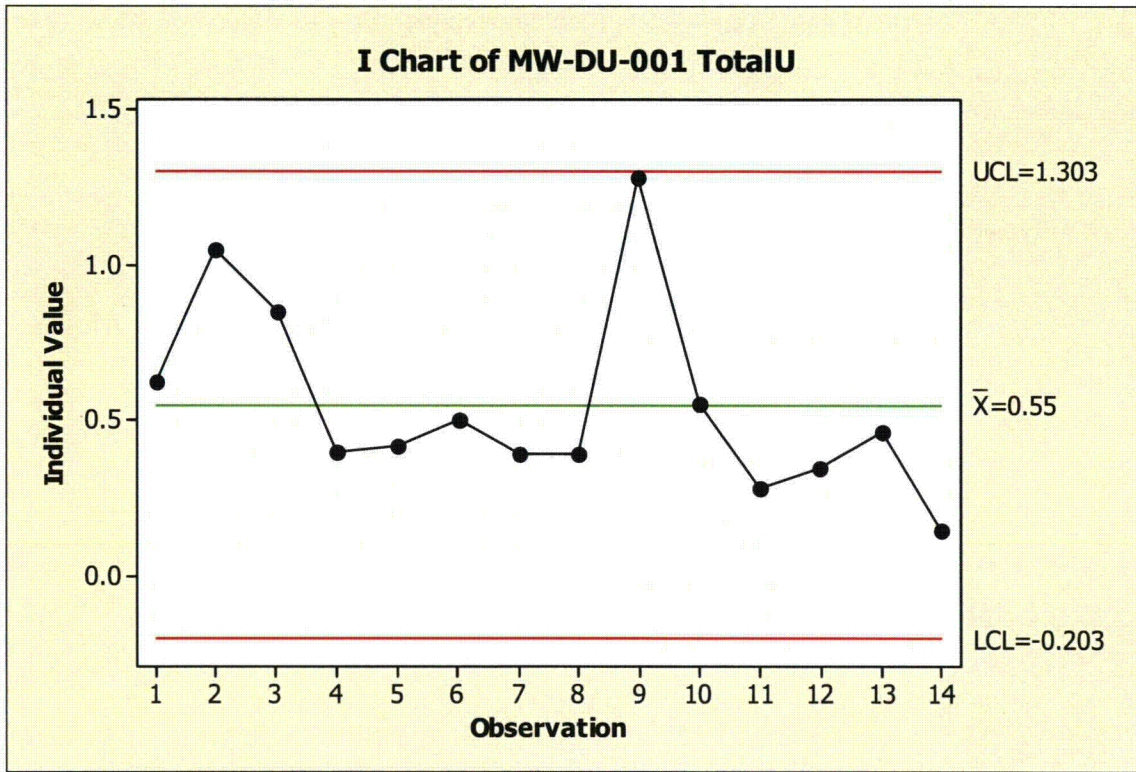


Figure 4-12. Variable Control Chart for Total Uranium in MW-DU-001 (2004-2011)

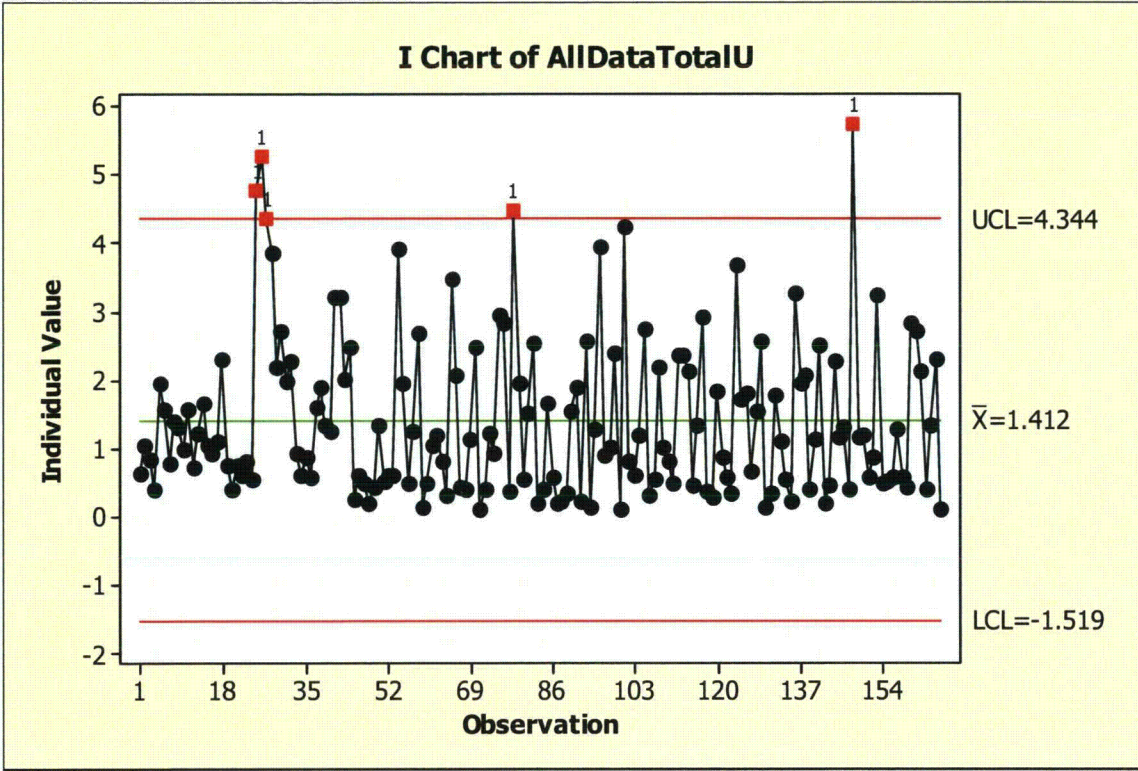
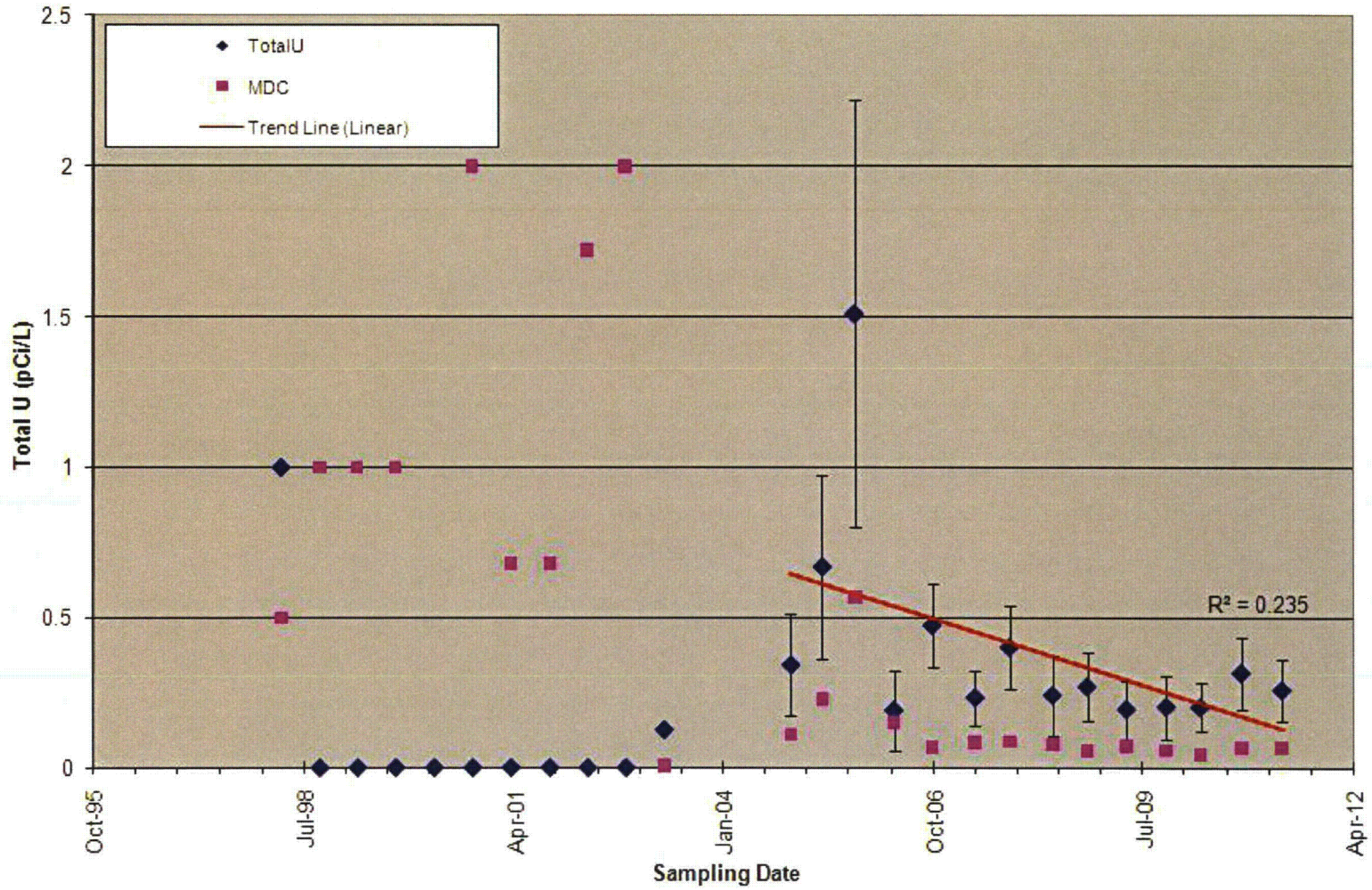
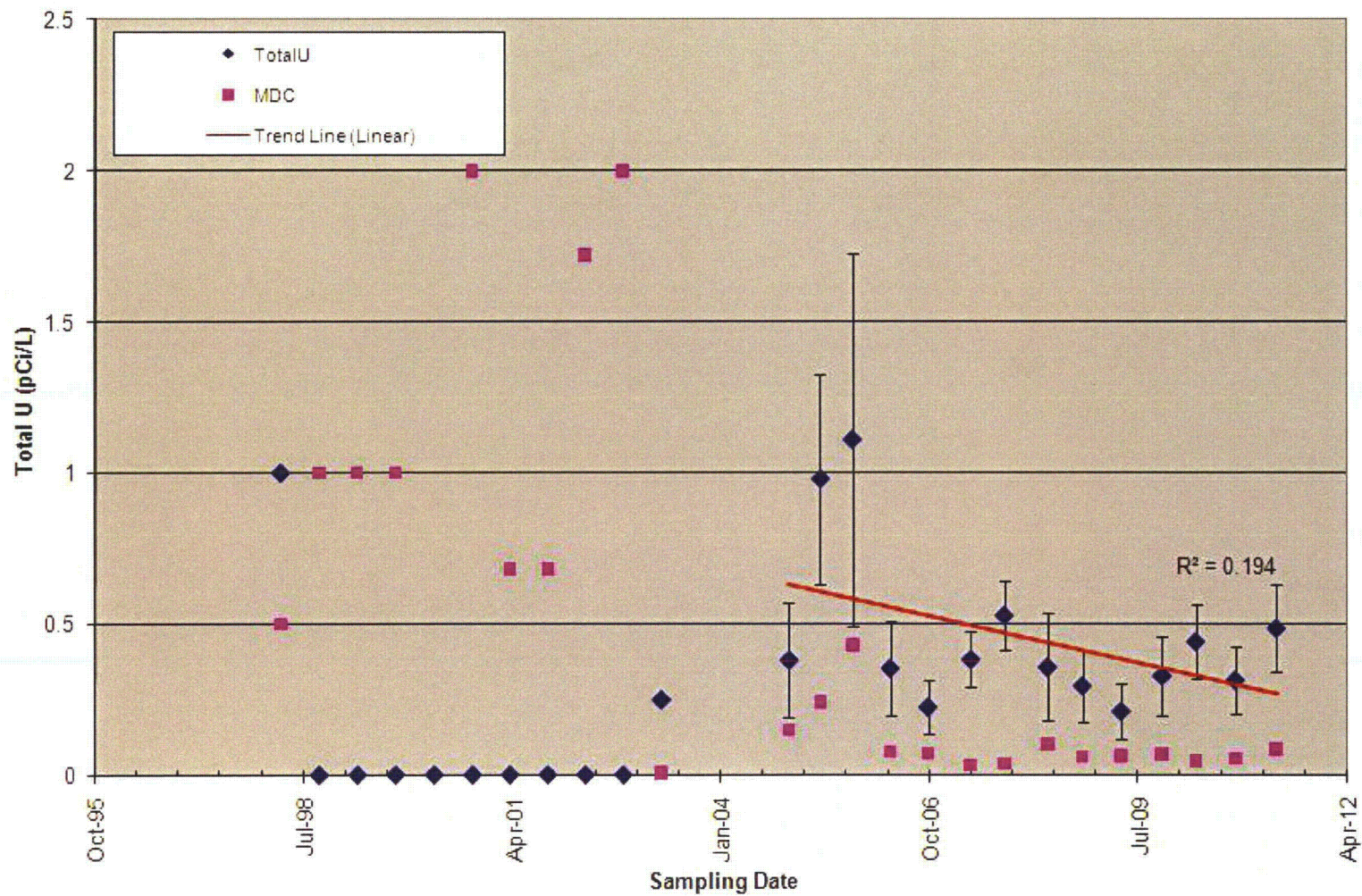


Figure 4-13. Control Chart for All Monitoring Well Data (2004-2011)



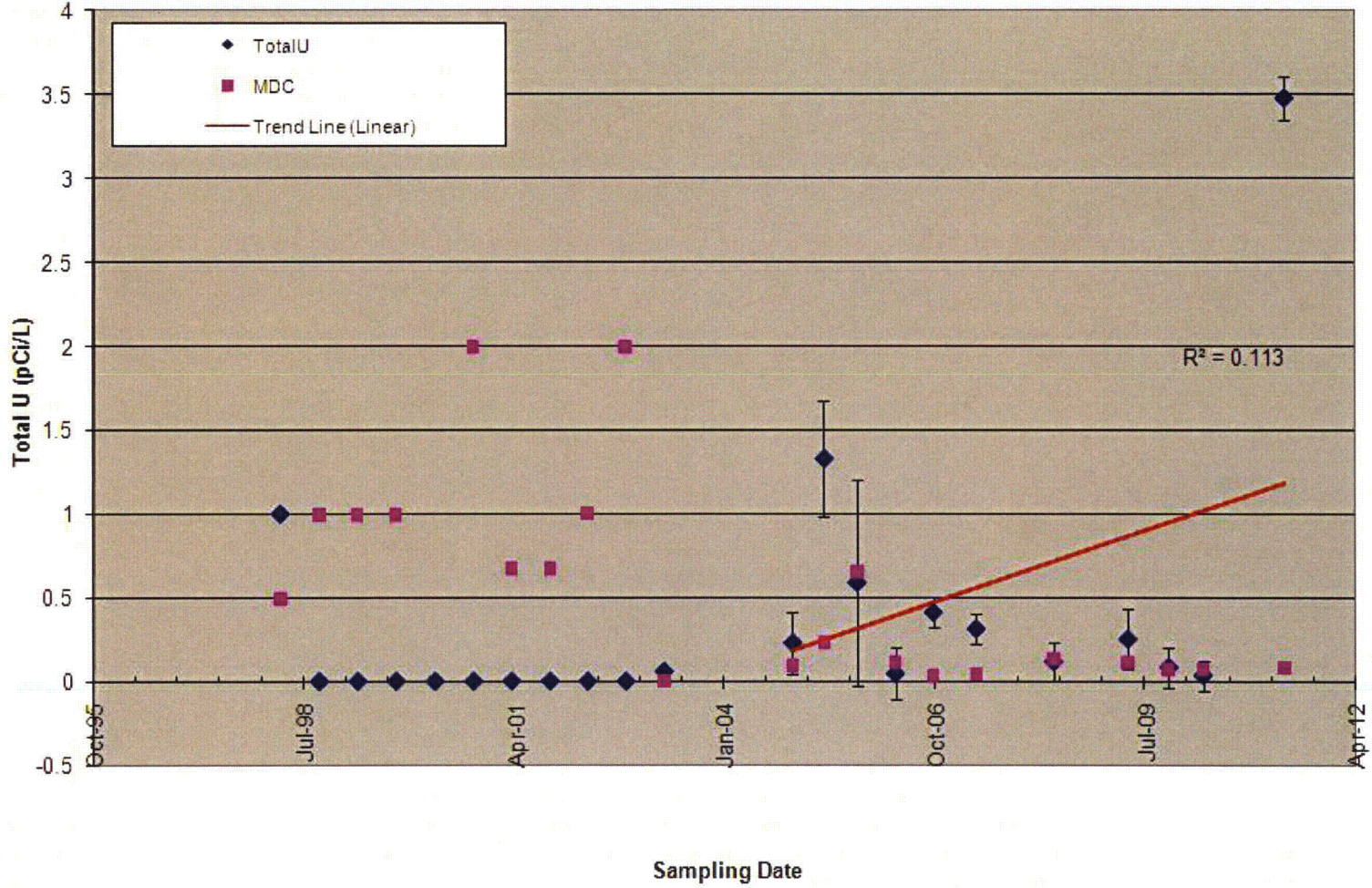
MDC – Minimum Detectable Concentration

Figure 4-14. Total Uranium in SW-DU-001 (1998-2011)



MDC – Minimum Detectable Concentration

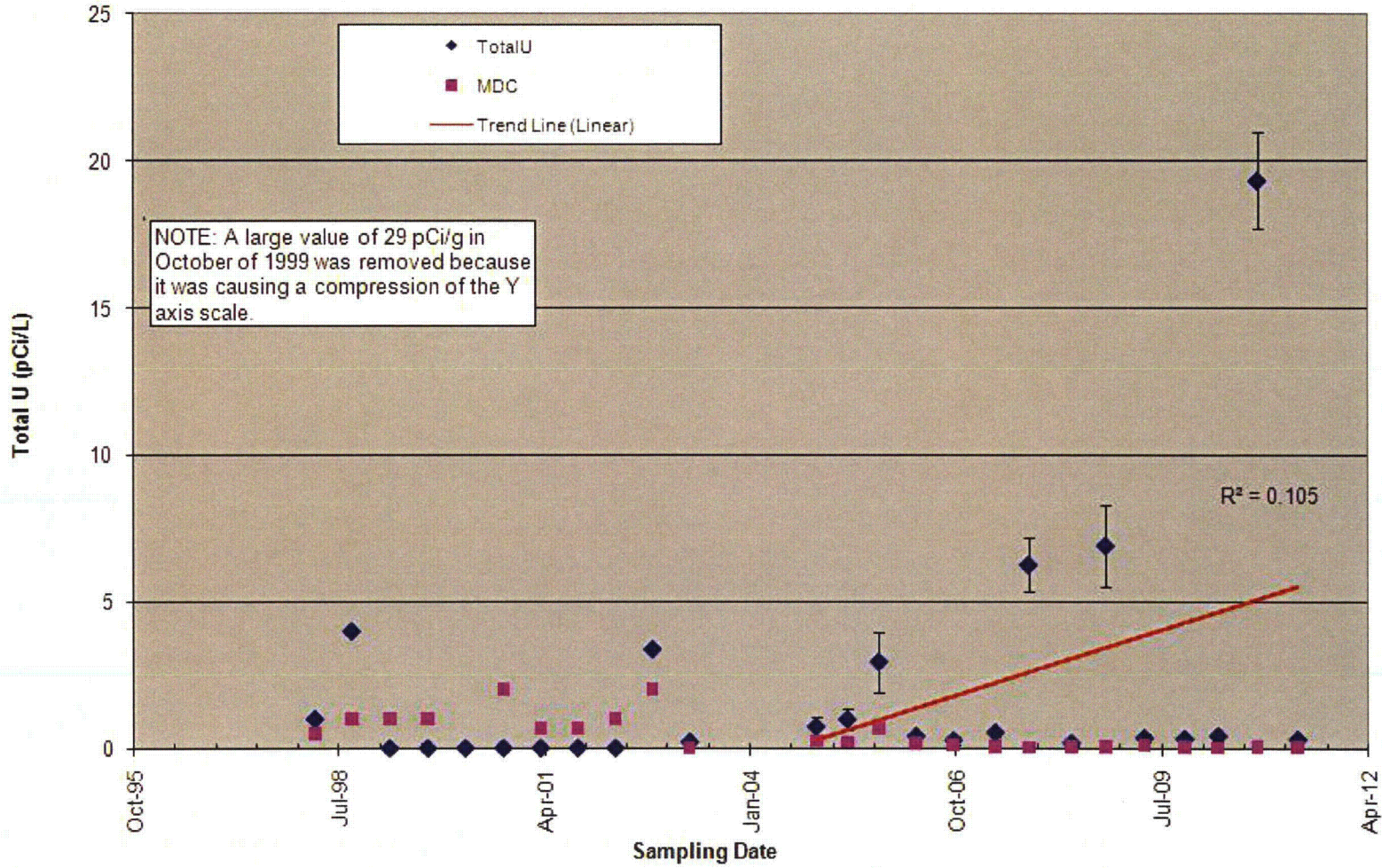
Figure 4-15. Total Uranium in SW-DU-002 (1998-2011)



