1213484

Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

12-AMRP-0016

APR 25 2012

Ms. J. A. Hedges, Program Manager
Nuclear Waste Program
State of Washington
Department of Ecology
3100 Port of Benton Blvd.
Richland, Washington 99354

Dear Ms. Hedges:

TRANSMITTAL OF APPROVED WASTE SITE RECLASSIFICATION FORM NO. 2011-099 AND SUPPORTING DOCUMENTATION FOR THE 100-H-33, 183-H SOLAR EVAPORATION BASINS RADIONUCLIDE COMPONENTS WASTE SITE, REVISION 0

Attached for your use is the approved Waste Site Reclassification Form No. 2011-099 and supporting documentation for the "100-H-33, 183-H Solar Evaporation Basins Radionuclide Components Waste Site," Rev. 0. If you have questions, please contact me or your staff may contact Ellwood Glossbrenner, of my staff, at (509) 376-5828.

Sincerely,

Mark S. French, Federal Project Director
for the River Corridor Closure Project

AMRC:ETG

Attachment

cc w/attach:
N. M. Menard, Ecology
Administrative Record, H6-08

cc w/o attach:
R. D. Cantwell, WCH
S. L. Feaster, WCH
D. L. Plung, WCH
M. L. Proctor, WCH
J. P. Shearer, CHPRC

100-HR-1

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-HR-1 **Control No.:** 2011-099

Waste Site Code(s)/Subsite Code(s):

100-H-33

Reclassification Category: Interim ☒ Final ☐

Reclassification Status: Closed Out ☐ No Action ☒ Rejected ☐

RCRA Postclosure ☐ Consolidated ☐ None ☐

Approvals Needed: DOE ☒ Ecology ☒ EPA ☐

Current waste site condition:

The 100-H-33, 183-H Solar Evaporation Basins Radionuclide Components waste site is located in the 100-HR-1 Operable Unit of the 100-H Area of the Hanford Site. The waste site is located north of the 105-H Reactor and north of the eastern 183-H Clearwell (126-H-2 waste site) within the former 183-H Water Treatment Facility. Four of the former water treatment basins within the 183-H facility were used for solar evaporation of liquid wastes from the 300 Area. These basins, identified as the 116-H-6 waste site, 183-H Solar Evaporation Basins Nonradionuclide Components, were remediated and reclassified with a modified Resource Conservation and Recovery Act (RCRA) closure. There is no radiological posting associated with the backfilled basin.

Basis for reclassification:

The shallow zone samples from below the former concrete basin floor and borehole samples from beneath each of the four basins indicate that the source of radiological contamination has been removed and only low concentrations of residual radionuclides are present in the deep vadose zone beneath the easternmost basin (Basin 1) at the 100-H-33 waste site. Additional information on the history and sample results is provided in the *100-H-33, 183-H Solar Evaporation Basins Radionuclide Components Waste Site* Attachment to this waste site reclassification form.

As a part of the modified RCRA closure of the 116-H-6 waste site, four groundwater monitoring wells were put into place, three downgradient of the 183-H Basins (199-H4-12C, 199-H4-12A, and 199-H4-3), and one upgradient (199-H4-8). The locations and additional detail of the groundwater monitoring wells are provided in the Attachment to this waste site reclassification form. The 2010 results of the groundwater monitoring report show that technetium-99 and total uranium are present well under the maximum contaminant level for each constituent.

The combination of borehole results and groundwater sampling indicate that source removal has occurred, and that residual radionuclide contamination warranting cleanup is not present in the deep vadose zone. Results of groundwater monitoring for technetium-99 and uranium show continued decline since monitoring was begun, indicating that residual contamination only remains in the groundwater and is slowly dissipating. Groundwater will continue to be monitored for uranium and technetium-99 in coordination with nonradionuclide monitoring performed by the U.S. Department of Energy as a part of the 183-H RCRA Postclosure Plan.

