

March 27, 2009

Ms. Yolande Norman U.S. Nuclear Regulatory Commission (NRC) Mailstop T-8 F-5 Washington, DC 20555-0001

Dear Ms. Norman:

In accordance with the U.S. Army Jefferson Proving Ground License SUB-1435 requirements, and at the U.S. Army's request, Science Applications International Corporation (SAIC) is submitting six hard copies and 4 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 October 2008 Environmental Sampling Event.

Please contact Mr. Paul Cloud at (410) 436-2381, e-mail address: <u>paul.d.cloud@us.army.mil</u> or the undersigned at (703) 375-2074, e-mail address: <u>skibinskij@saic.com</u> if you have any questions.

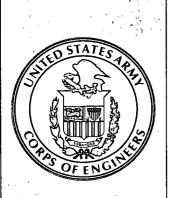
Sincerely,

Joseph N. Skibinski

cc: Paul Cloud

Brooks Evens

SAIC Central Records Project File (transmittal memo only)



U.S. Army Corps of Engineers

RADIATION MONITORING REPORT FOR LICENSE SUB-1435 JEFFERSON PROVING GROUND

Summary of Results for October 2008 Sampling Event

FINAL

Submitted to:

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

Prepared by:

Science Applications International Corporation Reston, Virginia

March 2009

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LIST OF ACRONYMS AND ABBREVIATIONS

μg/L Micrograms per Liter

ASTM American Society for Testing and Materials

CFR Code of Federal Regulations

CHPPM U.S. Army Center for Health Promotion and Preventive Medicine

DQO Data Quality Objective DU Depleted Uranium

ERM Environmental Radiation Monitoring

ERMP Environmental Radiation Monitoring Program

I.D. Identification

JPG Jefferson Proving Ground LCL Lower Control Limit mS/cm MilliSiemens per Centimeter

NRC Nuclear Regulatory Commission
pCi/g PicoCuries per Gram
PicoCuries per Liter

pCi/L PicoCuries per Liter QA Quality Assurance

QAPP Quality Assurance Project Plan

QC Quality Control

SAIC Science Applications International Corporation

SOP Standard Operating Procedure

UCL Upper Control Limit

1. INTRODUCTION

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

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

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

This report summarizes the methodology, results, and conclusions of the October 2008 sampling event, which is the second of two planned sampling events in 2008 for this biannual program. The sampling requirements and approach are presented in Section 2. The results of the multimedia sampling event are presented and discussed in Section 3. Historical data from the ERMP are discussed in Section 4. Conclusions and recommendations are summarized in Section 5. References cited are identified in Section 6. The appendices of this report include the SOP (Appendix A), field logbook (Appendix B), and data validation summary (Appendix C). All tables and figures are presented at the end of their respective sections.

2. SAMPLING REQUIREMENTS AND APPROACH

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

3. RESULTS

An SAIC field crew prepared for and conducted sampling at JPG concurrent with other characterization sampling efforts in October 2008. Appendix B contains a copy of the field logbook, which documents environmental monitoring report field activities during the sampling effort.

No unusual or abnormal conditions (e.g., soil or water discoloration, odd odors, or elevated radiation levels) were observed during the sampling effort with the possible exception of the lack of flowing water in Big Creek and Middle Fork Creek.

The sample locations for the groundwater, surface water, sediment, and soil samples are depicted in Figure 3-1. Sections 3.1 through 3.4 summarize the sampling results for each medium, respectively. The results of the data validation are presented in Appendix C. All data were determined to meet data quality objectives (DQOs) and criteria presented in the SOP (as provided in Appendix A).

3.1 GROUNDWATER

The concentrations of total dissolved uranium in groundwater at the 11 monitoring wells plus 1 duplicate sample are presented in Table 3-1. Water quality parameter measurements are presented in Table 3-2. (Water quality measurements were not obtained for MW09 as the very limited quantity of water available and the need for characterization and environmental samples precluded the ability to purge the well.) Total uranium concentrations of the October 2008 groundwater samples ranged from 0.11 picocuries per liter (pCi/L) to 4.25 pCi/L with an average concentration of 1.63.

In addition to the individual isotopic concentrations, Table 3-1 presents the U-238/U-234 ratios for each sample, which ranged from 0.18 ± 0.12 to 5.99 ± 0.75 . A U-238/U-234 ratio of 3 or less is representative of natural uranium, whereas higher ratios are potentially indicative of DU (U.S. Army 2002). For the purposes of this report, samples with U-238/U-234 ratios in excess of 3 are investigated further to validate if the sample is representative of DU or natural uranium. Given that location MW01 exhibited a U-238/U-234 ratio of 5.99 ± 0.75 , it was subjected to additional investigation consisting of:

- Review of analytical data, which indicated that the U-234 concentration was low and was reflected as an "approximate concentration"
- Evaluation of two characterization samples (consisting of unfiltered/unpreserved and filtered/preserved samples) from the same well, which exhibited DU ratios of less than 3
- Review of logbook entries, which indicated that the well was purged to dryness and thus may have inadvertently introduced sediments into the sample.

All other groundwater samples had U-238/U-234 ratios in the range of 0.18 ± 0.12 to 1.62 ± 0.17 . Based on the U-238/U-234 ratios, groundwater location MW01 exhibited evidence of the presence of DU.

3.2 SURFACE WATER

The concentrations of total dissolved uranium in surface water at seven sampling locations plus one duplicate sample are presented in Table 3-3. (A surface water sample was not able to be obtained from location SWS-03 as the stream was dry at that location.) Water quality parameter measurements are presented in Table 3-4. Total uranium concentrations ranged from 0.04 to 6.91 pCi/L, with an average concentration of 1.14 pCi/L. The U-238/U-234 ratio for locations SWS05 and SWS08 were 7.02 ± 1.38 and 3.58 ± 0.18 , respectively. As a result of having a U-238/U-234 ratio exceeding 3, location SWS05 and SWS08 were subjected to additional investigation that included review of results of characterization sampling and radiological surveys that were ongoing concurrent with environmental monitoring activities. Investigation included:

- Review of the sample data, which reflected the fact that the U-234 concentration for location SWS08 was an "approximate concentration."
- Review of field logbooks and associated information to assess basis for elevated concentration.
 Logbook and sample log sheets indicated that Big Creek was not flowing at the time of sample collection; thus, suspended DU may have contributed to the elevated ratios in SW05 and SW08.
- Review of sediment samples collected adjacent to and downstream from SW05 and SW08, which reflected ratios of less than 3.
- Comparison of results to naturally occurring U-234/U-238 ratios. (The U-234 to U-238 ratio in natural uranium has been found to vary considerably due to preferential leaching of U-234 resulting from radiation damage of crystal lattice upon alpha decay of U-238, oxidation of insoluble tetravalent U-234 to soluble hexavalent U-234, and alpha recoil of Th-234 (and its U-234 daughter) into soluble phase. Migration of leached U-234 produces the variability. U-234/U-238 activity ratios in water vary from 0.5 to 40 (Fujikawa et al. 2000).)

The U-238/U-234 ratio for each of the other samples was in the range of 0.24 ± 0.047 to 2.06 ± 0.16 . Based on the U-238/U-234 ratios, surface water at locations SWS05 and SWS08 exhibited evidence of the presence of DU.

3.3 SEDIMENT

The concentrations of total uranium in sediment at eight sampling locations plus one duplicate sample are presented in Table 3-5. Sediment samples were collected at the same locations as surface water samples, as shown in Figure 3-1. Total uranium concentrations ranged from 0.22 to 1.89 picocuries per gram (pCi/g), with an average concentration of 1.04 pCi/g. The U-238/U-234 ratio for the samples ranged from 0.89 ± 0.12 to 1.71 ± 0.13 .

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

3.4 SOIL

The concentrations of total uranium in surface soil at four surface soil sample locations plus one duplicate sample are presented in Table 3-6. Total uranium concentrations ranged from 0.36 to 1.62 with an average concentration of 1.26 pCi/g. The U-238/U-234 ratios ranged from 0.87 ± 0.26 to 1.42 ± 0.08 .

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

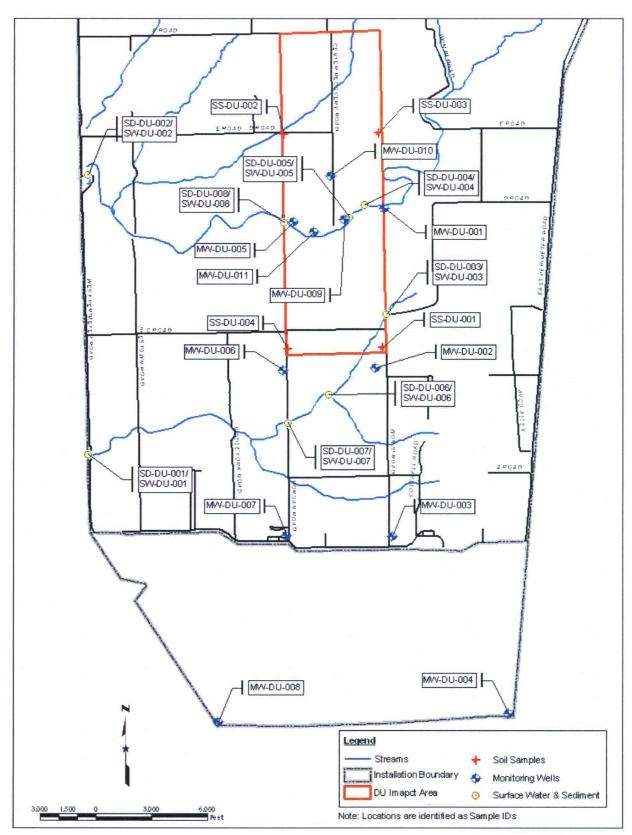


Figure 3-1. Sampling Locations for the JPG ERM Program

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

JPG Sample Designation ^a	Sample I.D.	Analyte	Result (pCi/L)
MW01	MW-DU-001	U-234	0.182 J
MW01	MW-DU-001	U-235	0.012 U
MW01	MW-DU-001	U-238	1.09
		Total Uranium	1.28
	U-	238/U-234 Ratiob	5.99
MW02	MW-DU-002	U-234	2.71
MW02	MW-DU-002	U-235	0.025 U
MW02	MW-DU-002	U-238	1.21
		Total Uranium	3.95
	U-	238/U-234 Ratiob	0.45
MW03	MW-DU-003	. U-234	0.652
MW03	MW-DU-003	U-235	-0.005 U
MW03	MW-DU-003	U-238	0.246
	4	Total Uranium	0.89
	· U-	238/U-234 Ratiob	0.38
MW03D	MW-DU-003D	U-234	0.631
MW03D	MW-DU-003D	U-235	0.037 J
MW03D	MW-DU-003D	U-238	0.359
	Ma Arthritis	Total Uranium	1.03
	U-	238/U-234 Ratiob	0.57
MW04	MW-DU-004	. U-234	1.28
MW04	MW-DU-004	U-235	0.092 J
MW04	MW-DU-004	U-238	1.01
		Total Uranium	2.38
•	U-	238/U-234 Ratiob	0.79
MW05	MW-DU-005	U-234	0.047 J
MW05	MW-DU-005	U-235	0.000 U
MW05	MW-DU-005	U-238	0.065 J
		Total Uranium	0.11
**************************************	U-	238/U-234 Ratiob	1.38
MW06	MW-DU-006	U-234	2.18
MW06	MW-DU-006	U-235	0.099 J
MW06	MW-DU-006	U-238	1.97
		Total Uranium	4.25
· · · · · · · · · · · · · · · · · · ·	U-	238/U-234 Ratiob	0.90
MW07	MW-DU-007	U-234	0.573
MW07	MW-DU-007	U-235	0.019 U
MW07	MW-DU-007	U-238	0.222
		Total Uranium	0.81
	U-	238/U-234 Ratiob	0.39
MW08	MW-DU-008	U-234	0.215
MW08	MW-DU-008	U-235	0.033 J
MW08	MW-DU-008	U-238	0.348
		Total Uranium	0.60
	U-	238/U-234 Ratiob	1.62

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

JPG Sample Designationa	Sample I.D.	Analyte	Result (pCi/L)
MW09	MW-DU-009	U-234	0.986
- MW09	MW-DU-009	U-235	-0.010 U
MW09	MW-DU-009 (U-238	0.226
		Total Uranium	1.20
	U-:	238/U-234 Ratiob	0.23
MW010	MW-DU-010	U-234	1.94
MW010	MW-DU-010	U-235	0.050 J
MW010	MW-DU-010	U-238	0.751
		Total Uranium	2.74
į	U-	238/U-234 Ratiob	0.39
MW011	MW-DU-011	U-234	0.247
MW011	MW-DU-011	U-235	0.011 U
MW011	MW-DU-011	U-238	0.045 J
		Total Uranium	0.30
	U-	238/U-234 Ratiob	0.18

^a Represents sample designation developed in previous sampling programs.

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

JPG Sample Designation ^a	Sample I.D.	рН	Temp (°C)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Rad (μR/hr)
MW01	MW-DU-001	7.21	18.7	b	6.75	6
MW02	MW-DU-002	6.50	16.6	0.750	0.04	5
MW03	MW-DU-003	6.19	15.2	0.750	0.00	5
MW04	MW-DU-004	6.27	18.6	0.825	0.00	5.5
MW05	MW-DU-005	6.85	15.4	14.2	0.00	5
MW06	MW-DU-006	6.08	14.3	0.90	6.23	5
MW07	MW-DU-007	6.43	15.1	0.933	0.00	6
MW08	MW-DU-008	6.71	13.0	0.722	0.87	6
MW09°	MW-DU-009					5
MW10	MW-DU-0010	6.84	13.0	0.787	0.57	5
MW11	MW-DU-0011	6.73	15.8	6.11	1.29	6

^a Represents sample designation developed in previous sampling programs.

^b Unitless.

J – Indicates that the radionuclide was positively identified; the associated numerical value is the approximate concentration of the radionuclide in the sample.

ND – Indicates that one or more isotopes were not detected; therefore, the calculation was not performed.

U – Indicates that the data met all QA/QC requirements and the radionuclide was analyzed for but was not detected above the reported sample quantification limit.

^b Above Horiba reading range.

^c Data not collected as well could was not purged due to the limited volume of water available. Instead, the limited volume of water was collected with Hydrasleeve to meet higher priority characterization and environmental sampling needs.

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

JPG Sample Designation ^a	Sample I.D.	Analyte	Result (pCi/g)		
SWS01 /	SW-DU-001	U-234	0.121 J		
SWS01	SW-DU-001	U-235	0.020 U		
SWS01	SW-DU-001	U-238	0.130 J		
		Total Uranium	0.27		
	· U.	-238/U-234 Ratiob	1.07		
SWS02	SW-DU-002	U-234	0.132 J		
SWS02	SW-DU-002	U-235	-0.005 U		
SWS02	SW-DU-002	U-238	0.162 J		
		Total Uranium	0.29		
	U-	-238/U-234 Ratiob	1.23		
SWS02D	SW-DU-002D	U-234/	0.092 J		
SWS02D	SW-DU-002D	U-235	0.026 U		
SWS02D	SW-DU-002D	U-238	0.170 J		
		Total Uranium	0.29		
	U-	-238/U-234 Ratiob	1.85		
SWS04	SW-DU-004	U-234	0.154		
SWS04	SW-DU-004	U-235	0.014 U		
SWS04	SW-DU-004	U-238	0.318		
	Total Uranium				
		J-238/U-234 Ratiob	2.06		
SWS05	SW-DU-005	U-234	0.848		
SWS05	SW-DU-005	U-235	0.105 J		
SWS05	SW-DU-005	U-238	5.96		
		Total Uranium	6.91		
		-238/U-234 Ratiob	7.02		
SWS06	SW-DU-006	U-234	0.041 J		
SWS06	SW-DU-006	U-235	-0.010 U		
SWS06	SW-DU-006	U-238	0.010 U		
		Total Uranium	0.04		
		-238/U-234 Ratiob	ND		
SWS07	SW-DU-007	U-234	0.135 J		
SWS07	SW-DU-007	U-235	0.000 U		
SWS07	SW-DU-007	U-238	0.114 J		
		Total Uranium	0.25		
		-238/U-234 Ratiob	0.84		
SWS08	SW-DU-008	U-234	0.120 J		
SWS08	SW-DU-008	U-235	0.012 U		
SWS08	SW-DU-008	U-238	0.430		
		Total Uranium	0.56		
	U-238/U-234 Ratio ^b 3.58				

^a Represents sample designation developed in previous sampling programs.

^b Unitless.

J – Indicates that the radionuclide was positively identified; the associated numerical value is the approximate concentration of the radionuclide in the sample.

ND – Indicates that one or more isotopes were not detected; therefore, the calculation was not performed.

U – Indicates that the data met all QA/QC requirements and the radionuclide was analyzed for but was not detected above the reported sample quantitation limit.

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

JPG Sample Designation ^a	Sample I.D.	рН	Temp (°C)	Conductivity (microSiemens/cm)	Dissolved Oxygen (mg/L)	Rad (µR/hr)
SWS01	SW-DU-001	7.23	18.9	0.390	7.82	6
SWS02	SW-DU-002	7.02	21.7	0.379	8.51	8
SWS03b	SW-DU-003			,		8
SWS04	SW-DU-004	5.96	13.9	0.423	5.21	8
SWS05	SW-DU-005	6.67	19.2	0.354	5.48	9
SWS06	SW-DU-006	7.14	23.0	0.263	5.51	7
SWS07	SW-DU-007	6.15	14.2	0.389	5.32	7
SWS08	SW-DU-008	6.41	18.3	0.371	4.01	6

^a Represents sample designation developed in previous sampling programs.

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

JPG Sample Designation ^a	Sample I.D.	Analyte	Result (pCi/g)	
SES01	SD-DU-001	U-234	0.628	
SES01	SD-DU-001	U-235	0.040 J	
SES01	SD-DU-001	U-238	0.738	
		Total Uranium	1.41	
	Ū-	238/U-234 Ratiob	1.18	
SES01D	SD-DU-001D	U-234	0.502	
SES01D	SD-DU-001D	U-235	0.031 J	
SES01D	SD-DU-001D	U-238	0.564	
		Total Uranium	1.10	
	. U-	238/U-234 Ratiob	1.12	
SES02	SD-DU-002	U-234	0.764	
SES02	SD-DU-002	U-235	0.033 J	
SES02	SD-DU-002	U-238	0.805	
	1.60			
	U-	238/U-234 Ratiob	1.05	
SES03	SD-DU-003	U-234	0.652	
SES03	SD-DU-003	, U-235	0.033 J	
SES03	SD-DU-003	U-238	0.766	
	Total Uranium			
	. U-	238/U-234 Ratiob	1.17	
SES04	SD-DU-004	U-234	0.100	
SES04	SD-DU-004	U-235	0.000 U	
SES04	SD-DU-004	U-238	0.123	
		Total Uranium	0.22	
	U-238/U-234 Ratiob			
SES05	SD-DU-005	U-234	0.223	
SES05	SD-DU-005	U-235	0.020 J	
SES05	SD-DU-005	U-238	0.381	
		Total Uranium	0.62	
	U-:	238/U-234 Ratiob	1.71	

^b Dry stream precluded collection of sample and associated data.

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

JPG Sample Designation	Sample I.D.	Analyte	Result (pCi/g)
SES06	SD-DU-006	U-234	0.212
SES06	SD-DU-006	U-235	0.023 J
SES06	SD-DU-006	U-238	0.199
		Total Uranium	0.43
	U-	238/U-234 Ratiob	0.94
SES07	SD-DU-007	U-234	0.320 J
SES07	SD-DU-007	U-235.	0.023 J
SES07	SD-DU-007	U-238	0.284 J
		Total Uranium	0.63
	U-	238/U-234 Ratiob	0.89
SES08	SD-DU-008	U-234	0.695 J
SES08	SD-DU-008	U-235	0.020 J
SES08	SD-DU-008	U-238	1.17 J
		Total Uranium	1.89
	U-	238/U-234 Ratiob	1.68

^a Represents sample designation developed in previous sampling programs.

b Unitless

J – Indicates that the radionuclide was positively identified; the associated numerical value is the approximate concentration of the radionuclide in the sample.

ND – Indicates that one or more isotopes were not detected; therefore, the calculation was not performed.

U – Indicates that the data met all QA/QC requirements and the radionuclide was analyzed for but was not detected above the reported sample quantitation limit.

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

JPG Sample Designation ^a	Sample I.D.	Analyte	Result (pCi/g)
SOS01	SS-DU-001	U-234	0.819 J
SOS01	SS-DU-001	U-235	0.009 J
SOS01	SS-DU-001	U-238	0.715 J
		Total Uranium	1.57
	U-2	238/U-234 Ratiob	0.87
SOS02	. SS-DU-002	U-234	0.146
SOS02	SS-DU-002	. U-235	0.004 U
SOS02	SS-DU-002	U-238	0.208
		Total Uranium	0.36
	U-2	238/U-234 Ratiob	1.42
SOS02D	SS-DU-002D	U-234	0.752
SOS02D	SS-DU-002D	U-235	0.017 J
SOS02D	SS-DU-002D	U-238	0.850
		Total Uranium	1.62
,	U-2	238/U-234 Ratiob	1.13
SOS03	SS-DU-003	U-234	0.674 J
SOS03	SS-DU-003	U-235	0.042 J
SOS03	SS-DU-003	U-238	0.773 J
		Total Uranium	1.49
	U-	238/U-234 Ratiob	1.15
SOS04	SS-DU-004	U-234	0.625
SOS04	SS-DU-004	U-235	0.035 J
SOS04	SS-DU-004	U-238	0.594
		Total Uranium	1.25
	U-2	238/U-234 Ratiob	0.95

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

J – Indicates that the radionuclide was positively identified; the associated numerical value is the approximate concentration of the radionuclide in the sample.

ND – Indicates that one or more isotopes were not detected; therefore, the calculation was not performed.

U – Indicates that the data met all QA/QC requirements and the radionuclide was analyzed for but was not detected above the reported sample quantification limit.

4. HISTORICAL DATA ASSESSMENT AND TREND ANALYSIS

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

Table 4-1. Action Levels and Corrective Actions for Total Uranium in Environmental Media

Jefferson Proving Ground, Madison, Indiana

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

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

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

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

4.1 GROUNDWATER

For 94 discrete samples available from 11 monitoring wells (MW01 to MW11) during the period from 2004 through October 2008, the average total uranium activity-concentration is 1.41 pCi/L, the standard deviation is 1.15 pCi/L, and the maximum detected activity-concentration is 5.27 pCi/L. The activity-concentrations at each well are well below the 150 pCi/L action level for groundwater.

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

Data for each monitoring well are summarized in run charts, as shown in Figures 4-1 through 4-11. Total uranium results are displayed along with each measurement's associated error bars. The error bars are expressed at 1.96 standard deviations and represent a 95 percent confidence interval. Where trend lines are provided, the associated coefficient of correlation also is provided (the R² value listed on each figure). An R² 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. Only samples from MW-DU-005 and MW-DU-007 exhibited trend lines with R² values greater than 0.5 (i.e., somewhat significant) (0.546 and 0.554, respectively). In each of these instances, however, there is a decreasing trend in total uranium concentrations.

In addition to the aforementioned run charts (Figures 4-1 through 4-11), individual variable control charts were created in April 2006 for each monitoring well, with the upper control limit (UCL) and the lower control limit (LCL) defined at 3 standard deviations above or below the mean. The control charts were created to determine if any single sample result warranted further examination. These control charts were re-examined in this report. Results from MW-DU-002 reflect a concentration of 3.95 pCi/g, which exceeds the UCL of 3.32. All other total uranium results at each sampling location were within 3 standard deviations of the mean concentration. (Although the total uranium result for MW-DU-006 was 4.25 pCi/g, this value is only slightly above the mean of 3.992 pCi/L for this location and significantly less than its UCL of 7.007 pCi/L.) 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 four points that lie above the UCL applicable to the full data set. Each of the five points is for MW-DU-006. Clearly, this well has exhibited (and continues to exhibit) total uranium results exceeding that of the other wells. The U-238/U-234 ratio for each of these samples was equal to or greater than 0.90, eliminating DU as a likely cause. This well will continue to be monitored closely.

4.2 SURFACE WATER

For 78 discrete samples available from 8 surface water sampling locations (SW01 to SW08) during the period from 2004 through October 2008, the average total uranium activity-concentration is 0.63 pCi/L, the standard deviation is 1.06 pCi/L, and the maximum detected activity-concentration is 6.91 pCi/L. The activity-concentrations at each sample location are well below the 150 pCi/L action level for surface water.

Data for each surface water sampling location are summarized in run charts, as shown in Figures 4-14 through 4-21. Total uranium results are displayed along with each measurement's associated error bars. The error bars are expressed at 1.96 standard deviations and represent a 95 percent confidence interval. Where trend lines are provided, the associated coefficient of correlation also is provided (the R² value listed on each figure). As noted in Section 4.1, an R² value that approaches 1.0 suggests a strong relationship between the sample results and the sampling dates.

