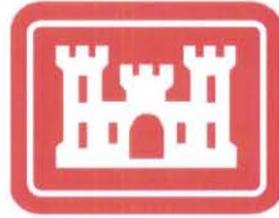


U.S. ARMY
CORPS OF ENGINEERS
HUNTINGTON DISTRICT



TM

2009 WELL REPORT
Final Report

Plum Brook Ordnance Works
Sandusky, Ohio

Contract No. W91237-09-P-0026

*Prepared by
Stillwater Environmental Services, Inc.
West Milton, Ohio*

April 2010

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**2009 MONITORING WELL INSPECTION REPORT
PLUM BROOK ORDNANCE WORKS
SANDUSKY, OHIO**

BACKGROUND

The former Plum Brook Ordnance Works (PBOW) encompasses over 6000 acres in Erie County Ohio. In the 1940s, under contract to the U.S. Army, the Trojan Powder Company manufactured 2,4,6 trinitrotoluene (TNT), dinitrotoluene (DNT), and pentolite. Approximately 1 billion pounds of these materials was produced between 1941 and 1944. In 1945 PBOW was placed on standby status while the Department of the Army conducted decommissioning and decontamination activities. In September 1945 the property was transferred to the Ordnance Department, the War Assets Department, and the General Services Administration. The National Aeronautics and Space Administration (NASA) acquired 6,500 acres in the mid-1960s.

The US Army Corps of Engineers (USACE) Huntington District, in cooperation with the Nashville and Louisville Districts, has identified several Areas of Concern (AOC) at PBOW. Investigation activities have been initiated in the areas of the former TNT, DNT and Pentolite manufacturing operations as well as ancillary operations such as Acid Areas, Waste Water Treatment Plants and Ash Pits. As part of the USACE's site-wide investigation activities, there are approximately 100 groundwater monitoring wells located within the perimeter of the PBOW site and 4 wells located off-site. Not all of the wells are currently in an active monitoring program to determine contaminant concentrations; however, the height of the water column in each well is measured quarterly and the wells are observed to determine if maintenance activities are needed. Maintenance activities include painting, cap placement, lock replacement or labeling on each well as needed. Groundwater level measurements were conducted on each monitoring well in May, August, and October 2009 and the final measurement activity was conducted in February 2010.

During the monitoring period (May2009 through February 2010), there were several wells that were inaccessible because the wells were located within restricted access due to ongoing NASA activities. Wells BED-MW15, EB-RA-01, and PB-BED-MW23 were inaccessible due to NASA activities, but at least one measurement was obtained over the course of the monitoring period. Well AA1-BED-GW003 was not measured due to the presence of hydrogen sulfide vapors emanating from the well.

In addition to quarterly water level measurements, the areas immediately surrounding the wells were mowed and cleared of obstructions. A 10ft-wide path was mowed from the nearest paved road to the well. Access roads or pathways become overgrown and access to the wells becomes hindered due to fallen trees, large branches and heavy growth of vegetation. Equipment such as a brush mower, hedge trimmers, chain saws and pruners are used to remove the heavy overgrowth of vegetation. Mowing efforts were completed in May, June-July, August and November. This schedule allowed for mowing early in the season to maintain control of the vegetation, and a final mowing to remove late season growth.

Each well was photographed to document the current condition of the well and document any maintenance activities that were performed and to evaluate the need for future maintenance. The photographs also document the condition of the casing platform and bollards. Water levels, maintenance activities and photographs of the wells are provided in the appendices of this report.