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-HR-1 **Control No.:** 2011-099

Waste Site Code(s)/Subsite Code(s):

100-H-33

Regulator comments:

Approval of this Waste Site Reclassification Form documents the regulator's agreement that the 100-H-33 waste site qualifies for "No Action" under this Interim Action ROD. In addition, Ecology has evaluated the data for this site against WAC 173-340 (2007) cleanup levels for direct contact, groundwater protection, and river protection. This evaluation is documented in the letter transmitting Ecology's approval of the site's interim reclassification to "No Action."

Waste site 116-H-6, which addressed cleanup of non-radiological contaminants, has been closed under a RCRA permit. Any remaining non-radiological contamination, not previously identified at 116-H-6, is being addressed under a RCRA post-closure permit. Further, the 116-H-6 WIDS form indicates that this waste site is under RCRA post-closure.

Waste Site Controls:

Engineered Controls:	☒ Yes	☐ No	Institutional Controls:	☒ Yes	☐ No	O&M Requirements:	☐ Yes	☒ No

If any of the Waste Site Controls are checked Yes, specify control requirements including reference to the Record of Decision, TSD Closure Letter, or other relevant documents:

Due to the presence of non-radiological contaminants at the same physical location as the 116-H-6 waste site, associated engineered controls and institutional controls have been identified. Little information exists on the 116-H-6 vapor barrier, but it is thought to be a type of plastic liner. During closure of the 183-H facility, a vapor barrier was placed at the bottom of the excavated area to help prevent migration of non-radiological contaminants remaining in the soil.

M. S. French	M S French	4/6/12
DOE Federal Project Director (printed)	Signature	Date
N. Menard	Nina M. Menard	4/12/12
Ecology Project Manager (printed)	Signature	Date
N/A		
EPA Project Manager (printed)	Signature	Date

100-H-33, 183-H SOLAR EVAPORATION BASINS RADIONUCLIDE COMPONENTS WASTE SITE

Attachment to Waste Site Reclassification Form 2011-099

October 2011

100-H-33, 183-H SOLAR EVAPORATION BASINS RADIONUCLIDE COMPONENTS WASTE SITE

100-H-33 BACKGROUND AND SAMPLE RESULTS SUMMARY

The 100-H-33 waste site addresses only radionuclide components of the 183-H Basins, as the non-radionuclide component was addressed by the RCRA Closure and Postclosure Plan. The 183-H Solar Evaporation Basins were originally part of the 12 sedimentation and flocculation basins within the 183-H Water Treatment Facility. Four of the concrete water treatment and storage basins were left in place during the 1974 demolition of the head house to serve as the solar evaporation basins. Each basin was subdivided into a sedimentation basin and a shallow flocculation basin. The flocculation basins were 14 m (46 ft) wide, 10 m (33 ft) long, and 3 m (10 ft) deep. The sedimentation basins were 16 m (50 ft) wide, 29 m (95 ft) long, and 5 m (17 ft) deep at the north end and 5 m (16 ft) deep at the south end. Figure 1 provides a graphic of the basins.

From 1973 to 1985, the basins received neutralized spent acid waste solutions contaminated with technetium-99 (Tc-99) and uranium from the 300 Area Fuels Fabrication Facility. Other wastes such as unused chemicals and miscellaneous spent waste solutions were also treated in the basins.

In 1991, characterization samples were obtained from boreholes drilled within each of the four basins. The boreholes were located in the deeper, sedimentation portion of each basin (Figure 2). The borehole in basin 3 was placed in the northern half of the sedimentation basin while the boreholes for basins 2 and 4 were placed in the southern half of the sedimentation basin. Although the plan for borehole 1, as depicted in Figure 2, shows the borehole in the northern half of the sedimentation basin, the borehole (well 199-H4-50) was actually drilled in the southern half of the basin. As depicted in Figure 3, survey data from 1991 verified that the borehole was placed in the southern rather than the northern section of the sedimentation basins.