MDC - Minimum Detectable Concentration

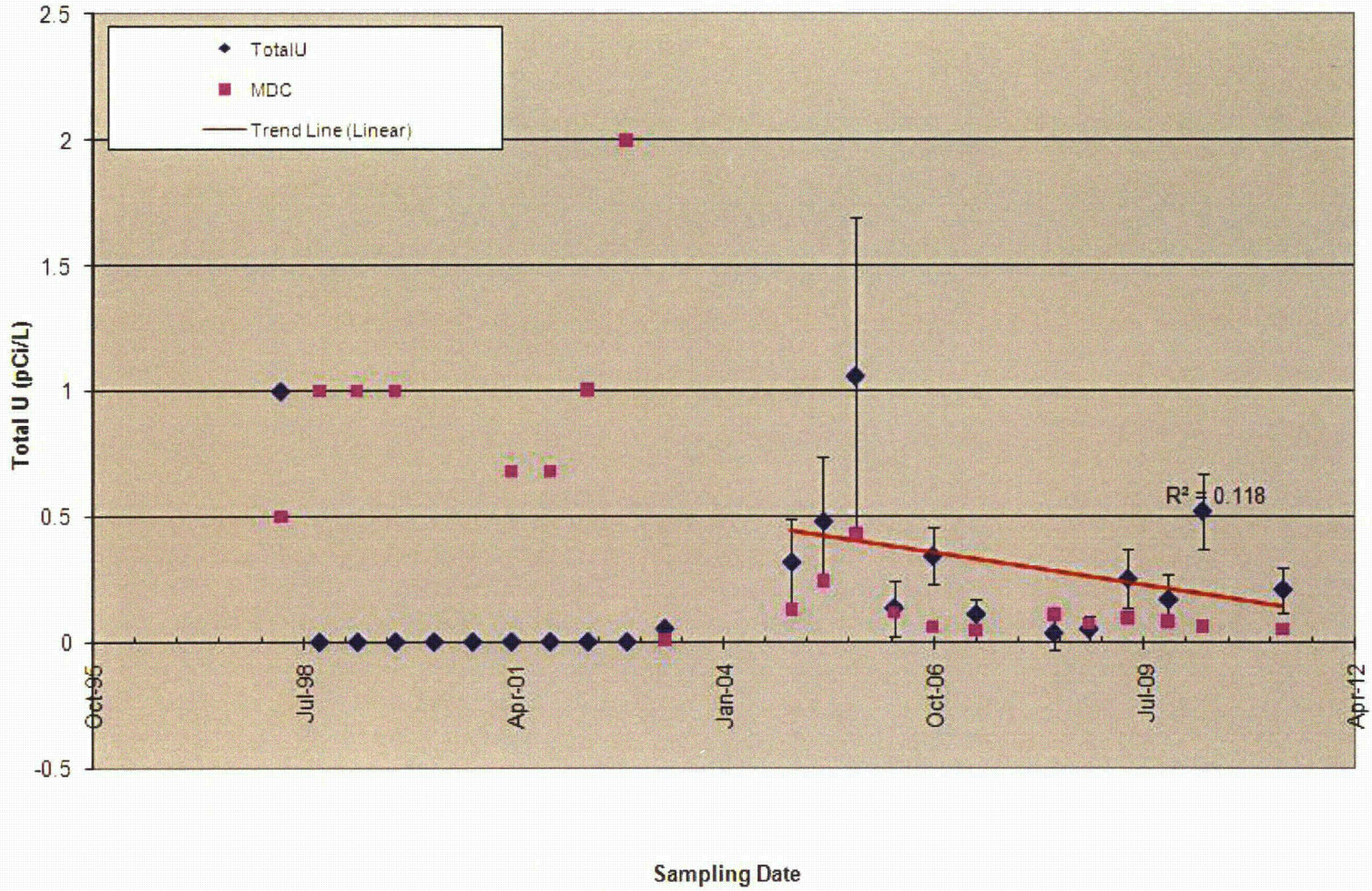
NOTE: No sample was collected in October 2007, October 2008, or October 2010 as the creek was dry.

Figure 4-16. Total Uranium in SW-DU-003 (1998-2011)



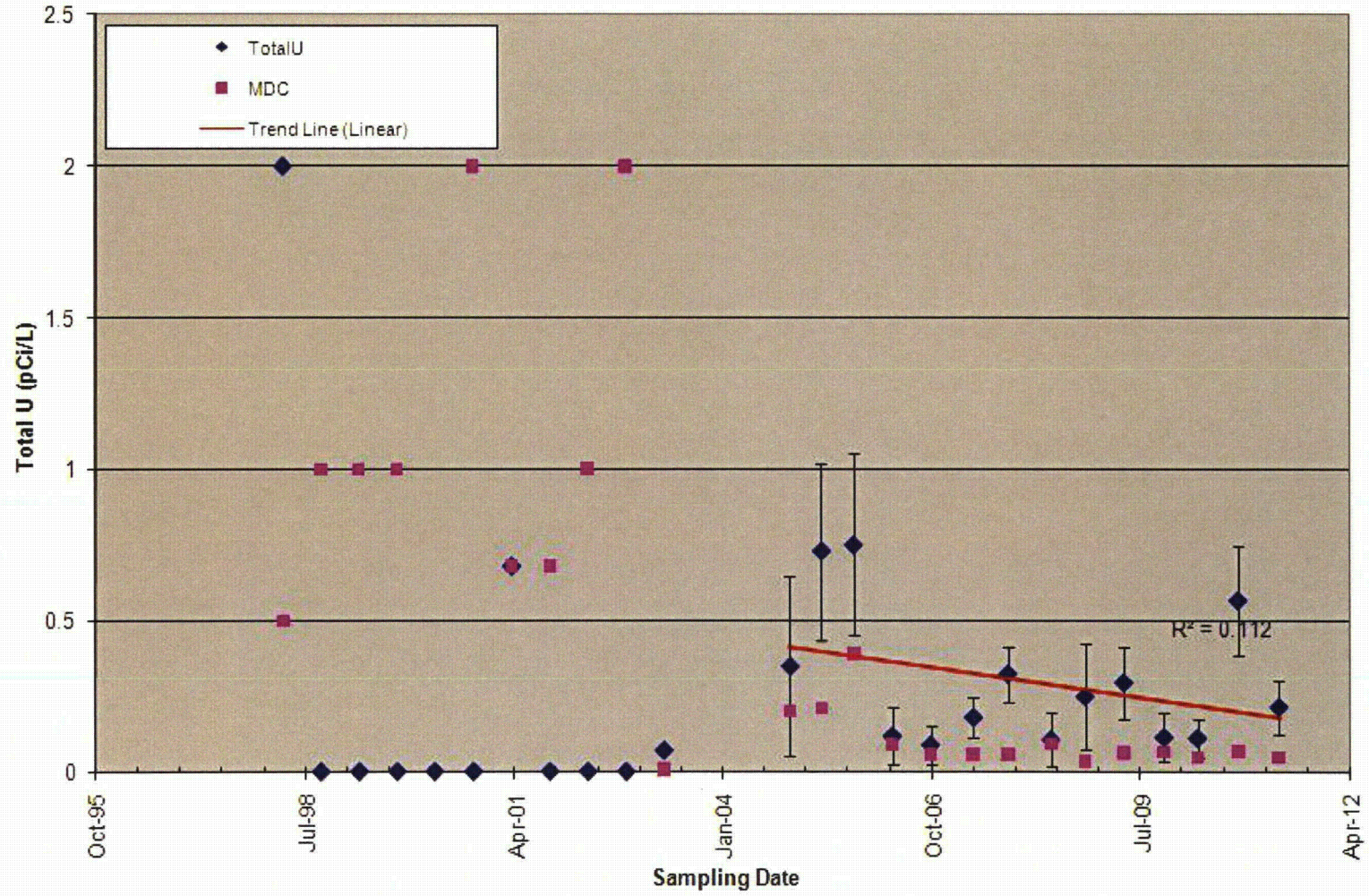
MDC – Minimum Detectable Concentration
 NOTE: A large value of 29 pCi/g in October 1999 was removed because it was causing a compression of the Y axis scale.

Figure 4-18. Total Uranium in SW-DU-005 (1998-2011)



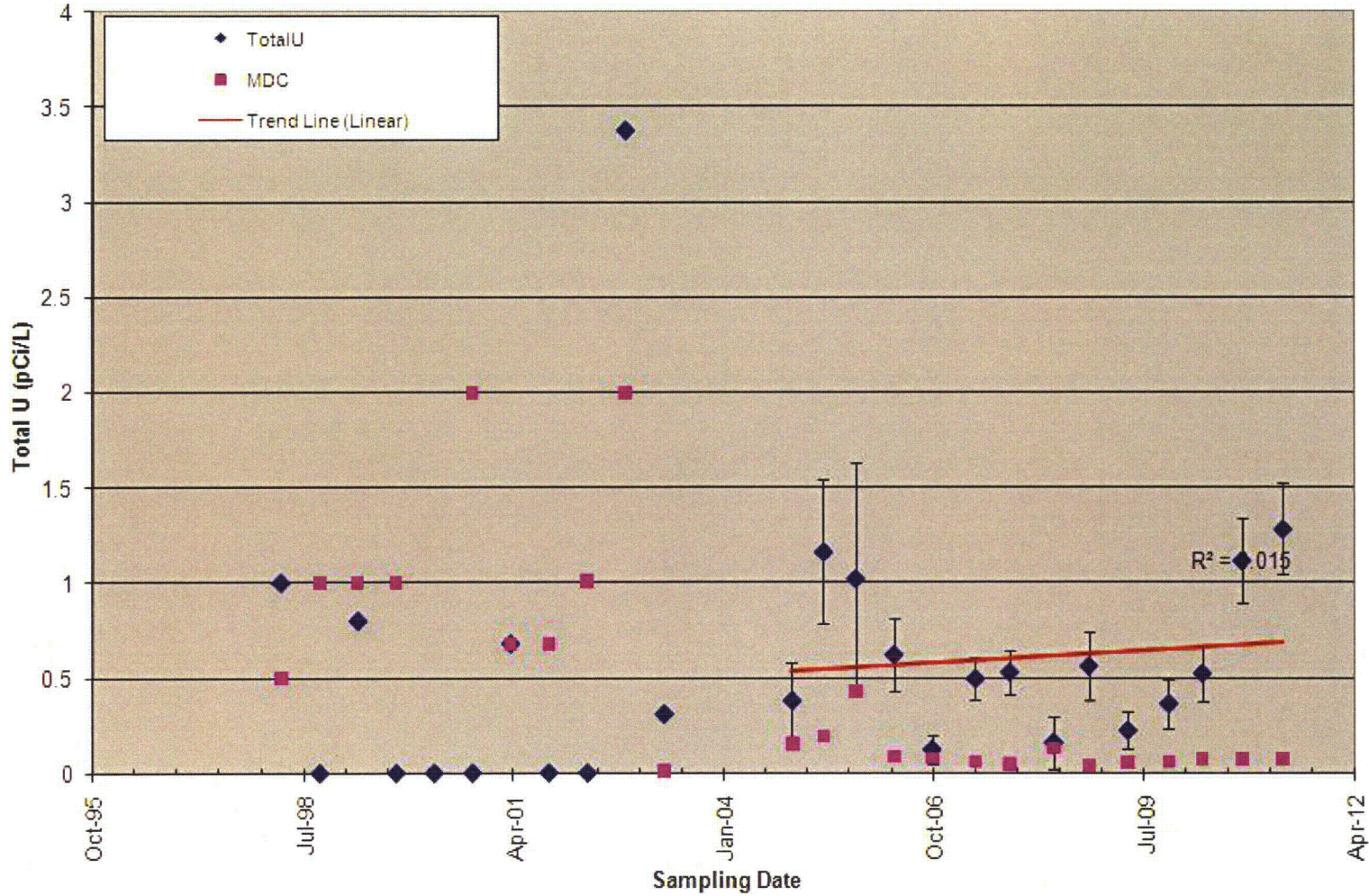
MDC – Minimum Detectable Concentration
NOTE: No sample was collected in October 2007 or October 2010 as the creek was dry.

Figure 4-19. Total Uranium in SW-DU-006 (1998-2011)



MDC - Minimum Detectable Concentration

Figure 4-20. Total Uranium in SW-DU-007 (1998-2011)



MDC - Minimum Detectable Concentration

Figure 4-21. Total Uranium in SW-DU-008 (1998-2011)

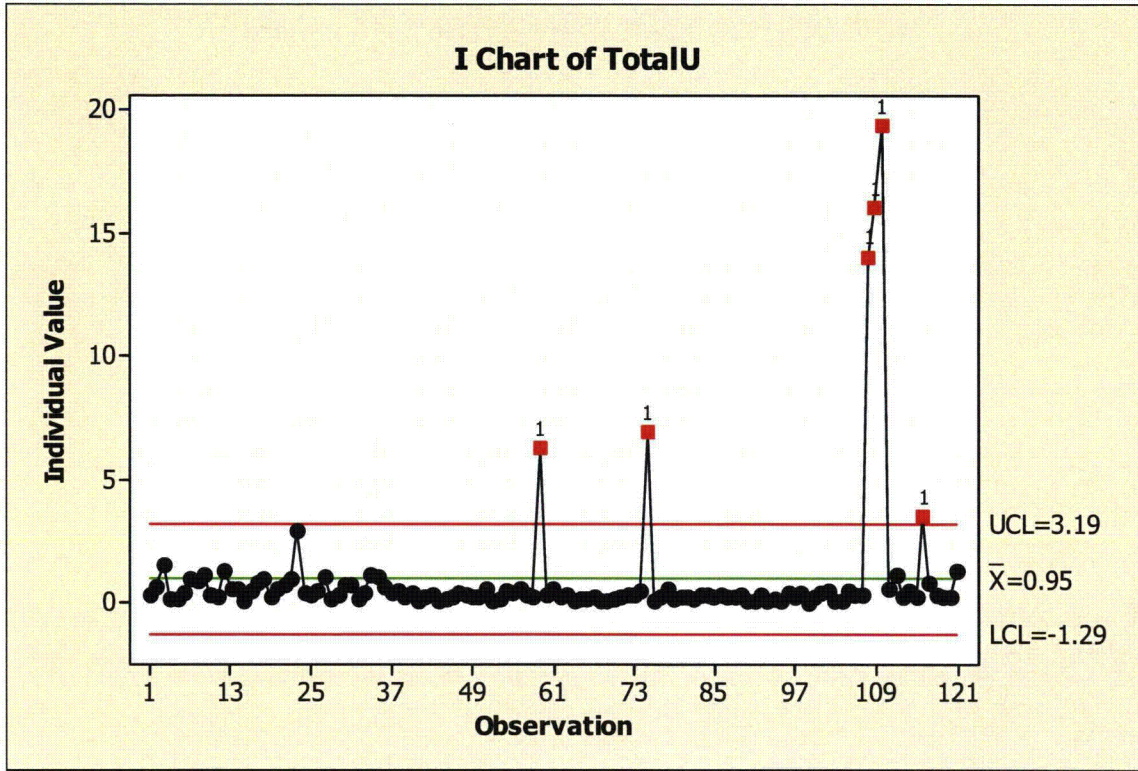
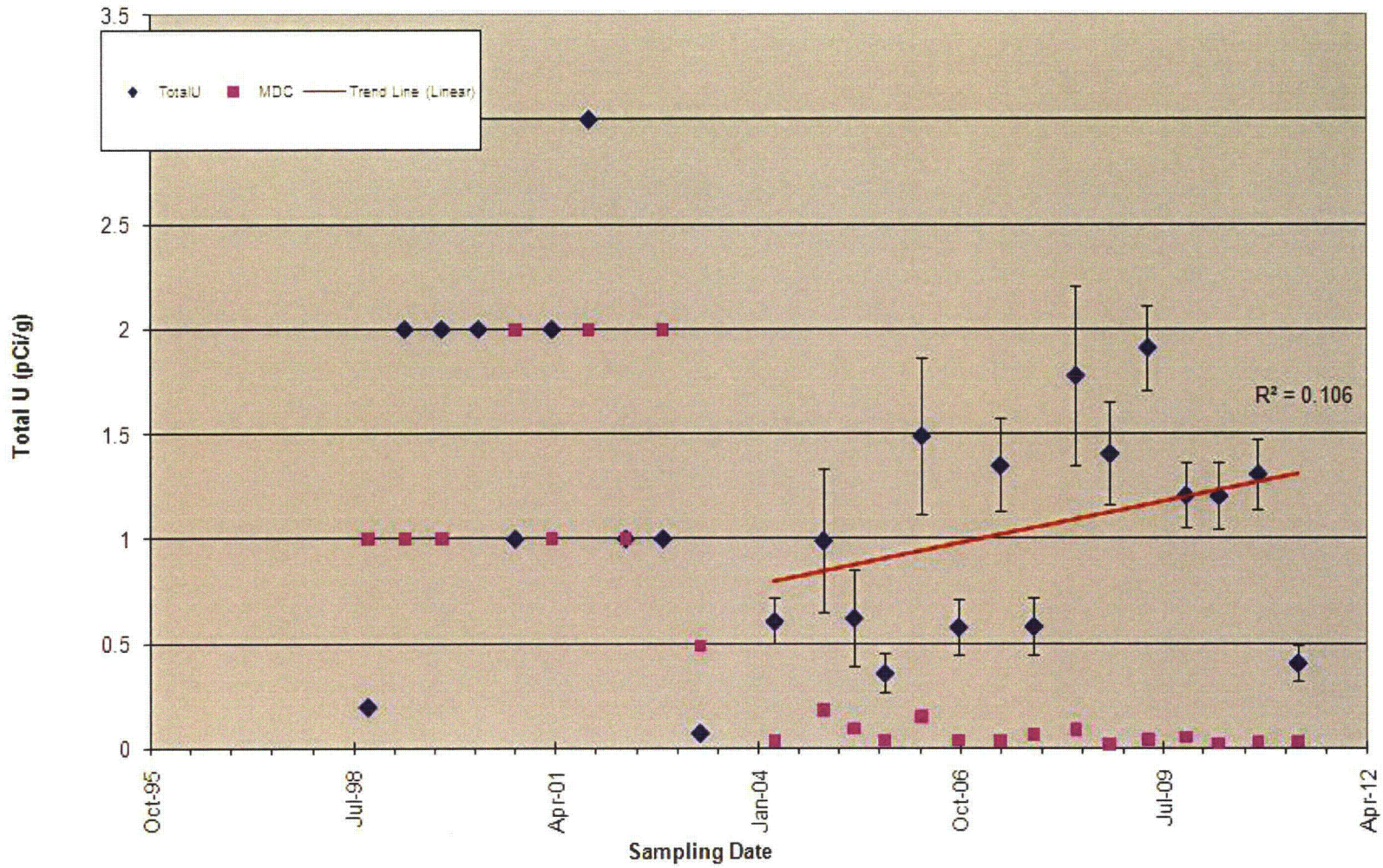
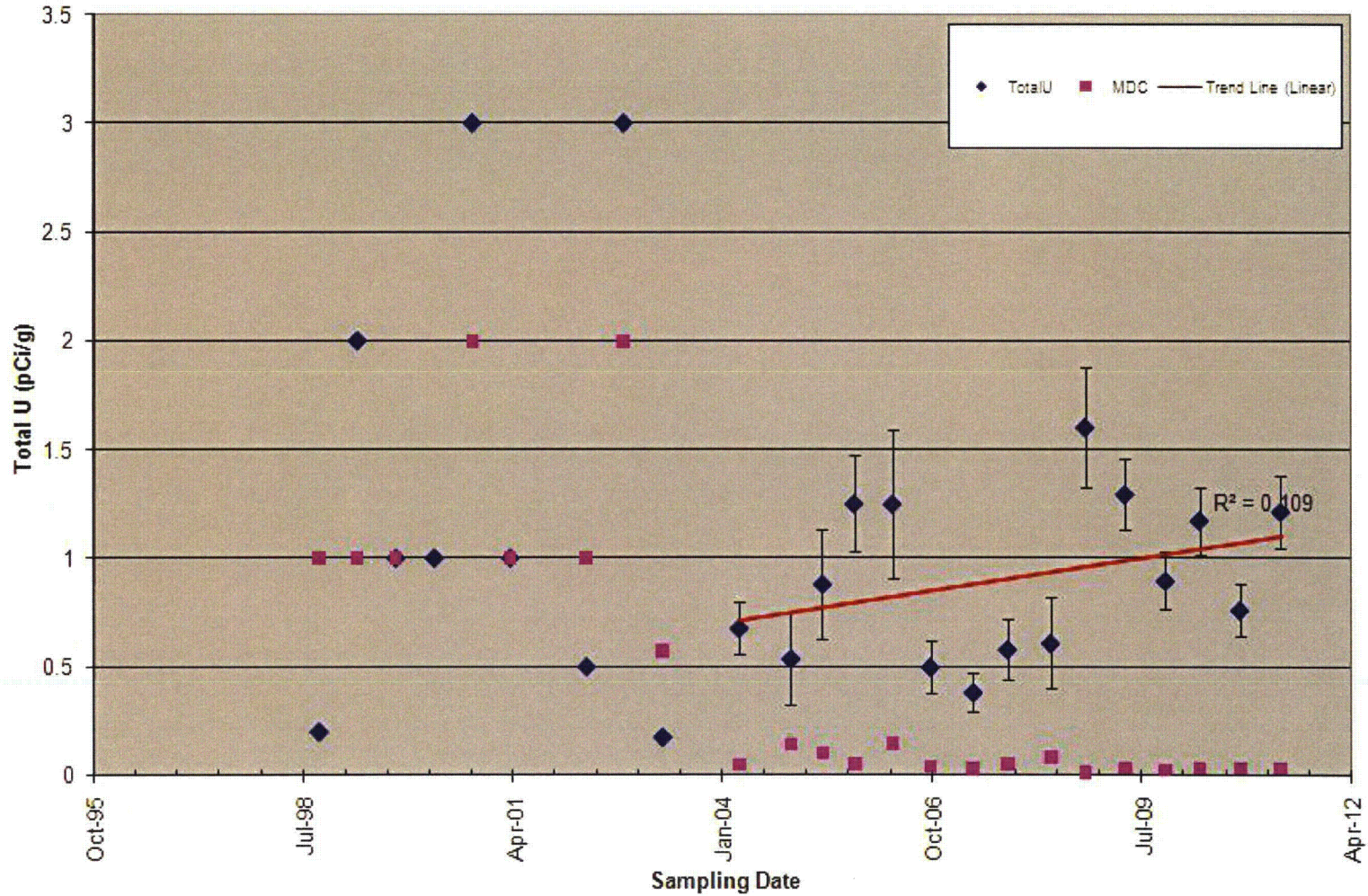