2009 Summary of Groundwater Monitoring Well Water Levels

2009 Groundwater Monitoring Well Water Levels
Plum Brook Ordnance Works
Sandusky, Ohio

	May 2009	August 2009	October 2009	February 2010
Well # (on map)	Water Level Reading (ft)	Water Level Reading (ft)	Water Level Reading (ft)	Water Level Reading (ft)
AA1-BED-GW001	37.25 oil / 37.68 water	36.62 oil / 37.16 water	35.90 oil / 36.40 water	35.65 oil / 36.51 water
AA1-BED-GW002	38.80 oil / 38.86 water	35.52 oil / 35.66 water	32.89 oil / 32.91 water	30.10 oil / 30.30 water
AA1-BED-GW003	no measurement - h2s	no measurement - h2s	no measurement - h2s	no measurement - h2s
AA1-BED-GW004	35.25	35.71	36.5	39.50
AA1-GW-002	5.12	7.62	8.49	2.65
AA1-GW-003	5.81	7.97	8.11	6.56
AA1-GW-004	6.53	8.56	11.29	7.64
AA1-GW-005	8.35	9.45	11.20	12.72
AA2-BED-GW-001	12.60	13.13	15.00	16.46
AA2-GW-002	6.60	15.00	19.20	20.83
AA3-BED-GW-001	28.70	28.63	29.65	30.50
AA3-BED-GW-002	33.52	32.65	33.33	34.28
AA3-BED-GW-003	11.84	12.30	13.48	14.57
AA3-GW-002	5.75	8.63	8.42	6.71
AA3-GW-003	6.00	9.50	10.90	4.39
AA3-GW-004	9.15	10.60	13.29	11.68
AA3-GW-005	7.35	11.46	13.73	7.62
ABG-BED-GW-001	4.85	7.72	8.30	6.50
ABG-GW-002	5.48	8.63	8.95	7.10
BED-MW-13	35.69	36.22	38.11	38.40
BED-MW-14	17.31	19.05	21.88	22.18
BED-MW-15	22.32	Unable to access area due to NASA activity	20.64	21.55
BED-MW-16	2.15	3.20	3.30	3.43

2009 Groundwater Monitoring Well Water Levels
Plum Brook Ordnance Works
Sandusky, Ohio

Well # (on map)	May 2009	August 2009	October 2009	February 2010
	Water Level Reading (ft)	Water Level Reading (ft)	Water Level Reading (ft)	Water Level Reading (ft)
BED-MW-17	35.25	33.81	33.70	32.43
BED-MW-18	35.55	35.70	36.00	36.38
BED-MW-19	28.40	31.50	33.96	33.10
BED-MW-20	13.90	14.38	14.95	15.08
BG8-BED-GW-001	5.05	5.00	5.51	6.30
EB-GM-01	9.12	9.76	9.82	9.26
EB-GM-02	7.55	14.20	18.40	19.92
EB-GM-03	7.20	8.67	8.48	7.75
EB-GM-04	5.33	9.03	9.85	5.35
EB-GM-05	7.35	8.66	8.58	7.80
EB-GM-06	7.48	8.90	8.43	7.70
EB-PS-02	5.92	7.21	6.00	6.50
EB-PS-03	8.30	6.77	5.78	6.45
EB-PS-04	8.75	9.51	9.70	9.10
EB-RA-01	7.04	Unable to access area due to NASA activity		
EB-SP-01	6.95	10.25	11.67	9.62
EB-SP-03	6.16	7.23	6.28	6.41
EB-SP-04	7.85	8.43	7.68	7.82
EB-SP-05	6.19	7.34	6.78	5.90
EB-SP-06	8.02	8.46	8.32	7.65
GCL-MW-01	7.09	9.96	11.17	4.86
GCL-MW-02A	6.81	9.30	10.33	4.61
GCL-MW-02B	7.59	10.24	11.26	4.67
GCL-MW-03	5.59	8.13	9.17	3.84
IT-MW-01	6.26	8.77	8.78	6.17

2009 Groundwater Monitoring Well Water Levels
Plum Brook Ordnance Works
Sandusky, Ohio

	May 2009	August 2009	October 2009	February 2010
Well # (on map)	Water Level Reading (ft)	Water Level Reading (ft)	Water Level Reading (ft)	Water Level Reading (ft)
IT-MW-02	7.10	12.06	17.70	5.85
IT-MW-05	6.40	8.56	10.30	4.91
IT-MW-06	5.72	10.11	11.40	10.24
IT-MW-08	5.23	11.75	15.15	14.90
IT-MW-09	9.51	12.73	12.92	10.95
IT-MW-10	9.40	17.00	21.25	22.15
MK-MW-09	6.02	9.20	16.20	9.25
MK-MW-10	5.70	8.25	12.48	5.65
MK-MW-11	7.11	10.32	13.60	8.03
MK-MW-12	9.70	11.56	12.12	10.50
MK-MW-14	6.10	9.11	10.38	9.20
MK-MW-15	6.21	8.82	10.06	9.10
MK-MW-16	6.71	8.22	6.64	7.09
MK-MW-17	4.56	5.60	4.88	4.40
MK-MW-19	6.50	8.40	8.75	6.60
MK-MW-20	6.78	5.20	5.60	8.34
MK MW-22	8.35	9.64	9.70	8.10
MK-MW-23	7.49	9.38	9.38	9.20
MK-MW-24	6.43	9.59	10.40	Frozen @ 12'
MNTA-BED-GW001	38.45	38.42	39.30	40.08
PB-BED-MW-22	abandoned	abandoned	abandoned	abandoned
PB-BED-MW-23	21.4 oil / 21.6 water	Unable to access area due to NASA activity	22.36 oil / 22.8 water	22.04 oil / 22.05 water
PB-BED-MW-24	30.10	31.45	34.15	34.85
PB-BED-MW-25	14.25	16.34	16.46	15.30
PB-BED-MW-26	46.30	45.85	45.45	44.37