Both radiological and chemical data were analyzed in borehole samples. All the basins showed elevated levels of Tc-99 ranging from 176 (basin 2) to 2.8 (basin 4) pCi/g in the uppermost samples collected at 0-2 ft below the concrete basin. The Tc-99 concentration declined relatively quickly with depth in basins 2, 3, and 4, but measured 6.6 pCi/g in the deepest sample for basin 1 collected at 31.9-33.4 ft bgs (Table 1). Uranium was also elevated in all sample depths with values ranging from 7.8 to 2.5 pCi/g of U-234, 1.0 to 0.3 pCi/g of U-235, and 5.7 to 2 pCi/g of U-238 with decreasing concentrations with depth (Table 1).

Figure 1. Depiction of the 183-H Solar Basins.

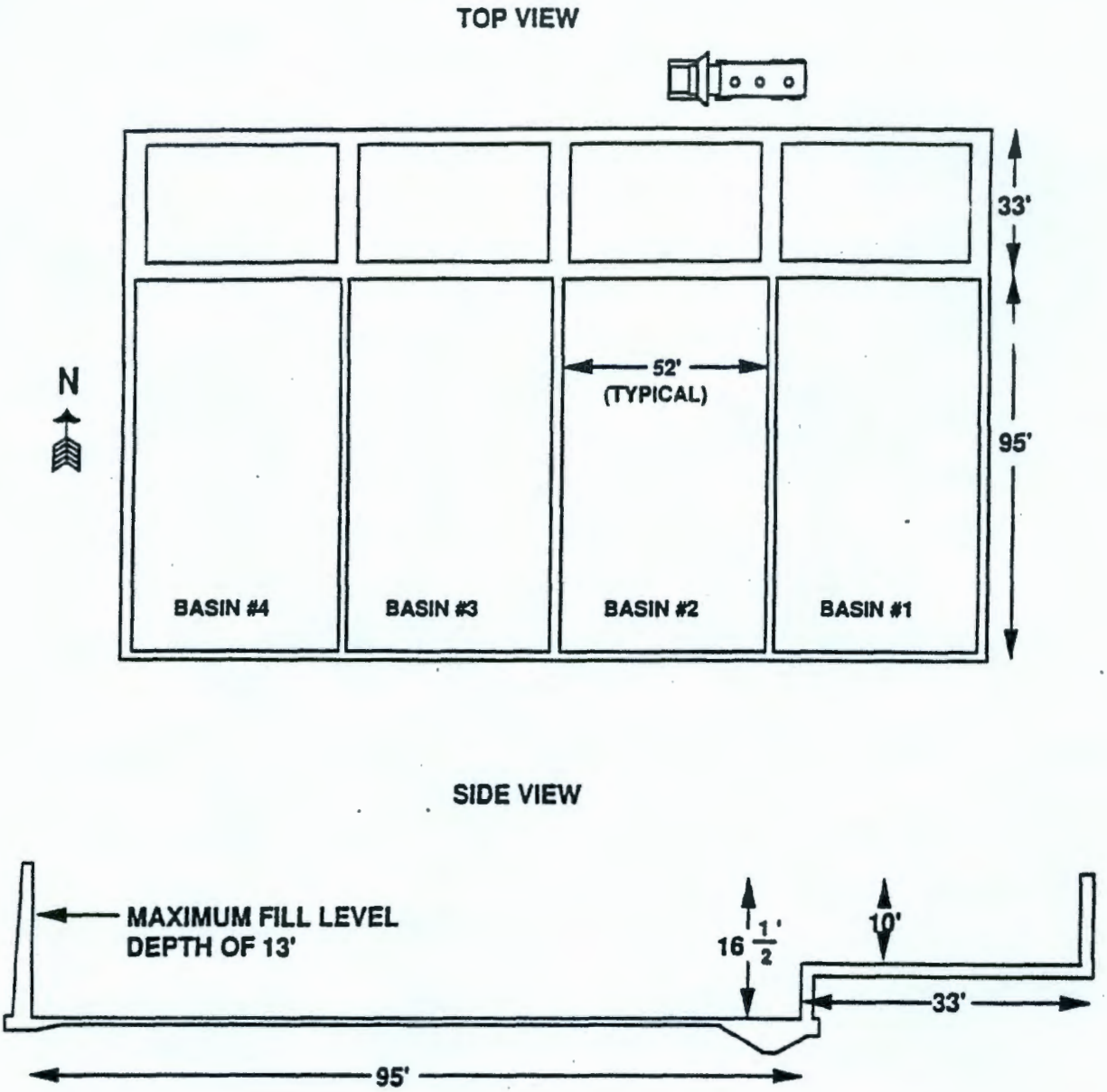

Figure 2. Locations of 1991 Boreholes in the 183-H Solar Basins.