The figures for all eight individual surface water sampling locations indicate no significant trends. In addition, none of the samples exhibited trend lines with R^2 values greater than 0.5 (i.e., somewhat significant).

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

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

All of the surface water results for the October sampling event were below the mean except SW-DU-005. These data will continue to be monitored to determine if there is a seasonal trend. Surface water sample SW-DU-005 exhibited a total uranium concentration of total uranium of 6.91 pCi/L for the October 2008 sampling effort. This result is about a factor of three higher than the 2.33 pCi/L UCL for the total population of surface water samples and is also slightly above the UCL of 6.78 pCi/L applicable to this sample location. Results for this sample were also above the UCL in October 2005 (SAIC 2006) and the October 2007 result for SW-DU-005 was a factor of about 2 higher than any previous result for this location. In addition, the U-238:U-234 isotopic ratio is 7.02 for this location for the October 2008 sampling. Results for this location are higher than would be expected and will continue to be closely monitored.

4.3 SEDIMENT

For 89 discrete samples available from 8 sediment sampling locations (SD01 to SD08) during the period from 2004 through October 2008, the average total uranium activity-concentration is 0.98 pCi/g, the standard deviation is 0.55 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 R² value listed on each figure). As noted in Section 4.1, an R² 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 October 2008 sediment sampling results vary around the mean, as expected.

4.4 SOILS

For 51 discrete samples available from 4 surface soil sampling locations (SS01 to SS04) during the period from 2004 through October 2008, the average total uranium activity-concentration is 1.60 pCi/g, the standard deviation is 0.29 pCi/g, and the maximum detected activity-concentration is 2.25 pCi/g. The activity-concentrations at each location are well below the action level of 35 pCi/g. The October 2008 surface soil sampling results vary around the mean, as expected.

Data for each surface soil sampling location are summarized in run charts, as shown in Figures 4-32 through 4-35. Total uranium results are displayed along with each measurement's associated error bars. The error bars are expressed at 1.96 standard deviations and represent a 95 percent confidence interval. Where trend lines are provided, the associated coefficient of correlation also is provided (the R² value listed on each figure). As noted in Section 4.1, an R² 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, none of the surface soil sampling locations exhibited trend lines with R^2 values greater than 0.5 (i.e., somewhat significant).

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

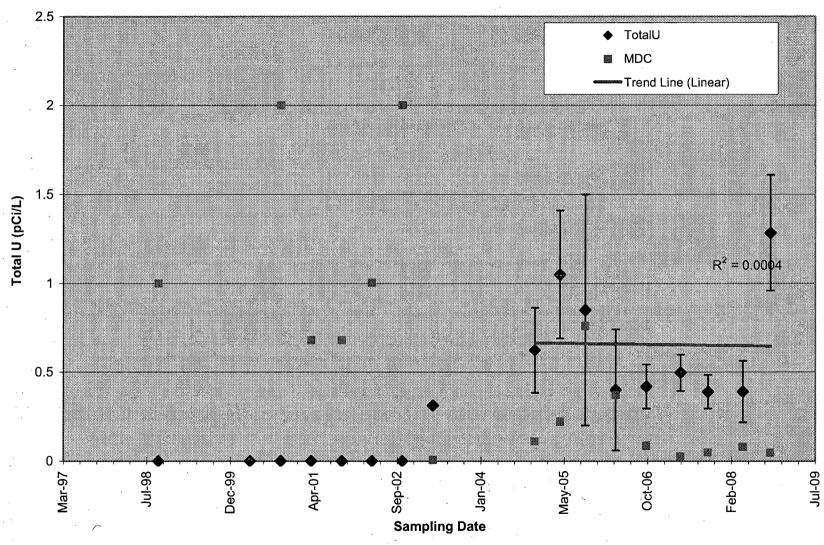


Figure 4-1. Total Uranium in MW-DU-001 (1998-2008)

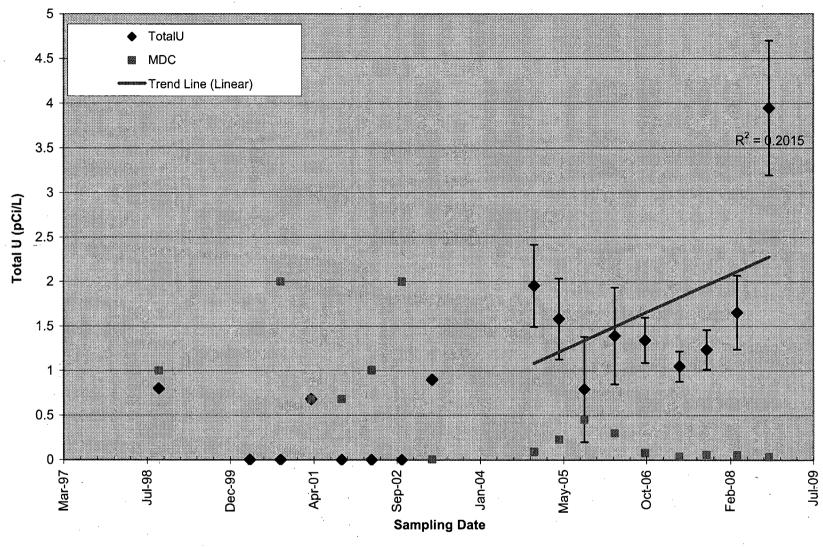


Figure 4-2. Total Uranium in MW-DU-002 (1998-2008)

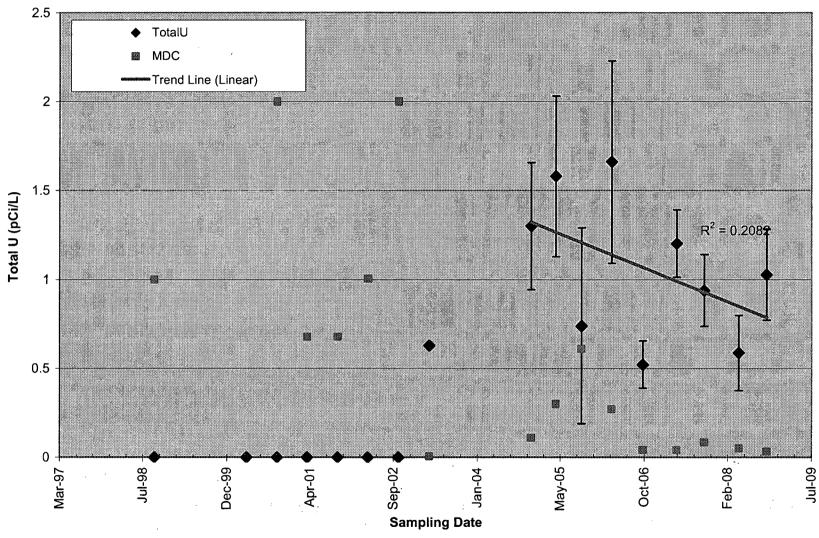


Figure 4-3. Total Uranium in MW-DU-003 (1998-2008)

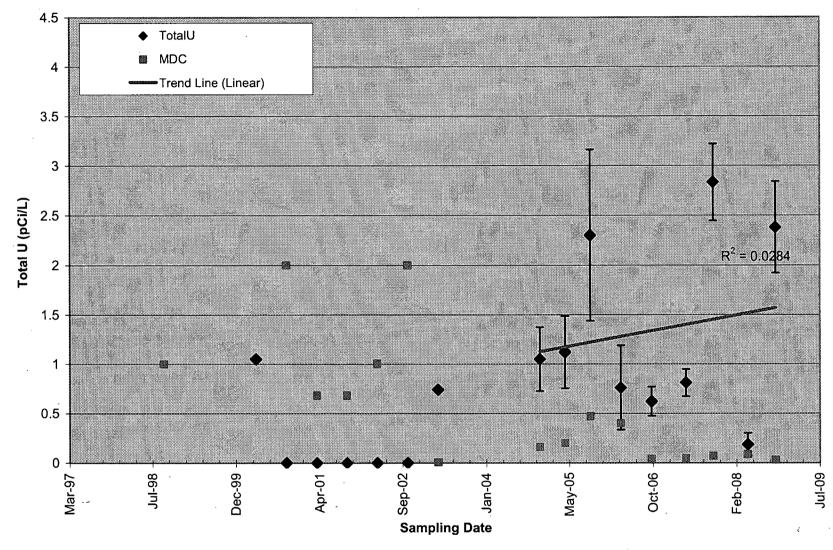


Figure 4-4. Total Uranium in MW-DU-004 (1998-2008)

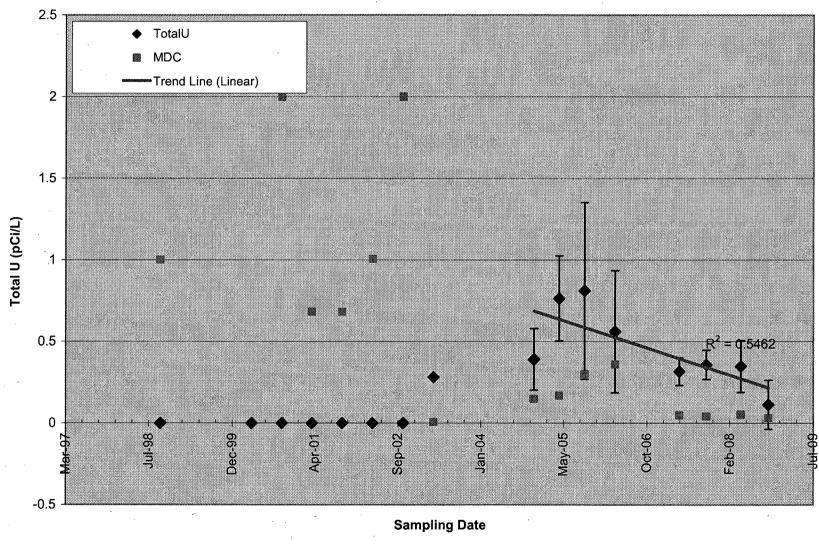
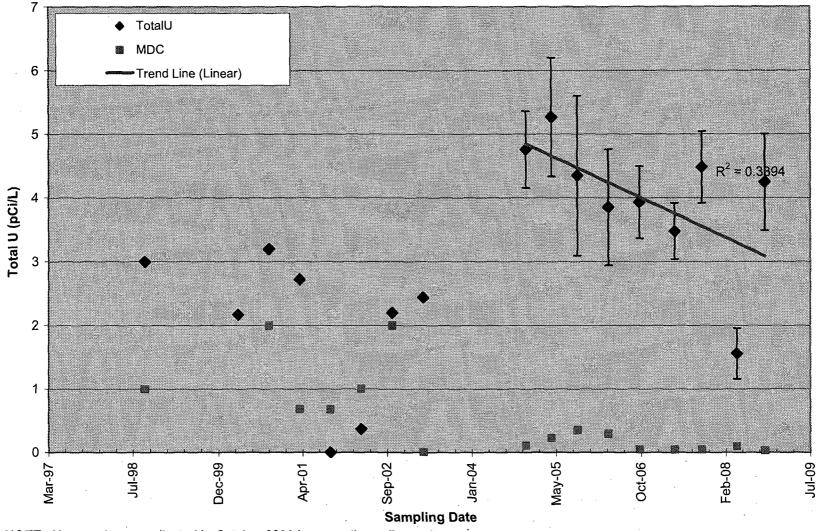


Figure 4-5. Total Uranium in MW-DU-005 (1998-2008)



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

Figure 4-6. Total Uranium in MW-DU-006 (1998-2008)

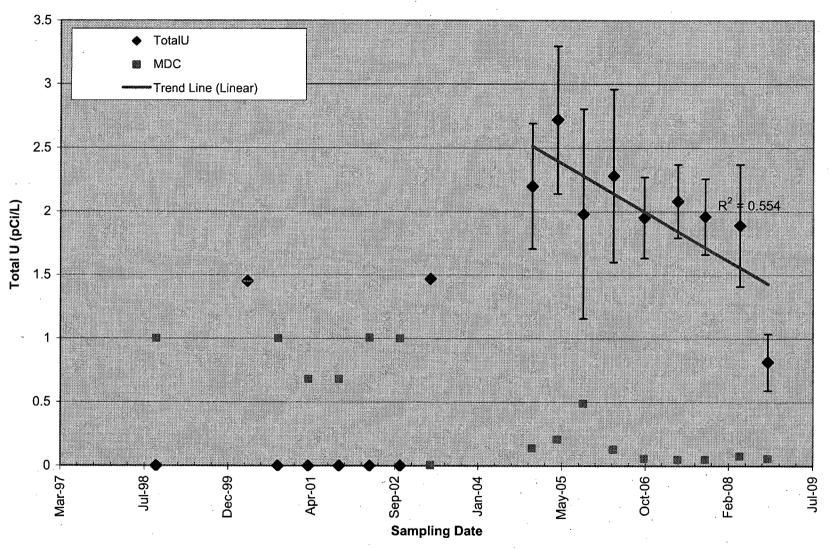


Figure 4-7. Total Uranium in MW-DU-007 (1998-2008)

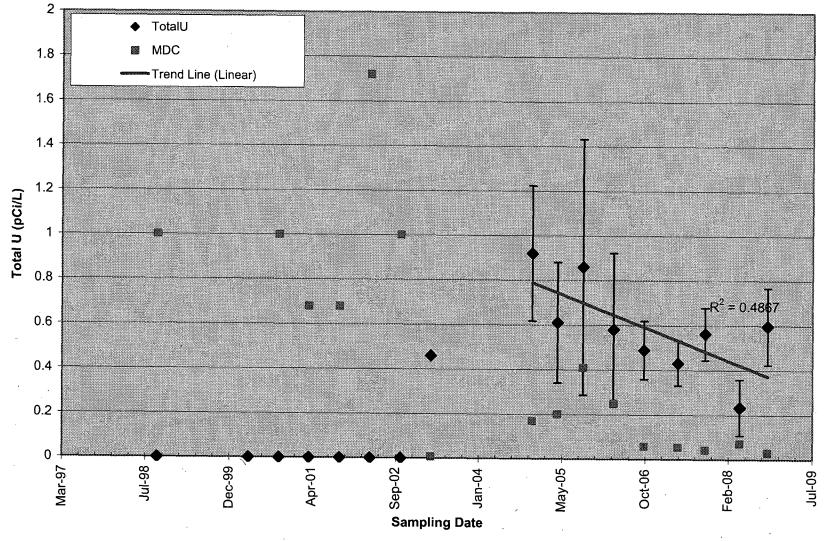


Figure 4-8. Total Uranium in MW-DU-008 (1998-2008)

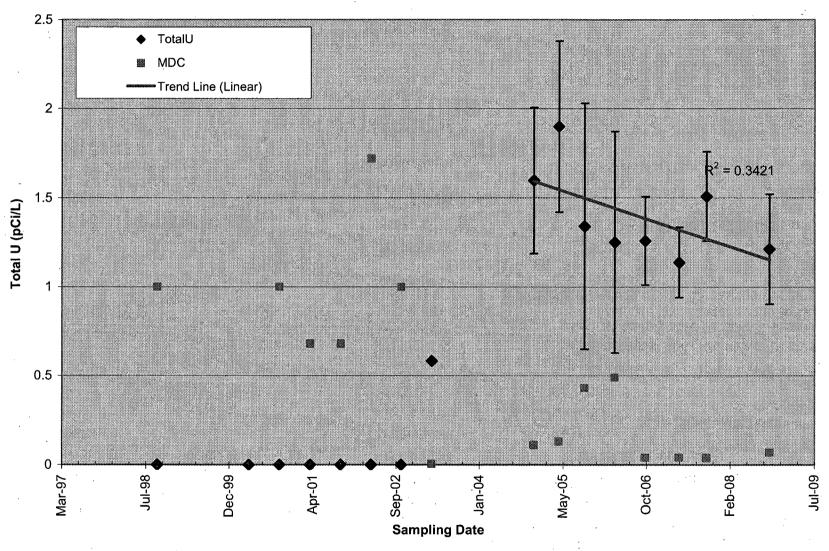


Figure 4-9. Total Uranium in MW-DU-009 (1998-2008)

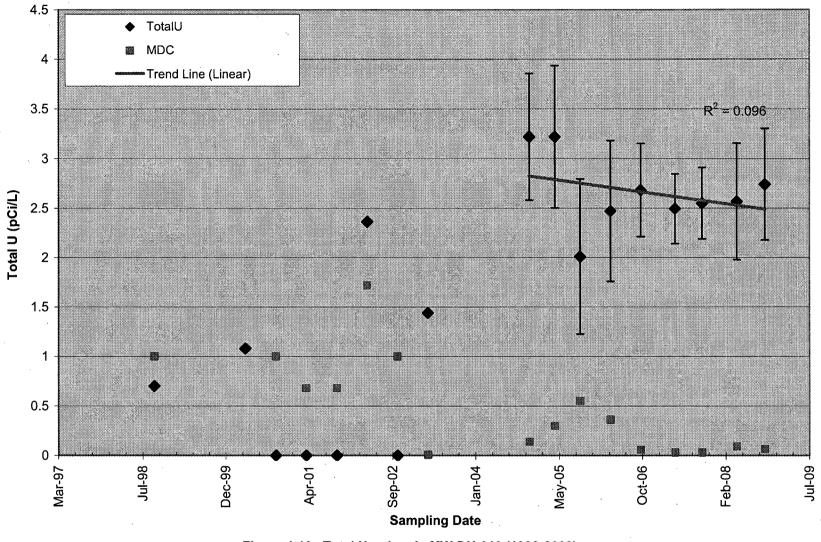
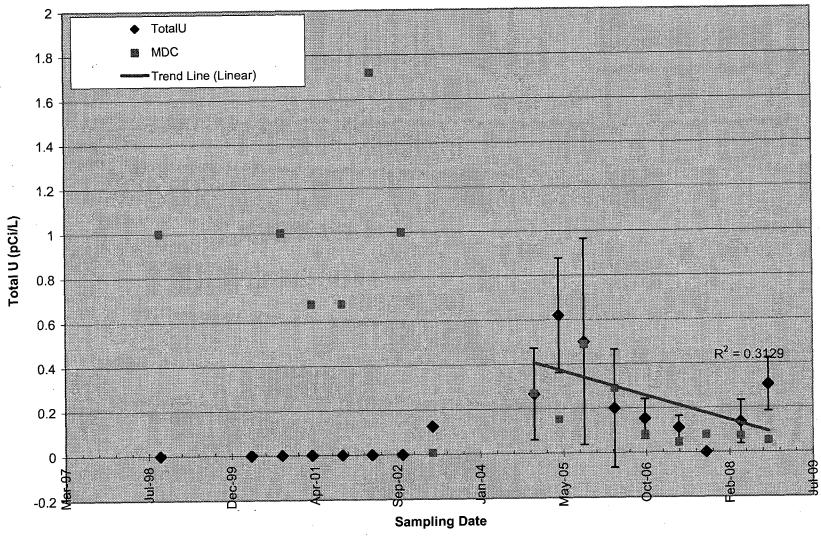


Figure 4-10. Total Uranium in MW-DU-010 (1998-2008)



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

Figure 4-11. Total Uranium in MW-DU-011 (1998-2008)

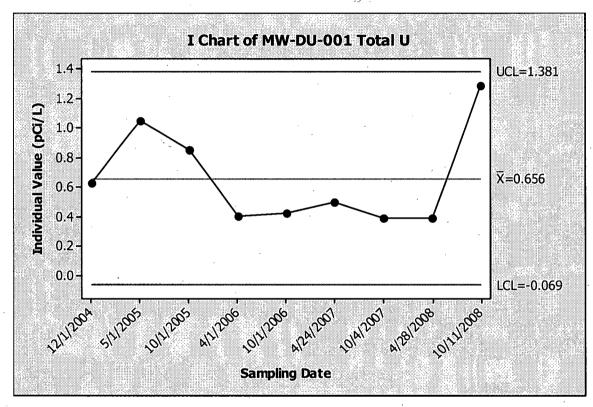


Figure 4-12. Variable Control Chart for Total Uranium in MW-DU-001 (2004-2008)

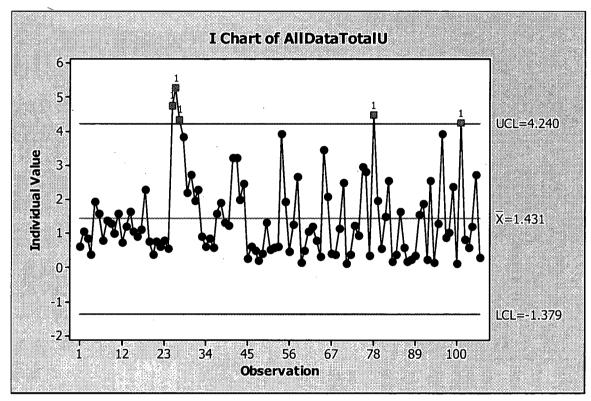


Figure 4-13. Control Chart for All Monitoring Well Data (2004-2008)

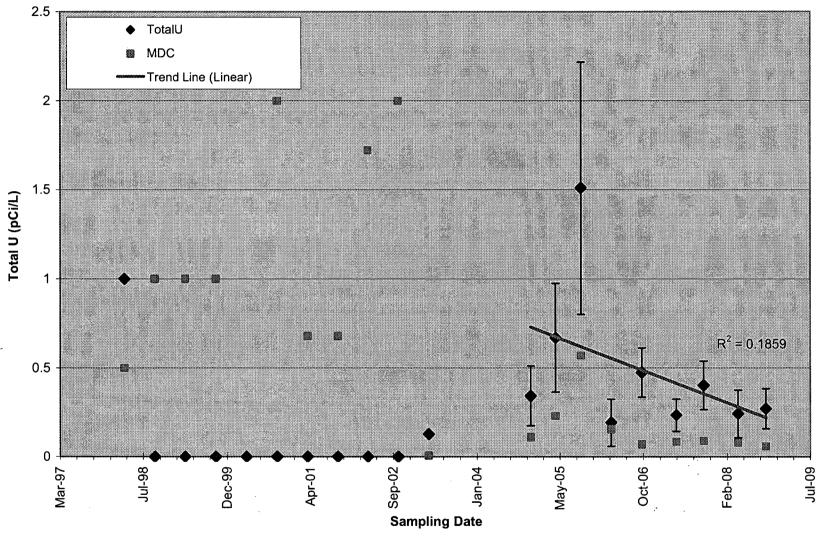


Figure 4-14. Total Uranium in SW-DU-001 (1998-2008)

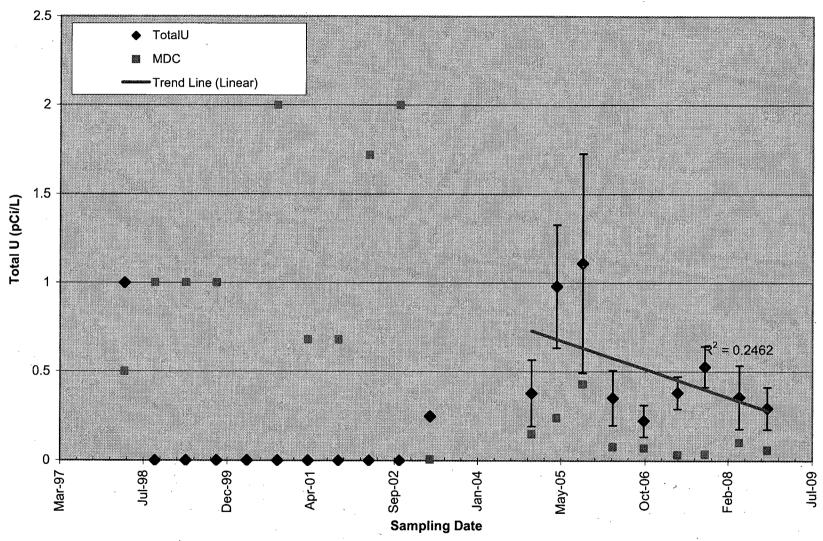
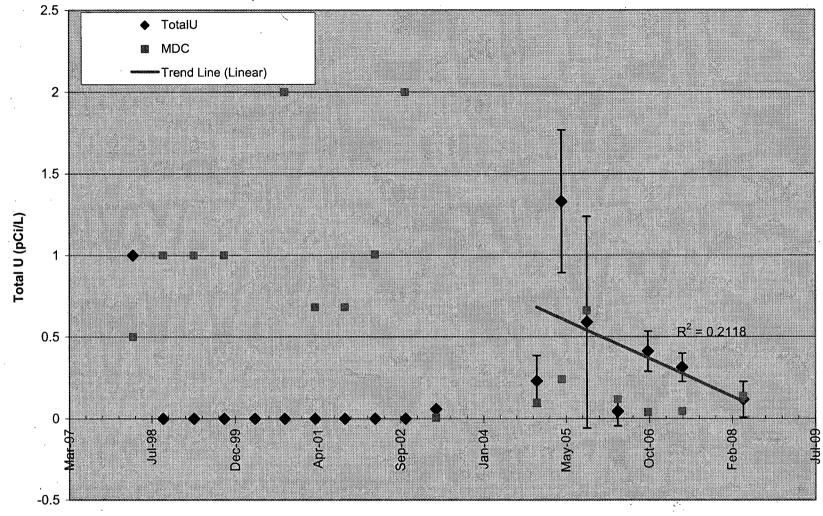