Figure 4-22. Control Chart for All Surface Water Data (2004-2011)



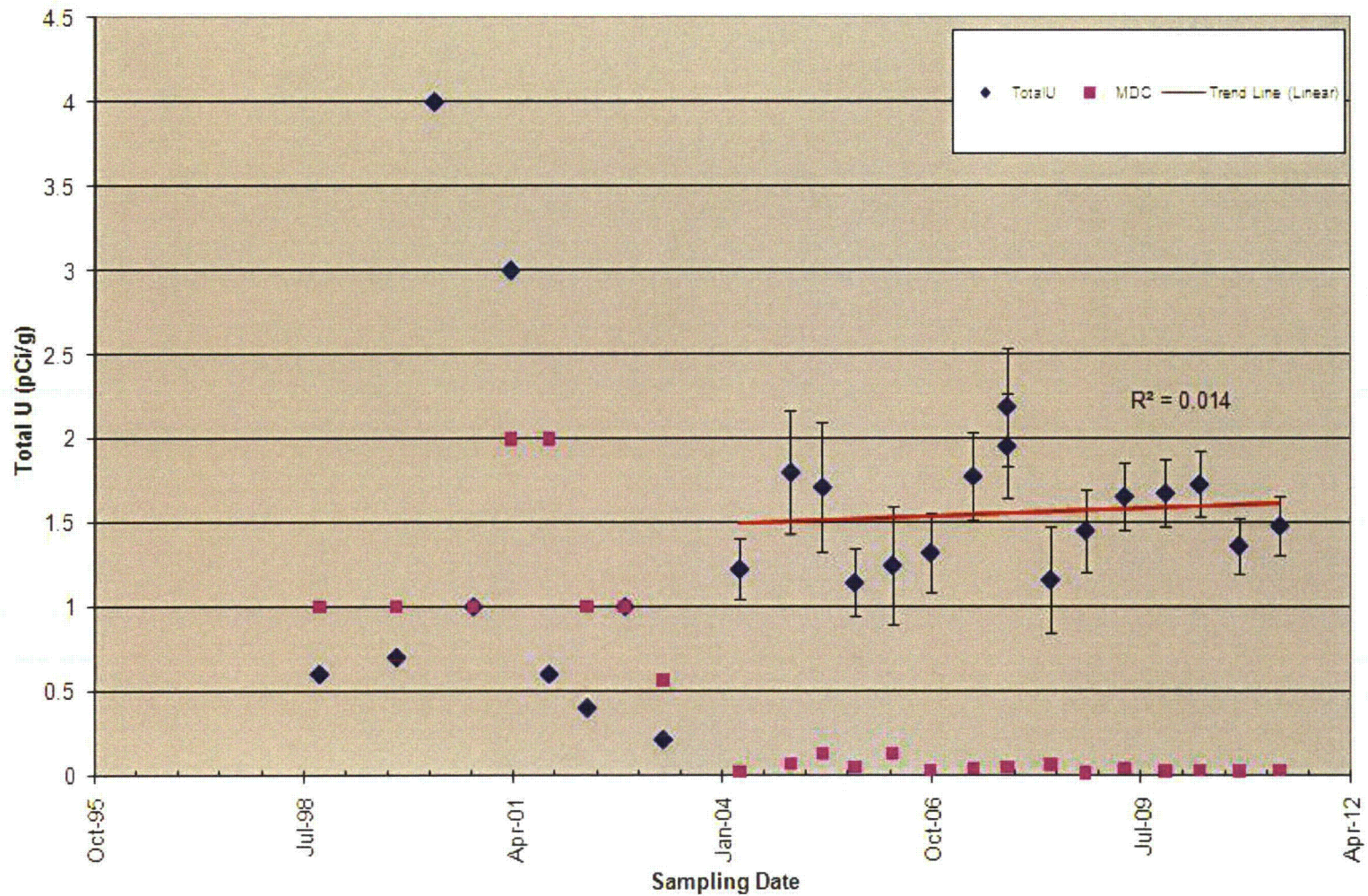
MDC - Minimum Detectable Concentration

Figure 4-23. Total Uranium in SD-DU-001 (1998-2011)



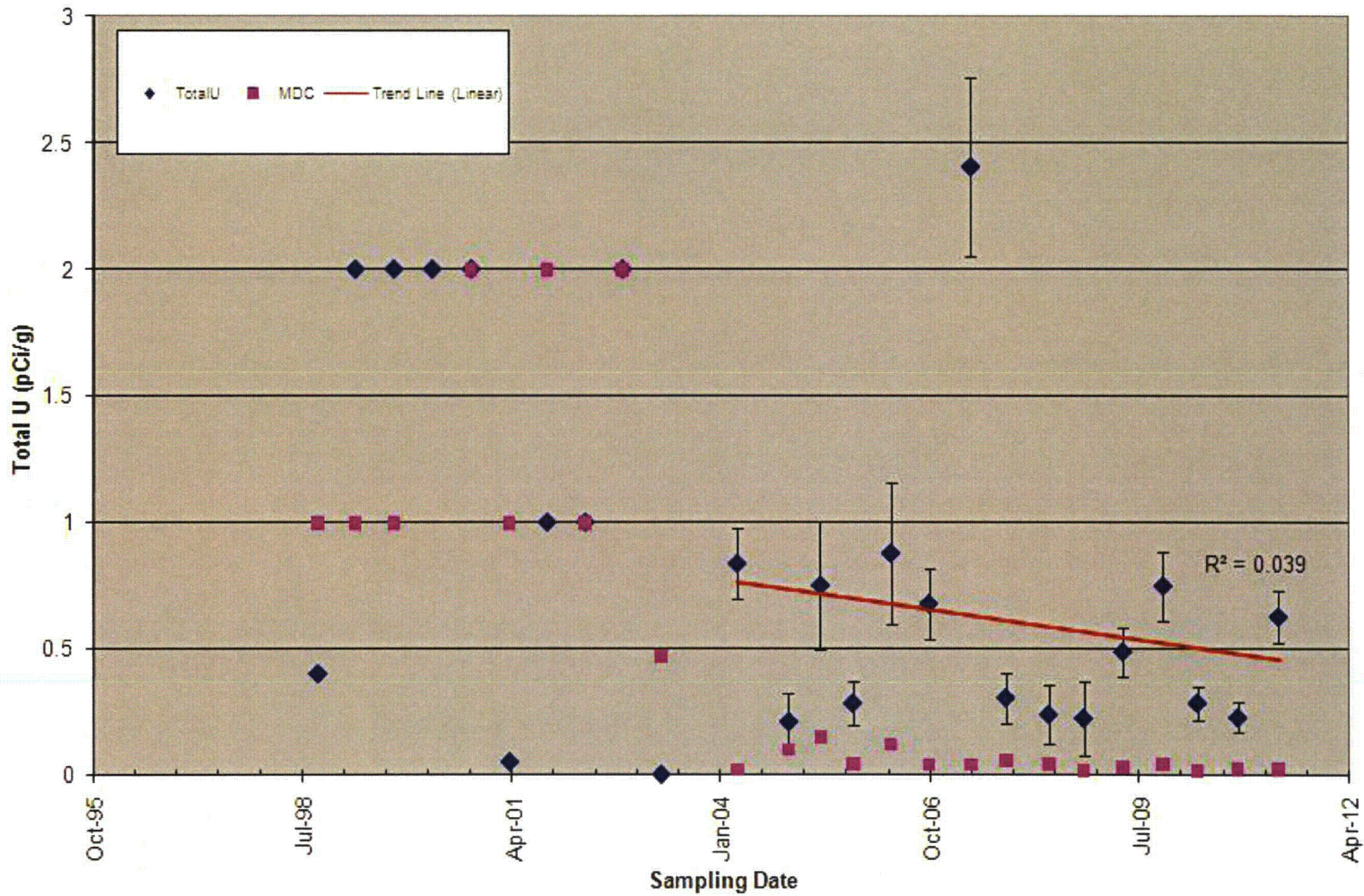
MDC - Minimum Detectable Concentration

Figure 4-24. Total Uranium in SD-DU-002 (1998-2011)



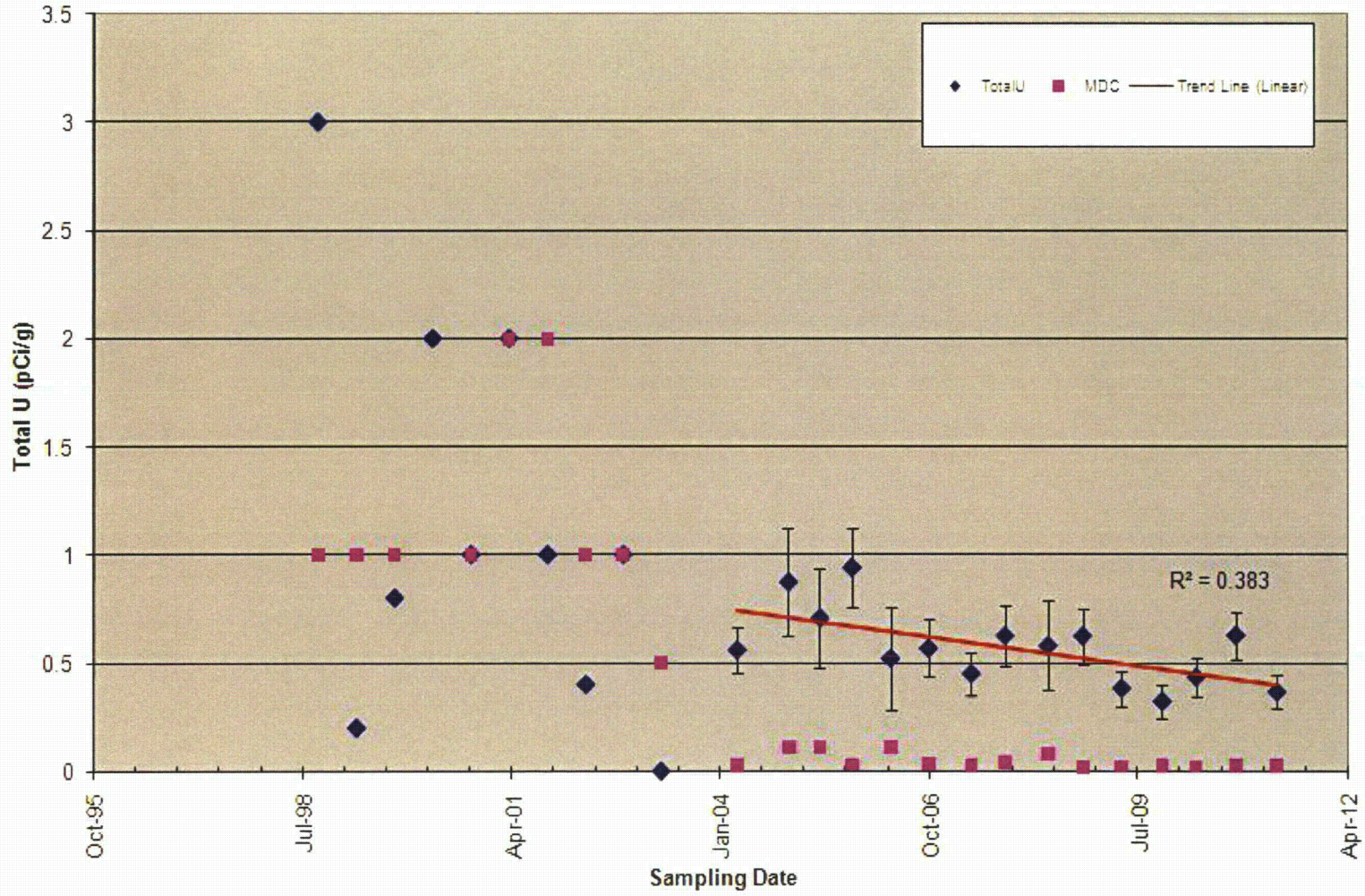
MDC - Minimum Detectable Concentration

Figure 4-25. Total Uranium in SD-DU-003 (1998-2011)



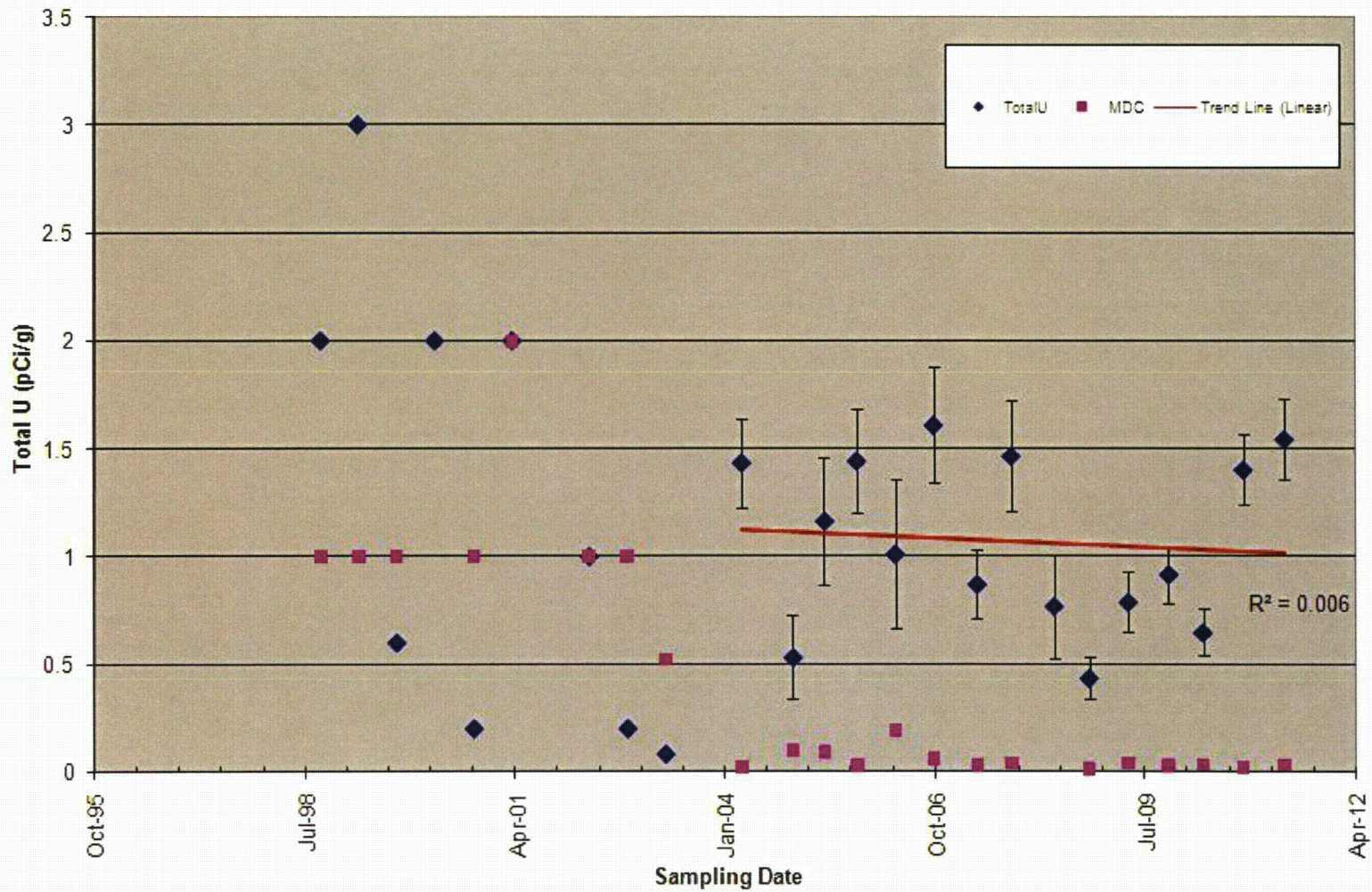
MDC - Minimum Detectable Concentration

Figure 4-26. Total Uranium in SD-DU-004 (1998-2011)