2009 Groundwater Monitoring Well Water Levels
 Plum Brook Ordnance Works
 Sandusky, Ohio

	May 2009	August 2009	October 2009	February 2010
Well # (on map)	Water Level Reading (ft)			
PB-BED-MW-28	6.93	8.80	10.66	8.90
PB-BED-MW-29	2.48	3.87	4.50	3.90
PB-BED-MW-30	31.25	34.60	36.87	35.80
PB-BED-MW-33	74.15	75.59	77.15	78.40
PR-MW-07	3.45	5.87	7.5	2.74
PR-MW-09	4.65	7.34	8.9	3.30
TNT-A-BED-GW001	36.70 oil / 37.50 water	36.32 oil / 37.12 water	36.77 oil / 37.54 water	37.82 oil / 38.72 water
TNT-A-MW-10	5.50	7.47	6.43	5.25
TNT-A-MW-11	5.27	9.51	10.52	12.10
TNT-B-BED-GW-001	3.58	4.72	4.90	4.23
TNT-B-BED-GW-002	6.10	9.21	8.29	6.70
TNT-B-BED-GW-003	19.91	20.80	21.45	20.88
TNT-B-BED-GW-004	7.45	8.74	8.88	7.59
TNT-C-BED-GW-001	61.80	61.55	61.35	61.47
TNT-C-MW-03	6.49	11.11	14.70	15.22
TNT-C-MW-04	5.70	7.90	10.97	9.52
TNT-C-MW-05	4.85	8.10	17.10	21.55
TNT-C-MW-06	5.32	6.67	7.12	5.75
WA-MW-01	7.42	17.21	21.10	24.50
WA-MW-02	2.03	4.72	5.72	1.26
2BG-BED-GW-001	33.80	33.07	32.76	35.55
2BG-BED-GW-002	47.19	46.71	46.10	45.35
2BG-BED-GW-003	48.75	48.34	47.95	47.47

2009 Summary of Well Maintenance Activities

Plum Brook Ordnance Works
Sandusky, Ohio

2009 Monitoring Well Maintenance Summary
Maintenance Timeframe - May 2009 through March 2010

Well # (on map)	Well ID Number Condition	Photo Taken	Page Number / Photo Number	Well Casing Condition		Bollard		Well Cap	Padlock	Maintenance Performed During Reporting Period (see note)
				Paint	Corrosion/ Damage	Paint	Construction			
AA1-BED-GW001	good	√	1/1	no		no		√	good	
AA1-BED-GW002	good	√	1/2	no		no		√	good	
AA1-BED-GW003	good	√	1/3	no	Very corroded	no		√	good	Heavy H2S gas, no measurement
AA1-BED-GW004	good	√	1/4	no		no		√	good	
AA1-GW002	good	√	1/4	no		no		√	good	
AA1-GW003	good	√	1/6	no		no		√	good	
AA1-GW004	good	√	2/7	no		no		√	good	
AA1-GW005	good	√	2/8	no		no		√	good	
AA2-BED-GW001	good	√	2/9	no		no		√	good	
AA2-GW002	good	√	2/10	no		no		√	good	
AA3-BED-GW001	good	√	2/11	no		no		√	good	
AA3-BED-GW002	good	√	2/12	no		no		√	good	
AA3-BED-GW003	good	√	3/13	no		no		√	good	
AA3-GW002	good	√	3/14	no		no		√	good	
AA3-GW003	good	√	3/15	no		no		√	good	
AA3-GW004	good	√	3/16	no		no		√	good	
AA3-GW005	good	√	3/17	no		no		√	good	
ABG-BED-GW001	good	√	3/18	no		no		√	good	
ABG-GW002	good	√	4/19	no		no		√	good	