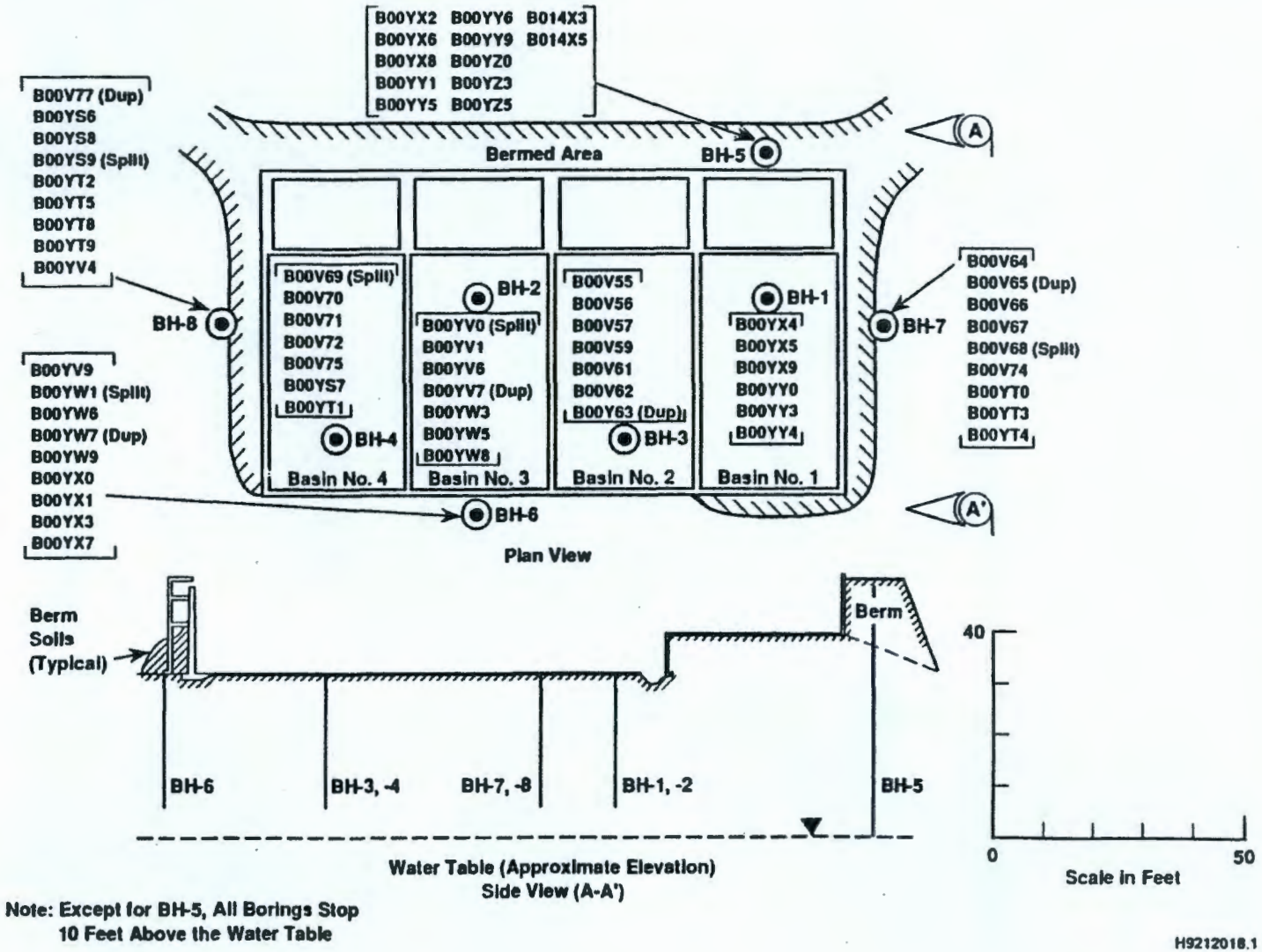

Figure 3. 100-H-33 Related Borehole Locations Within the 183-H Solar Evaporation Basins Footprint.