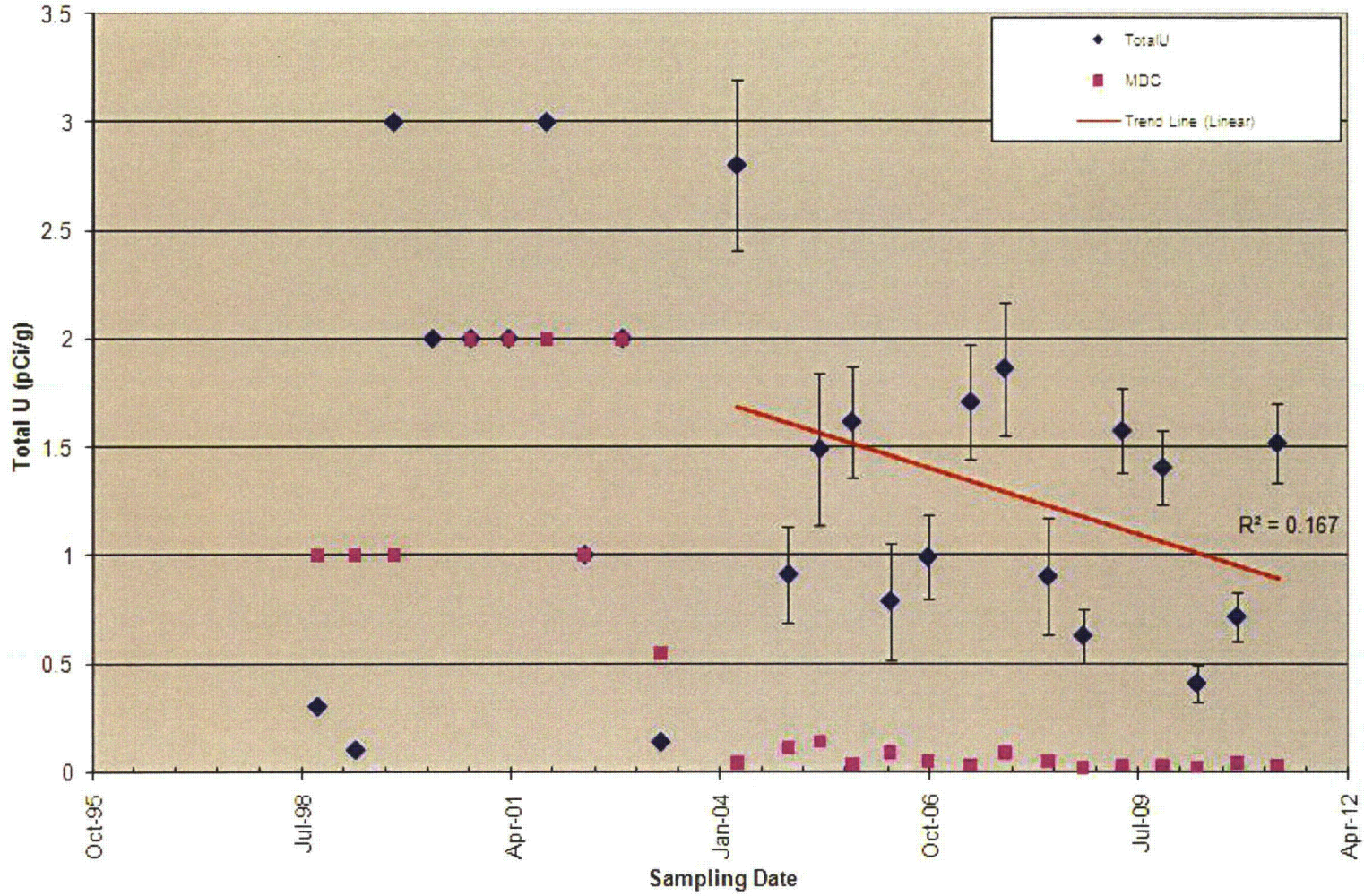
MDC - Minimum Detectable Concentration

Figure 4-27. Total Uranium in SD-DU-005 (1998-2011)



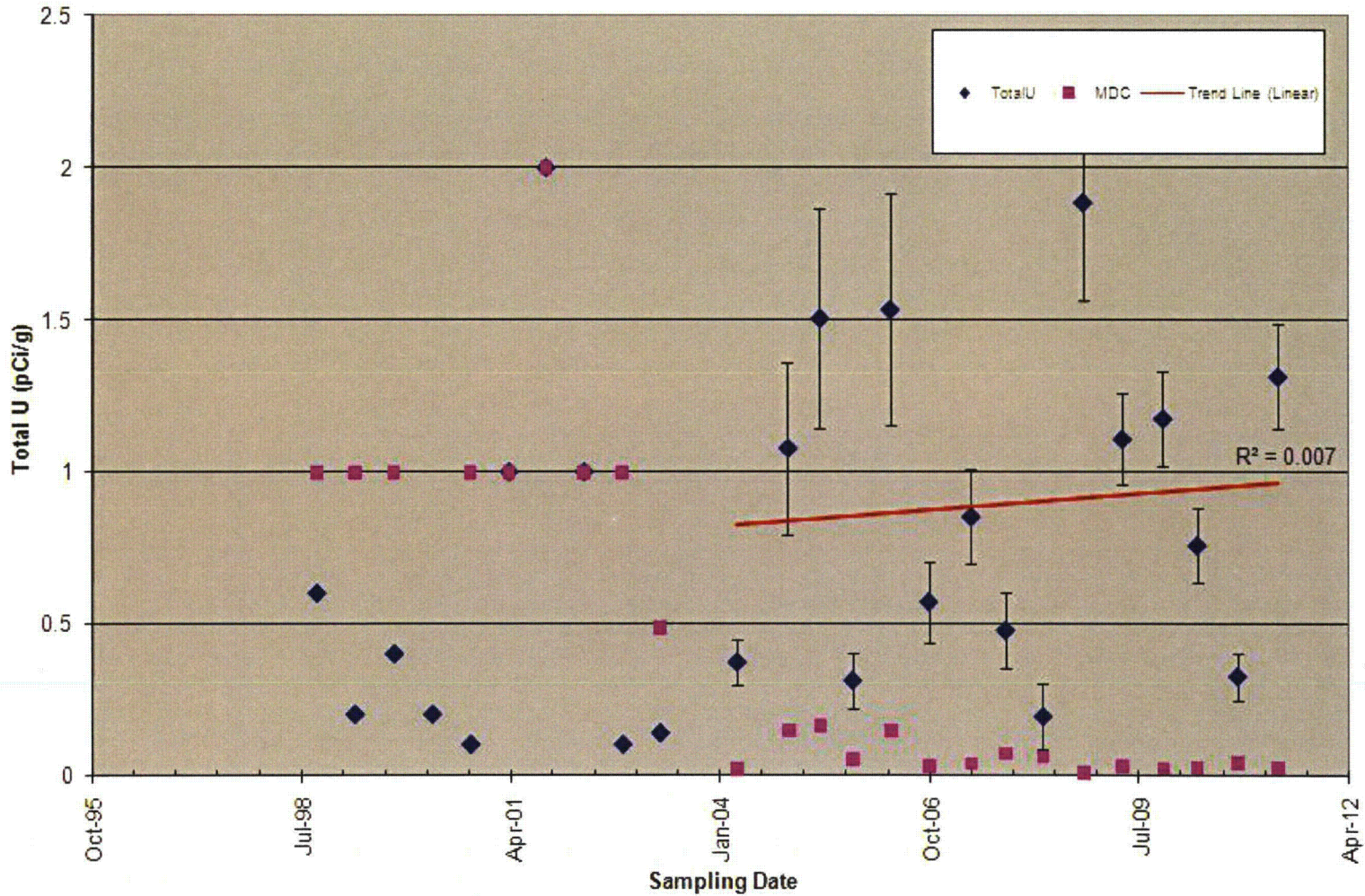
MDC – Minimum Detectable Concentration

Figure 4-28. Total Uranium in SD-DU-006 (1998-2011)



MDC - Minimum Detectable Concentration

Figure 4-29. Total Uranium in SD-DU-007 (1998-2011)



MDC - Minimum Detectable Concentration

Figure 4-30. Total Uranium in SD-DU-008 (1998-2011)

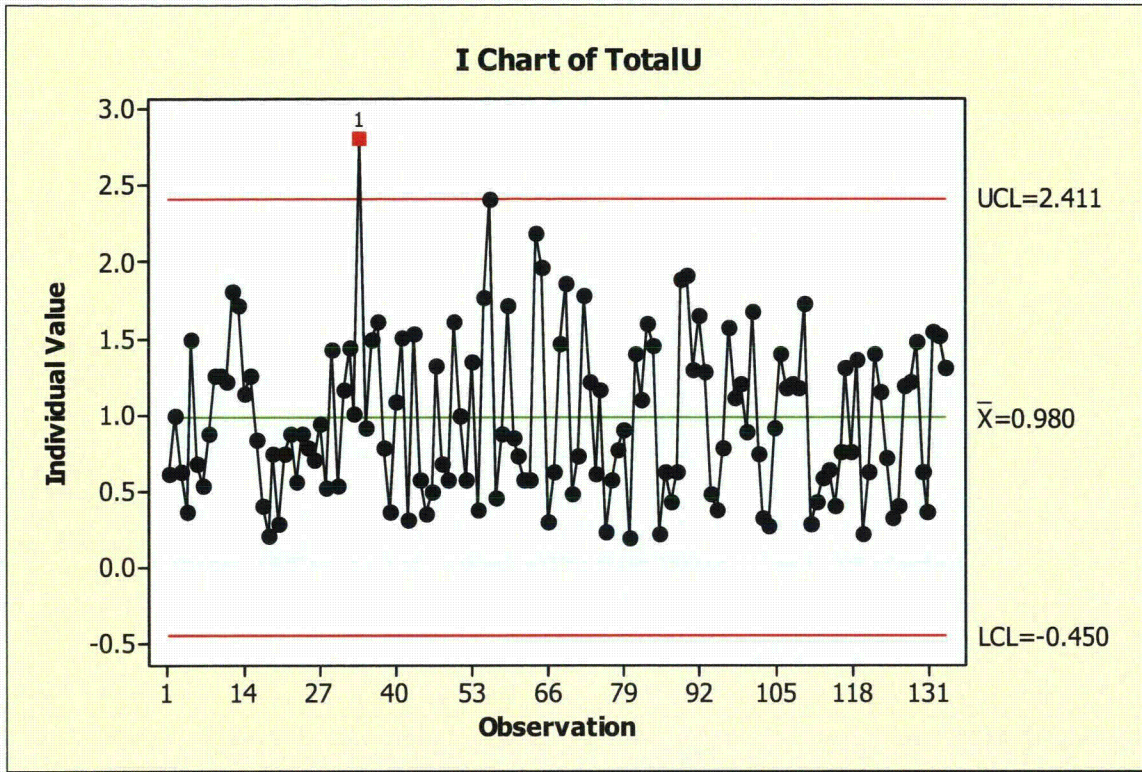
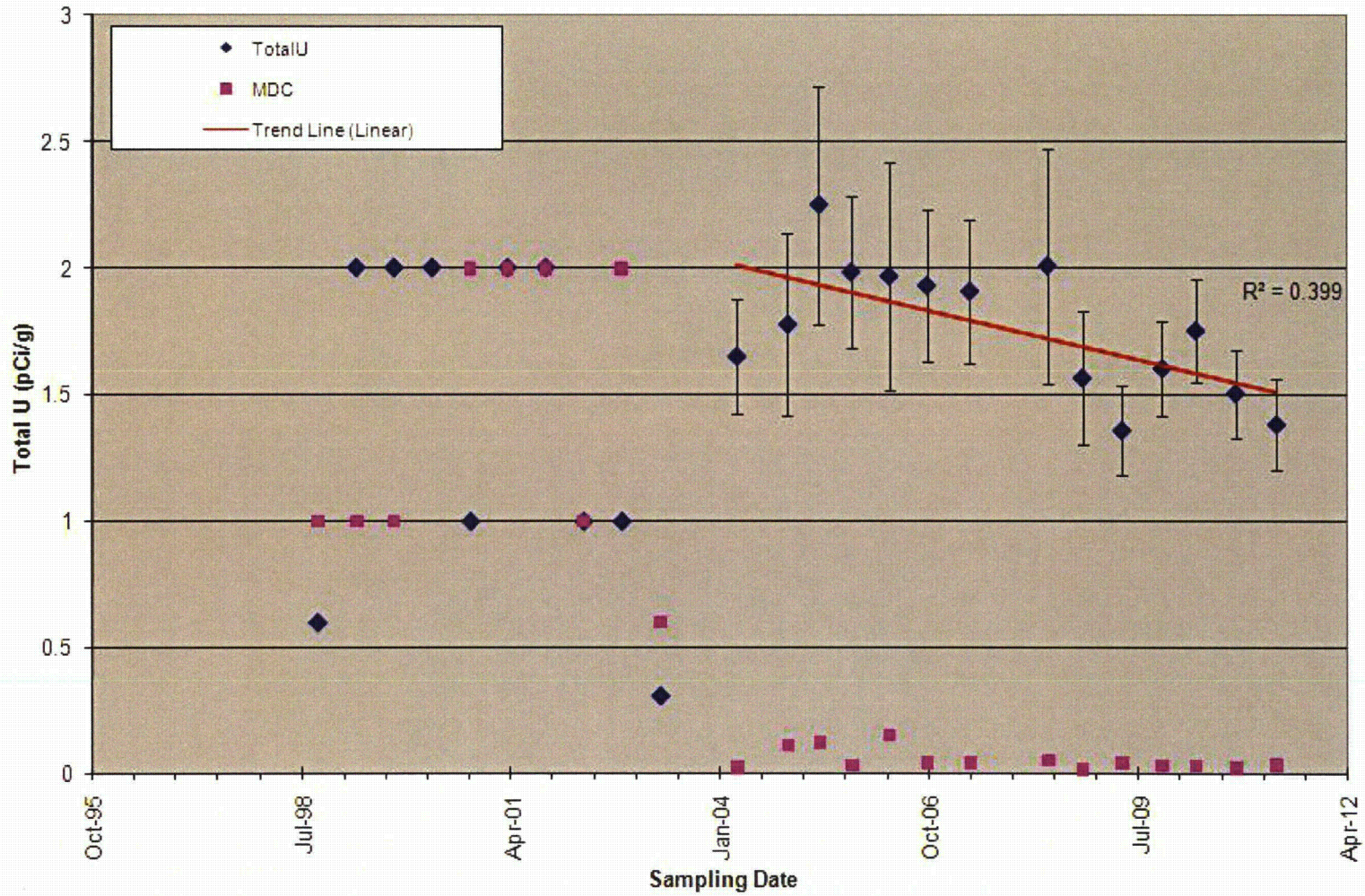
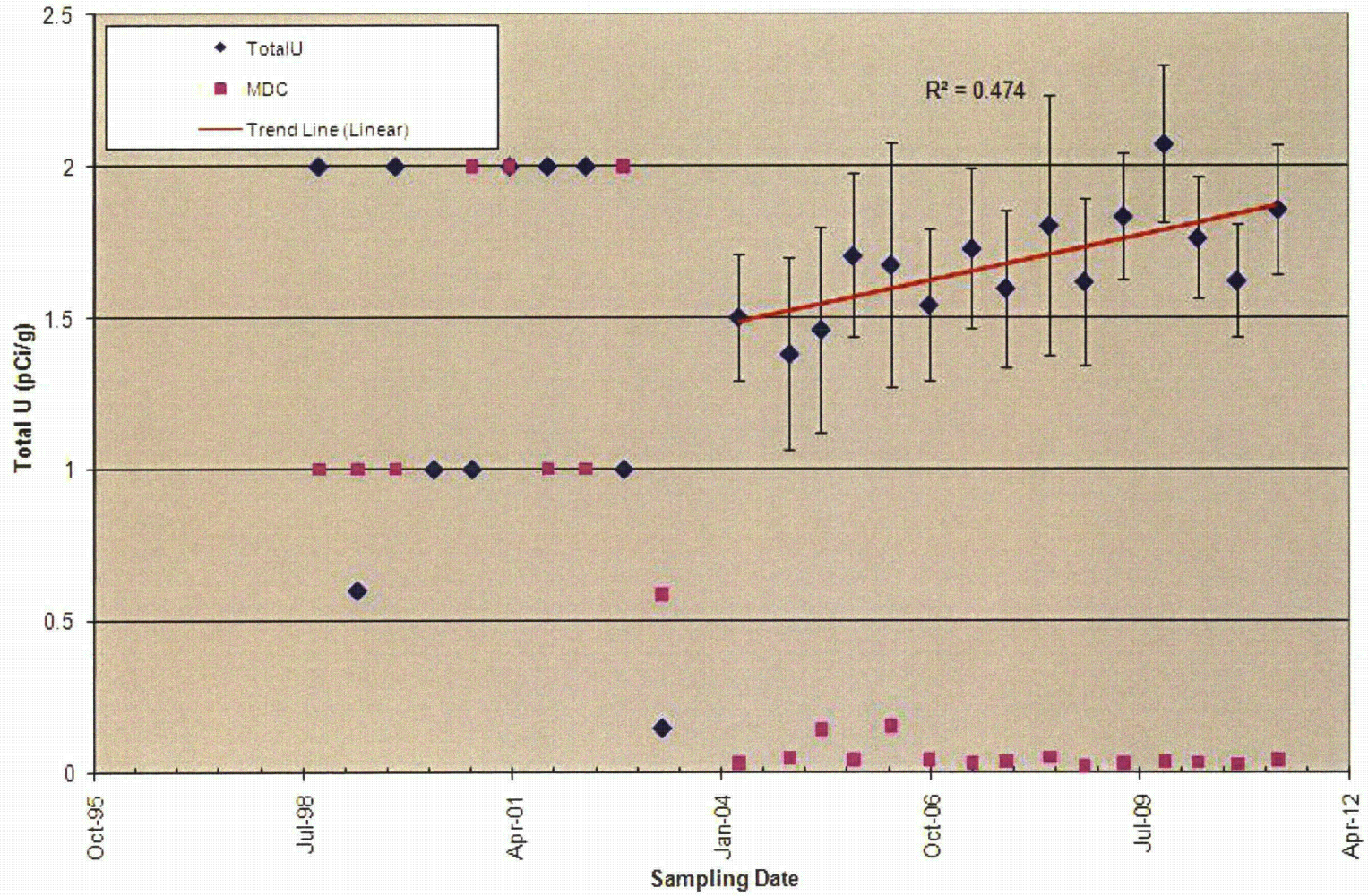


Figure 4-31. Control Chart for All Sediment Data (2004-2011)



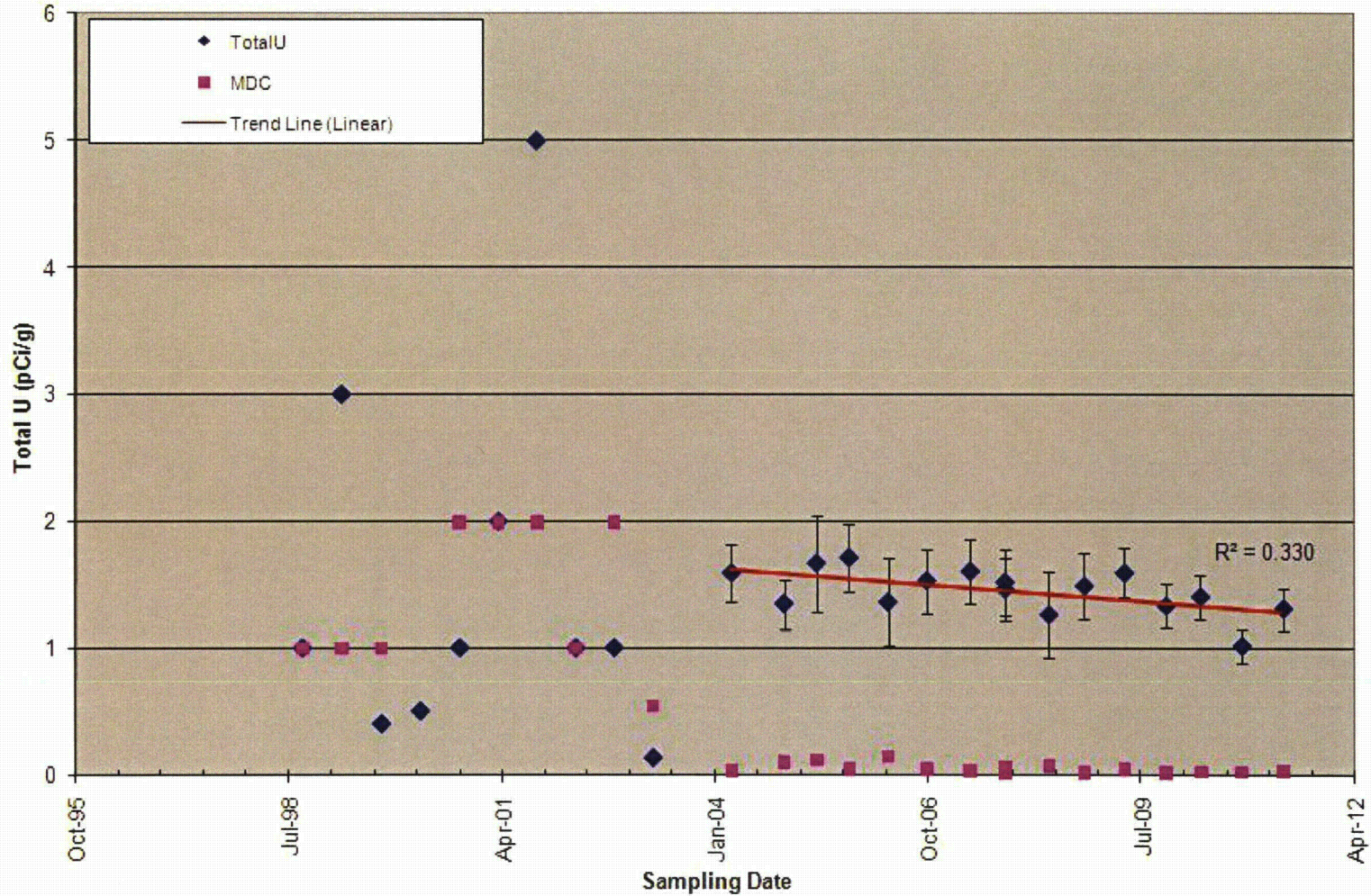
MDC - Minimum Detectable Concentration

Figure 4-32. Total Uranium in SS-DU-001 (1998-2011)