Figure 4-15. Total Uranium in SW-DU-002 (1998-2008)



Sampling Date

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

Figure 4-16. Total Uranium in SW-DU-003 (1998-2008)

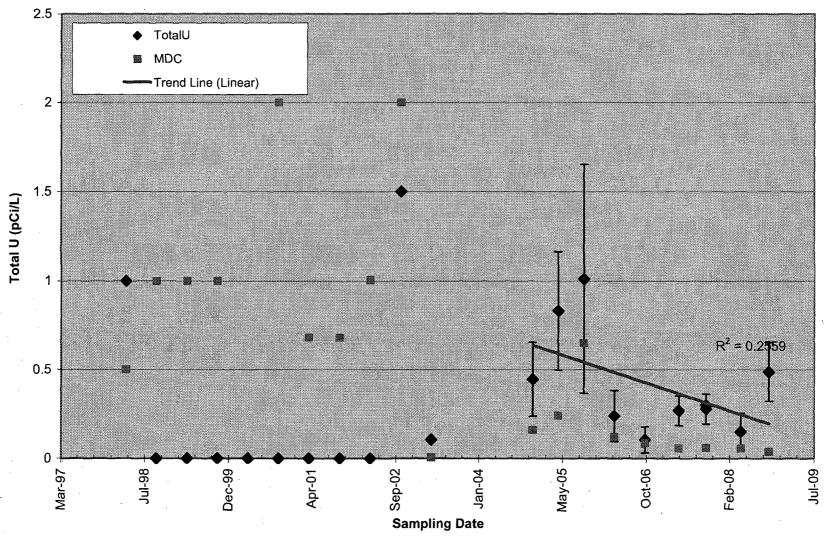
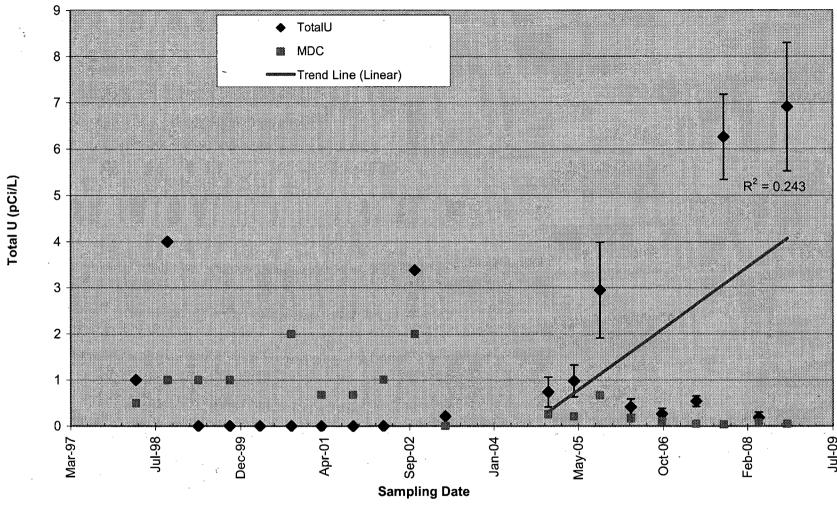
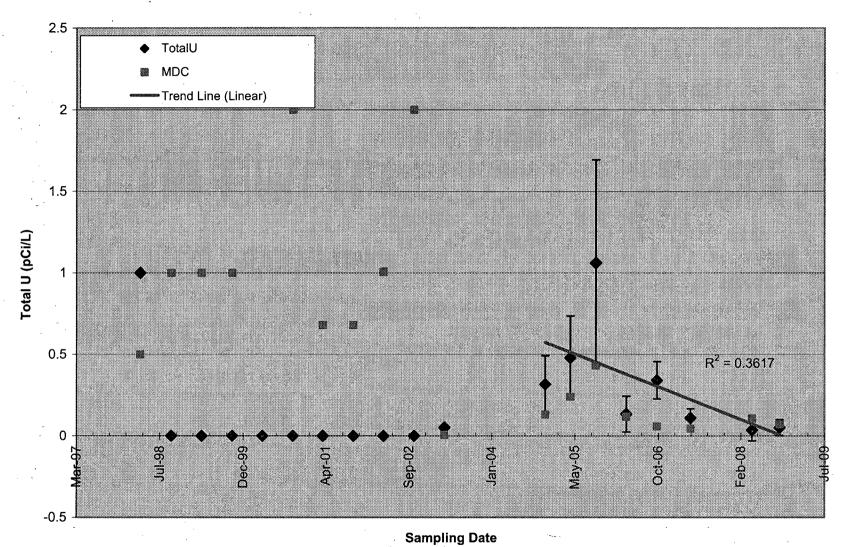


Figure 4-17. Total Uranium in SW-DU-004 (1998-2008)



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 (1998-2008)



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

Figure 4-19. Total Uranium in SW-DU-006 (1998-2008)

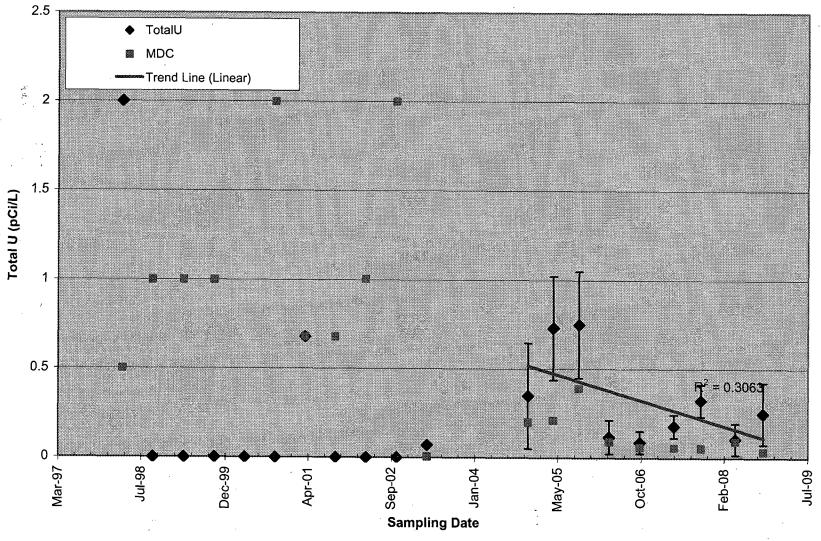


Figure 4-20. Total Uranium in SW-DU-007 (1998-2008)

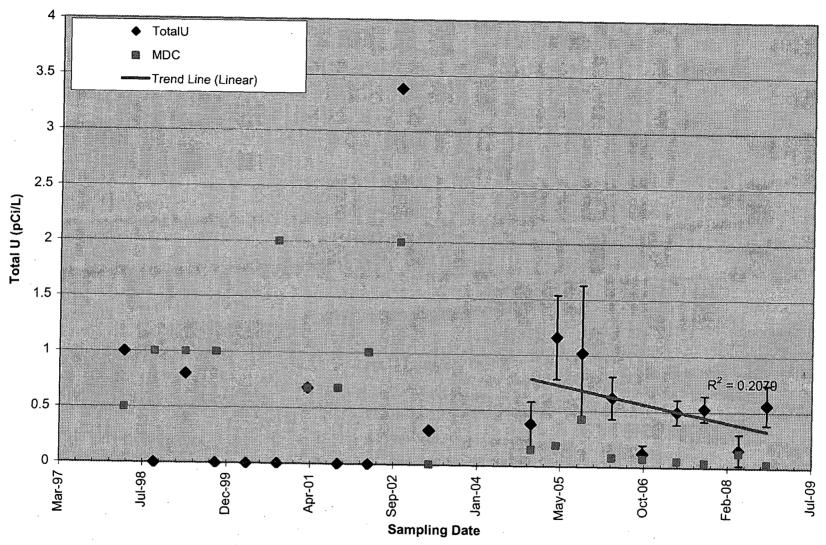


Figure 4-21. Total Uranium in SW-DU-008 (1998-2008)

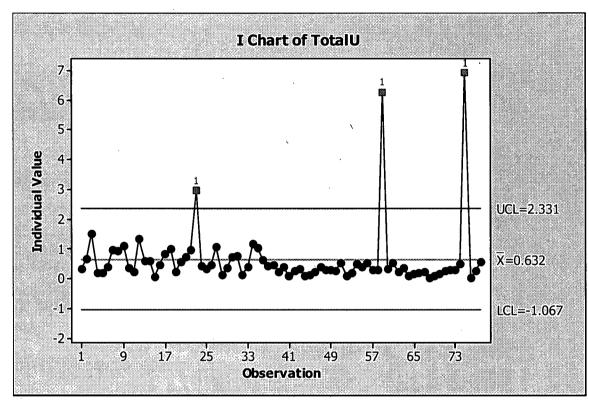


Figure 4-22. Control Chart for All Surface Water Data (2004-2008)

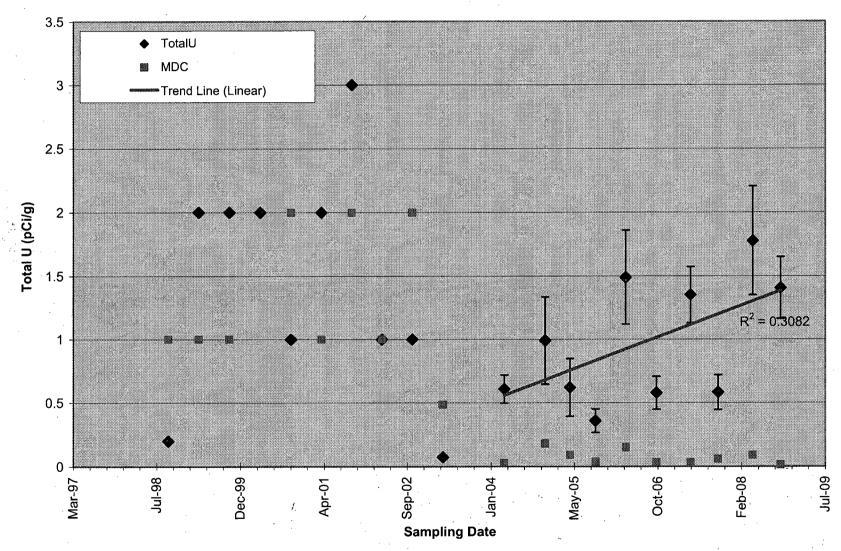


Figure 4-23. Total Uranium in SD-DU-001 (1998-2008)

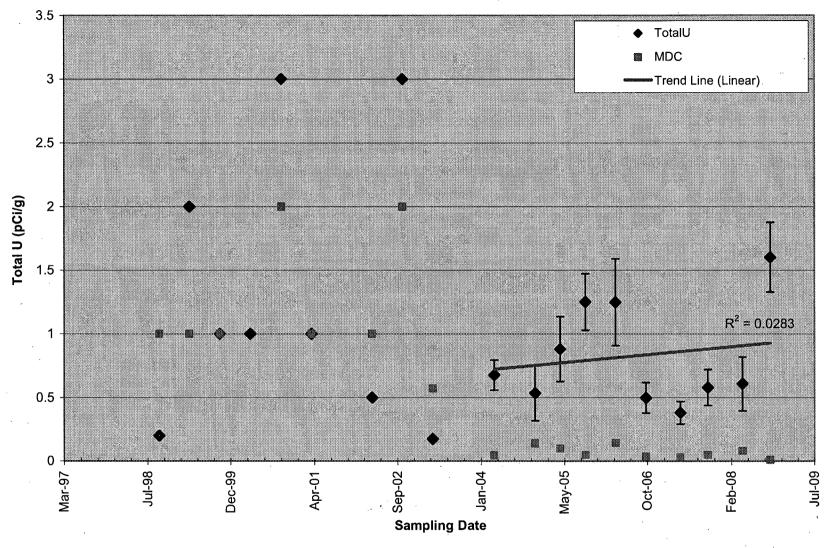


Figure 4-24. Total Uranium in SD-DU-002 (1998-2008)

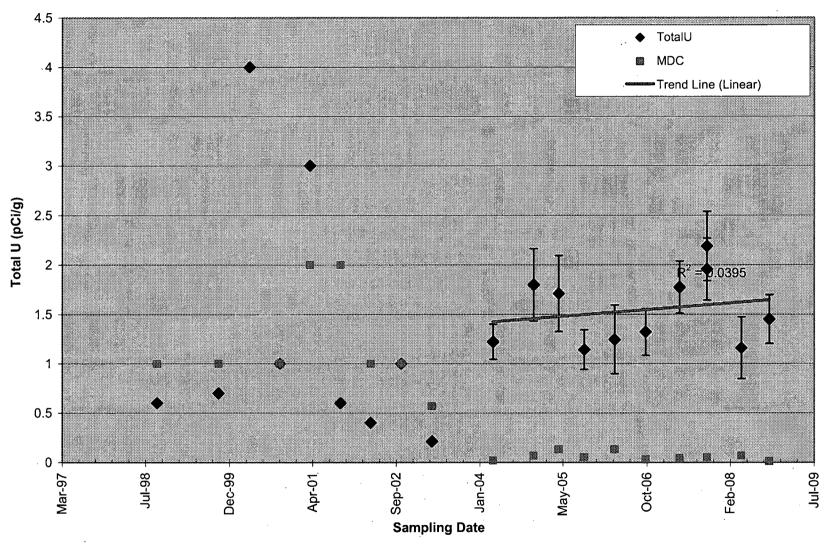


Figure 4-25. Total Uranium in SD-DU-003 (1998-2008)

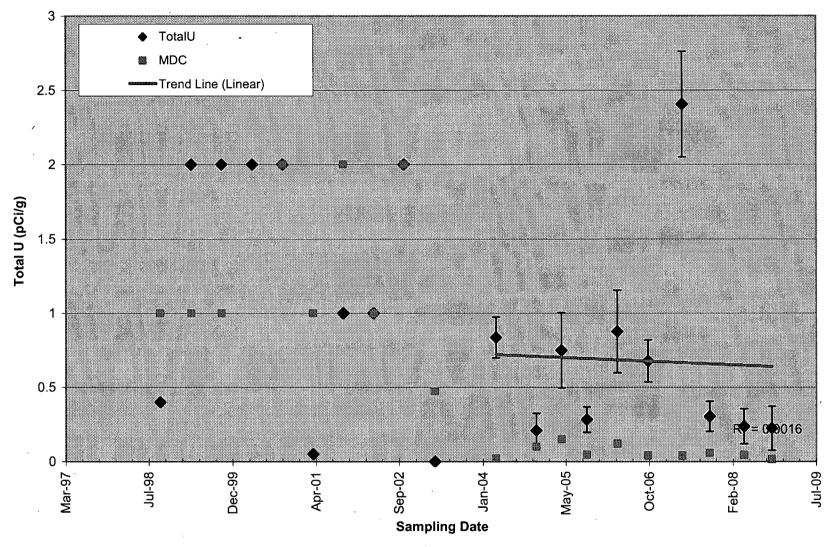


Figure 4-26. Total Uranium in SD-DU-004 (1998-2008)

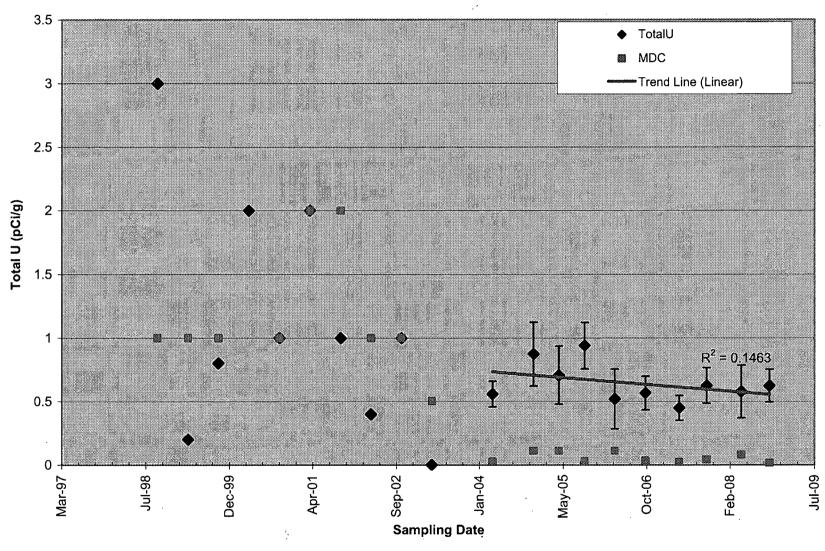


Figure 4-27. Total Uranium in SD-DU-005 (1998-2008)

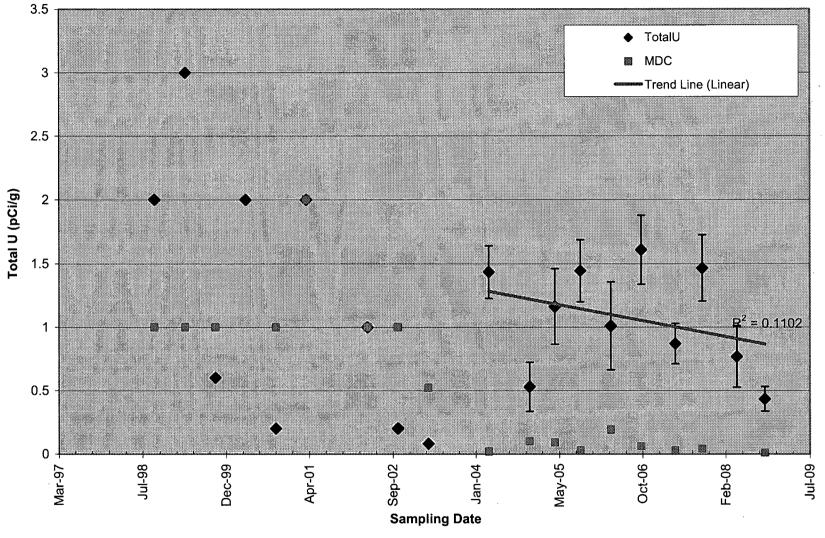


Figure 4-28. Total Uranium in SD-DU-006 (1998-2008)

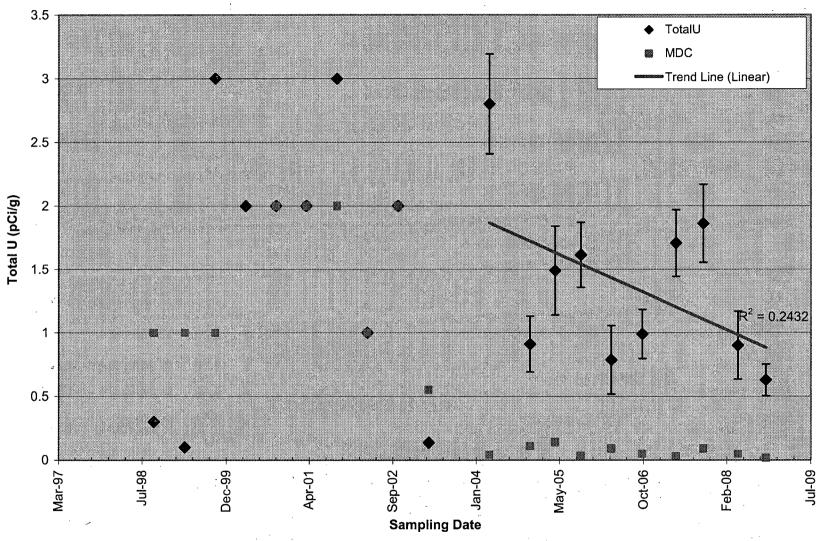


Figure 4-29. Total Uranium in SD-DU-007 (1998-2008)

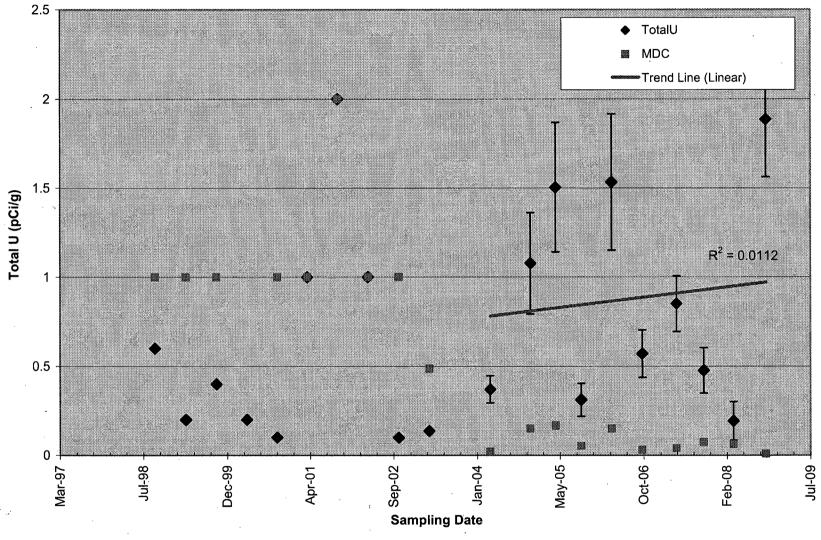


Figure 4-30. Total Uranium in SD-DU-008 (1998-2008)

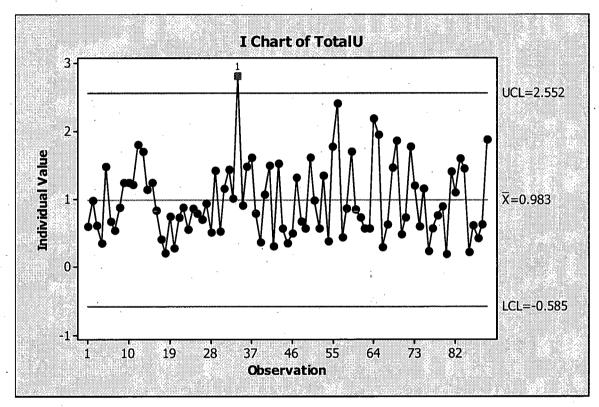


Figure 4-31. Control Chart for All Sediment Data (2004-2008)

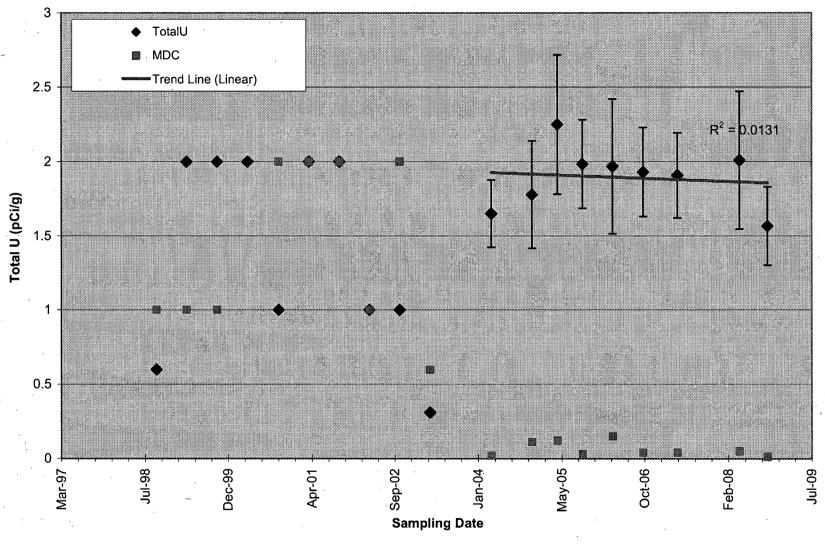


Figure 4-32. Total Uranium in SS-DU-001 (1998-2008)