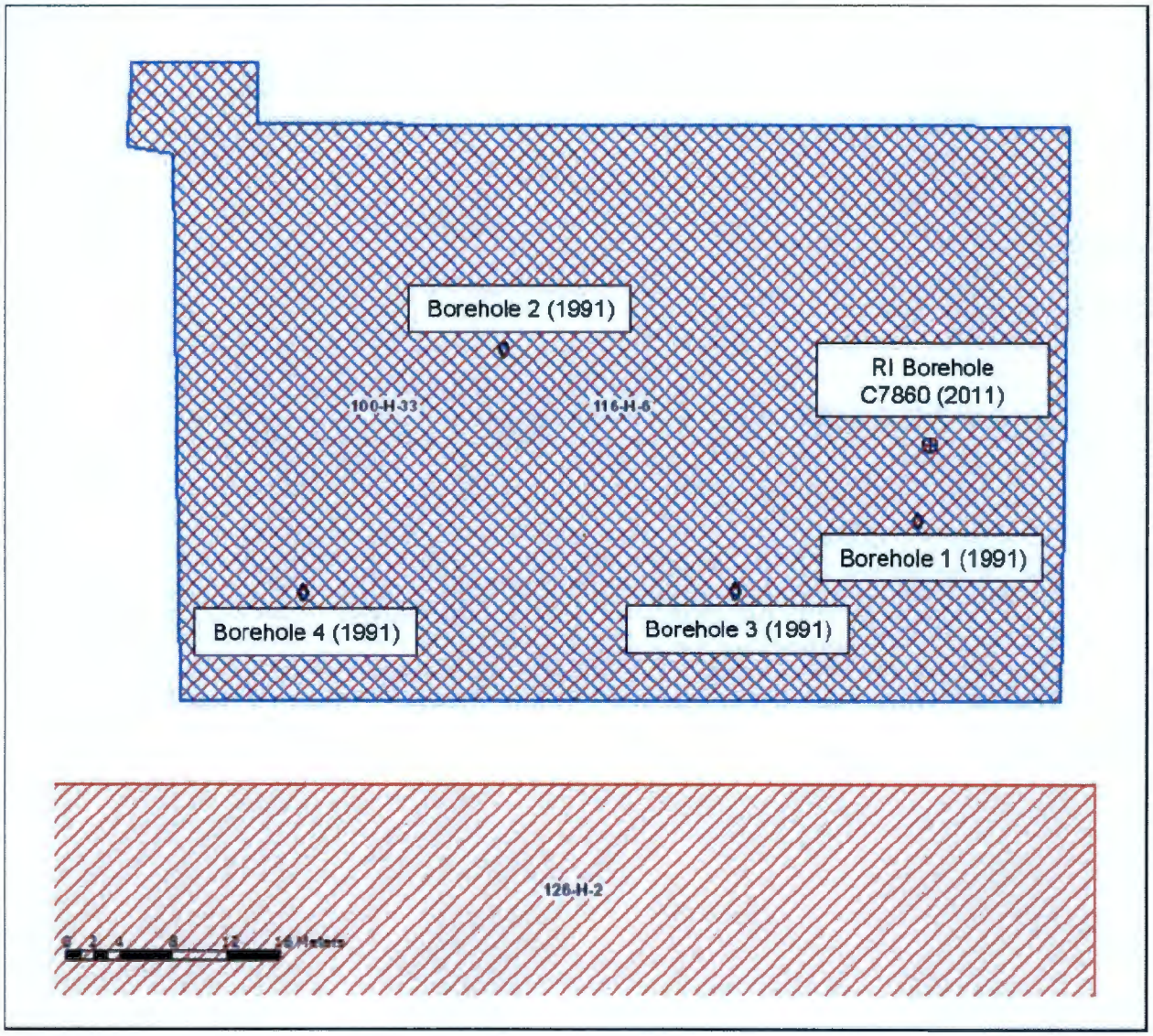

Table 1. Radionuclide Results from 1991 Borehole Samples within the 183-H Solar Evaporation Basin (DOE/RL-95-29).

Borehole, Location	Sample Interval Depth		Sample Number	Gross Alpha		Gross Beta		Tc-99		U-234		U-235		U-238		Cs-137	
	ft (below basin)	ft (bgs)		pCi/g	Q	pCi/g	Q	pCi/g	Q	pCi/g	Q	pCi/g	Q	pCi/g	Q	pCi/g	Q
BH-1, Basin 1	0 - 2	7 - 9	B00YX4	25		47		39		7.0		0.8		5.3		0.1	U
BH-1, Basin 1	4 - 4.4	12 - 13.4	B00YX5	22		21		1.1		7.8		1.0		5.7		0.1	
BH-1, Basin 1	9 - 9.6	16 - 16.6	B00YX9	12		19		1.2		6		0.5		4.5		0.1	U
BH-1, Basin 1	14.5 - 15.5	21.5 - 22.5	B00YY0	9		15		3.1		2.8		0.2		2.0		0.09	U
BH-1, Basin 1	19.4 - 20.6	26.4 - 27.6	B00YY3	4.2		20		4.6		2.1		0.16 [a]		1.7		0.09	
BH-1, Basin 1	24.9 - 26.4	31.9 - 33.4	B00YY4	7.6		17		6.6		2.5		0.3		2.0		0.08	U
BH-3, Basin 2	0 - 2	7 - 9	B00V55	10		52		176		1.6		0.2	U	1.5		0	U
BH-3, Basin 2	4 - 6	11 - 13	B00V56	2		14		3.8		0.6		0.1	U	0.8		0	
BH-3, Basin 2	10 - 11	17 - 18	B00V57	3		15		0.5	U	0.5		0.1	U	0.5		0.03	U
BH-3, Basin 2	14.5 - 15.5	21.5 - 22.5	B00V59	7		12		0.2	U	0.5		0.1	U	0.4		0.03	U
BH-3, Basin 2	19 - 20.2	26 - 27.2	B00V61	0		10		0.2	U	0.4		0.1	U	0.3		0.04	U