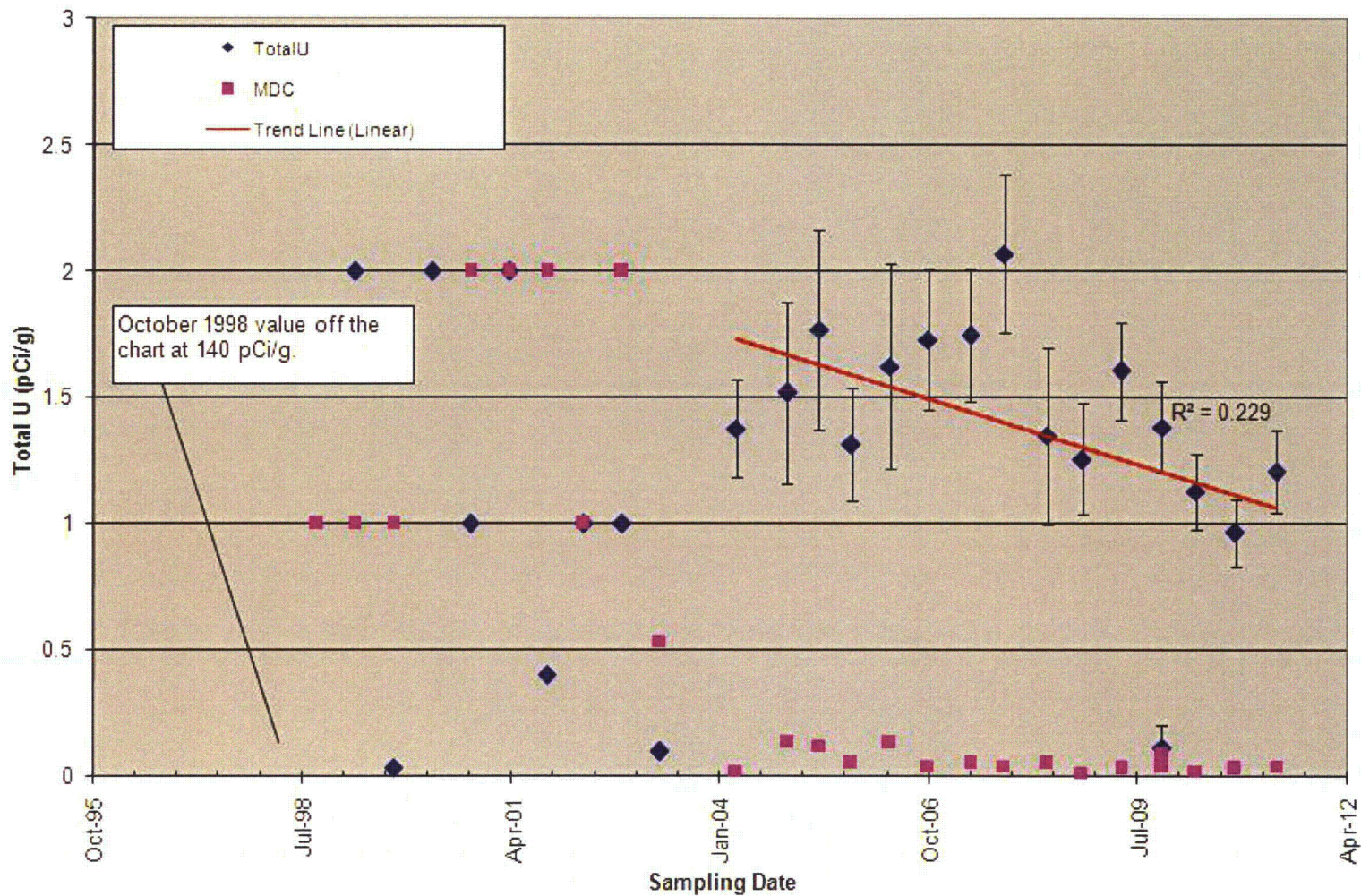
MDC – Minimum Detectable Concentration

Figure 4-33. Total Uranium in SS-DU-002 (1998-2011)



MDC - Minimum Detectable Concentration

Figure 4-34. Total Uranium in SS-DU-003 (1998-2011)



MDC - Minimum Detectable Concentration

Figure 4-35. Total Uranium in SS-DU-004 (1998-2011)

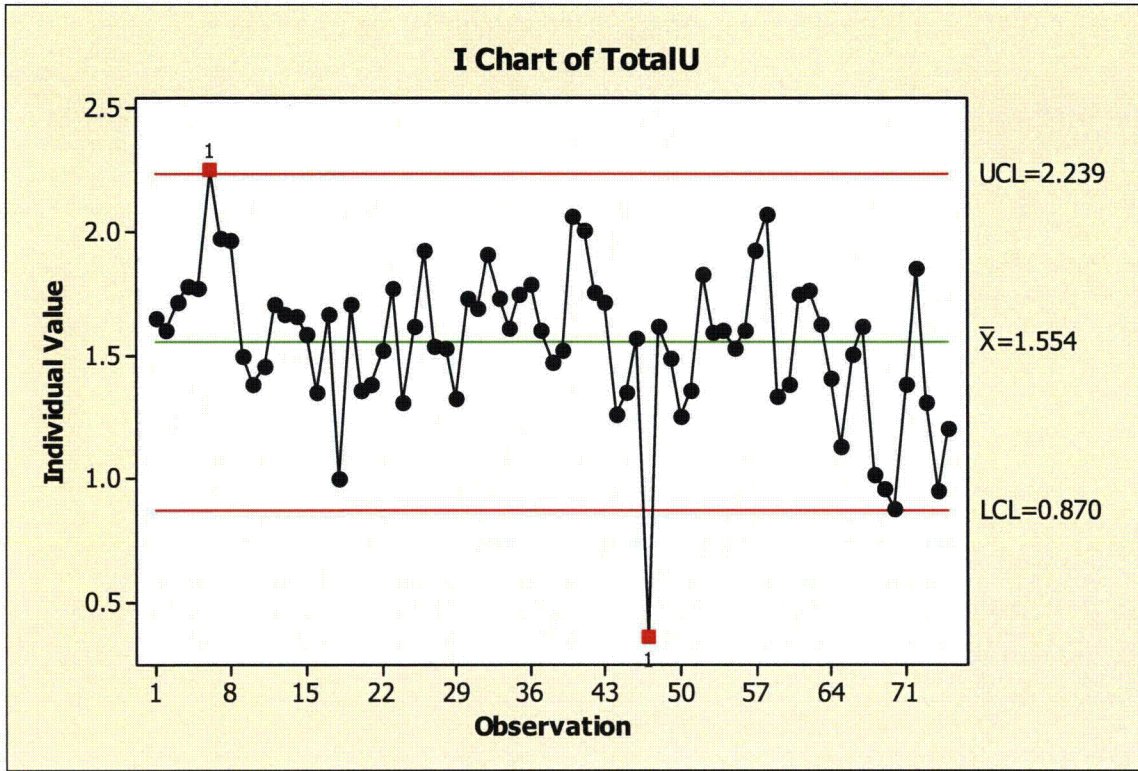


Figure 4-36. Control Chart for All Surface Soil Data (2004-2011)

5. CONCLUSIONS AND RECOMMENDATIONS

The April 2011 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 3.0 are investigated further to validate whether a sample result is representative of DU or natural uranium. Although no ratios exceeding 3.0 were encountered for this sampling event, SD-DU-04 exhibited a U-238/U-234 ratio of 2.9 ± 1.1 . Given that this result may range from 1.8 to 4.0 at the 95 percent confidence level and could exceed the investigational criterion of 3.0, the sample was subjected to additional investigation, which failed to provide explanatory information for the result. The Army will continue to closely monitor results from SD-DU-004.

Trend analysis reflected that no sample location exhibited an R^2 value indicating that the trend was somewhat significant. 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). 1985. License Number SUB-1435, Jefferson Proving Ground, Madison, Indiana. U.S. Army, TECOM, Aberdeen Proving Ground, Maryland.
- 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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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

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**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.

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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

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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.

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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).

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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.

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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

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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

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- 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

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ANNEX B

FORMS, LABELS AND WORKSHEETS

Effective Date 10 Mar 00
Date Removed from Service _____

Request for Laboratory Services

Directorate of Laboratory Sciences
REQUEST FOR LABORATORY SERVICES

For DLS Use Only
LIMS JOB# _____
Date Received _____

PLEASE PRINT OR TYPE ALL REQUESTED INFORMATION

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 SIGNATURE: _____
PRINT NAME: _____
(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

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PART 4: PROJECT COORDINATION INFORMATION

1. DATE SAMPLES TO ARRIVE AT DLS: 12/04/2000
Note: Prior Arrangements Must Be Made with GML 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:

CHAIN-OF-CUSTODY (COC)

SAFETY CONSIDERATION/HAZARDOUS MATERIALS (Specify):

ANALYSES WITH SHORT-HOLDING TIMES (List Specific Analyses):
Filter water samplers 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

2. SHIP TO: 3 large coolers and bags for soil samples need to be shipped to site
(Please include Bldg # and Phone #)
U.S. Army Jefferson Proving Ground
1661 West J.P.G. Nible 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
588	Uranium in Water	U-002	Water	9	Surface Water (1 gal Cubitainer)
803	Uranium in Soil	G-002	Soil	9	Sediment
588	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

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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)			

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 _____			

Effective Date _____
 Date Removed from Service _____

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

SOIL SAMPLES				
Sample ID	Sample Date	Exposure Reading (μ R/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 (μ R/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)

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 (μ R/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)

Effective Date _____
Date Removed from Service _____

ANNEX C
SAMPLE LOCATION MAPS

Effective Date _____
Date Removed from Service _____

Jefferson Proving Ground: DU Sampling GROUNDWATER MONITORING WELLS



Figure 1: Groundwater samples (Sept. 1997)

Effective Date _____
Date Removed from Service _____

Jefferson Proving Ground: DU Sampling SOIL SAMPLES

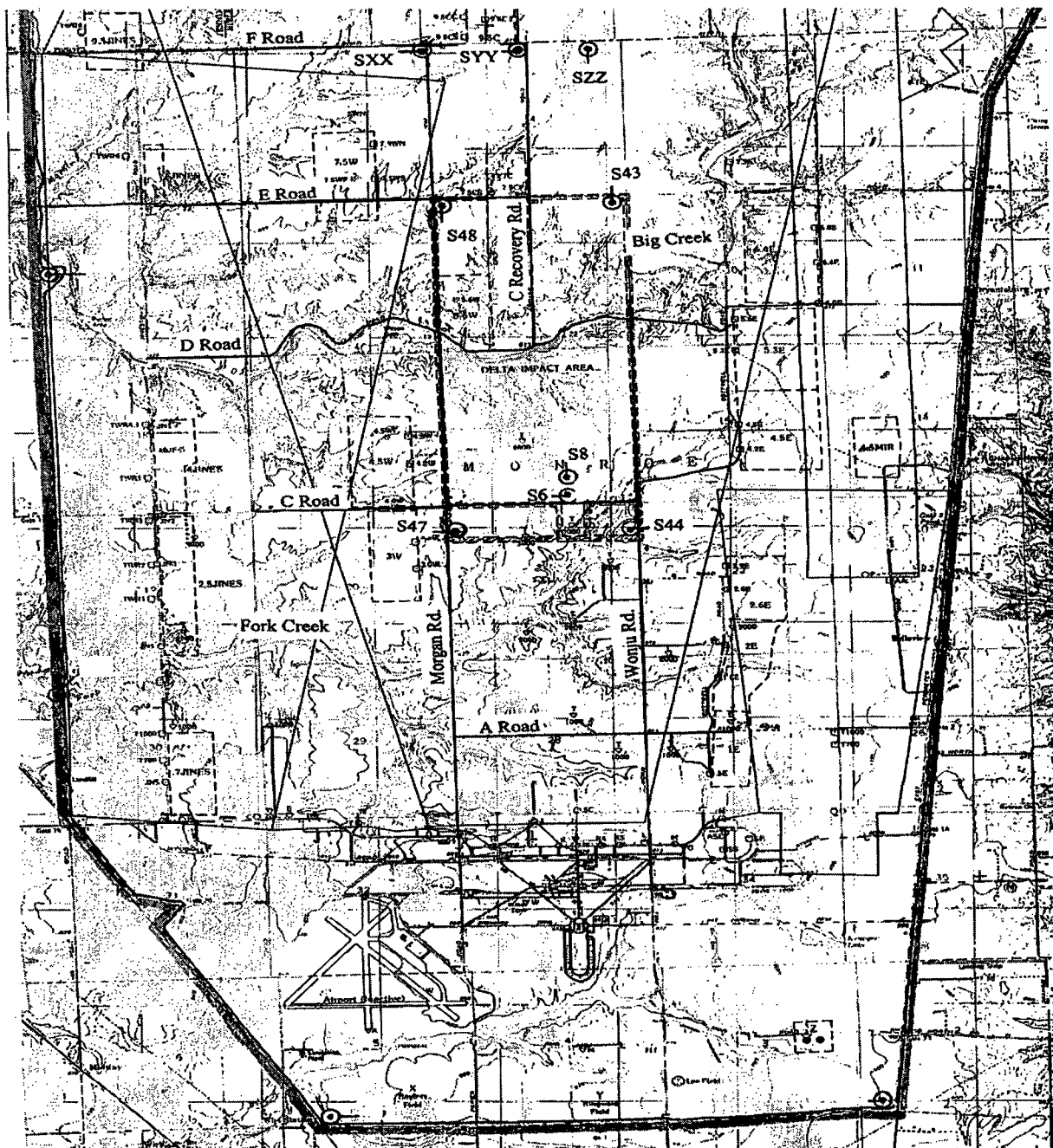


Figure 2: Soil Samples (Sept. 1997)

Effective Date _____
Date Removed from Service _____

**Jefferson Proving Ground: DU Sampling
SURFACEWATER & SEDIMENT SAMPLES**

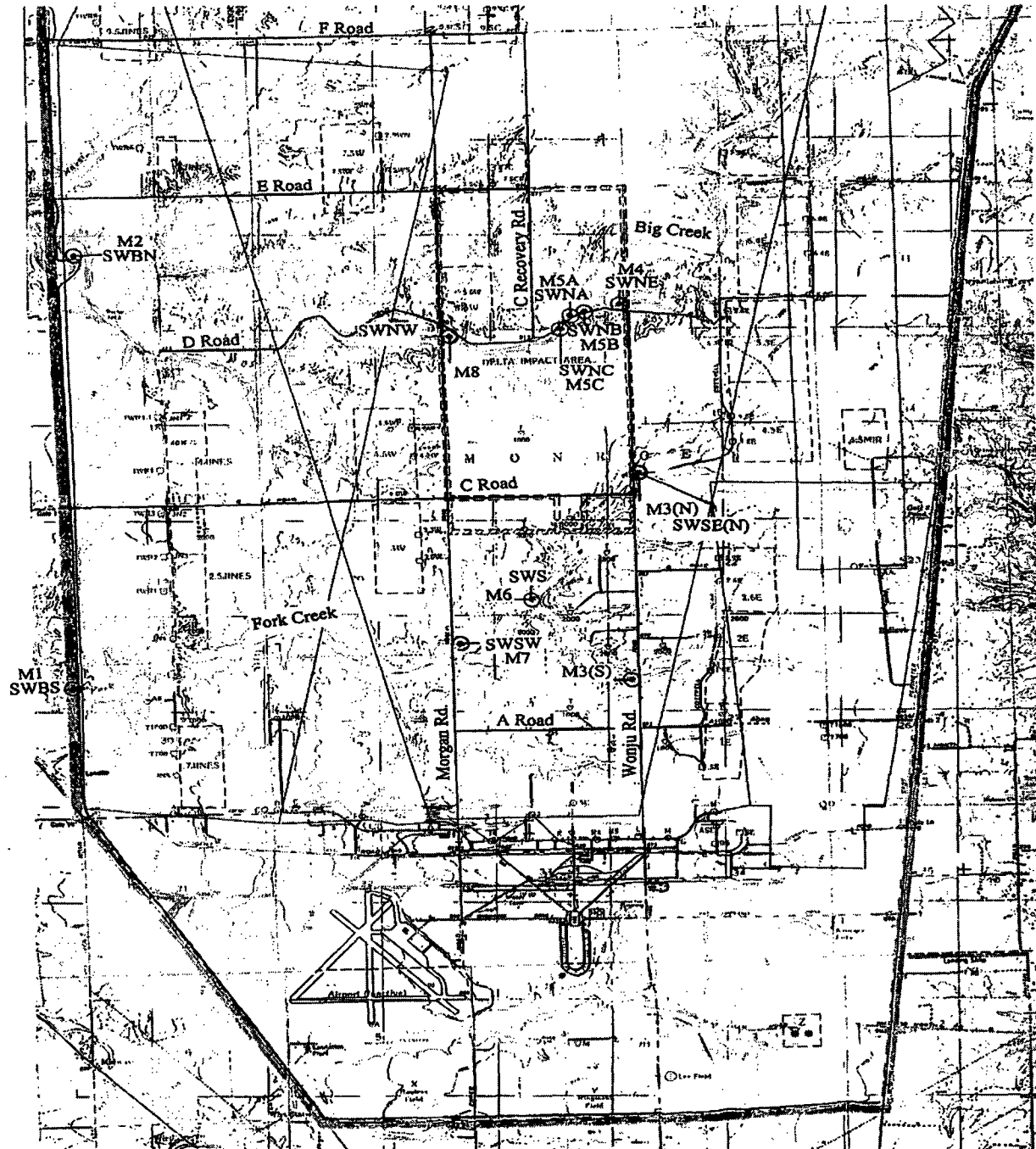
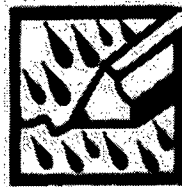


Figure 3: Surfacewater & Sediment Samples (Sept. 1997)

APPENDIX B
FIELD LOGBOOK

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Jefferson Proving Ground



"Rite in the Rain"

ALL-WEATHER

ENVIRONMENTAL

No. 550

ERM Summary

Logbook 2 for ERM

R-1

"Rite in the Rain"
ALL-WEATHER WRITING PAPER



ALL-WEATHER
ENVIRONMENTAL FIELD BOOK

Name: Joseph Skibinski
Science Applications Int'l Corporation (SAIC)
Address: 12100 Sunset Hills Road, 4th Floor
Reston, VA 20190
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Project: Jefferson Proving Ground (JPG)
Contract # W912QR-94-D-0119
Delivery Order # 17
ERM Sampling / Gas-Loss Study / Slug-Testing

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JPL

10/15/10

Sample Management / Demobilization

1345 Arrived at FedEx in Columbus, Ind.
Dropping off 3 coolers for TestAmerica -
St. Louis. Tracking #s

8689-7637-7117

8689-7637-7706

8689-7637-7691

1355 Leave FedEx for Madison, Ind.

1455 Arrived at Madison, Ind. Simon is flying
back to Northern Virginia next day.

SF 10/15/10

US 10/15/10

JPL

4/25/11

Mobilization for ERM Sampling

1860 Simon Fay (Sazc) was to fly out of
Baltimore-Washington Intl Airport (BWI) for
Cincinnati. However, flight delayed at least
90 mins.