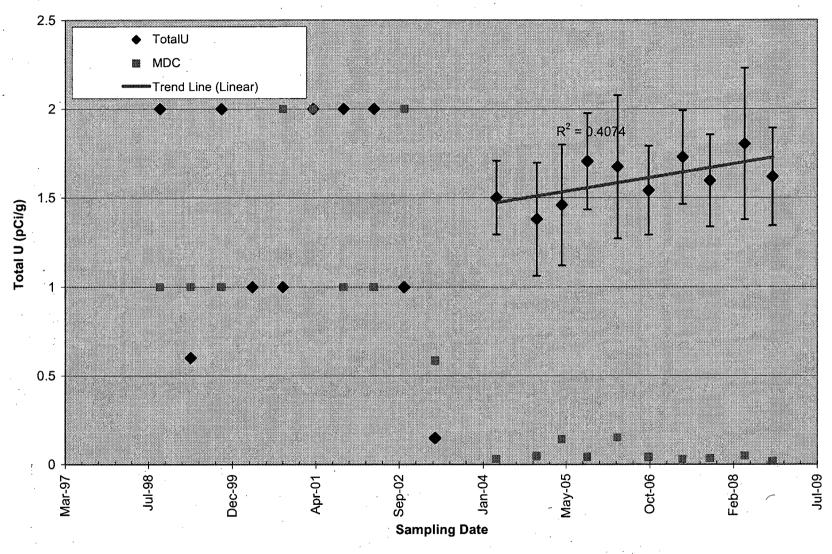


Figure 4-33. Total Uranium in SS-DU-002 (1998-2008)

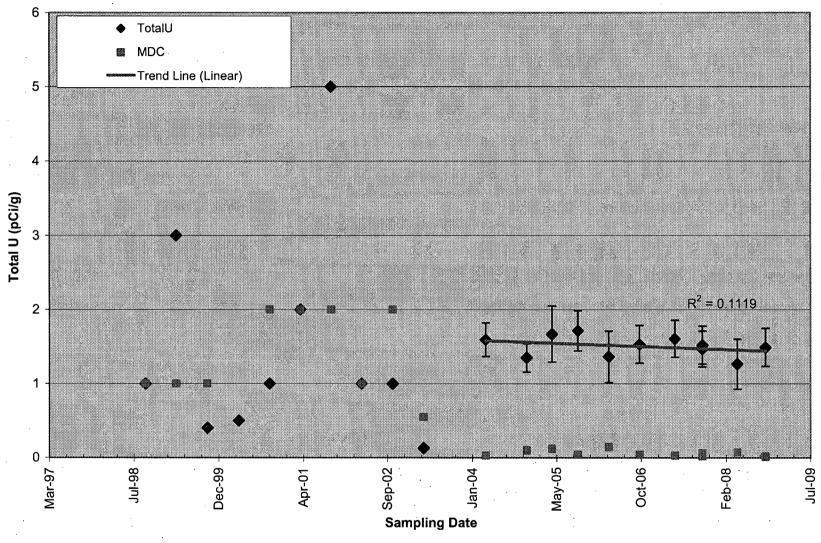


Figure 4-34. Total Uranium in SS-DU-003 (1998-2008)

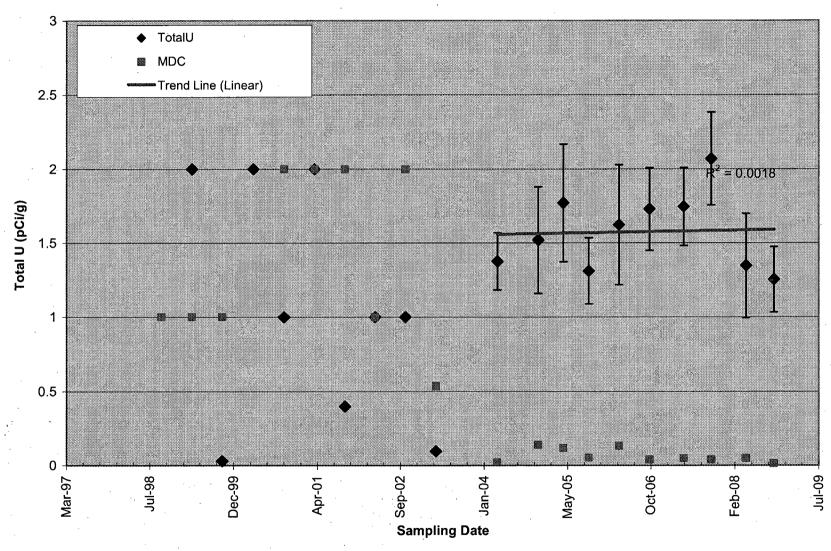


Figure 4-35. Total Uranium in SS-DU-004 (1998-2008)

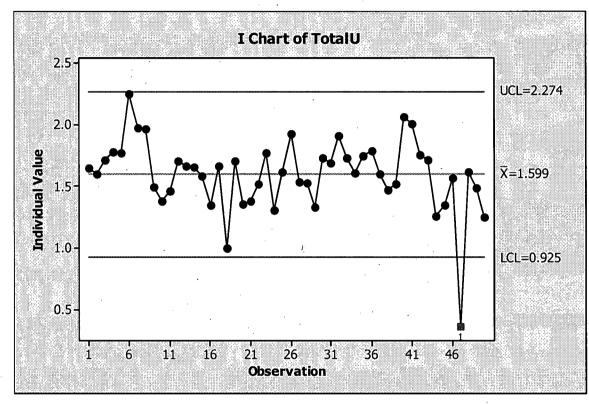


Figure 4-36. Control Chart for All Surface Soil Data (2004-2008)

5. CONCLUSIONS AND RECOMMENDATIONS

The October 2008 sampling event was conducted in accordance with the SOP (CHPPM 2000), and all data were determined to comply with the requirements of the Quality Assurance Project Plan (QAPP) (see Appendix A). The environmental media sample results are generally a small fraction of the action levels (see Table 4-1) established in the SOP. For the purposes of this report, samples with U-238/U-234 ratios in excess of 3 are investigated further to validate whether a sample result is representative of DU or natural uranium. A ratio exceeding 3 existed for groundwater sample MW01 and for surface water samples SWS05 and SWS08. Each of these samples was subjected to additional investigation as noted in Section 3. Trend analysis completed did not provide evidence of any notable increasing or decreasing trends in the environmental media sampled. Furthermore, no action levels defined in the Army's license were exceeded. Future environmental monitoring will continue to be completed in accordance with the SOP.

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6. REFERENCES

- CHPPM (U.S. Army Center for Health Promotion and Preventative Medicine). 2000. Standard Operating Procedure, Depleted Uranium Sampling Program, Environmental Radiation Monitoring Program. SOP No. OHP 40-2. 10 March.
- CFR (Code of Federal Regulations). 2008. 10 CFR 20. Energy. Nuclear Regulatory Commission. Standards for Protection Against Radiation.
- Fujikawa, Y., M. Fukui, M. Sugahara, E. Ikeda, and M. Shimada. 2000. Variation in Uranium Isotopic Ratios 234U/238U and 235U/Total-U in Japanese Soil and Water Samples Application to Environmental Monitoring. IAEA 10 Proceedings.
- NRC (Nuclear Regulatory Commission). 1988. License Number SUB-1435 and Subsequent Amendments, Jefferson Proving Ground, Madison, Indiana. U.S. Army, TECOM, Aberdeen Proving Ground, Maryland. 8 May.
- SAIC (Science Applications International Corporation). 2006. Radiation Monitoring Report for License SUB-1435 Jefferson Proving Ground, Summary of Results for 10-13 April 2006 Sampling Event. Final. October.
- U.S. Army. 1999. U.S. Army Test and Evaluation Command, Environmental Radiation Monitoring (ERM) Plan for Jefferson Proving Ground. Memorandum to Mr. Larry W. Camper, Chief, Decommissioning Branch, Division of Waste Management, Office of Nuclear Material Safety and Safeguards, United States Nuclear Regulatory Commission, Washington, DC 20555-001 from Dal M. Nett, Chief, Safety Division, Directorate for Mission Support.
- U.S. Army. 2000. Standing Operating Procedure, Depleted Uranium Sampling Program, Environmental Radiation Monitoring Program, Jefferson Proving Ground, Madison, Indiana. MCHB-TS-OH. SOP No. OHP 40-2. Effective date, 10 March 2000.
- U.S. Army. 2002. Decommissioning Plan for License SUB-1435. Jefferson Proving Ground, Madison, Indiana. Prepared for the U.S. Army SBCCOM by SAIC. June.

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APPENDIX A
STANDARD OPERATING PROCEDURE

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Effective Date $\frac{1}{2}$ Date Removed from Service

10 Mar 00

STANDING OPERATING PROCEDURE

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

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

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

2. Authority.

- a. US Nuclear Regulatory Commission License No. SUB-1435.
- b. Program Services Meeting, 14 September 1999, between SBCCOM and HPP, USACHPPM.
- 3. **Scope.** This SOP applies to Health Physics Program personnel performing the collection of environmental samples in support of the ERM.
- 4. **Definitions, Abbreviations**. A list of terms and abbreviations used in this SOP can be found in Annex A.
- 5. Forms, Labels, and Worksheets. A sample of all forms, sample labels, and sample collection worksheets can be found in Annex B.
- 6. Point(s) of Contact for Program Coordination:
 - a. Soldier and Biological Chemical Command

Ms. Joyce Kuykendall, SBCCOM Health Physicist

Comm: 410-436-7118

DSN : 584-7118

email: joyce.kuykendall@sbccom.apgea.army.mil

b. US Army Center for Health Promotion and Preventive Medicine

Health Physics Program (Pgm 26)

Comm: 410-436-3502

DSN : 584-3502

fax: 410-436-8261/8263

Radiologic, Classic and Clinical Chemistry Division

(RCCCD)

Comm: 410-436-3983/8235

DSN: 584-8235

c. Jefferson Proving Ground

Mr. Ken Knouf, Site Manager

Mr. Phil Mann

Ms. Yvette Hayes

Comm: 812-273-2551/2522/6075

7. Survey Coordination.

- a. Pre-Survey Coordination: 60 days prior to scheduled sample date.
- 1) Initial Coordination: made through the SBCCOM Health Physicist. Close coordination with the site management team at JPG will be required to ensure support will be onsite at the time of sampling.
- 2) USACHPPM HPP Program Assistant, (410) 436-1303, (if call from the Edgewood Arsenal: 5-1303) will be contacted to initiate travel orders. Due to the nature of the sampling program, a four-wheel drive vehicle is required to perform this project. The project and associated report number will be 26-MA-8260-R#-YY. The R# will be a "1" for the October and "2" for the April survey, and the YY will be the current fiscal year.
- 3) Prepare CHPPM Form 330-R-E (Request for Laboratory Services. (See Annex B) This form can be found on the USACHPPM Web Site or through intranet FormFlow program. Current DLS Test Codes being used are as follows:

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

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

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

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

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

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

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

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

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

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

- b. Field instrument quality control. Upon receipt of field instruments from the HPP Instrument Coordinator and the Surface Water and Waste Water Program, appropriate instrument quality control checks will be conducted to ensure proper operation prior to departure.
- 1) Radiation detection instrumentation will be checked for response against a radiation check source. This check source should also be shipped to the survey site for instrument verification on

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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:
 - \leq 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 $3.0 \times 10^{-1} \text{ pCi/ml}$
 - < 1.5 x 10⁻¹ pCi/ml no corrective action.
 - $> 1.5 \times 10^{-1}$ pCi/ml resample; if results above 1.5×10^{-1} pCi/ml is confirmed, investigate to determine reason for the high level and immediately notify the SBCCOM RPO to initiate notification to the NRC.

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

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

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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.
- 1. **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
е.	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
1.	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

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Request for Laboratory Services

Directorate of Laboratory Sciences	
	For DLS Use Only
REQUEST FOR LABORATORY SERVICES	LIMS JOB#
PLEASE PRINT OR TYPE ALL REQUESTED INFORMATION	Date Received
PART 1: PROJECT INFORMATION	
1. DATE OF REQUEST: 08/03/2000	
2. PROJECT #: (CHPPM only) <u>26 MA 8260</u> XO#	·
3. FUND SOURCE: P84 DERA DERA Supplemental (Specify)	· · · · · · · · · · · · · · · · · · ·
DIVISION/PROGRAM: Health Physics Program	
i. INSTALLATION: Jefferson Proving Ground	
6. STATE WHERE SAMPLES TO BE COLLECTED: Indiana	
NAME OF PROJECT OFFICER(s): Mr. David Collins	
TELEPHONE: (410) 436-3502 FAX#	(410) 436-8261
E-MAIL: david.collins@apg.amedd.army.mil	
B. NAME OF SAMPLE COLLECTOR: Mr David Collins	
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	
L 11. PROJECT COORDINATOR/DLS TECHNICAL CONSULTANT - Was project coor	dinated with DIS2 Ves Di
Name of Person in DLS: Mr. Gary Wright ext. 8235	uniated with DE3! X YES N
PART 2: TURNAROUND TIME REQUESTED	
I. DATE RESULTS REQUIRED:	
2. INDICATE THE APPROPRIATE SAMPLE OR PROJECT DESIGNATION:	. •
X STANDARD (Note: All samples are routinely processed as Standard Analyses Unless Arrangements Have Been M	lade 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#):	
X MAIL:	
REQUESTED BY: Mr. David Collins	
PRINT NAME: SIGNATURE:	
(Note: Signature Required if	Submitted by Hard Copyl
CHPPM Form 330-R-E. 1 May 96. (MCHB-DC-LLI) Replaces AEHA Form 330	0-R, Jul 93, which is obsolete.

Figure B-1a

					Page 2 of 2
	ΡΔΩΤ	4: PROJECT C	OORDINATIO	N INFORMATIO	N
. DATE SA	AMPLES TO ARRIVE AT DLS:	12/04/2000	O O III DINA I I L	·	
	ior Arrangements Must Be Made with SN	L for Samples That Wi	Il Arrive Outside o	Routine Duty Hours w	hich are M-F 0730 -1700)
 Special 	Comments: Samples will arrive	from the field with	out preservation	or filtration.	
. SPECIAL	HANDLING REQUIREMENTS:				•
\square	CHAIN-OF-CUSTODY (COC)				· · · · · · · · · · · · · · · · · · ·
	SAFETY CONSIDERATION/HAZ	ARDOUS MATER	IALS (Specify)	:	
	<u> </u>				
x	ANALYSES WITH SHORT-HOLI	DING TIMES (List	Specific Analy	ses):	:
	Filter water samokes and test for o	lissolved U-238, No	preservative ad	d in the field.	
	OTHER (Specify):		-		
. SAMPLE	COLLECTION KIT:				,
	REQUIRED: 07/04/2000		•		
	PREFERENCE:				•
	1. TO BE PICKED UP AT DLS	BY PROJECT OFF	ICER		
\square	2. SHIP TO:	3 large coolers	and bags for so	il samples need to be	shipped to site
	(Please include Bldg # and Phone #)		ferson Proving (
			.G. Niblo Road	(Bidg 125)	
		Madison, IN 4			
	<u> </u>	(812) 273-255	1		
	P/	ART 5: SAMPLE	ANALYSIS	INFORMATION	
DLS TEST CODE	PROCEDURE DESCRIPTION	STD METHOD	MATRIX	NUMBER OF SAMPLES	SPECIAL REQUIREMENTS/COMMENTS (REQUESTS FOR EXTRA BLANKS OR
303	Uranium in Soil	G-002	Soil	5	Soil
-00			141-4		
086	Uranium in Water	U-002	Water	9	Surface Water (1 gal Cubitainer)
	***************************************	G-002	Soil	9	Surface Water (1 gal Cubitainer) Sediment
303	Uranium in Soil	G-002	Soil	9 .	Sediment
303	***************************************		 	<u> </u>	
303	Uranium in Soil	G-002	Soil	9 .	Sediment
303	Uranium in Soil	G-002	Soil	9 .	Sediment
303	Uranium in Soil	G-002	Soil	9 .	Sediment
303	Uranium in Soil	G-002	Soil	9 .	Sediment
103	Uranium in Soil	G-002	Soil	9 .	Sediment
303	Uranium in Soil	G-002	Soil	9 .	Sediment
303	Uranium in Soil	G-002	Soil	9 .	Sediment
303	Uranium in Soil	G-002	Soil	9 .	Sediment
303	Uranium in Soil	G-002	Soil	9 .	Sediment
303	Uranium in Soil	G-002	Soil	9 .	Sediment
303	Uranium in Soil	G-002	Soil	9 .	Sediment
103	Uranium in Soil	G-002	Soil	9 .	Sediment
303	Uranium in Soil	G-002	Soil	9 .	Sediment
303	Uranium in Soil	G-002	Soil	9 .	Sediment
303	Uranium in Soil	G-002	Soil	9 .	Sediment
303	Uranium in Soil	G-002	Soil	9 .	Sediment
586 803 586	Uranium in Soil	G-002	Soil	9 .	Sediment

Figure B-1b

Effective Date $\underline{10~\text{Mar}~00}$ Date Removed from Service

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

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JEFFERSON PROVING GROUND

DU SAMPLING PROGRAM
PROJECT NUMBER: 26-MA-R_-8260-___

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

SOP	No.	OHP	40-	- 7
ソンニ	NO.	OHE	ユし	_

Ef	fecti	ive Date	
Date Removed	from	Service	

JEFFERSON PROVING GROUND

DU SAMPLING PROGRAM

PROJECT NUMBER: 26-MA-R_-8260-__

			GROUND WATER SAMPLES					
Sample	Exposure Sample Reading		Sample Locations		Comments			
	Date	(µR/hr)	· · · · · · · · · · · · · · · · · · ·	рН	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					

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JEFFERSON PROVING GROUND

DU SAMPLING PROGRAM
PROJECT NUMBER: 26-MA-R_-8260-___

		so	OIL SAMPLES	
Sample ID	Sample Date	Exposure Reading (µR/hr)	Sample Locations	JPG ID Code
SOS1			Vicinity at intersection of C-Road and Wonju Road)	(S44)
SOS2			Vicinity at intersection of E-Road and Morgan Road	(S48)
SOS3	į		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.

SOP	No.	OHP	40-2

	Εf	fecti	lve Date	
Date	Removed	from	Service	

JEFFERSON PROVING GROUND

DU SAMPLING PROGRAM
PROJECT NUMBER: 26-MA-R_-8260-___

	•	SURFACE	WATER SAMPLES	
Sample ID	Sample Date	Exposure Reading (µR/hr)	Sample Locations	JPG ID Code
SWS1	1	·	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)

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Date	Removed	from	Serv	ice	

JEFFERSON PROVING GROUND

DU SAMPLING PROGRAM
PROJECT NUMBER: 26-MA-R_-8260-___

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

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ANNEX C

SAMPLE LOCATION MAPS

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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

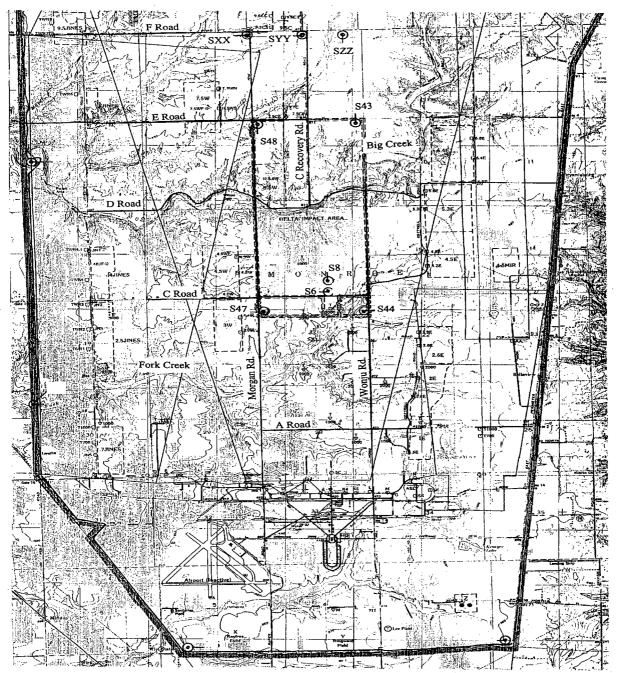


Figure 2: Soil Samples (Sept. 1997)

Date Removed from Service

Jefferson Proving Ground: DU Sampling SURFACEWATER & SEDIMENT SAMPLES

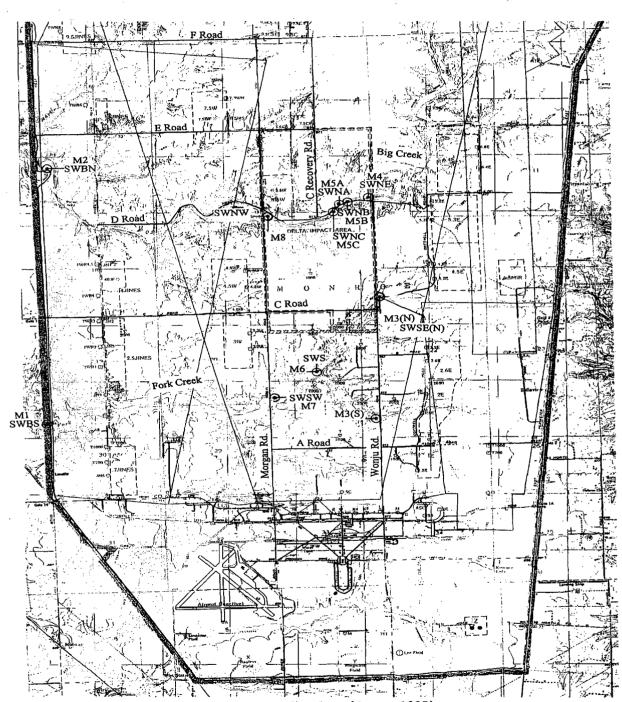


Figure 3: Surfacewater & Sediment Samples (Sept. 1997)

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APPENDIX B
FIELD LOGBOOK

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Jefferson Proving Ground Date 1916/108

Project Class ERM Sampling - MM-DU-10097

Note: The following information are transferred from
Other logicals for JPG Grifford September 1535 Arrive) at well MM-4. Setting up
to purp well. Intial water level at
MM-4 is 13.09 ft BPVC. The bottom
of the well is 24.18 ft BPVG. The
Pump is set at 22 ft BPVG.

1635 (offect sample MM-DU-004 (SAIC 106E)
at MM-4 for Total/Isotopic Uranium.
1725 Final Water level at MM-4 is 16.4 ft BPM.

SF 19/6/08

Jefforn Pauly Grand 10/7/48 ERM Sangling - Mini-Outous, Minious 007 Note: Following information are transferred from other laglocates for IPG

GAVI SUN SED Scapping. Q858 Arried at well MW-3. The initial viale level at MW-373 14:05 FLBPUK. Total teach of the well is 41.73 fr BAK. The pump is set at 38 fa BPUC 0957 (ollect Sample 1994-00-003/SAZLIFE) at MN-3 for Total/Isotopia Ugan. Also collect diplicate MM-DU-003 (SAIL 10 DE) for Total / Isotope Vranic. First water level out MM-3 is 30.08 1302, FA BONC. 1346 Amico at well mm. 7. The instict water level at MW-7 is 12.69 A BPVC. Total dept of the well is 48.65 H BAUC. Pump is set at 44 A BAIC. Collect Sample MW-DV-007(SAILINE) 1458

1458 (offert sample MW-DU-007(SAILIGE)

at MW-7 for Total/Isotopic UPanim.