BH-3, Basin 2	24 - 25	31 - 32	B00V62	2		10		0.3	U	0.4		0.1	U	0.4		0.03	U
BH-3, Basin 2	24 - 25 (duplicate)	31 - 32 (duplicate)	B00V63	3		14		0.5		0.5		0.1	U	0.5		0.03	U
BH-2, Basin 3	0 - 2	7 - 9	B00YV1	11		20		6.7		0.6		0.02		0.4		0.07	U
BH-2, Basin 3	6.2 - 7	13.2 - 14	B00YV6	5		13		0.4		0.5		0.01		0.4		0.06	U
BH-2, Basin 3	6.2 - 7 (duplicate)	13.2 - 14 (duplicate)	B00YV7	7		17		0.3		0.4		0.03		0.4		0.09	U
BH-2, Basin 3	9.5 - 10.3	16.5 -17.3	B00YV8	4		13		0.8		0.4		0.04		0.5		0.08	U
BH-2, Basin 3	14 - 15.8	21 - 22.8	B00YW3	1		13		0.3		0.6		0.04		0.5		0.08	U
BH-2, Basin 3	19.25 - 20.15	26.25 - 27.15	B00YW5	2		16		0.3		0.4		0.04		0.4		0.08	U
BH-2, Basin 3	24 - 24.5	31 - 31.5	B00YW8	4		14		1		0.5		0		0.5		0.08	U
BH-4, Basin 4	0 - 2	7 - 9	B00V70	7		16		2.8		0.8		0.1	U	0.8		0.03	U
BH-4, Basin 4	4 - 6	11 - 13	B00V71	7		15		0.4	U	0.6		0.1	U	0.6		0.03	U
BH-4, Basin 4	9 - 10.5	16 - 17.5	B00V72	0		14		0.2		0.4		0.004		0.5		0.04	U
BH-4, Basin 4	14 - 14.5	21 - 21.5	B00V75	6		16		0.2		0.5		0.01		0.5		0.03	U
BH-4, Basin 4	19 - 20	26 - 27	B00YS7	4		15		0.4		0.3		0.02		0.4		0.04	U
BH-4, Basin 4	24.6 - 25.6	31.6 - 32.6	B00YT1	6		15		0.2		0.4		0.004		0.4		0.04	U