1940 Left BWI for Cincinnati Airport.

2185 Arrived at Cincinnati Airport. Getting a
quick dinner and then heading to Madison,
Ind.

2300 Arrived at Madison, Ind hotel. Checking in
with crew in the morning.

SF 4/25/11

JR 4/25/11

Well Purging

- 0650 met up with Matt Logan (SAIC field manager) at motel today. Discussing today's activities. There is a lot of rainfall in the area and there are downed trees at the facility.
- 0725 Simon is at Walmart getting sample management items and bottle water.
- 0740 Simon arrived at field office. Getting items ready for sampling. met up with Dave Lawson (SAIC RADCON/GIS).
- 0800 Everyone had to retake the RAD worker training Exam for JPG.
- 0830 Everyone left field office for JPG ERM sampling. Weather today is overcast and windy.
- 0850 Arrived at MW-11. This well was not bailed 10 days ago due to blockage of road/path by a tree. Initial water level is 5.74 ft BTOL. Matt Logan is downloading datalogger.
- 0904 Start bailing. Number of bails: $\text{||||} \text{||||} \text{||||} \text{||||}$
MW-11 |||| (25)
- 0928 Arrived at MW-9. This well was not bailed 10 days ago due to blockage of road/path by a tree. Initial water level is 28.90 ft BTOL. Matt is downloading datalogger.

— *W* 4/26/11

SW/SO-DU-005, SW/SO-DU-008, well purging

- 0932 Start bailing. Number of bails: $\text{||||} \text{||||} \text{||||}$
MW-9; rain has started, very windy. 111 (18)
- 0955 Collected surface water sample SW-DU-005 (SAIC/SE) for ~~Total~~ Total / Isotope Uranium ^{of 100ml}
- 1000 Collected sediment sample SO-DU-005 (SAIC/SE) for Total Isotope Uranium.
- 1017 Arrived at MW-10. This well was not bailed 10 days ago due to blockage of road/path by a tree. Initial water level is 1.43 ft BTOL.
- 1021 Start bailing. Number of bails: $\text{||||} \text{||||} \text{||||} \text{||||}$
MW-10; rainfall is heavy $\text{||||} \text{||||}$ (35)
- 1100 Collected surface water sample SW-DU-008 (SAIC/SE) for Total Isotope Uranium.
- 1025 Collected sediment sample SO-DU-008 (SAIC/SE) for Total Isotope Uranium.
- 1138 Arrived at MW-5. This well was not bailed 10 days ago due to blockage of road/path by a tree. Initial water level is 15.8 ft BTOL.
- 1156 Start bailing. Number of bails: $\text{||||} \text{||||} \text{||||}$ (13)
MW-5: rainfall has stopped but still windy.
- 1210 Lunch break.

— *W* 4/26/11

1225 Arrived at MW-6. Initial water level is 28.30 feet BTOC. Background dose = 5 $\mu\text{g/hr}$. RAD Screen Background = 38 cpm. Water quality parameters are:

pH = 7.37

Conductivity = 0.572 ns/cm

Turbidity = 57.8 NTU

Temperature = 15.24 $^{\circ}\text{C}$

DO = 7.23 mg/L

1235 RAD Screen bottles = 37 cpm. Collect sample MW-000

1242

Arrived at MW-7. Initial water level is 8.73 feet BTOC. Background dose = 9 $\mu\text{g/hr}$. RAD Screen Background = 36 cpm. Water quality parameters are:

pH = 7.41

Conductivity = 0.604 ns/cm

Turbidity = 9.90 NTU

DO = 3.58 mg/L

Temperature = 12.89 $^{\circ}\text{C}$

1245

Collect sample MW-007. RAD screen bottles = 31 cpm

1300

Arrived at MW-3. Initial water level is 8.52A BTOC. Background dose = 6 $\mu\text{g/hr}$. RAD screen background = 37 cpm. Water quality parameters are:

4/26/11

(cont) pH = 7.58
 Conductivity = 0.575 ns/cm
 Turbidity = 1.9 NTU
 DO = 5.72 mg/L
 Temperature = 12.50 $^{\circ}\text{C}$

1315 Collect sample MW-DU-003. RAD screen bottles = 41 cpm.

1330 Arrived at MW-2. Initial water level is 8.59 feet BTOC. Background dose = 6 $\mu\text{g/hr}$. RAD screen background = 38 cpm. Water quality parameters are:

pH = 7.77

Conductivity = 0.367 ns/cm

Turbidity = 5.1 NTU

DO = 7.79 mg/L

Temperature = 12.65 $^{\circ}\text{C}$

1335 Collect sample MW-DU-002. RAD screen bottles = 35 cpm

1345

Arrived at MW-1. Initial water level is 9.56 feet BTOC. Background dose = 6 $\mu\text{g/hr}$. RAD screen background = 26 cpm. Water quality parameters are:

pH = 7.75

Conductivity = 0.264 ns/cm

Turbidity = 6.6 NTU

DO = 11.24 mg/L

Temperature = 12.84 $^{\circ}\text{C}$

4/26/11

Location JPLG

Date 4/26/11

Project / Client ERM Sampling
MW-8, MW-4

1358 Collect sample MW-DU-001. RAD screen bottle = 38 cpm.

1415 Arrived at MW-8. Initial water level is 22.95 ft bgs.
Background dose = 6 $\mu\text{R}/\text{hr}$. RAD screen background = 32 cpm. Water quality parameters are

pH = 7.60
 Conductivity = 0.341 mg/cm
 Turbidity = 24.7 NTU
 DO = 12.11 mg/L
 Temperature = 14.33 $^{\circ}\text{C}$

1420 Collect sample MW-DU-008. RAD screen bottles = 34 cpm.

1435 Arrived at MW-4. Initial water level is 3.39 ft bgs.
Background dose = 6 $\mu\text{R}/\text{hr}$. RAD screen background = 40 cpm. Water quality parameters are

pH = 7.51
 Conductivity = 0.370 mg/cm
 Turbidity = 15.6 NTU
 DO = 6.42 mg/L
 Temperature = 14.91 $^{\circ}\text{C}$

1440 Collect sample MW-DU-004. RAD screen bottles = 31 cpm.

1500 Arrived at Bldg. 125 field office. Sample manager
1515 Simon left JPLG to get a replacement water level indicator as current one started to have sensor issues. Meet next day at Bldg. 125 at 0730.

JRS 4/26/11

Location JPLG

Date 4/27/11

Project / Client ERM Sampling
SS-DU-004, SS-DU-002, SS-DU-003,

0655 Simon Fong (SAIC) left motel for Walmart to get sample management items. Currently, it is raining with overcast skies. Highs in 60s. Thunderstorms very likely.

0720 Arrived at JPLG field office Bldg. 125. Colleen Thomas for ERM Sampling. Dana Winslow (SAIC UXO support) is here. It is raining heavily.

0800 Everyone left field office for ERM Sampling.

0815 Collect surface soil SS-DU-004 (SAIC ISE) as duplicate (SAIC ISE) for total / isotope uranium.

0900 Collect surface soil SS-DU-002 (SAIC ISE) for total / isotope uranium.

0935 Called Joe Slobinski (SAIC project manager) to discuss current conditions at JPLG.

1010 Arrived at entrance to SS-DU-003.

1035 Collect surface soil SS-DU-003 (SAIC ISE) for total / isotope uranium.

1115 Lunch break

1125 Matt is downloading dataloggers out various wells (i.e. JPLG-DU-061, JPLG-DU-065, JPLG-DU-060).

JRS 4/27/11

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Location

JPL

Date

4/27/11

Project / Client

ERM Sampling

SW-DU-003, SD-DU-003, SS-DU-001, SW/SD-DU-006

- 1200 Collect surface water SW-DU-003 (SAZC 13E) for total / isotopic uranium.
- 1205 Collect sediment SD-DU-003 (SAZC 13E) for total / isotopic uranium.
- 1235 Collect surface soil SS-DU-001 (SAZC 15E) for total / isotopic uranium.
- 1315 Collect surface water SW-DU-006 (SAZC 14E) for total / isotopic uranium.
- 1320 Collect sediment SD-DU-006 (SAZC 15E) for total / isotopic uranium.
- 1350 Matt is downloading datalogger near creek of SW-DU-006.
- 1500 Arrived at Bldg. 125. Unloading items and sample management. Thunder & lightning observed.
- 1520 Leave field office. Meet next day at 0730.

JPL 4/27/11

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Location

JPL

Date

4-28-11

Project / Client

ERM Sampling

SW/SD-DU-007, MW-S, SW/SD-DU-004

- 0710 Simon Fong (SAZC) left Apple for JPL field office, weather current is dry but ok.
- 0725 Arrived at field office. Gathering items for sampling. Temperature highs in SWs.
- 0735 Everyone leave field office for ERM sampling and stream-gauge downbats.
- 0745 Collect surface water SW-DU-007 (SAZC 15E) for total / isotopic uranium.
- 0750 Collect sediment SD-DU-007 (SAZC 15E) for total / isotopic uranium.
- 0811 Arrived at MW-S. Water level is 16.03 feet above background base = 6 ⁱⁿ/hr. RAD screen background = 35 cpm. Water quality parameters are:
 pH = 6.67
 Conductivity = 0.926 ^{µS}/cm
 Turbidity = 1.7 NTU
 DO = 8.85 ^{mg}/L
 Temperature = 16.22 °C
- 0815 Collect sample MW-DU-005. RAD screen outlet = 29 cpm
- 0920 Collect surface water SW-DU-004 (SAZC 15E) for total / isotopic uranium.
- 0925 Collect sediment SD-DU-004 (SAZC 15E) for total / isotopic uranium.

JPL 4/28/11

Location JPG

Date 4/28/11

Project / Client ERM Sampling

MW-9, MW-10

1008 Arrived at MW-9. Water level is 37.14 feet BToc.
 Background dose = 7 $\mu\text{g}/\text{hr}$. RAD screen background =
 31 cpm. Water quality parameters are
 pH = 7.18
 Conductivity = 8.76 mS/cm
 Turbidity = 0.7 NTU
 DO = 4.41 mg/L
 Temperature = 12.91 $^{\circ}\text{C}$

1015 Collect sample MW-DU-009. RAD screen bottles =
 41 cpm. Only LSL of water available in
 well before it went dry.

1038 Arrived at MW-10. Water level is 1.87 feet BToc.
 Background dose = 6 $\mu\text{g}/\text{hr}$. RAD screen background
 = 35 cpm. Water quality parameters are
 pH = 7.97
 Conductivity = 1.07 mS/cm
 Turbidity = 7.9 NTU
 DO = 6.25 mg/L
 Temperature = 12.88 $^{\circ}\text{C}$

1043 Collect sample MW-DU-010. RAD screen bottles
 = 37 cpm.

1050 Matt Logan (SAZC) is downloading data loggers.

MFL 4/28/11

Location JPG

Date 4/28/11

Project / Client ERM Sampling

MW-11, SW/SD-DU-002, SW/SD-001

1129 Arrived at MW-11. Water level is 6.19 feet
 BToc. Background dose = 5 $\mu\text{g}/\text{hr}$. RAD screen
 background = 46 cpm. Water quality
 parameters are
 pH = 8.10
 Conductivity = 0.238 mS/cm
 Turbidity = 25.7 NTU
 DO = 11.00 mg/L
 Temperature = 12.57 $^{\circ}\text{C}$

1133 Collect sample MW-DU-011. RAD screen bottles
 = 46 cpm.

1240 Arrived back at field office to get Dana
 Winburn (SAZC UXO specialist) checked out.
 Dana's flight is at 0500 in Cincinnati today.

1300 Resume data logger downloads and ERM sampling.

1325 Collect surface water SW-DU-002
 (SAZC ISE) and duplicate (SAZC ISE) for total/
 isotopic uranium.

1330 Collect sediment SD-DU-002 (SAZC ISE)
 and duplicate (SAZC ISE) for total/
 isotopic uranium.

1355 Collect surface water SW-DU-001 (SAZC ISE) for total/
 isotopic uranium.

1400 Collect sediment SD-DU-001 (SAZC ISE) for total/
 isotopic uranium. *MFL* 4/28/11

Location: JPG Date: 4/28/11

Project/Client: ERM Sampling
Sample Management / Demolition

- 1425 Arrived back at JPG field office Bldg.
125. Unloads items and sample management.
- 1700 Everyone leave field office. Demolition
next day. Dropping off packages and 3
coolers for FedEx.

SF 4/28/11

JES 4/28/11

Location: JPG Date: 4/28/11

Project/Client: ERM Sampling
Well Purge Field Form Transcription

Well ID	Date of Purge	DBS (liters)	Purge Start	Purge End	Number of Purge Balls	Notes/Weather
MW-1	4/14/11	9.71	1720	1733	19	well bailed dry
MW-2	4/14/11	9.55	1700	1708	12	well bailed dry; trail in well
MW-3	4/14/11	9.39	1632	1645	20	well bailed dry
MW-4	4/14/11	3.76	1522	1550	43	well bailed dry
MW-5	4/26/11	15.15	1156	1206	13	well bailed dry
MW-6	4/15/11	11.02	1000	1007	17	well bailed dry
MW-7	4/14/11	9.25	1752	1804	30	well bailed dry
MW-8	4/14/11	23.98	1610	1616	8	well bailed dry
MW-9	4/26/11	28.90	932	944	18	well bailed dry; trail in well
MW-10	4/26/11	1.43	1021	1038	35	well bailed dry
MW-11	4/26/11	5.74	904	919	25	well bailed dry; trail in well; original SF 4/28/11

JES 4/28/11

ERM Sampling
Weather / Sample Management Information

Surface Water and Ground-water samples were collected in 2, 1L plastic bottles with no preservatives. Samples are to be preserved and filtered at the laboratory.

Sediment and Surface Soil samples were collected in 1, 8 oz amber jar with no preservatives.

3 coolers are shipped to ~~Texas~~ America - St. Louis with the following tracking #s

7947-0219-2281

7947-0219-2400

7947-0219-2649

Weather for April 2011 ERM Sampling are summarized below

- 4/26/11 : Overcast skies entire day; intermittent showers on and off (mostly light rain); lightning in afternoon. Very windy.
- 4/27/11 : Heavy rain fall in early morning that tapered off around noon. Windy all day. Overcast skies in afternoon that turned into showers for rest of evening.
- 4/28/11 : Very chilly and cool in morning with some wind but dry. Skies were clear until late afternoon where strong showers arrived ^{4/27} 4/28/11

Location JPG Date 4-26-11 95

Project / Client ERM Sampling
Cloudy, breezy 65°F (air), occasional light rain in PM

On site: MWL, DLL, SF
0700: Mob to site
0710: Arrive onsite. Organize equipment
Due to weather on 4-18 and 4-19, crew was unable to haul MW 5, MW 9, MW 10 and MW 11. Tree blocking, vines over Rd, other roads to N either flooded or washed out. Roads may continue to be an issue. Calling for another 4"-5" of rain through Wed nearby evening.
0745: Calibrate Horiba U-32* 15615. Pre-cal: pH 3.82, cond 3.61, pH turb -1.0. Auto cal meter w/ auto cal solution. Post-cal: pH 3.98, cond 4.50, turb 9.3. Clean turbidity sensor. Turb 0.5 w/ 0.0 NTU solution.
0805: Tailgate H&S meeting, RAD working training.
0830: Exchange phone #s w/ Army / Fish and Wildlife. Mob to N road.
0857: Stop and download MW 11 - October 2010
DTCW: 5.74 Replaced descent
0906: Stop and download MW 9 - October 2010
DTCW: 28.90 Replaced descent

JPG

ERM Sampling

4-26-11

0955 Collected SW DU 005. Creek at high stage, high sediment load. Water dipped directly from creek.

1000 Collected SO DU 005. Fine sand, saturated collected w/ plastic scoop and composited in ziplock bag and transferred to sample jar.

1100 Collected SW DU 008. Creek at high stage, high sediment load. Water dipped directly from creek.

1105 Collected SO DU 008. Silty w/ v. fine sand, saturated collected w/ plastic scoop and composited in ziplock bag and transferred to sample jar.

1325 Stop and download MW 2 - October 2010. DTW not recorded to pull logger. EBS pulled logger to purge w/o stopping and recorded a DTW at that time. Replaced desiccant.

1500 At Bldg 105 to unhook equipment. ERM ground water sampling notes recorded by Simon King.

~~Mary King~~
4-26-11

JPG

ERM Sampling

4-27-11

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Rain (55°F (am)), Cloudy occasional sun 70°F (pm)

Onsite MDL, DLL, SF, DW

0700 Arrive onsite, organize equipment, tailgate H.S. meeting. RAD water training for Dana Winslow.

0715 Calibrate Horiba U-22# 15615. Pre-cal pH 4.08, cond 4.16 mS/cm, turb 8.3. Auto cal meter w/ auto cal solution. Post cal pH 3.98, cond 4.51, turb 0.6.

0800 Heavy rain overnight. To site to check road conditions and what sample locations can be reached.

0815 Collected SS DU 004 and duplicate. Sandy, silty collected w/ plastic scoop and composited in ziplock bag and transferred to sample jars.

0900 Collected SS DU 002. Silty soil, saturated collected w/ plastic scoop, composited in ziplock bag and transferred to sample jar.

0955 Collected SS DU 003. Silty organic matter soil collected w/ plastic scoop, composited in ziplock bag and transferred to sample jar.

1129 Stop and download JPG DU 060 - October 2010. DTW: 4.30 hpx. Replaced desiccant.

1131 Start JPG DU 060 to collect DTW hourly, every 60 mins. Ret: 4.30

JPG
ERM Sampling

4-27-11

- 1136 Stop and download JPG DU OGD. October 2010. DTW: 23.25' spec. Replaced desiccant.
- 1140 Start JPG DU OGD - April 2011 to collect DTW linear, every 60 mins. Ref: 23.25'
- 1143 Stop and download JPG DU OGI. October 2010. DTW: 7.32' spec. Replaced desiccant.
- 1146 Start JPG DU OGI - April 2011 to collect DTW linear, every 60 mins. Ref: 7.32'
- 1206 Start SGS-MF 04. 04.27.11 to collect level linear, every 5 mins.
- 1212 Stop and download JPG DU OSI. October 2010. DTW: 4.01' spec. Replaced desiccant.
- 1216 Start JPG DU OSI - April 2011 to collect DTW linear, every 60 mins. Ref: 4.01'
- 1235 Collected SS-DU 001. S.H. w/ some clay, moist collected w/ plastic scoop, composited in ziplock bag and transferred to sample jar.
- 1245 Unable to connect to SGS-MF 03. Pulling loggers to take back to HRC.
- 1251 Start MW 2, April 2011 to collect DTW linear, every 60 mins. Ref: 7.35'
- 125 Collected SW DU 006. Water dipped directly from stream.

JPG
ERM Sampling

4-27-11

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- 1320 Collected SD-DU 006. S.H. saturated collected w/ plastic scoop, composited in ziplock bag and transferred to sample jar.
- 1345 Stop and download SGS-MF 02. 10.14.10. Replaced desiccant. DTW: 0.05 above nail head.
- 1350 Start SGS-MF 02. 04.27.11 to collect level linear, every 5 mins.
- 1500 At Biggs Lab. Had truck stopped off at Wegman's and had Fish: Wild life pull it out. Unload equipment.