1627 Final mode level at MW-7 is 13.54 G BAIL

80(44) 24-3

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Seldler Entles

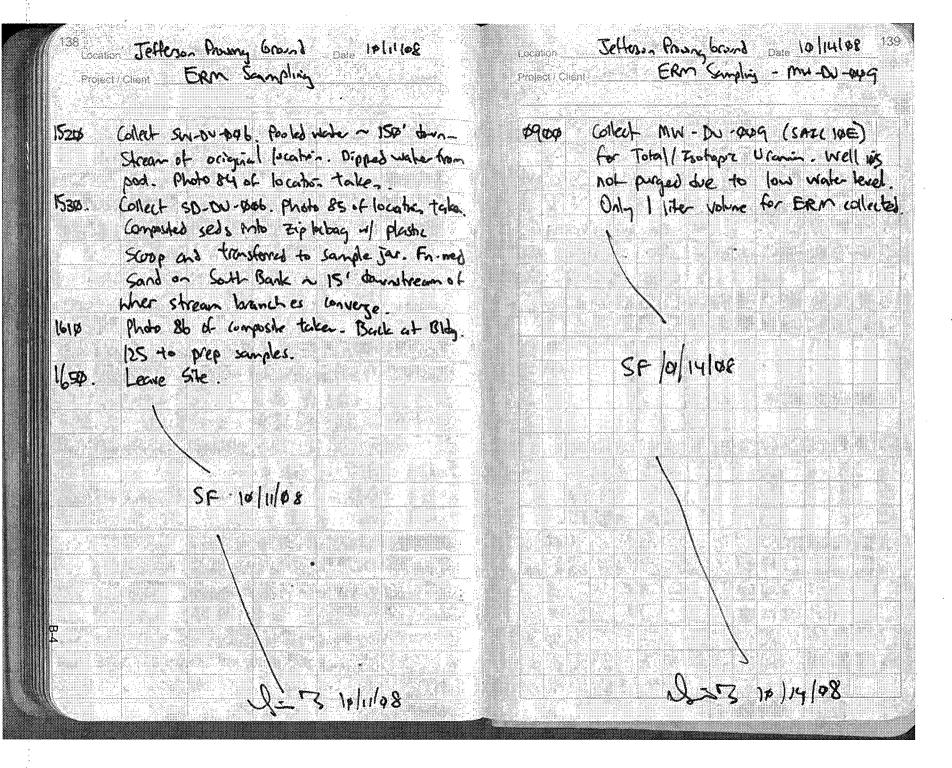
~ U=13 18/1/168

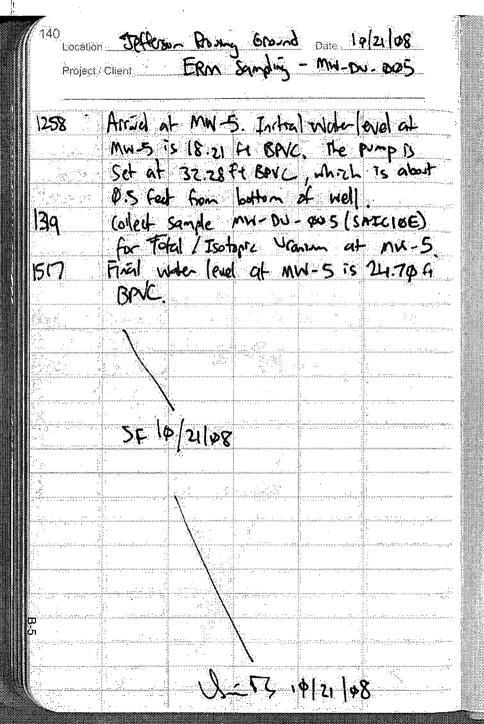
r 134 Locati	on Jeffers	n Proving G	mud	Dale 119 DV 2003 M	100 48
Projec	i) Cirent E	RM Sampl	~ - SS-1	DV-GB3 W	M-DO-43E
				MN-D	1-005
0915	SAL She	phesion (s	inac) col	culed Sur	fue soil
				KIE).	
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[ØØ1	collect's	iample 1	nw-W-6	08 (SA1	(IPE) for
i i kina		shore un			
1438	Smen	arnia) a	it mul	L to p	ump well
	for s	unples b	ecane th	B to p	+ by in
	v ben	mi da	1. The	Alu ei	und lectur
	TO San	NDO.			
1448	Collect	sample	WM DO	- D72 (SI	AZCINE) (4
	TOHAT	Listopic	U Carin		
	<u> </u>	SF 1	0/10/08		
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B-2					
	:				uda
		<u>ļ.:</u>	12/1	3 18/10/	Ø
					476 %

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Location Jefferson Promy Grand Date 10/11/08 137

Lollect SS-DU-QUZ. Phylo 76 of location taker. Composite Silly soil Who Zyplac bay with plasti scoop. Collected dipliede. Placture was not taken of composte. 1340 Collect Sur-ou-002. Wide tipped from Stream. Bust side of bridge on West Perimeter at Big Creek. No flow collected. Collected diplitate of water sample. Photo 77 of location tecles 1352 (offect SD-DU-DOZ. Sedlment composited 1240 Zie loe Day will plantiz scoop. Ufn Sand Stilt Weeked from North Balk of Creek End-of Bridge ~ 30' Upstream. Photo 78 of Sediment location taken Photo 79 of lampoile taken 45 Collected SW-DU-Bis). Water dipped from street on west side of bridge at west ferimeter and middle fork, photo 80 tola Collect 50-00-001. Collected silfy sediate μзφ on North Buk of creek, ~ 400 upstream of bridge. Composited seds into Explox bay we plastic scoop. Photo & of location talcer. Photo 82 of composite taken. Collected dupticate of seamment. 8411/181 22C -





Location Jefferson Proving Grand Date 10/23/28 141 Project/Client ERM Sympling - MW-DU-DOI

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	on Jefferson Proving Grand Date 10/27/148	Ĺ	ocation	¥	i	 :0			, De	ıte				143
Projec	mw-Du-Pab	P	roject)	/Cilent	***************************************			 	2 1 2				·	· ,
1132	Applicate MW-11 to boil sample of grandwise due to low work-level.											:	*************	: : : :
1200	Collect sample MU-DU-ON (SAZILOE) for													
130¢	April at MW-10 to bot grandwater													
1330	Sample due to low hicke-level. (ollect sando MW-DU-010 (SAZLIGE)		~			 							~	
	for Total/Isotopie Uranjan.													
1540	Arrived Cit MW-6 to boil grand-sole. Sample due to low water level.		2-1								·		·	
1550	Collect Sangle MW-DU-006 (SAIL DE)								-	·\$00 · · · · · · · · · · · · · · · · · ·	***************************************			
	to/ Total / Itohopie Vann.													
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TNY	SF 14/27/08				4									

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<i>*</i> .	Project Nam	e:		on Proving G		,	Well Identifi	ication:	Mu	1-1		
•	Project Num	ber:	01-16	633-04-9381	<del>~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~</del>		Project Loca	ation;	Ma	adison, India	na:	•
	Purged by:		<u> </u>	8	<u>EC</u>	48	Date:			12/68		•
	Sampled by Checked by		26	. & . & .	E.C.	· /	Date:		10/	23/08	***************************************	
	Checked by			: M &			Date,	-	<u>ar an garaña</u> Tas en en			•
	WELL VOL	UME CALC	ULATION:			3			å		. *	
	Circle diame	eter and K us	sed below:	1" I.D., K=0.	.041 gal/ft		6" I.D., K=1	1.469 gal/ft				
			(	2" I.D., K=0.			8" I.D., K=2					
r				4 T.D., K=0.	.653 gal/ft		10" ID, K=4	4.08 gal/ft	45	*		3
	ar saar aa saa iila.	the control	w t		10 M 120	4.	fs.	.,		pa.	y lot	5
."	1 Well Volu	me: -7/1 ///	O DAME	de samble e l	11.21 .	o di pari deleta	entanan ara-	mn 22.4	5S		<b>y</b>	
	Height of wa	ster column	7.794	ft) x K value	06.114.3	t = /thisen	Water colur	3 74	gal)			•
ئىللىرلىيىسى دىيانىسىسى چەھىر	Purge Volu	me:	July 1895 - 1			30011	TTER VOIGH	10/05/1		man and the second	wywo to warming	
	1 Well Volu	me <u>3.7</u> 4	gallons	) x 3 = 3 We	Il Volumes (	11.22	gallons)					250,000,000
	Purge Rate	(	_gpm) x (	min)	= 1 Well Vo	ulume						
	Purge Rate		_gpm) x (	min)	= 3 Well Vo	olume						
•	1.17.00221.2.024	Contraction is soon.	activities in a state of the	Links and the state of		galling the second	·		·		1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	•
	Time	*C	рН	Cond. c mS/cm	Turbidity NTU	.; D.O.	ORP	Purged	Well	Depth to	Purge	: :
	4.7	11.5	Committee of the Commit	X999	1410	mg/l	136	Quantity	Volume	Water	Rate	<b>:</b>
į	11/2	15'2	3/2	.499X		100	119	0.23		12.49	D.05	47
į	1177	19 4	13.H.	.997	1	1.68	114	19.35	<del>                                      </del>	13 94	6.02	† ' ' '
	1473	70.0	714	.794*	<u> </u>	106	100	18.45	<u> </u>	14.37	0.07	1
	1432	797	77.1	×.		7.004	9/2	10.55	<del>                                     </del>	14.64	202	1 3
	432	534	7.16		Ø	4.844		8.65		11/25	1002	
*9	1472	19.0	7.81	*	1	9.87	92	1.35		15 77	0007	1
•	14.44	19.3	3.70	-X		7.000	41,	035		17.33	8.00	emptied to
	452	19.2	221	*	-2.	11-52"	74	72.55		12.71	692	Cert
,	1497	14.6	7.14	جر ا	ーレ	4.34	90	1,05		17.80	0.072	1
	1300	16.5	7.13	<b>A</b>	1-1	9.25	90	1.75	. In a	14,79	5919	]
;	1507	19.9	7.17	K	1~L	UAT	191	1.25		15,30	902	]
	1507	15.1	7.25	<u> </u>	1	4.33	92	1.35		19.84	007	
	1543	19.7	7.66	*	-7	9.610	93	11.42		29.37	0.02	_
	1577	70.1	7.7.3	*	-7_	3.94"	194	1.55		20.73	007	4
	1577	14.3	7.73	*	1-2	(e. (a) #	<del>`\`\</del>	1.65		121.40	007	4
	15.27			<del>  1</del>	1000	9.94/12		1.75		142.25	002	116
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	I JA	143	4.58	*	1-1-	1667	1 1/17	2.25	+	23.54	1005	720
	1284	19,2	7.02	<del>-</del>	† <del>- i</del> -	4.2.6	172	7.35	1	74.67	0.02	17 G : 7 · · · · ·
	16.54	(4.7	7.18	1 7	1-7	6.90		2,45	1	25.45	0.02	
	MOU	14.7	7.15	<b>\$</b>	1 . 2	4.120		2.55	1	26,10	802	1
	1079		7.18	* *	-1	10.73		2.45		27.22		1
÷		FORMATIO	N21.					G INFORMA	ATION:			
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1110	Time Purg		1432	2	A( 10 T S	Strate of the s	Sampled 5	Table 1	<u> 36</u>	8	FC	
S COLON		hod: Pump	X	Bailei	***************************************	;	100	lethod: Bailer	·	Other	Pump	*****
in h.		سم (ilake			_(ft)		Grab	· <u>X</u>	<u> </u>	Composite		
(O) //	Pump Typ		FULT					is Collected:	131	<u> </u>	2M	<u></u>
A L	Purge Rati		9.92-		_(gpm)			servatives:	H ₂ 5	$\alpha_{+}H\lambda$	iC3	
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j.	Project Name: Project Number: Purged by: Sampled by:		Jefferson Proving Ground 01-1633-04-9381-310				Well Identific Project Loca Date: Date:		MW-1 (continued) Madison Indiana 10/12/08				
	Checked by:			& _		:	Date:	.91			····		
	er Dinabelera dal Barr	e e e e e e e e e e e e e e e e e e e		*				75 7	***			•	
		IME CALCU ter and K us	ed below:	1" I.D., K=0.0 2" I.D., K=0.1 1" I.D., K=0.6	163 gal/ft	3	6" I.D., K=1 8" I.D., K=2 10" ID, K=4	- 通信の関係を行っている。	r a mg	e week			
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	I Well Volui Total Depth Height of wa	<u> </u>	_ft) - Depth t			) = Height of gai/ft) = 1	water colum Well Volum	n (	ft) gai)				
	Purge Volu	me:	nga nganig ni din		in the constituent is the			, angles, papers	TITLE OUT CARGON N	Augustinia (Maria)	. I - 1 so s grope - solli son	enter enter esta esta esta esta esta esta esta esta	
j	1 Well Volur Purge Rate Purge Rate	(	gallons) _gpm) x ( _gpm) x (	, , ,		lume	gallons)						
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	Time	Temp °C	рH	Cond mS/cm	Turbidity NTU	D.O. mg/l	ORP	Purged Quantity	Weil Volume	Depth to Water	,Purge Rate		
,	tielA	17.2	7.19	4.999	-1	0.95"	+84	w.75		29.09	0:00		
	1019	17.9	7.18	*		16: 92	+92	10.95	<u>:-</u>	80.14	9.02	34.71	
	11029	19.0 19.7	7.20	Y *	-1	6.75	+97	4.05	Languerge and Carlo	22.13	8.82		
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										1.5.7.		<b>]</b>	
** *						1		1				<b>J</b> ;	
•	PURGE IN Time / Date	FORMATIO	IN.				SAMPLING INFORMATION: Time / Date Started: (26) 18/23/88						
	Time Purg	* * * * * * * * * * * * * * * * * * *	1422			<del>-</del>	Sampled b		90	<i></i> 8.	7.6	1.9°	
	and the second of the second o	nod: Pump	×	Bailer		<del></del> , ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', ', '		ethod: Bailer		Other	Puren	<del>⊤.</del>	
	Depth to In		***************************************		<u>((t)</u> :		Grab	X		Composite		······································	
	Pump Type		<del>(4, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,</del>	<u>eriktisii.</u>	The same and the	<del>i</del> i i		s Collected:			<u> </u>	<del></del>	
	Purge Rate Purged Vo		(gpm) (gal)				Bottle Preservatives: Recovering WL:					<del></del> : .!	
₹	Water Qua		Horiba U-22#				Duplicate Sampling.						
	How was y	reld measur	C. Company of the Com				Laboratory					<del></del> -	
	Was well o		1202 83	Yes	No	<del>-</del>	COC Form	nig .				·	
•		tainenzed/A ontroller set	m1.	NA NA	VA (Heriz)		9. 9. 2. 9. 2.				,‡		
	initios.co	windings Set.	. <u>- <u>W. 1. 1. 2. 2.</u></u>	1969	(riesz)				•				



roject Name roject Numb			on Proving Gr 33-04-9381-			Well Identific Project Loca	1 (12 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1 (2 ) 1	MV Ma	. · ·		
Purged by:		<u> </u>				Date:	· · · · · · · · · · · · · · · · · · ·	101	9/18/08		•
		<u>Seu</u> 🐧			11.	Date:	-	10/	× *		
Checked by:	. :-			<del></del>		Date:		•		·	
NELL VOLU	ME CALCL	ILATION:						t.			* B
Circle diamet	er and K us		1" I.D., K=0.0			6" I.D., K=1			2 1	ъ.	
. ,			2"1D, K=0.1	T		8" I.D., K=2		* %	Ton J	snall	Sucon
			4" I.D., K=0.6	553 gal/it		10" ID, K=4	.08 gai/it	₹ _{ec.}	17	- VACOR	Sureen =
l Well Volun		ng katalay	ar jirkin	ar il impass	gali di milayya					5.94	A+
							no ( <b>8.5</b> 5				4.8
		<u> </u>	_ft) x K value	(CLUE3	gal/ft) = 1	Well Volum	e (1.4¢	gal)	, è m		
Purge Volur 1 Well Volur		nalionet	) x 3 = 3 Wei	(Volumes )	4.2	galions)	ż		٠.		
Purge Rate (		gp,		= 1 Well Vo		yanuris)	ng maggi Mg Jamasa a	on Applicable		in the work at a put	
Purge Rate (		gpm) x (		= 3 Well Vo					4.	90	
			·			<u> </u>					
Time	Temp °C	рН	Cond mS/cm	Turbidity NTU	D.O. mg/l	ORP	Purged Quantity	Well Volume	Depth to Water	Purge Rate	
1140	u.6	11.24	6.29	18.1	0.94	+164	Ø	7 (4)(3) 10	15.49	(Value	ાં અસ્ત
1145	16.0	10.28	0.767	10.8	1.50	1-97	4.2		15.96	4.436	0.04
1150	ابعا	6.3	1,764	ıa,≤,	0.63	- 94	0.4		14.3	9.04	]
1155	110.3	4.32	1.74	11.9	2.37	-95	Q-Le		No. Sie	0,04	
1205	10.7	10 32	0.757	10.1	0.34	-90	0.8		17.03	0.04	1
1210	10.8	10.40	0.758	10.4	0.19	-89	115		17.10	0.61	
1215	16.9	6.43	0.757	11.5	0.23	-89		C. Carlo	17.20	0.64	1
1220	16.8	10.40	0.759	12.7	0.11	-91	1.0		17.49	6.04	]
4×27	व थ	Qu 10.16	1	12.7	9.18	-90	1.8		17.59	0.04	1
1830	17.0	10,49	0.750	14.2	0.19	-90	2.0	<u> </u>	17 125	0.04	
1240	10.5	11.50	6.754	13.9	0.19	-90	3.4	<u> </u>	18.84	0.04	1
1245	lieA	6.49	0.752	15.6	0.13	- 84	2.6		19.63	0.04	1
130014	145	6.49	0.752	15.7	10,1.3	-84	2.0	121.70	170.74	1.04	TH-60 413
1255	10.6	10.49	9.75	14.7	0.10	-82	3.0	14.22		0.04	17.54
1300	14.5	6.50	0.750	17.5	8.04	-81	3.4	<del>                                     </del>	20.00 20.38	0.01	war amp
1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		14.214	1 P	<u> </u>	1 7 7 7	1 7	12.1	1	100.00		TANETT AND
LEARS	Contect	Sample							I		]
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2 3 2 2 2 AND	i i i i i i i i i i i i i i i i i i i		+	Υ'	HPY ( )			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	r range	ta in various of	1.
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AND ADDRESS OF THE PARTY OF THE	FORMATIO			121	400	South to the first to	IG INFORMA			10/10/0	<del>कार</del> <b>छ</b>
Time / Date		114	<b>-</b> 9 4 1	14/8/4	DO0.		te Started:	1448		שושושי	<u> </u>
Time Purge Purge Meth	tania ara da	TOMO	Bailer		<b></b> , 3	Sampled t Sample M	by: lethod: Bailer	-35	& Other	Pümp	<del>.</del> v .
Depth to in		~21,5		(ft)		Grab	X. 200	No.	Composite		<u></u>
Pump Type	A CONTRACT OF THE PARTY OF THE	FULT2	L	-0.9 .		# of Bottle	es Collected:		luby ER	n)	
Purge Rate: 9.94 (gpm)				***	1.00	servatives	H2504	,			
Purged Volume: 3.4 (g. Water Quality Meter: Honba U-22# (5.50)2			_(gal) .:0	Recovering WL: Duplicate Sampling:			22.8				
A355 and a 14 ac	iny meter: ield measur	***************************************	graduas	~ <del>~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~</del>	wen .	Laborator	tree .	<u> </u>			
Was well c			Yes_X	No.	₹c	COC Forr					
<ul> <li>A.A. 61 464 5147 31</li> </ul>	ainerized/A	A 4 (1) (1) (1) (1)		NA	ere vi <del>188</del> 3	4	الانجاب الحالجات الأجراط	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	753	<del></del>
- All deals and	introller set	0	NA.	(Hertz)	- Data - Die Sie		hai? Aus	:			
Grumos co			<del></del>					2.5			f



Project Name Project Numi Purged by: Sampled by: Checked by: WELL VOLL	per:	01+16	n Proving <u>6</u> 33-04-9381- & & &			Well Identific Project Loca Date: Date: Date:		Madison, Indiana				
Circle diame	(	1" I.D., K=0.0 2" I.D., K=0. 4" I.D., K=0.0	163 gal/ft		6" I.D., K=1 8" I.D., K=2 10" ID, K=4	.61 gal/ft	i de la companya de La companya de la co			•		
1: Well Volui Total Depth Height of wa Purge Volui 1: Well Volui Purge Rate Purge Rate	(41.33 ter column ( me: 4.3 ne 4.3		x 3 = 3 Wel 		3,53 lume		n 231	<b>98</b> n) gal)	aranjanjan mes	ar an trop gamen	rough the second	Share and the state of the stat
	Temp	7.4	Cand	Turbidity	D.O.	ORP	Purged	Well	Depth to	Purge		
Tīme	°C *	рН	mS/cm	NTU	mg/l	mv	Quantity	Volume	Water	Rate		
10011	110.6	5.56	0.747	<i>31</i> 1	1,40	+155	0		14.95	0.04		•
00.30	15 0	5 73	40.750	168.3	9.00	173	0.2		10 03	O CA		•
0.925	بكيز	5 40	0.74v	47.9	0.00	+ 76	0.4		17.10	0 64		
0930	15 3	3 W	0.745	_ ابلک	0.05	74 D	7.8		1 3 30	0.04		
0940	15 4	1,09	0 743	34.8	1.12	+35	1.0		17 11	4.01		
D945	15.5	10 15	0.747	20.0	0.00	1 200	1.7		17.45	0.01		
0950	15.11	12 19	0.74	31,4	1.00	r 32	1,4		1745	0.01		
1955	52	13.19	0 750	21.12	O. O.D	+10	1.12		15.30	0.03		
			As a second								•	+1
										22 - 1 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -		
		<b> </b>					-	<del>                                     </del>		<del> </del>		
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1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	<u> </u>		ļ					· <u> </u>	2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.			
					ļ	-	<del>                                     </del>	<del> </del>		27%		
	<u> </u>						<del>                                     </del>	-				
	<b></b>					1						
PURGE IN	FORMATIO		7 40 7.1 %	V. Z 1	1 (11) HW (11) 10	and the second of the	G INFORMA	ATION:		والساومان أفأفان	,	
Time / Date	5 (4) (4) (4) (4) (4) (4) (4) (4)	1915	2.26	10/01/	140	Time / Dat	the first term of the first term of the	095.7		108		
Time Purge		_0455	1.91	4144	<b></b>	Sampled b		EC_	_ &	<u> </u>		
Purge Mett Depth to In	. 2	- X	+ PPVC	iff)	4	Grab	ethod: Bailer	( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )	Other Composite	Pumo		
Pump Type	No. of Carlot and Carlot	301		±60.	3.,	5 (4 C) 18 E	x Collected:	- 22	Composite	HERM	/ MC/M	7/52000
Purge Rate			BU	(gpm)	•	Bottle Pres		La/AR	2 - 2	2	·	NI SA KAG
Purged Vo		NI.L		_ (gal)		Recoverin		70:	5 × 8	PUC		
Water Qua		Horiba U-22#		•337		Duplicate :	and the first of the first of the first	MIN	150 E	Moup		* *
	ield measur	ed?	grache	had coliv	w.	Laboratory		6,0	L.	. <del> </del>	,:	
Was well c			4es	No.X	an <del>A</del> genta	COC Form	ns i	-	ž.		٠.	1
<ul> <li>Zillymin N.E. S. S.</li> </ul>	lainerized/A	75 JAN 65	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	NA .				t it		,		
Grunfos co	introller set	<u>@</u>	NA .	_(Hertz)		B. File			168		lag s	A
		ATION: (i.e.		dili <b>o</b> ns, prob	iems encou	ntered, mair	tenance rec	juired, unusi	ial colorivito	(pic)	-10	Free
Liench	لطنتنت	2120	D7164			<u> - 11 147 - 15 1</u>		<u> </u>		D	-10	a garana



roject Name roject Numb			n Proving G 33-04-9381-		14	Well Identific Project Loca	: ****	<u>MW</u>	-4 dison, India	na
urged by:		Gr.	&	<b>JA</b>		Date:		16	dle. 1	9
lampled by:		35	& _	36a		Date:	<u> </u>	10	008	
hecked by:	i e		&			Date:	* * · ·	aparte 1. initi		
VELL VOLU						1. 				pr
Circle diame	ter and K us		1" I.D., K=0.0 2" I.D., K=0.	163 gal/ft		6" I.D., K=1 8" I.D., K=2	.61 gal/ft			, e
Park Line	State Decision (	inistra sekali≇ dila	4° I.D., K=01	653 gal/lt	rjælefilm í N	10" ID, K=4	.08 gal/ft			ar .
l <b>Well Volu</b> t Fotal Depth	24.18	ft) - Depth	to Water (4	3.97	= Height of	water colum	m (1).¢			
Purge Volui	me:		وحرزا أحاشتهم وبالزا				* CLAI	gal)		
l Well Volun Purge Rate i		gailons) _gpm) x (	x 3 = 3 Wel min)			gallons)	Karangan	e A.	u Dr. — agu	
Purge Rate		_gpm) x (		= 3 Well Vo		AV Sep Links (LIM as y		A (t	and a vine a county page.	· · · · · · · · · · · · · · · · · · ·
Time	Temp °C	рН	Cend mS/cm	Turbidity NTU	D.O. mg/l	ORP mv	Purged	Well Volume	Depth to Water	Purge Rate
15.50	स्र	<b>6.7</b> L	9.723	44	1,82	+262	, O		40-65	W_ 7
1555	100	(e. (6).e	1 019	40.5	0.00 0.00	+152	2.2		15.70	0.44
1605	8.10	4.00	6. 222	22.6	0.00	+134	1.6		15 90	0 04
1416	18.	6.0	0.828	.45.0	\$.do	+ laa	j.a		14.25	4.02
Ile15	13.8	4.00	0.821	ale	0.00	+113	3.3		15.88	9.42
1625	18.10	10.15	9.829	200	4.00	+10/	273		15.67	D. 08
1430	195	10.25	4 820	24.0	0 00	+ 93	12.2		18:34	8.02
11035	9.4	10 23	1 325	20.2	8.80	180	13.6		5.72	0.02
			322							a B
			1							
	: \$					•	<del> </del>			1
				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1	HAY!			NAME OF THE PARTY	
		1		rsLi	4-18	$\phi : Y \rightarrow$				
				400	Y'' 'I	j.,	. 5	ų.	1 44 37438	
		1	1:0							
								<b> </b>	1	1
				i i i i i i i i i i i i i i i i i i i						
		4				i agaminanga				
DUDGEN	FORMATIC	NAI-	<u> </u>		A Company Commencer	CAMOUN	G INFORMA	TIONI		1
Time / Date	2.	15.000	La Lord Park	10 6	108	Time / Da		1435	)	10/11/
Time Purgi	rae programme and the second	11.35	ੋ । ਹਿ	<i>जिठ</i> ह		Sampled !	20 F THE RESPONDED TO	FG		<b>13</b> 6
Purge Met	nod: Pump	X (4)	Baile			Sample M	lethod: Bailer		Other	Pomp
Depth to In			<u> </u>	_(ft)		Grab	X	12	Composit	***************************************
Pump Type	化氯磺基甲基二氯甲甲基二氯甲	1-1/1F	Pump	NAME OF THE OWNER.	<u>-</u> 2 <u></u>	- 14. A. M. M. M. S. S. S. M.	s Collected:	113	77.68	<u> </u>
Purge Rate Purged Vo		Q.01- C	.4X	_(gpm) _(gal)		Recovering	servatives:	HNOS	Lui X e	210
Water Qua	1871 - 177 - 177	Honba U-22#		_(Agi)		and the second control of the	Sampling:		Vo.	***
	ield measu		6 Contrate	CHADA		Laborator		G	<u> ۲</u>	in e i
Comment of the second of the	avitated?	e sar in	Yes	No.X		COC For				
was well c	ها و هند بد تنا درانیدا تر و بند ه	imount	A	NA		. \$ A				
Water con	namerizeo <i>ie</i> ontroller set	* * * * * * * * * * * * * * * * * * * *	NA	(Hertz)						