**Plum Brook Ordnance Works
Sandusky, Ohio**

2009 Monitoring Well Maintenance Summary
Maintenance Timeframe - May 2009 through March 2010

Well # (on map)	Well ID Number Condition	Photo Taken	Page Number / Photo Number	Well Casing Condition		Bollard		Well Cap	Padlock	Maintenance Performed During Reporting Period (see note)
				Paint	Corrosion/ Damage	Paint	Construction			
EB-SP-01	good	√	7/38	no		no		√	good	
EB-SP-03	good	√	7/39	no		no		√	good	
EB-SP-04	good	√	7/40	no		no		√	good	
EB-SP-05	good	√	7/41	no		no		√	good	
EB-SP-06	good	√	7/42	no		no		√	good	
GCL-MW01	good	√	8/43	no		no		√	good	
GCL-MW02A	good	√	8/44	no		no		√	good	
GCL-MW02B	good	√	8/45	no		no		√	good	
GCL-MW03	good	√	8/46	no		no		√	good	
IT-MW01	good	√	8/47	no		no		√	good	
IT-MW02	good	√	8/48	no		no		√	good	
IT-MW05	good	√	9/49	no		no		√	good	
IT-MW06	good	√	9/50	no		no		√	good	
IT-MW08	good	√	9/51	no		no		√	good	
IT-MW-09	good	√	9/52	no		no		√	good	
IT-MW10	good	√	9/53	no		no		√	good	
MK-MW09	good	√	9/54	no		no		√	good	
MK-MW10	good	√	10/55	no		no		√	good	
MK-MW11	good	√	10/56	no		no		√	good	
MK-MW12	good	√	10/57	no		no		√	good	
MK-MW14	good	√	10/58	no		no		√	good	
MK-MW15	good	√	10/59	no		no		√	good	
MK-MW16	good	√	10/60	no		no		√	good	
MK-MW17	good	√	11/61	no		no		√	good	
MK-MW19	good	√	11/62	no		no		√	good	
MK-MW20	good	√	11/63	no		no		√	good	
MK-MW22	good	√	11/64	no		no		√	good	
MK-MW23	good	√	11/65	no		no		√	good	
MK-MW24	good	√	11/66	no		no		√	good	
MNTA-BED-GW001	good	√	12/67	no		no		√	good	

Plum Brook Ordnance Works
Sandusky, Ohio

2009 Monitoring Well Maintenance Summary
Maintenance Timeframe - May 2009 through March 2010

Well # (on map)	Well ID Number Condition	Photo Taken	Page Number / Photo Number	Well Casing Condition		Bollard		Well Cap	Padlock	Maintenance Performed During Reporting Period (see note)
				Paint	Corrosion/ Damage	Paint	Construction			
PB-BED-MW23	good	√	12/68	no		no		√	good	
PB-BED-MW24	good	√	12/69	no		no		√	good	
PB-BED-MW25	good	√	12/70	no		no		√	good	
PB-BED-MW26	good	√	12/71	no		no		√	good	
PB-BED-MW28	good	√	12/72	no		no		√	good	
PB-BED-MW29	good	√	13/73	no		no		√	good	
PB-BED-MW30	good	√	13/74	no		no		√	good	
PB-BED-MW33	good	√	13/75	no		no		√	good	
PR-MW7	good	√	13/76	no		no		√	good	
PR-MW9	good	√	13/77	no		no		√	good	
TNT-A-BED-GW001	good	√	13/78	no		no		√	good	
TNT-A-MW10	good	√	14/79	no		no		√	good	
TNT-A-MW11	good	√	14/80	no		no		√	good	
TNT-B-BED-GW001	good	√	14/81	no		no		√	good	
TNT-B-BED-GW002	good	√	14/82	no		no		√	good	
TNT-B-BED-GW003	good	√	14/83	no		no		√	good	
TNT-B-BED-GW004	good	√	14/84	no		no		√	good	
TNT-C-BED-GW001	good	√	15/85	no		no		√	good	
TNT-C-MW03	good	√	15/86	no		no		√	good	
TNT-C-MW04	good	√	15/87	no		no		√	good	
TNT-C-MW05	good	√	15/88	no		no		√	good	
TNT-C-MW06	good	√	15/89	no		no		√	good	
WA-MW01	good	√	15/90	no		no		√	good	Removed downed tree
WA-MW02	good	√	16/91	no		no		√	good	Removed downed tree and had to cut top of casing down ~1" so cap would fit.
2BG-BED-GW-001	good	√	16/92	no		no		√	good	
2BG-BED-GW-002	good	√	16/93	no		no		√	good	Replaced lock.
2BG-BED-GW-003	good	√	16/94	no		no		√	good	