~~11/21/11~~
~~4-27-11~~

JPG
ERM Sampling
Partly cloudy, 45°F (am), 65°F (pm)

4-28-11

Onsite MSL DILL SF DU
0700: Arrive onsite Calbank Hecla U 29
15615 Pre cal: pH 3.96, cond 4.56 mS/cm,
turb 1.3. Auto cal meter, w/ auto cal solution
Post cal: pH 4.00, cond 4.51, turb 0.0
Load equipment.

0715: Jan/guk H/S meeting

0745: Stop and download SGS MFC 01 - 10-15-10
Replaced desiccant DTW: 14.12' below stilling
well lid

0751: Start SGS MFC 01 04-28-11 to collect level
lines, every 5 mins.

0745: Sample SW DU 007. Water dipped directly
from stream.

0750: Collected SW DU 007. Sandy silt, water
collected w/ plastic scoop, composited in ziplock
bag and transferred to sample jar.

0824: Stop and download JPG DU 081 - October
2010. DTW: 49.3' bpc. Replaced desiccant.

0828: Start JPG DU 081 - April 2011 to collect
DTW lines, every 60 mins. Ref: 49.3'

0920: Tire bustler on lid to SGS BC 03
Unable to move. Not able to download

JPG
ERM Sampling

4-28-11

101

0920: Collect SW DU 004. Water dipped
directly from stream.

0925: Collect SW DU 004. Finned gr sand
suspended collected w/ plastic scoop, composited
in ziplock bag and transferred to sample jar.

1020: Start MFC 7. April 2011 to collect DTW
lines, every 60 mins. Ref set to 0.00. Well
not recovered from sampling.

1027: Stop and download JPG DU 081 - October
2010. DTW: 18.90' bpc.

1031: Start JPG DU 081 - April 2011 to collect
DTW lines, every 60 mins. Ref: 18.90'

1055: Stop and download JPG DU 090 - October
2010. DTW: 37.18'

1058: Start JPG DU 090 - April 2011 to collect
DTW lines, every 60 mins. Ref: 37.18'

1100: Stop and download JPG DU 091 - October
2010. DTW: 16.18' bpc. Replaced desiccant.

1104: Start JPG DU 091 - April 2011 to collect
DTW lines, every 60 mins. Ref: 16.18'

1106: Stop and download JPG DU 090 - October
2011. DTW: 12.05' bpc. Replaced desiccant.

1109: Start JPG DU 090 to collect DTW lines,
every 60 mins. Ref: 12.05'

JPG
ERM Sampling

4-28-11

1117. Stop and download CGS BC 11-10-14-10
DTW from point 442
- 1123 - Start CGS BC 11-04-28-11 to collect
level linear, every 5 mins.
- 1135 - Ref = 9.24' Start MW 11-April 2011 to
collect DTW linear, every 60 mins.
- 1146 Stop and download JPG DU 02I October
2010 DTW: 13.58' bpc. Replaced desiccant
- 1149 - Start JPG DU 02I April 2011 to collect
DTW linear, every 60 mins. Ref = 13.58'
1154. Stop and download SGS BC 01-10-14-10
DTW: 16.33' below well lid. Replaced desiccant
- 1159 - Start SGS BC 01-04-28-11 to collect
level linear, every 5 mins.
1208. Stop and download JPG DU 02I October
2010 DTW: 2.39' bpc. Replaced desiccant.
1211. Start JPG DU 02I - April 2011 to collect
DTW linear, every 60 mins. Ref = 2.39'
1240. At Bldg 125 to survey of UXO equipment
- 1310 Stop and download JPG DU 040. October
2010 DTW: 25.54' bpc. Replaced desiccant
1314. Start JPG DU 040. April 2011 to collect
DTW linear, every 60 mins Ref = 25.54'

JPG
ERM Sampling

4-28-11

- 1325 Collect SW DU 002 and duplicate. Sample
dipped directly from stream.
1330. Collected SD DU 002. Sandy soil, and
collected w/ plastic scoop, composited in zip lock
bag and transferred to sample jar.
- 1355 Collect SW DU 001. Sample dipped
directly from stream.
1400. Collected SD DU 001. Fin. med. gr. soil
sand collected w/ plastic scoop, composited in
ziplock bag and transferred to sample jar.
1430. At Bldg 125 to scan out equipment &
samples. Unlabeled materials.
- Went need hammers, scoops or cal solution
for full ERM event. Good on hammer scope also.
1600. Keys returned to Army. Leaving site

~~M. J. [unclear]~~
4-28-11

SAMPLE LOG SHEET

PROJECT NAME: JPG

PROJECT NO: _____

SAMPLE ID NUMBER: SS-DU-001

DATE COLLECTED (MM/DD/YY): 4-27-11

TIME: 1235

SAMPLING LOCATION CODE: Surface Soil
DESCRIPTION: _____

SAMPLING POINT CODE: _____
DESCRIPTION: _____

NORTHING: _____ EASTING: _____ ELEVATION: _____

SAMPLE DEPTH CODE: _____ TO _____ BLS

SAMPLE MEDIA CODE: _____ DESCRIPTION: _____

WEATHER: Cloudy, breezy, 70°F ACTIVITIES IN AREA: _____
FIELD OBSERVATIONS: Collected with w/ some clay, most of southern limit of DU area W of Whyma Rd

background = 31 cpm

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	<u>54</u>	<u>CPM</u>		
TEMPERATURE:				
pH:				
CONDUCTIVITY:				
REDOX:				
DO:				
ORGANIC VAPORS:				
TURBIDITY:				
OTHER <u>Loss</u> :	<u>5</u>	<u>μR/hr</u>		

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

SAMPLE LOG SHEET

PROJECT NAME: JPG

PROJECT NO: _____

SAMPLE ID NUMBER: SS-DU-002 DATE COLLECTED (MM/DD/YY): 4-27-11
 TIME: 0900

SAMPLING LOCATION CODE: Surface Soil
 DESCRIPTION: _____

SAMPLING POINT CODE: _____
 DESCRIPTION _____

NORTHING: _____ EASTING: _____ ELEVATION: _____

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

WEATHER: Light rain, 65°F ACTIVITIES IN AREA: _____
 FIELD OBSERVATIONS: Collected saturated soil just inside western limit of DU area at Morgan and E. Road. Over land flow of rain water at location.

background: 78 cpm

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	<u>59</u>	<u>cpm</u>		
TEMPERATURE:				
pH:				
CONDUCTIVITY:				
REDOX:				
DO:				
ORGANIC VAPORS:				
TURBIDITY:				
OTHER <u>dose</u> :	<u>5</u>	<u>uS/hr</u>		

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: JPG

PROJECT NO: _____

SAMPLE ID NUMBER: SS-DU-003

DATE COLLECTED (MM/DD/YY): 4-27-11
TIME: 1035

SAMPLING LOCATION CODE: Surface soil
DESCRIPTION: _____

SAMPLING POINT CODE: _____
DESCRIPTION: _____

NORTHING: _____ EASTING: _____ ELEVATION: _____

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

WEATHER: Cloudy, 65°F ACTIVITIES IN AREA: _____
FIELD OBSERVATIONS: Collected silty organic soil just west of eastern DU boundary of Wagon and E. Road. Soil moist. Standing water in area, flowing to the S, east of location

background: 37 cpm

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	<u>41</u>	<u>cpm</u>		
TEMPERATURE:		<u>°C</u>		
pH:		<u>std units</u>		
CONDUCTIVITY:				
REDOX:				
DO:				
ORGANIC VAPORS:				
TURBIDITY:				
OTHER <u>data</u> :	<u>6</u>	<u>uL/hr</u>		

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: M. J. [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): 4.27.11

TIME: 0815

Dup @ location

SAMPLING LOCATION CODE: Surface soil

DESCRIPTION:

SAMPLING POINT CODE:

DESCRIPTION:

NORTHING: EASTING: ELEVATION:

SAMPLE DEPTH CODE: TO BLS

SAMPLE MEDIA CODE: DESCRIPTION:

WEATHER: Heavy rain

ACTIVITIES IN AREA:

FIELD OBSERVATIONS: Collected sandy silt just N of southern limit of DU area, east of morgan road. Wet soil. Area has a lot of standing water.

background: 37 cpm

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	47	cpm		
TEMPERATURE:				
pH:				
CONDUCTIVITY:				
REDOX:				
DO:				
ORGANIC VAPORS:				
TURBIDITY:				
OTHER <u>door</u> :	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: SW/SD-DU-001 DATE COLLECTED (MM/DD/YY): 4.28.11
 TIME: 1335/1400
W/S

SAMPLING LOCATION CODE: Surface Water / Sediment
 DESCRIPTION: _____

SAMPLING POINT CODE: _____
 DESCRIPTION: _____

NORTHING: _____ EASTING: _____ ELEVATION: _____

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

WEATHER: Partly cloudy, 65°F ACTIVITIES IN AREA: _____
 FIELD OBSERVATIONS: Collected from road at bank of middle fork, east of bridge at west perimeter. Water collected at bridge

background: 37 cpm

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	<u>32 / 34</u>	<u>cpm</u>		
TEMPERATURE:	<u>16.59</u>	<u>°C</u>		
pH:	<u>7.87</u>	<u>pH units</u>		
CONDUCTIVITY:	<u>0.096</u>	<u>µS/cm</u>		
REDOX:	<u>200</u>	<u>mV</u>		
DO:	<u>11.04</u>	<u>mg/L</u>		
ORGANIC VAPORS:	<u>-</u>	<u>-</u>		
TURBIDITY:	<u>19.9</u>	<u>NTU</u>		
OTHER <u>doc</u> :	<u>5</u>	<u>µg/L</u>		

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-DU-002 DATE COLLECTED (MM/DD/YY): 4/28/11
 TIME: 1325/1330

SAMPLING LOCATION CODE: Surface water / sediment W/S
 DESCRIPTION: Dup of water and sediment

SAMPLING POINT CODE: _____
 DESCRIPTION _____

NORTHING: _____ EASTING: _____ ELEVATION: _____

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

WEATHER: Partly cloudy 65°F ACTIVITIES IN AREA:
 FIELD OBSERVATIONS: Collected sample with an N stage of bog creek,
 east of bridge on West 16. meter. Wet soil. Water at bridge

background: 37 cpm

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	31/35	cpm		
TEMPERATURE:	16.68	°C		
pH:	7.87	pH units		
CONDUCTIVITY:	0.099	µS/cm		
REDOX:	288	mV		
DO:	10.57	mg/L		
ORGANIC VAPORS:	-	-		
TURBIDITY:	46.6	NTU		
OTHER <u>DOE</u> :	5	µMho		

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:

JPG

PROJECT NO:

SAMPLE ID NUMBER:

SW/SD-01-003

DATE COLLECTED (MM/DD/YY):

4.27.11

TIME:

1200/1205
W/S

SAMPLING LOCATION CODE:

Surface water / sediment

DESCRIPTION:

SAMPLING POINT CODE:

DESCRIPTION:

NORTHING:

EASTING:

ELEVATION:

SAMPLE DEPTH CODE:

TO

BLS

SAMPLE MEDIA CODE:

DESCRIPTION:

WEATHER:

Clady, Windy, Overcast 60°F

ACTIVITIES IN AREA:

FIELD OBSERVATIONS:

Creek at high stage. Sediment has soil characteristics of fine-grained sand and saturated. Surface water is turbid and collected at same location as sediment. Samples collect at Wagon Road and Cottrell Rd. on the East side of the bridge.

background: 35 cpm

Water / Sed

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	35/34	cpm		
TEMPERATURE:	19.76	°C		
pH:	6.76	no units		
CONDUCTIVITY:	0.078	ns/cm		
REDOX:	+278	mV		
DO:	9.50	mg/L		
ORGANIC VAPORS:	-	-		
TURBIDITY:	28.2	NTU		
OTHER <u>DOSE</u> :	5	μSv/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)

SAMPLE LOG SHEET

PROJECT NAME:

PROJECT NO:

SAMPLE ID NUMBER: SW/SD 00-004 DATE COLLECTED (MM/DD/YY): 4-28-11

TIME: 0900/0925 W/S

SAMPLING LOCATION CODE: Surface water / sediment DESCRIPTION:

SAMPLING POINT CODE: DESCRIPTION

NORTHING: EASTING: ELEVATION:

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

WEATHER: Sunny 60°F ACTIVITIES IN AREA: FIELD OBSERVATIONS: Creek at high stage high sediment load collected for med of sand on N side of Big Creek, E of SW-00-003. Water at same location elevated sand

background = 37 cpm

Table with 5 columns: FIELD MEASUREMENTS, READING, UNITS, SERIAL NO., LAST CALIB. Rows include RADIOACTIVITY (28/36 cpm), TEMPERATURE (12.77 °C), pH (7.39), CONDUCTIVITY (0.109 MS/cm), REDOX (297 mV), DO (9.44 mg/L), ORGANIC VAPORS, TURBIDITY (49.9 NTU), OTHER dose (7).

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] QC Checked By: [Signature]

SAMPLE LOG SHEET

PROJECT NAME: JPG

PROJECT NO: _____

SAMPLE ID NUMBER: SW150-DU-005 DATE COLLECTED (MM/DD/YY): 4/26/11
 TIME: 0955/1000
W/S

SAMPLING LOCATION CODE: Surface water / sediment
 DESCRIPTION: _____

SAMPLING POINT CODE: _____
 DESCRIPTION: _____

NORTHING: _____ EASTING: _____ ELEVATION: _____

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

WEATHER: Cloudy 65°F ACTIVITIES IN AREA: _____

FIELD OBSERVATIONS: Creek at high stage, high sediment load. Collected
frag. sand on S side of Big Creek, E of bridge on N-Road. Water
collected same location, turbid. Sediment is saturated

background = 31 cpm

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	<u>24 / 38</u>	<u>cpm</u>		
TEMPERATURE:	<u>15.49</u>	<u>°C</u>		
pH:	<u>6.65</u>	<u>std units</u>		
CONDUCTIVITY:	<u>0.113</u>	<u>mS/cm</u>		
REDOX:	<u>281</u>	<u>mV</u>		
DO:	<u>100</u>	<u>mg/L</u>		
ORGANIC VAPORS:				
TURBIDITY:	<u>48.8</u>	<u>NTU</u>		
OTHER <u>water / sed</u> :	<u>6</u>	<u>µg/L</u>		

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: M. J. [Signature]
 (Signature)

QC Checked By: _____
 (Signature)

SAMPLE LOG SHEET

PROJECT NAME: JPG

PROJECT NO: _____

SAMPLE ID NUMBER: SW150-00-006

DATE COLLECTED (MM/DD/YY): 4.27.11

TIME: 1315/1320
W/S

SAMPLING LOCATION CODE: Surface water / sediment
DESCRIPTION: _____

SAMPLING POINT CODE: _____
DESCRIPTION: _____

NORTHING: _____ EASTING: _____ ELEVATION: _____

SAMPLE DEPTH CODE: _____ TO _____ BLS

SAMPLE MEDIA CODE: _____ DESCRIPTION: _____

WEATHER: Cloudy 70°F ACTIVITIES IN AREA: _____

FIELD OBSERVATIONS: Collected silt, sediment at confluence of J. H. Barber Creek at high stage, high sediment load. Water at same location

background: 32 cpm
Water / Sed

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	<u>31/35</u>	<u>cpm</u>		
TEMPERATURE:	<u>18.22</u>	<u>°C</u>		
pH:	<u>6.74</u>	<u>standard</u>		
CONDUCTIVITY:	<u>0.038</u>	<u>µS/cm</u>		
REDOX:	<u>353</u>	<u>mV</u>		
DO:	<u>9.69</u>	<u>mg/L</u>		
ORGANIC VAPORS:	<u>-</u>	<u>-</u>		
TURBIDITY:	<u>29.5</u>	<u>NTU</u>		
OTHER <u>base</u> :	<u>6</u>	<u>µg/lb</u>		

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: SW 1-SD-00-007 DATE COLLECTED (MM/DD/YY): 4-28-11
 TIME: 045/0750
W/S

SAMPLING LOCATION CODE: Surface water
 DESCRIPTION: _____

SAMPLING POINT CODE: _____
 DESCRIPTION _____

NORTHING: _____ EASTING: _____ ELEVATION: _____

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

WEATHER: Partly cloudy 40°F ACTIVITIES IN AREA: _____

FIELD OBSERVATIONS: Creek in recession. High sediment load. Collected wet
 Sandy silt on E side of bridge on Margin at Middle fork creek. Water
 at same location.

background - 38 cpm

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	<u>201.41</u>	<u>cpm</u>		
TEMPERATURE:	<u>11.81</u>	<u>°C</u>		
pH:	<u>5.89</u>	<u>nd units</u>		
CONDUCTIVITY:	<u>0.139</u>	<u>MS/cm</u>		
REDOX:	<u>396</u>	<u>mV</u>		
DO:	<u>9.61</u>	<u>mg/L</u>		
ORGANIC VAPORS:	<u>-</u>			
TURBIDITY:	<u>24.8</u>	<u>NTU</u>		
OTHER <u>DOSE</u> :	<u>5</u>	<u>µR/hr</u>		

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: Maddy [Signature] (Signature) QC Checked By: _____ (Signature)

SAMPLE LOG SHEET

PROJECT NAME: JPG **PROJECT NO:** _____

SAMPLE ID NUMBER: SW150-N-008 **DATE COLLECTED (MM/DD/YY):** 4-28-11
TIME: 1100/1105
WTS

SAMPLING LOCATION CODE: Surface water / sediment
DESCRIPTION: _____

SAMPLING POINT CODE: _____
DESCRIPTION: _____

NORTHING: _____ **EASTING:** _____ **ELEVATION:** _____

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

WEATHER: Light rain 65°F **ACTIVITIES IN AREA:** _____
FIELD OBSERVATIONS: Peak of high stage, high sediment load. Collected silt w/ U-tag sand. Recovered on N side of Big Creek, E of bridge on Morgan. Water same location

background: 57 cpm
Water / sed

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:	<u>29/40</u>	<u>cpm</u>		
TEMPERATURE:	<u>15.55</u>	<u>°C</u>		
pH:	<u>6.71</u>	<u>no units</u>		
CONDUCTIVITY:	<u>0.114</u>	<u>ms/cm</u>		
REDOX:	<u>343</u>	<u>mV</u>		
DO:	<u>9.68</u>	<u>mg/L</u>		
ORGANIC VAPORS:	<u>-</u>	<u>μ</u>		
TURBIDITY:	<u>43.6</u>	<u>NTU</u>		
OTHER <u>data</u> :	<u>7</u>	<u>wt/wt</u>		

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: Mindy Day **QC Checked By:** _____
 (Signature) (Signature)

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APPENDIX C
DATA VALIDATION SUMMARY

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C. DATA VALIDATION SUMMARY

C.1 TestAmerica SDG F1E020478

This report contains the results from the data validation technical review for the Jefferson Proving Ground (JPG) Environmental Radiation Monitoring (ERM) April 2011 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 SDG. 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 the mass originates from U-238.
 - All samples were analyzed with SDG F1E020478.
1. The following items (as applicable) have been addressed during the validation review:
- Sample custody, integrity, and preservation
 - Sample handling and preparation
 - Holding times
 - Dilution factors
 - Detection limits
 - Laboratory background and carry-over
 - Overall assessment of the data
 - Quality control (QC)
 - 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.
- **Blank Contamination**—U-234 was present in the associated soil method blank at 0.029 ± 0.030 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 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. The method blank levels have little impact on the intended use of the data, since the detected levels in the method blank are significantly below the required reporting limit of 0.1 pCi/L.

SAMPLE INDEX

Laboratory:

Test America Laboratories, Inc.