# Science Applications From Science to Solutions International Corporation

Project Nam	<b>a</b> *∴	lefferso	n Proving G	round		Well Identifi	cation: *	Mh	1-5		•	
Project Num	. A. C		33-04-9381		S.	Project Loca	: i ±	. Ma	dison, Indiar	ia	-	
Purged by:	N4	36				Date:	*	10/13		***************************************	:	
Sampled by:		<del></del>	&		· ·	Date:	Ţ					
Checked by:			& _	7 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 /		Date:	÷		129 (17			
thirt ( Vinc)	DAE CALC	II ATIAN	· · · · · · · · · · · · · · · · · · ·			•	Ą.					
WELL VOLI	Company of the Compan	sed below:				6" I.D., K=1		•				
٠.		· •	2°1.D., K=0. 4°1.D., K≡0.	200		8" I.D., K=2 10" ID, K=4				gri.	i	
# 4#¥# 94 4.9m bod	tauset Arter			en e			en e			i e		it was
1 Well Volu Total Depth Height of wa	32.70	_ft) - Depth ( 15, 22	to Water (	7,500	r) = Height of 3 gal/ft) = 1	f water colun Well Volum	nn <u>(15.2</u> ne (2.49)	( <u>2</u> ft)				
Purge Volu	me:			ter die eine	estatual latalogo					mis hambora		e production
1 Well Volu		gallons;			7.44	gallons)						
Purge Rate Purge Rate		_gpm) x ( _gpm) x (	min) min)	= 1 Well Vi = 3 Well Vi		,						
	Temp		Cond	Turbidity	D.O.	ORP	Purged	Well	Depth to	Purge	**** <u>*</u>	** . "
Time	°C	рн	mS/cm	NTU	mg/l	mv	Quantity	Volume	Water	Rate	•	
9825	14,	5.100	5.50	3-	W 2.19	+124	0 25		18.5	2		
14830	14.5	12.25	5.40	-3	0.30	+39	0,35	·	20.15	0.07		
144278	14.6	10 100	6 41	-5	8:23	118	105	144.1	21 33			£
0945	14.8	10.100	5 67	-4	0.14	177	1.40		21.75			
0950	15.0	4.74	5.7a	-4	0.10	[	1.75		22,03			
0.855	15.1	4.70	5,92	<u>-2</u>	0.09	-19	2.1		22,10	2 a.a. 2 a.a. 2	, a	
9900	15.3	6.78	10.07	Φ	0.07	-30	Q 45		22.32			
89.05	15.7	10.79	10.24	<u>a</u>	002	1-35	2.8		22.54	T-	1	
0910	15.6	4.83	10.40	4	6.03	-35	13 13 X	<u> </u>	22.70	0.02	1	
1976	15-9	6.93	4.48	10	0 00	-35	1335		22.90	1100	1	
0925	15.8	4.95	609	7	0.01	-34	3.45	74 7 5 6 5 5 7	23.22	7		
9930	15.9	6.96	14.45	16	0.02	-29	2.55		23.60		]	
0935	15.8	10.9%	447	19	10.04	- 24	3.105		23.91		1	
0940	15.9	10.90	10.84	12	0.02	-22	2.75		24.09		A MACON UTOU	30.
Ø950	16.9	1,91	7.19	-8	0.62	-23	3, 95		24. U3 25.59	0.05	APPEN TEL	## 7 · *5
0 965	15.0	6.99	10.54		(3.00	+=12	4 35	Ur.	201	0.05	1	
1000	15.10	6.90	7.20	-6	0.00	-13	4.10	<b>†</b>	26.47	0.05	1	
1005	15.7	6.90	7.94	-5	0.00	-10	5.05		27.29	1 40	No. of the contract of the con	· . · · · · · · · ·
1010	15.4	6.91	7.34	-3	0.00	-14	5.5	en e	27.79	0.09	- DEOPPED PU	HP.
1015	16.0	10.94	1.3.1	4	0.03	-18	5.96	r de monte paren apo Nacionales de la companya	29.24		3	7
1020	14.9	10.95	13.7	7	0.00	1-21	10.7		128.59		1	•
1/025	FORMATIC	16.95	114.0	14_	10.00	-2	GINFORMA	TION	128.85	V.	J	
Time / Dat		10975	ř.	10/12/	118		e Started:	17/9	i i	18/21/	58 TWL 11	<b>r.</b> z
Time Purg		1022	##. ₹ # ##:	71.31	<b>.</b>	Sampled :		JA	. 8	E c		TO JOHN
	hod: Pump	-	Bailei			<ul> <li>1.3 + 5-433/4 &amp; 616345</li> </ul>	ethod: Bailer	24-	Other	Pario U	<b></b>	
Depth to Ir	ntake:	~30.79	~29.78	(ft)	<del></del>	Grab	X		Composite		<del></del> .	
Pump Typ		FULTZ		T			s Collected:	13 1	7 5	en	***	٠,
Purge Rat	7.7	Cit Z	C. PG	_(gpm)		in the strategy of the strateg	servatives.	HIVO		2504		
Purged Vo		7.3		_(gal)	. *	Recoverin	St - 4	24.	70			1.0
Water Qua		Horiba U-228		GD 717	THITTEN	4 6	Sampling:	MON	<u>لا</u> ــــــــــــــــــــــــــــــــــــ	<del>,</del>	· ·	
Was well (	rield measur	ert.	(ANDIA)	BO CAT	MANCIC	Laborator COC Forr	7.	-91L	Constitution State		<del></del>	
and the state of t	avitateo? tainerized/A	mount	Yes_X	NA NA	****	COO BUIL	1,817	rs				
	ontroller set		NA.	(Hertz)	100	N. J.	e e		*			e.
				<del>-</del>		7			iy.			
ADDITION							ntenance req	The second of the second of the		r, elc.i	. 40	
X DO		SWITCH		20 111		JE 20	wat cf	HOUSE	Α	E	3-12 _: ,	
wear			os con	menic		Control of the						
_57muc	ing me	TIED U	a well	CAST	2 200	vd VI	<u> </u>					



Pg. 242

roject Num urged by:	<b>**</b>	<i>51</i>	633-04-9381 &	JA	k i ky	Project Loc Date:	allon:		adison, India	na
ampled by:	d.	<u> </u>	&	<b>u.c.i</b>		Date:	**	cp/	2/20	
hecked by			&		e) •	Date:	÷.			
ELL VOLI	JME CALC	ULATION:				***		۳.		
		sed below:				6" I.D., K=	1.469 gal/ft			*
				.163 gai/ft			2.61 gal/ft			
	*		4" I.D., K=0	.653 gai/ft	- Yajibi	10" ID, K=	4.08 gal/ft	f entre	#4 /	4, 1
Well Volu	me:		a ta				in the second	y		
otal Depth		_ft) - Depth	to Water (_	<u> </u>	l) = Height o	f water colu	mn (	A)		
	iter column	<u> </u>	_ft) x K valu	e (	gal/ft) = 1	Well Volur	ne (	gal)		
urge Volu				سنسا سيسايين 1940ء تي آراڻي	haveddyn eigendd 2 Y de	inaanimiyayaa Tari		Yaya di Maraya Salaman a	indesimmentalium du	
Well Volu	ne (	gallons gpm) x (	) X 3 = 3 W6	II Volumes		gallons)	s.*			and the second
urge Rate	(	gpm) x (	min	) = 3 Well V	olume	. 19		:*		4.
	te de la	eretinia See 131	a printing 1				4.1 ****		usi paman u	De a proj
Time	Temp °C	рН	Cond mS/cm	Turbidity. NTU	D.O. mg/f	ORP	Purged. Quantity	Well Volume	Depth to Water	Purge Rate
Ø3 6	15.4	1. 95	14.2	19	0.00	-22	3.3	Todane	129 6	0.09
03/3	WELL	VENT D			1.0				1-14	14.4
12 FSL	14.0		72.3				ALCORDS			
1213	14.8	4.18	14.7	<b> </b>	2.81/	+221			19.05	
		t	17	-	<del> </del>	<b> </b>			-	
							4 1 4	1 (4)		
				<del> </del>			1			
			-	+	9,					
				$+ \neg$	1		1	<del>                                     </del>		1 1 1
					5	<b>V</b> 2/			1	
					-	128	>			**
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				<del>                                     </del>	+		+			
					1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					
		1 11 11				· 1		1	<b>V</b>	
	<u> </u>		<u> </u>							
· · · · · · · · · · · · · · · · · · ·	S ear age a differen				::			-	<del>                                     </del>	
		1	1				12 AN 17 A	<del>                                      </del>		
		1			. Harria	a i				1
			1, 1, 1, 1, 1, 1, 1, 1				Table Fire	1, 14		
PURGE IN Time / Date	FORMATIC	0825	i. ·	10/13/00			IG INFORMA ite Started:	ATION:		
Time Purge		1033		ALIST AL		Sampled		10.000 m		
	nod: Pump		Baile	ir	<del>ių</del> rojas paleikai. Mais partikai	13.7%	tethod: Baile	( <u> </u>	Other	Pump
Depth to In	Chronic Clark Control		<u> </u>	_(ft)		Grab	X		Compositi	
Pump Type	Supplied to the state of the st	Harter of the Committee			<del>~</del> i krigaly.		s Collected:			. 1: 1:
Purge Rate Purged Vo	1.00	). <del>(1 </del>		_(gpm)			servatives:		CONTRACTOR OF THE CONTRACTOR O	
ruigeu vo Water Qua		Horiba U-224	K	_(gal)		Recoverir	ng WL: Sampling:	: 131 · · · · · · · · · · · · · · · · · ·		
	ield measur		A STATE OF THE STA			Laborator		Salar Salar and Salar		n o and side to
Was well c	The state of the s		Yes	No		COC For	5. 1		AND TO SERVICE	
	lainerized/A			NA .						ñ
CONTRACTOR OF	introller set	(0)	NA.	(Hertz)		42 X 4		(1) (1)	·	
Grunus CC	1 1				10.00	11 II 14 14 14 14 14 14 14 14 14 14 14 14 14	et a state			6 No. 1

page lof z

# GROUNDWATER SAMPLE LOG

Project Name: Jefferson Proving Gr Project Number: 01:1633-04-938f- Purged by: JC & J Sampled by: & Checked by: &	310 F	Well Identification Project Location: Date: Date: Date:	:	son, Indiana	<b>7</b> 18
WELL VOLUME CALCULATION: Circle diameter and K used below: 1° I.D. K=0.0  2° I.D., K=0.0	63 gal/fi	5* I.D., K=1.469 ( 8* I.D., K=2.61 g; 10* ID. K=4.08 g;	al/ft		47.07
1 Well Volume: Total Depth ( 43.6 2 ft) - Depth to Water (2 Height of water column ( 18.69 ft) x K value Purge Volume: 1 Well Volume (3.65 gallons) x 3 = 3 Well	(*************************************	water column (_ Well Volume (3_	16-69 (t) 18-5 (gal)	dana masa ya 🎉	32.73 top of screen Pump soi m 40.
Purge Rate ( gpm) x ( min) Purge Rate ( gpm) x ( min)	= 1 Well Volume = 3 Well Volume	The second seco			
Time C pH mS/cm	Turbidity D.O. NTU mg/l		rged Well antity Volume		urge lateci Cf.
1050 16.6 6.6 0.734	-5.6. 0.79	F145 C			aury or Cit.
155 160 6.30 0.743	7460 015	FI3 3 €	62		16 0 p p. 50
100 16:4 6.37 0.744	436.0012	428 4	-4		12 9/1 0.4P
1105 10.7 6.43 6.747	2/9.0 0.24	H23 4			B 93 0.50
1/15 19,2 0.51 0.751	198.0 0.28	7114 4			10.60
1120 170 10.51 0.755		4200.	75 .	39.38 0	75
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1145 109 654 0 745	79.1 1.18	rit 1.	105		04
1150 17.4 4.85 0.744	78.0 1.24	T109	95	34.15 0	.04
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12.15 17.2 10.510 (0.729)	44.4 2.57		95	37.34 Ø	- <del></del>
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1225 19.0 4.60 6.729	56.9 2.53	+105 3.	25	39 29 0	
1230 10 4 10 10 729	75.1 2.60		45 45	38.54 C	
1240 19.4 10.62 0.732	90,9 2,41	T149 3.	85		04
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PURGE INFORMATION: Time / Date Started: 1650	10/9/08	SAMPLING INF	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	مامد	1/03 TWL 36,41
Time Purge End: /300	1917103	Time / Date Star Sampled by:	ned: <u>1041</u>	2 E	
Purge Method: Pump x Bailer		Sample Method	Baler X		Puro
Depth to Intake: ~ UZ	<u>(ft)</u>	Grab x		Composite	*
Pump Type and ID: FVLT		# of Bottles Coll	constitution (Constitution)		
Purge Rate: <u>0.03 - 0.040</u>		Bottle Preservat		<b>3</b>	······································
Purged Volume: 4,45	(gal) ) 2	Recovering WL		Dry	<u> </u>
Water Quality Meter: Hords U-22# 15 3 U How was yield measured? GEASUA		Duplicate Samp Laboratory	ing ANY	<u> </u>	<del>minimus</del> , in the second
Was well cavitated? Yes X	No	COC Form:			
Water containerized/Amount	<u>IA</u>	the state of the s	en e		<del></del>
Gruntos controller set @ NA NA	(Hertz)			M _{ed}	$(x,y) = \frac{1}{2} (x,y) + \frac{1}{2} (x,y)$
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ADDITIONAL INFORMATION ( .e. weather concerns of flush that number such a	mions progens encour	fczi, bc	ice required, unusua	e destablishing of the	B-14
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page 2 of t

oject Name	e:	Jefferso	n Proving G	round		Well Identific	ation:	MM	– Q (Ca	ntinuec
oject Numl	ber:		33-04-9381		· i	Project Loca	tion:	Mi	adison, Indian	а
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	Temp		Cond	Turbidity	.O.O.	ORP	. Purged.	Well	Depth to	Purge
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255		10.12		⊇78.d			4.45		41.39	0.04
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	hod: Pump		Baile	7		or for a property of the	ethod: Bailei		Other	Pump
Depth to Ir		~421		(ft)	<del>rri</del> d	Grab	3	***************************************	Composite	***************************************
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		FULT	- M 4.	· (anm)		18 144 1 4 4 1 4 4 1 1 1	servatives:	i <del>na Labara</del>	<u> </u>	<u>a planting</u> N
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	ality Meter:	Honba U-225		NTO-			Sampling:	<u> </u>		
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Charles the areas a	cavitated?	e e	Yes X	_ No	·	COC For	70,0	, <del></del>	<u> </u>	
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Grunfos c	antroller set	@	NA .	_(Hertz)		in Albanda	e De jih s		:	
in strain to the second	nn man i ne	toartest N	27.4	100	i de la companya de La companya de la co	:		30	14 14 14 14	
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ect Numb	er:		on Proving ( 633-04-9381			Well Identifi Project Loca	the state of the s		idison, Indiar	าส	
ged by:		JG_	&	EC.		Date:	gris success	10]	7/00		
npled by:		<u> </u>	. &	<u> </u>		Date:		10	17/00		
cked by:		<u> </u>	&	·	, · · · .	Date:					•
LL VOLU	ME CALC	ULATION:	_	e de la composition della comp			****	$u_{ij} = \frac{u_{ij}}{u_{ij}} = w_i$		:	
			1" I.D., K=0	.041 gal/ft		6" I.D , K=	1.469 gal/ft			1,0	
•			2"LD K=0			8" I.D., K=			·		
, :	7 174 1		4" I.D., K=0	.653 gai/ft	•	10" ID, K=	1.08 gal/ft	p * * *			•
Vell Volun	no:	4	****	N N	1 - P - 1	*	e Variable			· · · · · · · · · · · · · · · · · · ·	
al Deoth (	48.65	ft) - Deoth	to Water (	2.69	n = Height of	water colur	nn (35.	960			
ight of wat	er column	35.96	_ft) x K valu	2.69	gal/ft) = 1	Well Volum	e (5.86	e_gal)			
roe Volun	no:		A. C. C. C. C.	The second section is a second			Angelo et albandi na	agthian cialleachangage		- militari	
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	Temp		Cond	Turbidity	D.O.,	ORP	Purged	Well	Depth to	Purge	,
Time	"C	рH	mS/cm	"אדט	mg/l	mv	Quantity	Volume	Water	Rate	
400	80.1	638	0.791	107.6	0.99	-91	00-to	Υ	15.63	0.21	
172+	14.0	6.20	232	12.8	0.00	-76	0.4		15.44	0.10	
115	3.4	10.17	6.828	35.4	0.00	-111	12.2		5.40	1.05	
4 2.0	15.6	10.19	0.848	73.3	0.00	-1110	4.2		15.29	6 68	
425	15.5	12.II	9.905	82.1	9.00	- 122	10.10		15.29	4.08	
490	124	6.33	1.913	21.5	9.00	-125	7.0	<u>te</u>	15.34	9.08	
40	15.7	11.35	0.919	X T. I	7.90	- 147	7-07		15.40	9.08	er e e
145	15.0	4.38	0.924	1020	0.00	-120	8 2	1 1	15.53	4.09	
38	13.0	10.42	d.920		0.00	-64	9.4		15.54	0.08	
455	15.1	4.43	0.933	***************************************	0.00	- 13	9.0	1	15.54	6.68	.>
	· · · · · · · · · · · · · · · · · · ·		100	1							
-	<u> </u>										
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ne / Date		1400	. 1	16/7/	18		te Started.	1458	<u>-</u>	10/7/0	S.
ne Purge	ena: od: Pump	145 <u>*</u>	) Baile			Sampled I	by: ethod: Baile	ຸມ6	& Other	77-	
oth to int		<del>_</del> ди^		(ft)	***	Grab	X		Composite	Pump	
тр Туре		FOLT	<b>-</b>	\$537	4.3	N. Marchaeler	s Collected:	74+	2 EXM	MS+M	50+EX
rge Rate		<b>m.</b> d	8-0.2	(gpm)		Bottle Pre	servatives:	HUOVA	+ Has	24	
rged Volu		9.0	<b></b>	(gal)		Recoverin		13.59		*	
	ity Meter:	Honba U-22		03	TOTAL .	Duplicate		M3/1	<u>430 </u>	<u> </u>	
ow was yie as well ca	eld measur	ed?		ard cal	gair	Laborator		G N		,	
CONTRACTOR	化电子线 医乳头畸形	mount	Yes	NoQX NA	€e, in the contract of the co	COC For	gg.	` <u></u>	mamura a		
and the National Con-						**			•		
ater conta	troller set	. @	NA	(Hertz)	Age to		1.	119			



ject Name			in Proving.C			Well Identific		/vi	W. O	*****	
ject Numt	ber:	01-16	33-04-9381		. ?	Project Loca	ition:	Ма	dison, Indiar	na	
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mpled by: ecked by:		<u>ec</u>	&	<u> </u>		Date:		101	9/08		0
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LL VOLU	IME CALCU	JLATION:	1 1			e.		**	3	141 t. c	- ا
		ed below:	1" LD" K≅0	041 gal/ft		6" I.D., K=1	469 gal/ft			0514	
a the or specialization			2" I.D., K=0			8" I.D., K=2				Trade of the	<u> </u>
** *			4" I.D., K=0	653 gal/ft		10" ID, K=4		e for a proper	· · · · · · · · · ·		29.8
war twa says .	1	100	•				and		***	1.1.11 1	29.8°
Vell Volui	me: a a 1	_ft) - Depth	in with the section (1)	2 .0		or victorial com-		Δ.	Z	\$ 51	spot 4
ight of wa	iter column i	Le. 19	it) x K valu	e ( d , [ u	3 gal/ft) = 1	Well Volum	e	了(gal)			and the second s
rge Volui Yali Yolu	me: ∵∷ / ¢¢	A STATE		n in Terebrin. Bek Klebit Liberile A	A SIAT	11.15 (1.11) 11.15 (1.11)	3.95 ga	i i i i i i i i i i i i i i i i i i i	*	9 (M. )	
rge Rate		ganciis, _gpm) x (	ave como	= 1 Well Vo	wma	Nanous).	2. KZ 84	d '	199		
rge Rate		_gpm) x (		= 3 Well Vo							
Ĭ	<u> </u>		100			1,24 82.					
	Temp		Cond	Turbidity	D.O.	ORP	Purged	Well-	Depth to	:Purge	
Time	°C	Но	mS/cm	יוא י	mg/I	mv	Quantity	Volume	Water	Rate	
H0	13.1	5.64	0.850	7.3	2.09	+81	Ø		35.13	•	
845	12.7	6.18	4.836	-5.0	0.53	+59	Q.475		25.51	0.015	:
650	1a.7	140	0.390	45.4	0.29	+43	0.15		25.74	0.115	**
955	12.9	10.53	0.70	1-V.1	0.49	+39	0.25		3/2.03	0.015	:
900	12.0	18.37	W 1700	-18. P	0.103	+37	9.33		26.16	10.015	,
1916	12 2	1.30	M -222	-12164		+45	0.45	<u> </u>	25.92	0.015	
915	1,3 6	10 7 4	7 720	-6/2	0.57	440	U.525	<b>-</b>	25.90	P. p.5	4 4 22
930	13 10	10.71	0.722	-13.4	0.97	+49	a conto	u (\$0)	20.13	0.05	
.0.0	0 مسره ک	<del>, , , , , , , , , , , , , , , , , , , </del>		ating		1 = 2	14.22AA	<b>}</b>	3-47 (1.3	W.UES	
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URGE IN	FORMATIO	N:	<u> </u>			SAMPLIN	G INFORMA	TION	4		1.
	e Started:	0840		10/9/0	(A)	Time / Dat	4.4	0921	1 a 7	Dlutt	FR
me Purge	e End:	092	<b>0</b>	**   -   -	*	Sampled t	yers as asset that a first	7(3	_ i l	= 6.	213
urge Meth	hod. Pump	×	Baile	r	To the second	100 100 100 200 200 200 200 200 200 200	ethod: Bailer	· white the same of the same o	Other	Pump	•
epth to in	take:	- 241.1		(11)		Grab	×		Composite		•
ump Type	and ID:	FULTE			a sa	# of Bottle	s Collected:	7			Na La
urge Rate	9	0.0	15	_(gpm)	<del></del>	Bottle Pre	servatives:	4003		·	•
urged Vo	lume:		20D	_(gal)	en e	Recoverin	gWL:	3/11	y wit di	4	
	uity Meter:	Horiba (J-22#	208312	Ţ		Duplicate	Sampling:	ΝO			
	ield measur	ed?	Genous	MTED C		Laborator	51.1	696		15 17, 3	
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Carrier Contract	tainenzed/A	the first of the first	***************************************	NA:			·				4.1
irunfos co	ontroller set	@	NA	(Hertz)	professional and the second of	n in the state of	. Yezh		epokolodii N	100	5 •
er likeri	samaya (b. 1200-221 - 221 - 111)				in the sub-	and the	4. 111			i.	
	AL INFORM	ATION: (i.e.	weather cor	iditions, prof	blems encou	intered, mail	stenance rec	uired, unusu	al color/ode		ing still file
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oject Namo			on Proving G 33-04-9381			Well Identific Project Loca	· · · · · · · · · · · · · · · · · · ·		<i>∭.</i> 9 dison, Indian	a	
rged by: mpled by: ecked by:			& & &	<i>LLIDI</i>		Date: Date: Date:		10:14:	DΧ		
	me:	sed below:	2* I.D., K=0. 4* I.D., K=0.	163 gal/ft		6* i.D., K=1 8* i.D., K=2 10* iD, K=4	.61 gal/ft .08 gal/ft			ali dasse	in de
	ater column me: me (	gallons gpm) x (	_ft) x K value ) x 3 = 3 We min)	il Volumes ( = 1 Well Vo = 3 Well Vo	gal/ft) = 1 lume	Well Volum gallons)	e (	gal)		agong Space to Assert Asserting growth	n s den
Time	Temp.	_gpm) x (_	- Cond: mS/cm	Turbidity	D.O:	ORP *:	Purged: Quantity	∕ Well::: Volume	Depth to	⊘ Purge Rate	
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	e Started:		e liga	-		Time / Date	njuru, metaman ili,	deco	-	10:14.0	<b>2</b> 0
me Purgi irae Mell	e End: hod: Pump	×	Baile			Sampled b	y: ethod: Bailer	-1.//I	& Ciher		<del></del> -
age wea			- Jane	(n).	<u>-</u>	Grab	∴X ∴X		Composite		-4: :
imp Type	e and ID	. <del> </del>		<b>-</b> € 4 . 	<u>i</u> louise e	# of Bottles	Collected:				······································
irge Rati				_(gpm)		Bottle Pres		11102	104		
urged Vo	The state of the s	A. H. S. A.		_(gal)		Recovering		-38	- <del> </del>	<u> </u>	<u> </u>
	ality Meter: neld measur	Honba U-224 red?		<del>,,,,</del>	<del>.</del>	Ouplicate S Laboratory		<u> </u>			<del></del>
	reio rrieasur cavitated?	eus.	Yes_X	No	÷:	COC Form					; :
	tainerized/A	Stranger Street		NA .	i nga ₩, kit					:	.9
runtos co	ontroller set	@	NA	_(Hertz)			and Time	na kije is	#	g di se	
DDITION		IATION (I.e.	weather con	ditions grob	lems ancou	ntered, main	tenance red	uired, unusu	al colot/odor	8 V	B-
245	T) CC	Cattre	3 4116	0 70 0	24 00 0 1	20 41V	120 16	17 15 15 15 15 15 15 15 15 15 15 15 15 15	45 11 15 1		