NOTE: Maintenance Designation: P-Painted; L-Labeled; CL-Changed lock; AL-Added lock; AC-Added cap

2009 Photographs of Wells

AA1-BED-GW001



AA1-BED-GW002



AA1-BED-GW003



AA1-BED-GW004



AA1-GW002



AA1-GW003



AA1-GW004



AA1-GW005



AA2-BED-GW001



AA2-GW002



AA3-BED-GW001



AA3-BED-GW002



AA3-BED-GW003



AA3-GW002



AA3-GW003



AA3-GW004



AA3-GW005



ABG-BED-GW001



ABG-GW002



BED-MW13



BED-MW14



BED-MW15



BED-MW16



BED-MW17



BED-MW18



BED-MW19



BED-MW20



BG8-BED-GW001



EB-GM-01



EB-GM-02



EB-GM-03



EB-GM-04



EB-GM-05



EB-GM-06



EB-PS-02



EB-PS-03



EB-PS-04



EB-SP-01



EB-SP-03



EB-SP-04



EB-SP-05



EB-SP-06



GCL-MW01



GCL-MW02A



GCL-MW02B



GCL-MW03



IT-MW01



IT-MW02



IT-MW05



IT-MW06



IT-MW08



IT-MW09



IT-MW10



MK-MW09



MK-MW10



MK-MW11



MK-MW12



MK-MW14



MK-MW15



MK-MW16



MK-MW17



MK-MW19



MK-MW20



MK-MW22



MK-MW23



MK-MW24



MNTA-BED-GW001



PB-BED-MW23



PB-BED-MW24



PB-BED-MW25



PB-BED-MW26



PB-BED-MW28



PB-BED-MW29



PB-BED-MW30



PB-BED-MW33



PR-MW-07



PR-MW-09



TNT-A-BED-GW001



TNT-A-MW10



TNT-A-MW11



TNT-B-BED-GW001



TNT-B-BED-GW002

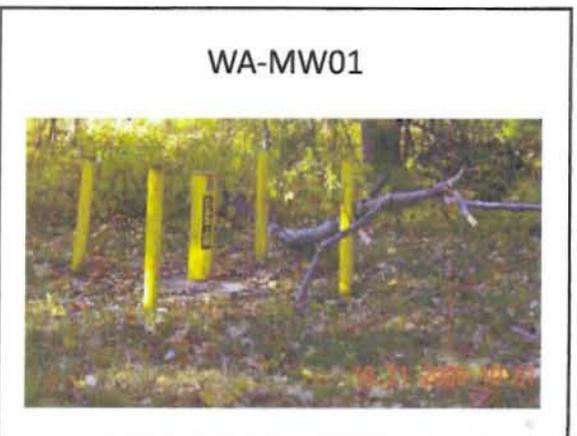
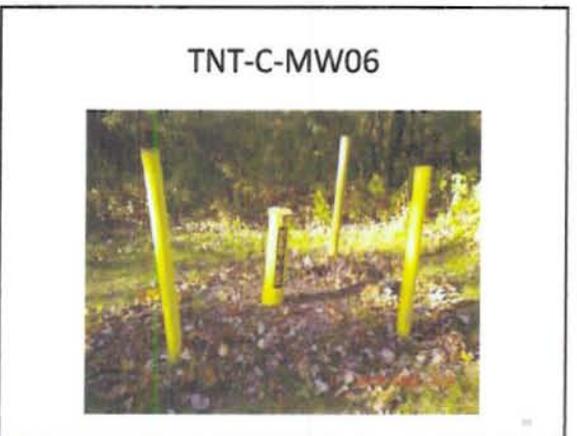
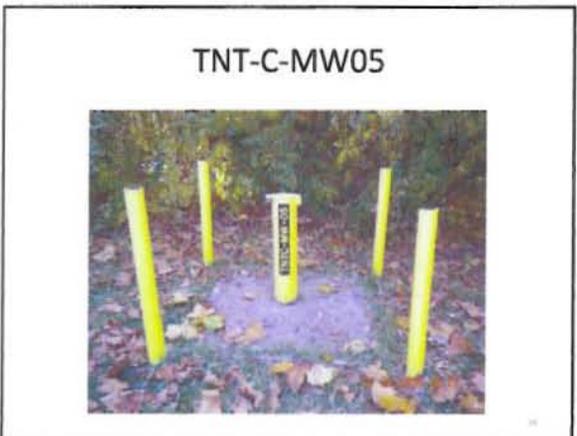
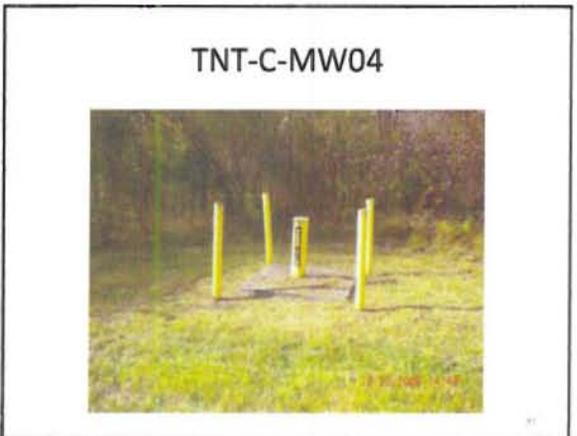
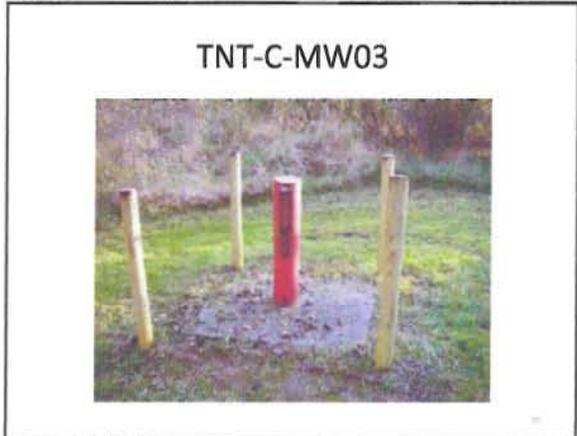
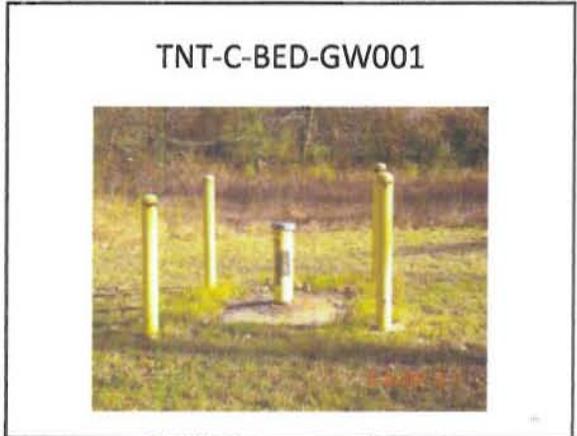