SDG #:

F1E020478

Client Sample I.D.	Laboratory Sample I.D.	Date Collected	Analyses Performed
SW-DU-005_SAIC15E	F1E020478-001	4/26/2011	Total and Isotopic Uranium
SD-DU-005_SAIC15E	F1E020478-002	4/26/2011	Total and Isotopic Uranium
SW-DU-008_SAIC15E	F1E020478-003	4/26/2011	Total and Isotopic Uranium
SD-DU-008_SAIC15E	F1E020478-004	4/26/2011	Total and Isotopic Uranium
MW-DU-006_SAIC15E	F1E020478-005	4/26/2011	Total and Isotopic Uranium
MW-DU-007_SAIC15E	F1E020478-006	4/26/2011	Total and Isotopic Uranium
MW-DU-007_SAIC15DE	F1E020478-007	4/26/2011	Total and Isotopic Uranium
MW-DU-003_SAIC15E	F1E020478-008	4/26/2011	Total and Isotopic Uranium
MW-DU-002_SAIC15E	F1E020478-009	4/26/2011	Total and Isotopic Uranium
MW-DU-001_SAIC15E	F1E020478-010	4/26/2011	Total and Isotopic Uranium
MW-DU-008_SAIC15E	F1E020478-011	4/26/2011	Total and Isotopic Uranium
MW-DU-004_SAIC15E	F1E020478-012	4/26/2011	Total and Isotopic Uranium
SS-DU-004_SAIC15E	F1E020478-013	4/27/2011	Total and Isotopic Uranium
SS-DU-004_SAIC15DE	F1E020478-014	4/27/2011	Total and Isotopic Uranium
SS-DU-002_SAIC15E	F1E020478-015	4/27/2011	Total and Isotopic Uranium
SS-DU-003_SAIC15E	F1E020478-016	4/27/2011	Total and Isotopic Uranium
SW-DU-003_SAIC13E	F1E020478-017	4/27/2011	Total and Isotopic Uranium
SD-DU-003_SAIC13E	F1E020478-018	4/27/2011	Total and Isotopic Uranium
SS-DU-001_SAIC15E	F1E020478-019	4/27/2011	Total and Isotopic Uranium
SW-DU-006_SAIC14E	F1E020478-020	4/27/2011	Total and Isotopic Uranium
SD-DU-006_SAIC15E	F1E020478-021	4/27/2011	Total and Isotopic Uranium
SW-DU-007_SAIC15E	F1E020478-022	4/28/2011	Total and Isotopic Uranium
SD-DU-007_SAIC15E	F1E020478-023	4/28/2011	Total and Isotopic Uranium
MW-DU-005_SAIC15E	F1E020478-024	4/28/2011	Total and Isotopic Uranium
SW-DU-004_SAIC15E	F1E020478-025	4/28/2011	Total and Isotopic Uranium
SD-DU-004_SAIC15E	F1E020478-026	4/28/2011	Total and Isotopic Uranium
MW-DU-009_SAIC15E	F1E020478-027	4/28/2011	Total and Isotopic Uranium
MW-DU-010_SAIC15E	F1E020478-028	4/28/2011	Total and Isotopic Uranium
SW-DU-002_SAIC15E	F1E020478-029	4/28/2011	Total and Isotopic Uranium
SW-DU-002_SAIC15DE	F1E020478-030	4/28/2011	Total and Isotopic Uranium
SD-DU-002_SAIC15E	F1E020478-031	4/28/2011	Total and Isotopic Uranium
SD-DU-002_SAIC15DE	F1E020478-032	4/28/2011	Total and Isotopic Uranium
SW-DU-001_SAIC15E	F1E020478-033	4/28/2011	Total and Isotopic Uranium
SD-DU-001_SAIC15E	F1E020478-034	4/28/2011	Total and Isotopic Uranium
MW-DU-011_SAIC15E	F1E020478-035	4/28/2011	Total and Isotopic Uranium

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ATTACHMENT

**JEFFERSON PROVING GROUND
SAMPLE DATA SUMMARY SHEETS**

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SAMPLE DATA SUMMARY – WATER
Isotopic Uranium A-01-R MOD

Sample I.D.	Analyte	Result	Error	MDC	Units	Qualifier	Reason Code
MW-DU-001 SAIC15E	U	0.38	0.2	0.14	ug/l		
MW-DU-001 SAIC15E	U-234	0.34	0.12	0.06	pci/L		
MW-DU-001 SAIC15E	U-235	0.045	0.045	0.03	pci/L	J	37
MW-DU-001 SAIC15E	U-238	0.121	0.068	0.047	pci/L	J	37
MW-DU-002 SAIC15E	U	0.72	0.289	0.13	ug/l		
MW-DU-002 SAIC15E	U-234	0.33	0.12	0.07	pci/L		
MW-DU-002 SAIC15E	U-235	0.017	0.034	0.061	pci/L	U	
MW-DU-002 SAIC15E	U-238	0.239	0.0969	0.042	pci/L		
MW-DU-003 SAIC15E	U	1.14	0.39	0.24	ug/l		
MW-DU-003 SAIC15E	U-234	0.85	0.2	0.09	pci/L		
MW-DU-003 SAIC15E	U-235	0.047	0.0509	0.057	pci/L	U	
MW-DU-003 SAIC15E	U-238	0.38	0.13	0.08	pci/L		
MW-DU-004 SAIC15E	U	0.58	0.25	0.07	ug/l		
MW-DU-004 SAIC15E	U-234	0.37	0.12	0.05	pci/L		
MW-DU-004 SAIC15E	U-235	0	0.0109	0.029	pci/L	U	
MW-DU-004 SAIC15E	U-238	0.196	0.083	0.023	pci/L		
MW-DU-005 SAIC15E	U	0.58	0.239	0.11	ug/l		
MW-DU-005 SAIC15E	U-234	0.237	0.0929	0.061	pci/L		
MW-DU-005 SAIC15E	U-235	0.015	0.029	0.053	pci/L	U	
MW-DU-005 SAIC15E	U-238	0.192	0.081	0.037	pci/L		
MW-DU-006 SAIC15E	U	3.46	0.68	0.18	ug/l		
MW-DU-006 SAIC15E	U-234	1.64	0.28	0.05	pci/L		
MW-DU-006 SAIC15E	U-235	0.046	0.0469	0.031	pci/L	J	37
MW-DU-006 SAIC15E	U-238	1.15	0.23	0.06	pci/L		
MW-DU-007 SAIC15DE	U	2.28	0.569	0.15	ug/l		
MW-DU-007 SAIC15DE	U-234	1.93	0.33	0.1	pci/L		
MW-DU-007 SAIC15DE	U-235	0.034	0.0469	0.071	pci/L	U	
MW-DU-007 SAIC15DE	U-238	0.76	0.189	0.05	pci/L		
MW-DU-007 SAIC15E	U	2.08	0.55	0.2	ug/l		
MW-DU-007 SAIC15E	U-234	1.4	0.28	0.07	pci/L		
MW-DU-007 SAIC15E	U-235	0.052	0.064	0.094	pci/L	U	
MW-DU-007 SAIC15E	U-238	0.69	0.189	0.07	pci/L		
MW-DU-008 SAIC15E	U	0.49	0.23	0.12	ug/l		
MW-DU-008 SAIC15E	U-234	0.211	0.0909	0.053	pci/L		
MW-DU-008 SAIC15E	U-235	0.02	0.032	0.051	pci/L	U	
MW-DU-008 SAIC15E	U-238	0.161	0.078	0.041	pci/L		

SAMPLE DATA SUMMARY – WATER
Isotopic Uranium A-01-R MOD

Sample I.D.	Analyte	Result	Error	MDC	Units	Qualifier	Reason Code
MW-DU-009 SAIC15E	U	0.85	0.35	0.19	ug/l		
MW-DU-009 SAIC15E	U-234	1	0.23	0.08	pci/L		
MW-DU-009 SAIC15E	U-235	0.073	0.066	0.04	pci/L	J	37
MW-DU-009 SAIC15E	U-238	0.28	0.12	0.06	pci/L		
MW-DU-010 SAIC15E	U	2.16	0.53	0.15	ug/l		
MW-DU-010 SAIC15E	U-234	1.54	0.28	0.07	pci/L		
MW-DU-010 SAIC15E	U-235	0.048	0.0479	0.033	pci/L	J	37
MW-DU-010 SAIC15E	U-238	0.72	0.179	0.05	pci/L		
MW-DU-011 SAIC15E	U	0.12	0.14	0.19	ug/l	U	
MW-DU-011 SAIC15E	U-234	0.072	0.055	0.058	pci/L	J	6,37
MW-DU-011 SAIC15E	U-235	0.008	0.0229	0.051	pci/L	U	
MW-DU-011 SAIC15E	U-238	0.041	0.0459	0.065	pci/L	U	
SW-DU-001 SAIC15E	U	0.06	0.11	0.2	ug/l	U	
SW-DU-001 SAIC15E	U-234	0.224	0.0929	0.065	pci/L	J	6
SW-DU-001 SAIC15E	U-235	0.019	0.031	0.048	pci/L	U	
SW-DU-001 SAIC15E	U-238	0.017	0.0359	0.067	pci/L	U	
SW-DU-002 SAIC15DE	U	0.52	0.27	0.26	ug/l		
SW-DU-002 SAIC15DE	U-234	0.31	0.11	0.06	pci/L		
SW-DU-002 SAIC15DE	U-235	0	0.012	0.032	pci/L	U	
SW-DU-002 SAIC15DE	U-238	0.175	0.0909	0.087	pci/L	J	37
SW-DU-002 SAIC15E	U	0.21	0.14	0.13	ug/l		
SW-DU-002 SAIC15E	U-234	0.171	0.079	0.065	pci/L		
SW-DU-002 SAIC15E	U-235	0.015	0.029	0.052	pci/L	U	
SW-DU-002 SAIC15E	U-238	0.067	0.0479	0.042	pci/L	J	37
SW-DU-003 SAIC13E	U	0.5	0.25	0.15	ug/l		
SW-DU-003 SAIC13E	U-234	3.26	0.469	0.09	pci/L		
SW-DU-003 SAIC13E	U-235	0.06	0.0609	0.071	pci/L	U	
SW-DU-003 SAIC13E	U-238	0.158	0.084	0.049	pci/L	J	37
SW-DU-004 SAIC15E	U	0.25	0.16	0.11	ug/l		
SW-DU-004 SAIC15E	U-234	0.73	0.17	0.06	pci/L		
SW-DU-004 SAIC15E	U-235	0.021	0.03	0.028	pci/L	U	
SW-DU-004 SAIC15E	U-238	0.081	0.053	0.038	pci/L	J	37
SW-DU-005 SAIC15E	U	0.38	0.23	0.23	ug/l		
SW-DU-005 SAIC15E	U-234	0.168	0.0889	0.082	pci/L	J	37
SW-DU-005 SAIC15E	U-235	0.021	0.034	0.054	pci/L	U	
SW-DU-005 SAIC15E	U-238	0.125	0.0759	0.076	pci/L	J	37

SAMPLE DATA SUMMARY – WATER
Isotopic Uranium A-01-R MOD

Sample I.D.	Analyte	Result	Error	MDC	Units	Qualifier	Reason Code
SW-DU-006 SAIC14E	U	0.058	0.077	0.077	ug/l	U	
SW-DU-006 SAIC14E	U-234	0.182	0.083	0.025	pci/L		
SW-DU-006 SAIC14E	U-235	0.009	0.0229	0.052	pci/L	U	
SW-DU-006 SAIC14E	U-238	0.018	0.026	0.025	pci/L	U	
SW-DU-007 SAIC15E	U	0.3	0.179	0.15	ug/l		
SW-DU-007 SAIC15E	U-234	0.111	0.064	0.049	pci/L	J	37
SW-DU-007 SAIC15E	U-235	-0.0026	0.0052	0.047	pci/L	U	
SW-DU-007 SAIC15E	U-238	0.103	0.0609	0.049	pci/L	J	37
SW-DU-008 SAIC15E	U	0.62	0.27	0.17	ug/l		
SW-DU-008 SAIC15E	U-234	1.06	0.22	0.05	pci/L		
SW-DU-008 SAIC15E	U-235	0.014	0.034	0.068	pci/L	U	
SW-DU-008 SAIC15E	U-238	0.206	0.0909	0.054	pci/L	J	37

SAMPLE DATA SUMMARY – SOILS
Isotopic Uranium A-01-R MOD

Sample I.D.	Analyte	Result	Error	MDC	Units	Qualifier	Reason Code
SD-DU-001 SAIC15E	U	0.61	0.179	0.07	mg/kg		
SD-DU-001 SAIC15E	U-234	0.189	0.0589	0.028	pci/g		
SD-DU-001 SAIC15E	U-235	0.014	0.0179	0.023	pci/g	U	
SD-DU-001 SAIC15E	U-238	0.204	0.0609	0.022	pci/g		
SD-DU-002 SAIC15DE	U	1.99	0.359	0.08	mg/kg		
SD-DU-002 SAIC15DE	U-234	0.5	0.1	0.01	pci/g		
SD-DU-002 SAIC15DE	U-235	0.031	0.027	0.025	pci/g	J	37
SD-DU-002 SAIC15DE	U-238	0.66	0.12	0.03	pci/g		
SD-DU-002 SAIC15E	U	2.1	0.379	0.04	mg/kg		
SD-DU-002 SAIC15E	U-234	0.48	0.1	0.03	pci/g		
SD-DU-002 SAIC15E	U-235	0.034	0.028	0.015	pci/g	J	37
SD-DU-002 SAIC15E	U-238	0.7	0.13	0.01	pci/g		
SD-DU-003 SAIC15E	U	2.26	0.379	0.06	mg/kg		
SD-DU-003 SAIC15E	U-234	0.69	0.12	0.03	pci/g		
SD-DU-003 SAIC15E	U-235	0.04	0.029	0.014	pci/g	J	37
SD-DU-003 SAIC15E	U-238	0.75	0.13	0.02	pci/g		
SD-DU-004 SAIC15E	U	1.35	0.27	0.07	mg/kg		
SD-DU-004 SAIC15E	U-234	0.156	0.05	0.024	pci/g		
SD-DU-004 SAIC15E	U-235	0.018	0.0179	0.012	pci/g	J	37
SD-DU-004 SAIC15E	U-238	0.452	0.0889	0.023	pci/g		
SD-DU-005 SAIC15E	U	0.67	0.189	0.05	mg/kg		
SD-DU-005 SAIC15E	U-234	0.134	0.0479	0.024	pci/g		
SD-DU-005 SAIC15E	U-235	0.01	0.014	0.014	pci/g	U	
SD-DU-005 SAIC15E	U-238	0.223	0.0629	0.018	pci/g		
SD-DU-006 SAIC15E	U	2.23	0.379	0.08	mg/kg		
SD-DU-006 SAIC15E	U-234	0.77	0.13	0.03	pci/g		
SD-DU-006 SAIC15E	U-235	0.033	0.029	0.031	pci/g	J	37
SD-DU-006 SAIC15E	U-238	0.74	0.13	0.03	pci/g		
SD-DU-007 SAIC15E	U	2.3	0.39	0.04	mg/kg		
SD-DU-007 SAIC15E	U-234	0.72	0.13	0.03	pci/g		
SD-DU-007 SAIC15E	U-235	0.026	0.025	0.025	pci/g	J	37
SD-DU-007 SAIC15E	U-238	0.77	0.13	0.01	pci/g		
SD-DU-008 SAIC15E	U	2.47	0.409	0.03	mg/kg		
SD-DU-008 SAIC15E	U-234	0.452	0.0959	0.025	pci/g		
SD-DU-008 SAIC15E	U-235	0.041	0.03	0.014	pci/g	J	37
SD-DU-008 SAIC15E	U-238	0.82	0.14	0.01	pci/g		

SAMPLE DATA SUMMARY – SOILS
Isotopic Uranium A-01-R MOD

Sample I.D.	Analyte	Result	Error	MDC	Units	Qualifier	Reason Code
SS-DU-001 SAIC15E	U	1.96	0.359	0.08	mg/kg		
SS-DU-001 SAIC15E	U-234	0.71	0.13	0.02	pci/g		
SS-DU-001 SAIC15E	U-235	0.023	0.025	0.032	pci/g	U	
SS-DU-001 SAIC15E	U-238	0.65	0.12	0.03	pci/g		
SS-DU-002 SAIC15E	U	2.77	0.45	0.09	mg/kg		
SS-DU-002 SAIC15E	U-234	0.88	0.15	0.04	pci/g		
SS-DU-002 SAIC15E	U-235	0.057	0.037	0.016	pci/g	J	37
SS-DU-002 SAIC15E	U-238	0.92	0.15	0.03	pci/g		
SS-DU-003 SAIC15E	U	1.85	0.34	0.06	mg/kg		
SS-DU-003 SAIC15E	U-234	0.65	0.12	0.03	pci/g		
SS-DU-003 SAIC15E	U-235	0.051	0.033	0.014	pci/g	J	37
SS-DU-003 SAIC15E	U-238	0.61	0.11	0.02	pci/g		
SS-DU-004 SAIC15DE	U	1.35	0.28	0.09	mg/kg		
SS-DU-004 SAIC15DE	U-234	0.489	0.098	0.026	pci/g		
SS-DU-004 SAIC15DE	U-235	0.009	0.014	0.023	pci/g	U	
SS-DU-004 SAIC15DE	U-238	0.454	0.0939	0.029	pci/g		
SS-DU-004 SAIC15E	U	1.61	0.32	0.1	mg/kg		
SS-DU-004 SAIC15E	U-234	0.64	0.12	0.03	pci/g		
SS-DU-004 SAIC15E	U-235	0.026	0.025	0.025	pci/g	J	37
SS-DU-004 SAIC15E	U-238	0.54	0.11	0.04	pci/g		

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 QC criteria. The presence or absence of the radionuclide cannot be verified.

Data Validation Reason Code

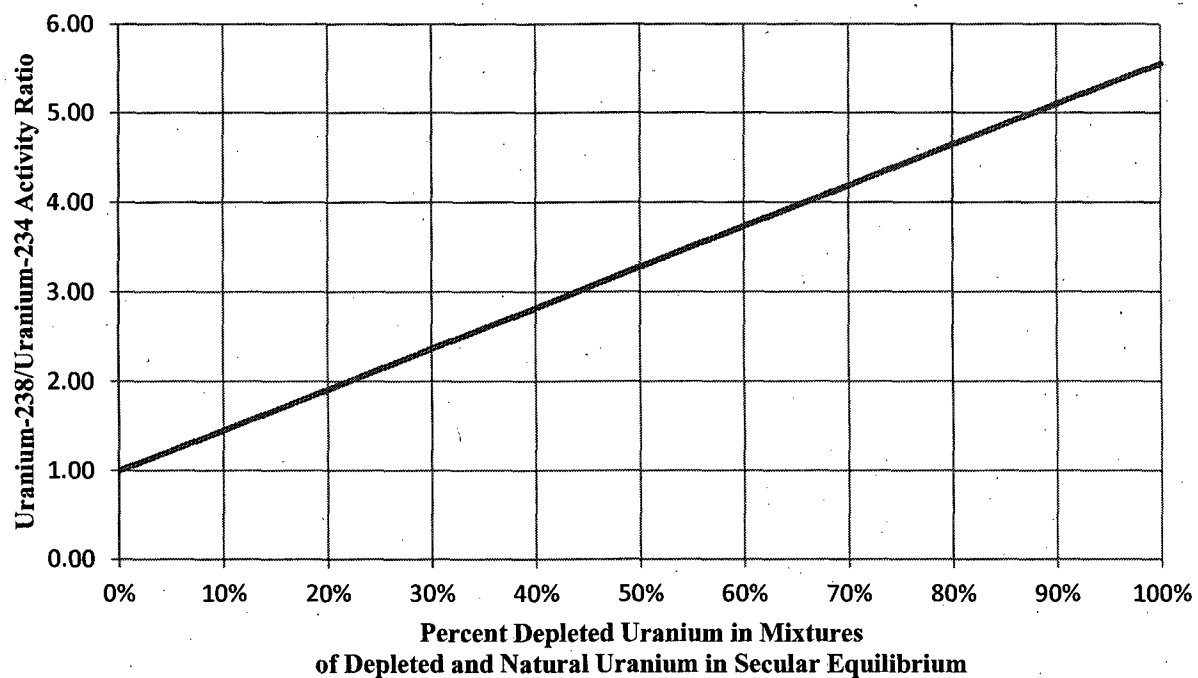
- 37 Associated error was greater than 50 percent of the sample result.
6 Associated method blank contamination.

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APPENDIX D
**RELATIVE URANIUM-238/URANIUM-234 ACTIVITY RATIOS FOR MIXTURES OF
DEPLETED AND NATURAL URANIUM**

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Figure D-1. Relative Uranium-238/Uranium-234 Activity Ratios for Mixtures of Depleted and Natural Uranium



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