Project Nam Project Num		Jeffer	rson Proving 1633-04-938	Ground	:. T	Well Identif			<u>n·10</u>		
Purged by:		MIL	&	*	<u>.</u>	Project Loc Date:	ation:	10.93	adison, Indi	ana	· e,
Sampled by		70		272	-	Date:		m &	98	<del></del>	*** ***
Checked by	•	· <del></del>	_ &	AL 17 SAN STEEL	<del>f</del>	Date:			34.44	200 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 -	
WELL VOL	UME CAL	CULATION:		٠.			÷ .	,		, =	
Circle diame	eter and K	used below:	1 <u>".</u> D. K=(	0.041 gal/lt		6"10 K=	1.469 gal/ft		A. In m.		<b>.</b>
			(2" I.D., K=(	0.163 gal/fb		8" I.D., K=:			18.81	901 SC	acr + BH nol
			4" I.D., K=(	).653 gal/ft	•	10" ID, K=	4.08 gal/ft			U	· · · · · · · · · · · · · · · · · · ·
1 Well Volu	me	es ny			at in the		o kaja		ing and the second		· · · · · · · · · · · · · · · · · · ·
Total Depth	41.5	3 ft) - Dept	h to Waler 6	11.65	h = Wolahi	of water colur					
Height of wa	ter colum	n (	_ft) x K valu	ie (	gal/ft) =	1 Well Volum	un (	n) gal)	*	* · · .	7
Lnide Aoin	me:							<del></del>			
1 Well Volur Purge Rate		gallon	s) x 3 = 3 W	ell Volumes	(1944)	_galions)	hadinin mika asas sa	Acres, and amounting	· · · · · · · · · · · · · · · · · · ·		
Purge Rate		gpm) x (	min	) = 1 Well V	olume	4					
6-10-48-1-10-11-12-2-2-2-2-2-2-2-2-2-2-2-2-2-2-	·		3,1111	) — a vven vi	ulume	:			¥		
	Temp		Cond	Turbidity	D.O.	ORP	Purged	Well	Depth to	Purge	
Time	°C	PH	mS/cm	NTU	mg/l	mv	Quantity	Volume	Water	Rate	
08H2	13.8	290	P18 0	348	12.16	43				0.07	
0850	11.0	16.63	0.808	36.8	0.19	<del>  }</del>	<u> </u>		1396	0.00	
0855	12.0	8.68	0.803	13.9	0.18	1-8	20 M 1 M 1 M 1 M 1		\$34	0.0	
0900	119	6.70	0.795	1173	NO M	+ $+$ $+$	रप		17.28	0.06	
0302	11.6	1671	0.789	1.8	0.46	16	~ ~ ~		1194	140.0	
0310	11.4	1633	185.0	6.3	0.67	13			प्रिंपेश	6.63	
2160	44	10- <u>17</u>	10.335	1.7	1.01	18			18.96	60.03	
0930	<del>-11.8</del> -	<del>- 47:12</del>	0 163	1.6	727	131			19.50	0.04	
0935	-11.8	+8-43	10.100	0.0	7.86	<del>                                     </del>			30.02	0.04	
47.75	11.9	16.44	0.765 0.765	0.0	3.08	29			10.57	0.04	
0440	119	16.78	0.764	0.0	1:3/	124	- 2		3176	0.07	,
0942	13.3	6.78	0.763	0.0	1.93	37	The state of the s	***************************************	31.80	20.0 20.0	
0950	13.3	6.79	0.159	00	17.14	40			23.79	0.04	
0.75.5	<del>-14.8</del>	1678	0.12	0.0	1.07	43			13.43	0.04	•
7007	19:00	12-13	0.123	0.0	1.00	44			30.08	0.04	
6761	19:4	12:49	18:18	0.0	1.90	41			28.24	0.05	•
1015	43.2	686	0. 108	0.0	1.68	100			36.76	0.04	
10:00	12.5	1679	0.780	0.0	130	132			9217	0.06	
1032	13.2	6.12	HET. D	0.0	11.7	ÃŘ	1 1 2 2 2 2 2		38.88	0.05	:
1020	132	10.79	0.746	0.0	0.48	18	### V # ###		78 PK	0.06	:
1000	-18-5	1677	0 123	00	0.30	14			30.79	20.0	
PURGE INF	OPMATIC	10 M	10 104	0.0	68.0	1 13	6		31.80	0.05	
Time / Date	A Section 1997 April 1997	0840	Ŷ.	10.13-01	3 "	SAMPLING Time / Date	INFORMAT	TION:			•
Time Purge			fin'	100 10 W	<b>)</b>	Sampled by		1330	. [	10-30-08	
Purge Metho	d: Pump		Bailer		\$4, ·	Sample Me		1 WC	& Other	<u> </u>	
Depth to Inta		_39.5		(ft)	et L	Grab	ን		Composite		
Pump Type	and ID:	- Follow	72/2/21		20- 20-	# of Bottles		15	)		
Purge Rate: Purged Volu	mar	<u>r</u> @	.05	(gpm)	-	Bottle Prese		HVD	2.28.11	(OR)	
Water Qualit		Honba U-22#	16:328	(gal)		Recovering		11.46			
How was yie				salstar.	idela	Duplicate S. Laboratory:		·		<del> </del>	
Was well car	vitated?		Yes_~	No		COC Form		The profit			••
Water contai				IA.		The section is properties.	*	<u> </u>			
Grunios con	troller set	<u>(0)</u>	NA.	(Hertz)							
ANAMARIA	د د سرغمانيوزيور	enn kalandaling Buddennasi				•					-
ADDITIONAL	NEORM	AHON (i.e.	weather conc	litions, proble	ems encoun	ligred, mainte	enance requi	red unusua	l color/odor,	elc.)	
	<del>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</del>			·····	<u></u>	<del> </del>					
				12 ·					1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		B-19



Project Name:		Jeffers	on Proving	Ground	·	Well Identif		:	JM-10	<b>)</b>
roject Number urged by:		W121	633-04-938 &	1-310	<del>.</del>	Project Loc	ation:		adison, India	ina
ampled by:	١	1.10.	. 8	<del>- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1</del>	1	Date:		100.	13-08	
hecked by:	:		&		÷	Date:			***************************************	
ELL VOLUME	E PATO	LIL ATIONS	7		•	23				
rcle diameter	and Ku	sed below:	d*iLD.∃K≅i	) ()41 nal/ft		8*1D V-	1.469 gal/ft	<b>;</b>		:
1 33 7 11 11 13	Lating Statement Co.	18 T 4 N 20 18 V T A 17 V		).163 gal/ft		8" I.D., K=	61 naint	,		
	,		4" I.D., K=(	).653 gal/ft		10" ID, K=	4.08 gal/ft			
Well Volume:	ŧ:									4.0
otal Depth (	<u></u>	_ft) - Depth	to Water (	. 9	t) = Height o	of water colur	nn 6	. 261		
eight of water	column		_ft) x K valu		gai/it) =	1 Well Volum	ne (	gal)		
urge Volume:		108 (42.87)	a company of a property a		e pridago e e e na	A SECTION AND AND	p. 10			
Well Volume ( urge Rate (	<u> </u>		) x 3 = 3 W	ell Volumes ( ) = 1 Well Vo		_gallons)	tasjadaš p	7	;	and the second second
urge Rate (		_gpm) x (_	min	) = 3 Well V	olume olume					
20 H			<del>,</del>		777					
Time	°C	ρΗ	Cond mS/cm	Turbidity NTU	D.O. mg/l	ORP	Purged	Well	Depth to	Purge
1045	2.6	6.80	235.0	0.0	3.0	10	Quantity	Volume	Water 33.11	Rate 0.05
1020	2.2	( , 2)	0.75	1.7	67.	<b>''</b>			33.7	0.06
1022	83	6.83	D. 774	7.3	11.0	- 3			30.68	73.70
1/000	4.8	6.82	0.119	12	065	- 9			35.38	20.0
11100	20	5.83	0.780	3.8	0.63	1 - 77 -			36.70	
+	77777	0.07	0.787	8.9	0.51	· 37	_ 0		10.86	0.07
				<u> </u>	<del>                                     </del>		<u>∿8</u>			
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JRGE INFOR		łż:		-2 d (2 d )		SAMPLING	INFORMAT	TION:		
me / Date Star me Purge End			. 1	<del>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</del>	•:	Time / Date			. 1	
urge Method:		×	9ailer			Sampled by		LEAVE TO THE T	8	
epth to Intake:	e mireto de	****		(ft)	P.	Sample Met Grab	x		Other	Pump
ump Type and	ID.			er en		# of Bottles			Composite	<del></del>
irge Rate		***************************************	***************************************	(gpm)	•	Bottle Prese	rvatives:			
rged Volume:	· ·			(gai)		Recovering				
ater Quality M ow was yield in		Honba U-22#	· ————————————————————————————————————		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Duplicate S	ampling:		*	
			Yes	No		Laboratory: COC Form	,			
as well cavitat	40.4		***************************************	IA .		dod Louis	٠,	Tara sa		
Vas well cavitat Valer container	uzed Am	Guni								



Project Nam	ie:	Jeffers	on Proving C	iround	.4	Well Identif	ication:	MW	<b>-</b> ₩		iii.
Project Num	nber:		633-04-9381			Project Loc	ation:		dison, India	na	r v
Purged by:		26	&	F	· 	Date:			8/10		
Sampled by		7.00F	8	217		Date:		10-3	11:08	······································	
Checked by	<b>,</b>	7	. & .			Date:		-l-,,		·····················	
WELL VOL	IIIAE CAT C	III ATIONI		*	٠.	:	7		••		# Phi
			1" I.D., K=0	041 00/6		6" I.D., K=	1 //60 65//		4	* 4	***
Our or or or	)	Sculosos.	(2°70 K=0			8" I.D., K=		•		•	**
	'4 <u>.</u> .		4" I.D., K=0			10" ID, K=	and the second of the second o				
et.			MACTINE 6	Talen <b>M</b> erikan	, w. 11		MAGNETICAL	11.2.3	5 - 120	u di	North State of
1 Well Volu		er it	e jetete te. Sjake	er vil						175 385	**
Total Depth	439	(1) - Depth	to Water (_	12 1 12 11	l) = Height	of water colu	mn (11.5	<b>Z_f</b> t)	÷		A STATE OF THE STATE OF
Height of w	ater column	11.54	_ft) x K valu	163	gai/ft) =	1 Well Volun	ne (1:58	gal)			
Purge Volu	ime:   40	<b>1</b>	ering. Der Selektive vært	in Steel	e 111	t esta a e					>
1 Well Volu	me (1.30	gallons	s) x 3 = 3 We	il Volumes (	3.67	_gailons)				t dan colorado de distribuido de la colorado de la	er sommen manner manner.
Purge Rate	<u> </u>	gpm) x (	min)	= 1 Well V	olume"				.*	A .	n kan
Purge Rate	بسسسسس	_gpm) x (_	min;	= 3 Well Vo	olume		<i>₹</i> :	KID Y	$\nu = 1$		37. 6.
20 sani - 10 an	Tëmn	Part Amelia de	Cond	Turbidity	D.O.	ORP	Purged	Well	Depth to	Purge	
Time	Temp °C	На	mS/cm	NTU	mg/i	mv	Quantity	Volume	Water	Rate	
1901	15.5	5 48	21.10	<b>53.</b> 7	212	111	1 0		33.67	7	reclas.
0986	15.2	431	13.9	31.4	0.00	-34	0.2		34.49	0.04	e who takes
0911	K/3	6.54	8.69	14.3	0.00	-34	V. 4	1	35 11	6.04	
8911	135	100Z	8.60	15.0	10.00	-27	0,6		358Y	004	:
692-1	K.8	6.70	7.59	18.4	0.30	1-23	98	<u></u>		01.64	Tank <b>e</b> ran
410	1/5.5	6.77	7.24	19.60	9.58	1-15	B. W		56.91	9.94	43777 Sec.
0931	15.8	10177	5.79	29.4	1110	177	1.25	<u> </u>	13.26	d.(D)	·
1930	12:5	6,70	5,58	24.7	1,29	1-1-3	1.50		-39,24	0.6>	ar top of an
6444	welld				-	7	¥.75			0,45	wind cuto
Visit	TWC CC BY	1			-	<u> </u>	ti i		-		
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	te Started:	p901		10/3/08	E		ite Started.	7300		10:310	Ž
Time Purg	je End: thod: Pump	<u>~41</u>			·····	Sampled		1.90c	&	012	in ;
Depth to I		241.5	Baile	(ft)		Grab	fethod: Baile	<u> </u>	Other Composit		**************************************
	e and ID:	Fulte				***************************************	es Collected:	- 2	Composi	·	The second second
Purge Ra		0.04-		(gpm)		and the first of the second	eservatives:	SATT	wan.		
Purged V		1.75		(gal)	, s Lighter	Recoveri		34.5	7		***
Water Qu	ality Meter:	Honba U-22	#	100 4 10 4 10 10 10 10 10 10 10 10 10 10 10 10 10		Duplicate	Sampling:	1 1 1 1			# 1111 호
	yield measu	red?	groduc	y 1 / 20 L	woln	Laborato	7.1				<del></del>
the service of the service of	cavitated?		Yes_X	No		COC For	m:				
2000	ntainerized//	Contract of the Contract of th		NA:	in it	in the gate of a control of the control of the cont	er eg som s				and the second s
Grunios	controller se	( <u>@</u>	NA:	_(Hertz)	i e i see BART	teganal filoso	in prif days in	a de cia	and the	r. Profile	
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Mid	GØ3	91): MUITAN NF DJ		Callecte			internance rec			or, etc.) ( <b>XCA n. i. i.</b> i.	ALE VICTOR

PROJECT NA		MPLE LO	A CARLO A CONTRACT OF PROPERTY OF THE PROPERTY	JECT NO:
AMPLE ID NUMBER: <u>\$</u>	7-01-001 7-01-001	DA	TE COLLECTED	(MM/DD/YY): 10:11-08 TIME: 1130
AMPLING LOCATION CO	DE: Justine	a Copper		14 8 mb 9
AMPLING POINT CODE: ESCRIPTION	¥.			······································
ORTHING:	EASTING	3. 3. <u>2. 1111 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 </u>	ELEV	ATION:
AMPLE DEPTH CODE: _ AMPLE MEDIA CODE: _			SCRIPTION:	BLS
Silvisal collected of	on W bank	of chel	+, ~ 40° up	sound to number
Callieted DUV of St Bksd=47 cpm 4	W-9 A-1			
Bksd=47 cpm 4		UNITS	SERIAL NO.	LAST CALIB.
Bk; & = 47 Cpm 4  FIELD MEASUREMENTS  RADIOACTIVITY:	V-9A-1	UNITS OPEN	SERIAL NO.	LAST CALIB.
BL; J=47 cp. 4  FIELD MEASUREMENTS  RADIOACTIVITY:  TEMPERATURE:	V-9A-1	epn e	SERIAL NO.	LAST CALIB.
Bks = 47 cpm 4  FIELD MEASUREMENTS  RADIOACTIVITY: TEMPERATURE: ph:	V-9A-1	650 20	SERIÁL NO.	LAST CALIB.
Bks = 47 cpm 4  FIELD MEASUREMENTS  RADIOACTIVITY: TEMPERATURE:	V-9A-1	epn e	SERIAL NO.	LAST CALIB.
FIELD MEASUREMENTS  RADIOACTIVITY:  TEMPERATURE: pH: CONDUCTIVITY: REDOX: DO:	V-9A-1	650 20	SERIÁL NO.	LAST CALIB.
FIELD MEASUREMENTS  RADIOACTIVITY:  TEMPERATURE: pH: CONDUCTIVITY: REDOX: DO: ORGANIC VAPORS:	V-9A-1	epr es es es es es	SERIÁL NO.	LAST CALIB.
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FIELD MEASUREMENTS  RADIOACTIVITY:  TEMPERATURE:  PH:  CONDUCTIVITY:  REDOX:  DO:  ORGANIC VAPORS:  TURBIDITY:  OTHER ASSESSMPLE TYPE:  CAMPLE TYPE:  CAMPLE COLLECTED:  SAMPLE COLLECTED:  SAMPLE COLLECTED:  SAMPLE COLLECTED:  CAMPLE TYPE:  CAMPLE COLLECTED:  C	READING  REA	SPA O GC	TIAL COMPOSITE RINSATE SEDURE WAS FOLLO	TIME COMPOSITE C
FIELD MEASUREMENTS  RADIOACTIVITY: TEMPERATURE: pH: CONDUCTIVITY: REDOX: DO: ORGANIC VAPORS: TURBIDITY: OTHER ASSESSMENT GRAB D QC TRIF	READING  REA	SPA O GC	TIAL COMPOSITE RINSATE SEDURE WAS FOLLO	TIME COMPOSITE C

PROJECT NAME:			PLE LOG SHEET PROJECT NO:			
SAMPLE ID NUMBER: SQ: 00-003			) DAT	ECOLLECTED	(MM/DD/YY): 10-11-08 TIME: 13-40	
SAMPLING LOCATION	ON CODE:	(sides)	Sel me		132	
SAMPLING POINT C	CODE:			<del></del>	en e	
NORTHING:	<del>Luciona</del> (	EASTING	3:	ELEV	ATION:	
SAMPLE DEPTH CO SAMPLE MEDIA CO	ODE:	*	_TO DE	SCRIPTION	BLS	
Definent call		Affiz-	43train	70.	Mount Fat prop	
Dad grant :	19 A	cęn.				
Dodgood:	19 A	A transfer	UNITS	SERIAL NO.	LAST CALIB.	
FIELD MEASUREMEI	NTS R	cęn.		SERIAL NO.	LAST CALIB.	
Dod <i>opud: L</i> FIELD MEASUREMEI	NTS R	cęn.	UNITS	SERIAL NO.	LAST CALIB.	
PIELD MEASUREMEI RADIOACTIV TEMPERATU	NTS R	cęn.	UNITS CPA	SERIAL NO.	LAST CALIB.	
FIELD MEASUREMENT RADIOACTIVE TEMPERATE	NTS R VITY: URE: pH; VITY: (	cęn.	UNITS	SERIAL NO.	LAST CALIB.	
FIELD MEASUREMENT RADIOACTIVE TEMPERATU	NTS R	cęn.	UNITS CPA	SERIAL NO.	LAST CALIB.	
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FIELD MEASUREMENT RADIOACTIVE CONDUCTIVE RED TURBIC OTHER 2004	VITY: URE: PH: VITY: DOX: DO: ORS: DITY: GRAB QC TRIP BL OTHER (SPE	EADING  3.1  3.1  3.1  3.1  3.1  3.1  3.1  3.	UNITS  CPC  SUCCESSICA  PSICA  SPA  GC  APLING PROC	TIAL COMPOSITE RINSATE	O TIME COMPOSITE O OC PIELD BLANK	
FIELD MEASUREMENT RADIOACTIVE CONDUCTIVE RED TURBIC OTHER 2054	VITY: URE: PH: VITY: DOX: DO: ORS: DITY: GRAB QC TRIP BL OTHER (SPE	EADING  3.1  3.1  3.1  3.1  3.1  3.1  3.1  3.	UNITS  CPC  SUCCESSICA  PSICA  SPA  GC  APLING PROC	TIAL COMPOSITE RINSATE	O TIME COMPOSITE O OC PIELD BLANK	
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PROJECT NA		APLE LO	G SHEET PRO	JECT NO:
AMPLE ID NUMBER: <u>\$</u>	D. W. 0013	DA	TE COLLECTED	(MM/DD/YY): 10 11-08 TIME: 0905
SAMPLING LOCATION CO DESCRIPTION: Sed.	ODE: Jang	ace maje		
AMPLING POINT CODE: DESCRIPTION				
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	e au ann an ann a	UNITS	SERIAL NO.	LAST CAUB.
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IORTHING:	EASTING	}:	ELEV	ATION:	
SAMPLE DEPTH CODE: _ SAMPLE MEDIA CODE: _			SCRIPTION:	BLS	
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Cheen chant men.  Box-going = 39 or 8 mg.  B MR  BELD MEASUREMENTS  RADIOACTIVITY:  TEMPERATURE: pH:	READING 13.9 5.96	UNITS Com C Su		LAST CALIB.	
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FTP-1215, Revision 0, 4:07/99

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PROJECT NA		APLE LOG	STATE OF THE STATE	IECT NO:
AMPLE ID NUMBER: \$\frac{\SS}{S}\$	9. 07.00K ): 00: 00E	DAT	E COLLECTED	(MM/DD/YY): 11:08 TIME: 1530
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TEMPERATURE:  pH: CONDUCTIVITY: REDOX: DO: ORGANIC VAPORS: TURBIDITY: OTHER AND: MPLE TYPE: SARAB D QC TRI	P BLANK L(SPECIFY)	UNITS  CPM  GU  ASU  NIM  SPA  CO CPI	SERIAL NO.  TIAL COMPOSITE RINSATE  DEDURE WAS FOLLO	TIME COMPOSITE Q QC FIELD BLANK
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FTP [215, Revision 0, 4:07/99

PROJECT NA	-0.5	WPLE LO	TOTAL OF THE SECOND AND AND ASSESSMENT	JECT NO:	
SAMPLE ID NUMBER: SS	800 · UO :		TE COLLECTED	(MM/DD/YY): 16: \ TIME: \( \lambda \la	
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PROJECT NA	ME: K	PLE LO	3 SHEET PRO	JECT NO:
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SAMPLING LOCATION CO DESCRIPTION: Surpr	DE: e Soll She	<b>%</b>		
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FIELD MEASUREMENTS  RADIOACTIVITY: TEMPERATURE: PH: CONDUCTIVITY: REDOX: DO: ORGANIC VAPORS: TURBIDITY: OTHER Desc SAMPLE TYPE: SE GRAB	READING	UNITS  COM	SERIAL NO.  STIAL COMPOSITE RINSATE	LAST CALIB.  LAST CALIB.  TIME COMPOSITE  QC FIELD BLANK
FIELD MEASUREMENTS  RADIOACTIVITY: TEMPERATURE: pH: CONDUCTIVITY: REDOX: DO: ORGANIC VAPORS: TURBIDITY: OTHER Desc: SAMPLE TYPE: \$\$ GRAB	P BLANK (SPECIFY)	UNITS  CPA  SPA  SPA  COC	TIAL COMPOSITE RINSATE	TIME COMPOSITE QC FIELD BLANK
FIELD MEASUREMENTS  RADIOACTIVITY: TEMPERATURE: pH: CONDUCTIVITY: REDOX: DO: ORGANIC VAPORS: TURBIDITY: OTHER DESC  SAMPLE TYPE: SA GRAB Q C TRII Q OTHER SAMPLE COLLECTED: SI YES IF SAP WAS NOT FOLLOWED	P BLANK (SPECIFY)	UNITS  CPY  SPA  SPA  CONTROL  OFFICE   TIAL COMPOSITE RINSATE CEDURE WAS FOLLO IS WERE NECESSAF	TIME COMPOSITE QC FIELD BLANK	
FIELD MEASUREMENTS  RADIOACTIVITY: TEMPERATURE: pH: CONDUCTIVITY: REDOX: DO: ORGANIC VAPORS: TURBIDITY: OTHER Desc: QC TRII Q OTHER G OTHER	P BLANK (SPECIFY)	UNITS  CPY  SPA  SPA  CONTROL  OCTO   TIAL COMPOSITE RINSATE	TIME COMPOSITE QC FIELD BLANK	