TNT-B-BED-GW003



TNT-B-BED-GW004





WA-MW02



2BG-BED-GW001



2BG-BED-GW002



2BG-BED-GW003



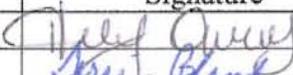
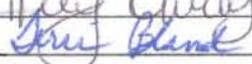
Quality Control – Review Comments

QUALITY ASSURANCE CERTIFICATION

**2009 Well Report – 2009 Update
Plum Brook Ordnance Works
Sandusky, Ohio**

Contract No. W91237-09-P-0026

This document is provided to certify that the members of the Quality Control team have reviewed the 2009 Well Report - Plum Brook Ordnance Works in Accordance with the Quality Control Plan. All comments from the various reviews have been resolved and / or incorporated.

Assignment	Name	Signature	Date
Project Manager	Helen Owens		3/29/10
Peer Review	Terri Bland		3/29/2010

Internal Review Comments

2009 Well Report – Plum Brook Ordnance Works

Contract W91237-09-P-0026

Comment: Background – Should include a discussion about why some water level data for specific wells is not presented in the water level summary

Response: Concur, the text was revised to include a discussion of why data for specific wells was not provided.

Comment: The spreadsheet containing the maintenance summary was included twice, delete one of the spreadsheets.

Response: Concur, the deletion was made.

Comment: The order of the well photographs should follow the same order as the level data is presented.

Response: Concur, the photos were rearranged to be in the same order as the well data.