99-011 M(P65 y040879

PROJECT NAME:			E LOG SHEET PROJECT NO:		
MPLE ID NUMBER: <u>\$</u>	- DV - <i>0</i> ນ	<u>23</u> DA	TE COLLECTED	(MM/DD/YY): <u>10-10-</u> TIME: <u>0915</u>	
AMPLING LOCATION CO	DDE:				
AMPLING POINT CODE: ESCRIPTION		<del></del>			
ORTHING:	EASTING	): 	ELEV/	ATION:	
AMPLE DEPTH CODE: _ AMPLE MEDIA CODE:		TO	SCRIPTION	81.	
Matura limber a	way (lec	ves) ~	1/2 mile We	st of Wanju Road	
				mud sence grown	
	READING	UNITS	SERIAL NO.	LAST CALIB	
ELD MEASUREMENTS RADIOACTIVITY:					
ELD MEASUREMENTS  RADIOACTIVITY: TEMPERATURE:	READING	UNITS			
ELD MEASUREMENTS  RADIOACTIVITY: TEMPERATURE: pH:	READING	UNITS			
RADIOACTIVITY: TEMPERATURE: pH: CONDUCTIVITY:	READING	UNITS			
RADIOACTIVITY: TEMPERATURE: pH:	READING	UNITS			
RADIOACTIVITY: TEMPERATURE: pH: CONDUCTIVITY: REDOX:	READING	UNITS			
RADIOACTIVITY: TEMPERATURE: pH: CONDUCTIVITY: REDOX:	READING	UNITS			
RADIOACTIVITY: TEMPERATURE: pH: CONDUCTIVITY: REDOX: DO: ORGANIC VAPORS:	READING	UNITS			
TEMPERATURE:  pH: CONDUCTIVITY: REDOX: DO: ORGANIC VAPORS: TURBIDITY: OTHER : IAMPLE TYPE: 87 GRAB	P BLANK (SPECIFY)	UNITS  C SP/	SERIAL NO.  STIAL COMPOSITE RINSATE  CEDURE WAS FOLLO	LAST CALIB.  U TIME COMPOSITE U QC FIELD BLANK	
RADIOACTIVITY: TEMPERATURE: pH: CONDUCTIVITY: REDOX: DO: ORGANIC VAPORS: TURBIDITY: OTHER  AMPLE TYPE: Ø GRAB O CC TRIE	P BLANK (SPECIFY)	UNITS  C SP/	SERIAL NO.  STIAL COMPOSITE RINSATE  CEDURE WAS FOLLO	LAST CALIB.  U TIME COMPOSITE U QC FIELD BLANK	
RADIOACTIVITY: TEMPERATURE: pH: CONDUCTIVITY: REDOX: DO: ORGANIC VAPORS: TURBIDITY: OTHER  O CC TRIE OTHER	P BLANK (SPECIFY)	UNITS  C SP/	SERIAL NO.  STIAL COMPOSITE RINSATE  CEDURE WAS FOLLO	LAST CALIB.  U TIME COMPOSITE U QC FIELD BLANK	
RADICACTIVITY: TEMPERATURE: pH: CONDUCTIVITY: REDOX: DO: ORGANIC VAPORS: TURBIDITY: OTHER OCTRIR	P BLANK (SPECIFY)	UNITS  C/M  O SP/O OC	SERIAL NO.  STIAL COMPOSITE RINSATE  CEDURE WAS FOLLO	LAST CALIB.  U TIME COMPOSITE U QC FIELD BLANK	

99-01 (MCP65)/040899

PROJECT NA		IPLE LOG		JECT NO:
AMPLE ID NUMBER: 🧘	5. CW - COM	DA1	E COLLECTED	(MM/DD/YY): 10-11-0 TIME: 1105
AMPLING LOCATION CO ESCRIPTION: Survey				estas en la
AMPLING POINT CODE:			MATTER AND	
ORTHING:	EASTING		ELEV	ATION:
AMPLE DEPTH CODE: _ AMPLE MEDIA CODE:			CRIPTION:	
	(U-9-A)	UNITS	SERIAL NO.	LAST CALIB.
		UNITS	SERIAL NO.	LAST CALIB:
ELD MEASUREMENTS  RADIOACTIVITY: TEMPERATURE:	READING		SERIAL NO.	LAST CALIB.
ELD MEASUREMENTS RADIOACTIVITY	READING		SERIAL NO.	LAST CALIB.
ELD MEASUREMENTS  RADIOACTIVITY: TEMPERATURE: pH:	READING		SERIAL NO.	
RADIOACTIVITY: TEMPERATURE: pH: CONDUCTIVITY: REDOX: DO:	READING		SERIAL NO.	
RADIOACTIVITY: TEMPERATURE: pH: CONDUCTIVITY: REDOX:	READING		SERIAL NO.	
RADIOACTIVITY: TEMPERATURE: pH: CONDUCTIVITY: REDOX: DO: ORGANIC VAPORS:	READING		SERIAL NO.	
RADIOACTIVITY: TEMPERATURE: PH: CONDUCTIVITY: REDOX: DO: ORGANIC VAPORS: TURBIDITY: OTHER DSS. AMPLETYPE: S GRAB	READING	Cem	TIAL COMPOSITE RINSATE	
RADIOACTIVITY: TEMPERATURE: PH: CONDUCTIVITY: REDOX: DO: ORGANIC VAPORS: TURBIDITY: OTHER DSS  AMPLETYPE: S GRAB	PBLANK (SPECIFY)	Cem  Cem  SPA  Cocception	TIAL COMPOSITE RINSATE	D TIME COMPOSITED OC FIELD BLANK
RADIOACTIVITY: TEMPERATURE: PH: CONDUCTIVITY: REDOX: DO: ORGANIC VAPORS: TURBIDITY: OTHER 10 64.  AMPLE TYPE: S GRAB C C TRIC	PBLANK (SPECIFY)	Cem  Cem  SPA  Cocception	TIAL COMPOSITE RINSATE	D TIME COMPOSITED OC FIELD BLANK
RADIOACTIVITY: TEMPERATURE: pH: CONDUCTIVITY: REDOX: DO: ORGANIC VAPORS: TURBIDITY: OTHER 10 66  COTHER	PBLANK (SPECIFY)	Cem  Cem  SPA  Cocception	TIAL COMPOSITE RINSATE	D TIME COMPOSITED OC FIELD BLANK
RADIOACTIVITY: TEMPERATURE: pH: CONDUCTIVITY: REDOX: DO: ORGANIC VAPORS: TURBIDITY: OTHER 10 GRAB QC TRII COTHER AMPLE COLLECTED: 8 YES IF SAP WAS NOT FOLLOWED	PBLANK (SPECIFY)	Cem Cem SPA C QC PLING PROC	TIAL COMPOSITE RINSATE	D TIME COMPOSITED OC FIELD BLANK

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APPENDIX C
DATA VALIDATION SUMMARY

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#### C. DATA VALIDATION SUMMARY

### C.1 GPL SDGs 810035, 810048, 810072, 810092, 810094, 810155, 810180, 810211

This report contains the results from the data validation technical review for the Jefferson Proving Ground (JPG) Environmental Radiation Monitoring (ERM) October 2008 samples and analyses that are associated with the above-referenced laboratory and sample delivery group (SDG) number. Surface water sample SW-DU-003 was not collected because the sampling location was dry. These data points have been selected for data validation, and the sample data summary sheets on the following pages specifically identify the samples and analyses associated with this validation review.

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

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

Report Summary	
Total Number of Samples	34
Total Number of Data Points	102
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 (American Society for Testing and Materials [ASTM] D3972-90M).
- Groundwater and surface water were analyzed in SDG 805042. Sediment/soil samples were analyzed in SDGs 804157 and 804185.
- 1. The following items (as applicable) have been addressed during the validation review:
  - Sample custody, integrity, and preservation
  - Sample handling and preparation
  - Holding times
  - Instrument calibration and performance
  - Dilution factors
  - Detection limits
  - Laboratory background and carry-over
  - Overall assessment of the data

- Quality control (QC)
  - Calibration checks and background
  - Preparation blanks
  - Laboratory control samples
  - Field blanks (if available)
  - Field duplicates (if available)
  - Chemical yield (tracer recovery)
  - Laboratory duplicates.

- 2. The above items were found to be acceptable, except as follows:
  - Overall Assessment of Data—U-234, U-235, and U-238 sample data with results greater than the minimum detectable concentration (MDC) were qualified as estimated, J, reason code 37 in instances where the associated error was greater than 50 percent of the sample result.
  - *Tracer Recovery*—Tracer recoveries were slightly elevated in samples SS-DU-001 SAIC10E, SD-DU-007 SAIC10E, and SD-DU-008 SAIC10E. U-234, U-235, and U-238 sample data results greater than the MDC were qualified as estimated, *J*, reason code 38 in these samples.

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

	SAMPLE INDEX	
Laboratory:		SDG#:
GPL		810035, 810048, 810072, 810092, 810094, 810155, 810180, 810211

Client Sample I.D.	Laboratory Sample I.D.	Date Collected	Analyses Performed
MW-DU-001 SAIC010E	SAC08-8860-01	10/23/08	Isotopic Uranium
MW-DU-002 SAIC010E	SAC08-8748-02	10/10/08	Isotopic Uranium
MW-DU-003 SAIC010E	SAC08-8769-01	10/7/08	Isotopic Uranium
MW-DU-003 SAIC010DE	SAC08-8769-02	10/7/08	Isotopic Uranium
MW-DU-004 SAIC010E	SAC08-8711-01	10/6/08	Isotopic Uranium
MW-DU-005 SAIC010E	SAC08-8812-01	10/21/08	Isotopic Uranium
MW-DU-006 SAIC010E	SAC08-8829-03	10/27/08	Isotopic Uranium
MW-DU-007 SAIC010E	SAC08-8769-03	10/7/08	Isotopic Uranium
MW-DU-008 SAIC010E	SAC08-8748-01	10/10/08	Isotopic Uranium
MW-DU-009 SAIC010E	SAC08-8803-01	10/14/08	Isotopic Uranium
MW-DU-010 SAIC010E	SAC08-8829-02	10/27/08	Isotopic Uranium
MW-DU-011 SAIC010E	SAC08-8829-01	10/27/08	Isotopic Uranium
SW-DU-001 SAIC10E	SAC08-8870-07	10/11/08	Isotopic Uranium
SW-DU-002 SAIC10E	SAC08-8870-05	10/11/08	Isotopic Uranium
SW-DU-002 SAIC10DE	SAC08-8870-06	10/11/08	Isotopic Uranium
SW-DU-003 SAIC10E	NA	υ NA	, NA
SW-DU-004 SAIC10E	SAC08-8870-01	10/11/08	Isotopic Uranium
SW-DU-005 SAIC10E	SAC08-8870-04	10/11/08	Isotopic Uranium
SW-DU-006 SAIC10E	SAC08-8870-08	10/11/08	Isotopic Uranium
SW-DU-007 SAIC10E	SAC08-8870-02	10/11/08	Isotopic Uranium
SW-DU-008 SAIC10E	SAC08-8870-03	10/11/08 Isotopic Urani	
SS-DU-001 SAIC10E	SAC08-8800-01	10/11/08 Isotopic Uraniun	
SS-DU-002 SAIC10E	SAC08-8800-08	10/11/08	Isotopic Uranium
SS-DU-002 SAIC10DE	SAC08-8800-09	10/11/08	Isotopic Uranium
SS-DU-003 SAIC10E	SAC08-8749-01	10/10/08	Isotopic Uranium
SS-DU-004 SAIC10E	SAC08-8800-05	10/11/08	Isotopic Uranium
SD-DU-001 SAIC10E	SAC08-8800-11	10/11/08	Isotopic Uranium
SD-DU-001 SAIC10DE	SAC08-8800-12	10/11/08	Isotopic Uranium
SD-DU-002 SAIC10E	SAC08-8800-10	10/11/08	Isotopic Uranium
SD-DU-003 SAIC10E	SAC08-8800-02	10/11/08	Isotopic Uranium
SD-DU-004 SAIC10E	SAC08-8800-03	10/11/08	Isotopic Uranium
SD-DU-005 SAIC10E	SAC08-8800-07	10/11/08	Isotopic Uranium
SD-DU-006 SAIC10E	SAC08-8800-13	10/11/08	Isotopic Uranium
SD-DU-007 SAIC10E	SAC08-8800-04	10/11/08	Isotopic Uranium
SD-DU-008 SAIC10E	SAC08-8800-06	10/11/08	Isotopic Uranium

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

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# **ATTACHMENT**

JEFFERSON PROVING GROUND SAMPLE DATA SUMMARY SHEETS

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SAMPLE DATA SUMMARY – SOILS						
Laboratory:		SDG#:				
GPL		810072, 810092				

Isotopic Uranium ASTM D3972-90M							
Sample I.D.	Analyte	Result	Error	MDC	Units	Qualifier	Reason Code
SS-DU-001 SAIC10E	U-234	0.819	0.197	0.012	pCi/g	. J	38
SS-DU-001 SAIC10E	U-235	0.032	0.022	0.009	pCi/g	J	37, 38
SS-DU-001 SAIC10E	U-238	0.715	0.175	0.007	pCi/g	J	38
SS-DU-002 SAIC10E	U-234	0.146	0.052	0.014	pCi/g		
SS-DU-002 SAIC10E	U-235	0.004	0.007	0.010	pCi/g	U	
SS-DU-002 SAIC10E	U-238	0.208	0.067	0.008	pCi/g		
SS-DU-002 SAIC10DE	U-234	0.752	0.184	0.017	pCi/g		
SS-DU-002 SAIC10DE	U-235	0.017	0.016	0.009	pCi/g	J	37
SS-DU-002 SAIC10DE	U-238	0.850	0.205	0.007	pCi/g		
SS-DU-003 SAIC10E	U-234	0.674	0.171	0.008	pCi/g	J	38
SS-DU-003 SAIC10E	U-235	0.042	0.028	0.010	pCi/g	J	37, 38
SS-DU-003 SAIC10E	U-238	0.773	0.192	0.015	pCi/g	j	38
SS-DU-004 SAIC10E	U-234	0.625	0.158	0.014	pCi/g		· .
SS-DU-004 SAIC10E	U-235	0.025	0.136	0.009	pCi/g	J	37
SS-DU-004 SAIC10E	U-238	0.594	0.023	0.014	pCi/g		0,
			T	<del></del>		T	
SD-DU-001 SAIC10E	U-234	0.628	0.159	0.008	pCi/g		'
SD-DU-001 SAIC10E	U-235	0.040	0.027	0.010	pCi/g	J	37
SD-DU-001 SAIC10E	U-238	0.738	0.183	0.014	pCi/g		,
SD-DU-001 SAIC10DE	U-234	0.502	0.132	0.014	pCi/g		
SD-DU-001 SAIC10DE	U-235	0.031	0.023	0.017	pCi/g	J	37
SD-DU-001 SAIC10DE	U-238	0.564	0.145	0.008	pCi/g		
SD-DU-002 SAIC10E	U-234	0.764	0.189	0.008	pCi/g		
SD-DU-002 SAIC10E	U-235	0.033	0.024	0.010	pCi/g	J	37
SD-DU-002 SAIC10E	U-238	0.805	0.198	0.008	pCi/g		
SD-DU-003 SAIC10E	U-234	0.652	0.162	0.013	pCi/g		
SD-DU-003 SAIC10E	U-235	0.033	0.023	0.009	pCi/g	J	37
SD-DU-003 SAIC10E	U-238	0.766	0.186	0.013	pCi/g		
SD-DU-004 SAIC10E	U-234	0.100	0.040	0.016	pCi/g	1	

			Isotopic Ura ASTM D3972				· ·
Sample I.D.	Analyte	Result	Error	MDC	Units	Qualifier	Reason Code
SD-DU-004 SAIC10E	U-235	0.000	0.135	0.009	pCi/g	U	
SD-DU-004 SAIC10E	U-238	0.123	0.046	0.014	pCi/g		
SD-DU-005 SAIC10E	U-234	0.223	0.070	0.014	pCi/g		
SD-DU-005 SAIC10E	U-235	0.020	0.019	0.017	pCi/g	J.	37
SD-DU-005 SAIC10E	U-238	0.381	0.106	0.016	pCi/g		
						•	
SD-DU-006 SAIC10E	U-234	0.212	0.069	0.009	pCi/g		•
SD-DU-006 SAIC10E	U-235	0.023	0.020	0.011	pCi/g	J	37
SD-DU-006 SAIC10E	U-238	0.199	0.066	0.009	pCi/g		
SD-DU-007 SAIC10E	U-234	0.320	0.091	0.008	pCi/g	J	38
SD-DU-007 SAIC10E	U-235	0.023	0.020	0.017	pCi/g	J	37, 38
SD-DU-007 SAIC10E	U-238	0.284	0.083	0.008	pCi/g	J	38
				•			
SD-DU-008 SAIC10E	U-234	0.695	0.171	0.007	pCi/g	J	38
SD-DU-008 SAIC10E	U-235	0.020	0.017	0.009	pCi/g	J	37, 38
SD-DU-008 SAIC10E	U-238	1.17	0.273	0.007	pCi/g	J	38

SAMPLE DATA SUMMARY – WATERS					
Laboratory:	. •	SDG#:			
GPL	·	810035, 810048, 810072, 810092, 810094, 810155, 810180, 810211			

Isotopic Uranium ASTM D3972-90M							
Sample I.D.	Analyte	Result	Error	MDC	Units	Qualifier	Reason Code
MW-DU-001 SAIC010E	U-234	0.182	0.094	0.047	pCi/L	J	37
MW-DU-001 SAIC010E	U-235	0.012	0.024	0.033	pCi/L	U	
MW-DU-001 SAIC010E	U-238	1.09	0.311	0.047	pCi/L		
						ı	
MW-DU-002 SAIC010E	U-234	2.71	0.671	0.027	pCi/L		
MW-DU-002 SAIC010E	U-235	0.025	0.036	0.034	pCi/L	U	
MW-DU-002 SAIC010E	U-238	1.21	0.342	0.027	pCi/L		
MW-DU-003 SAIC010E	U-234	0.652	0.213	0.027	pCi/L		
MW-DU-003 SAIC010E	U-235	-0.005	0.010	0.058	pCi/L	U	
MW-DU-003 SAIC010E	U-238	0.246	0.112	0.027	pCi/L		
				•			•
MW-DU-003 SAIC010DE	U-234	0.631	0.209	0.027	pCi/L		
MW-DU-003 SAIC010DE	U-235	0.037	0.044	0.033	pCi/L	J	37
MW-DU-003 SAIC010DE	U-238	0.359	0.142	0.027	pCi/L		
MW-DU-004 SAIC010E	U-234	1.28	0.352	0.025	pCi/L		
MW-DU-004 SAIC010E	U-235	0.092	0.071	0.031	pCi/L	J	37
MW-DU-004 SAIC010E	U-238	1.01	0.290	0.025	pCi/L		,
MW-DU-005 SAIC010E	U-234	0.047	0.043	0.025	pCi/L	J	37
MW-DU-005 SAIC010E	U-235	0.000	0.135	0.031	pCi/L	U	
MW-DU-005 SAIC010E	U-238	0.065	0.051	0.025	pCi/L	J	37
•							
MW-DU-006 SAIC010E	U-234	2.18	0.556	0.027	pCi/L		
MW-DU-006 SAIC010E	U-235	0.099	0.076	0.033	pCi/L	J	37
MW-DU-006 SAIC010E	U-238	1.97	0.510	0.027	pCi/L		
					•	•	
MW-DU-007 SAIC010E	U-234	0.573	0.193	0.026	pCi/L		
MW-DU-007 SAIC010E	U-235	0.019	0.036	0.057	pCi/L	U -	
MW-DU-007 SAIC010E	U-238	0.222	0.104	0.026 /	pCi/L		
	<u>'</u>				·		***************************************
MW-DU-008 SAIC010E	U-234	0.215	0.099	0.024	pCi/L		
MW-DU-008 SAIC010E	U-235	0.033	0.040	0.030	pCi/L	J	37
MW-DU-008 SAIC010E	U-238	0.348	0.134	0.024	pCi/L		
					· · · · · · · · · · · · · · · · · · ·		
MW-DU-009 SAIC010E	U-234	0.986	0.290	0.027	pCi/L		
MW-DU-009 SAIC010E	U-235	-0.010	0.014	0.069	pCi/L	U	
MW-DU-009 SAIC010E	U-238	0.226	0.106	0.027	pCi/L		
	1.				*		
MW-DU-010 SAIC010E	U-234	1.94	0.506	0.064	pCi/L		
MW-DU-010 SAIC010E	U-235	0.050	0.053	0.034	pCi/L	5 J	37

Isotopic Uranium ASTM D3972-90M							
Sample I.D.	Analyte	Result	Error	MDC	Units	Qualifier	Reason Code
MW-DU-010 SAIC010E	U-238	0.751	0.238	0.027	pCi/L		
MW-DU-011 SAIC010E	U-234	0.247	0.110	0.051	pCi/L		
MW-DU-011 SAIC010E	U-235	0.011	0.023	0.030	pCi/L	U	
MW-DU-011 SAIC010E	U-238	0.045	0.042	0.024	pCi/L	J	37
SW-DU-001 SAIC10E	U-234	0.121	0.074	0.027	pCi/L	J	37
SW-DU-001 SAIC10E	U-235	0.020	0.037	0.059	pCi/L	U	0,
SW-DU-001 SAIC10E	U-238	0.130	0.077	0.027	pCi/L	J	37
OW DILLOON ON OVE	11.004	0.400	0.070	0.070	0:4	1	07
SW-DU-002 SAIC10E	U-234	0.132	0.079	0.079	pCi/L	J	37
SW-DU-002 SAIC10E	U-235	-0.005	0.010	0.010	pCi/L	U	37
SW-DU-002 SAIC10E	U-238	0.162	0.088	0.027	pCi/L	J	3/
SW-DU-002 SAIC10DE	U-234	0.092	0.068	0.051	pCi/L	J	37
SW-DU-002 SAIC10DE	U-235	0.026	0.038	0.036	pCi/L	U	
SW-DU-002 SAIC10DE	U-238	0.170	0.092	0.029	pCi/L ·	J	37
SW-DU-004 SAIC10E	U-234	0.154	0.0889	0.030	pCi/L		
SW-DU-004 SAIC10E	U-235	0.014	0.028	0.037	pCi/L	U	
SW-DU-004 SAIC10E	U-238	0.318	0.137	0.030	pCi/L		
014 DH 005 0 10 10 7	T 00.4				0:0	Γ	T
SW-DU-005 SAIC10E	U-234	0.848	0.255	0.026	pCi/L		07
SW-DU-005 SAIC10E	U-235	0.105	0.077	0.032	pCi/L	J	37
SW-DU-005 SAIC10E	U-238	5.96	1.36	0.053	pCi/L	<u> </u>	
SW-DU-006 SAIC10E	U-234	0.041	0.042	0.028	pCi/L	J	37
SW-DU-006 SAIC10E	U-235	-0.010	0.015	0.072	pCi/L	U	
SW-DU-006 SAIC10E	U-238	0.010	0.021	0.028	pCi/L	U	
SW-DU-007 SAIC10E	U-234	0.135	0.081	0.028	pCi/L	J	37
SW-DU-007 SAIC10E	U-235	0.000	0.135	0.035	pCi/L	Ū	
SW-DU-007 SAIC10E	U-238	0.114	0.073	0.028	pCi/L	J	37
OW DIT 000 0 10 10 1	11.004	0.400	0.074	0.007	0:#		07
SW-DU-008 SAIC10E	U-234	0.120	0.074	0.027	pCi/L	J	37
SW-DU-008 SAIC10E	U-235	0.012	0.025	0.034	pCi/L	· U	
SW-DU-008 SAIC10E	U-238	0.430	0.160	0.027	pCi/L		L

# **KEY TO THE DATA VALIDATION QUALIFIERS**

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

# **Data Validation Reason Code**

- Associated error was greater than 50 percent of the sample result. Tracer yield exceeded the control limits. 37
- 38

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