[a] Sample result originally recorded as 16 pCi/g in summary data, but value has been corrected to 0.16 pCi/g based on raw data copy from the laboratory.

bgs = below ground surface
Q = qualifier
U = undetected

The original reported data of the radiological samples from these boreholes were retrieved from storage, and the results recorded in DOE-RL 1997 were checked for accuracy. A significant data entry error, recording 16 pCi/g U-235 at the borehole depth interval extending to 6.3 m (20.6 ft) below the concrete basin (equating to about 8.4 m [27.6 ft] bgs) in the basin 1 borehole (Well 199-H4-50), was identified (sample B00YY3). An evaluation of the raw data showed that the result was actually incorrectly entered onto the lab generated summary data page, which was used to report data in DOE-RL, 1997. The actual result for U-235 in B00YY3 is 0.16 pCi/g. The result equates to a more typical ratio of the uranium isotopes with U-234 and U-238 results of 2.1 and 1.7 pCi/g, respectively.

Soil removal in February 1996 removed 0.6 m (2 ft) from the entire basin footprint (the concrete basin structures had been previously removed). Radiological analyses were not conducted for the test pit samples. Soil removed under basin 1 for the sampling efforts was later disposed to the Environmental Restoration Disposal Facility (ERDF).

The 1991 borehole data from basin 1 was collected on the northern end of the sedimentation basin per DOE/RL-95-29 and other related documents (Figure 2). However, the coordinates provided in the Waste Information Data System (WIDS) for this borehole (groundwater monitoring well 199-H4-50) show the well is actually in the southern end of the basin. Survey data from 1991 verified that the borehole was placed in the southern rather than the northern section of the sedimentation basin as depicted in Figure 3.

The 116-H-6, 183-H Solar Evaporation Basins waste site, consisting of the nonradionuclide component of the basins, was reclassified as Interim Closed Out under a modified Resources Conservation and Recovery Act (RCRA) Treatment, Storage, and Disposal (TSD) closure in 1997, and required Postclosure groundwater monitoring. The groundwater monitoring program was put in place with three downgradient wells (199-H4-12C, 199-H4-12A, and 199-H4-3) and one upgradient well (119-H-4-8). The locations of groundwater monitoring wells are shown in Figure 4 (Hartman 2007). Results of groundwater monitoring for uranium and technetium-99 (Tc-99) through December 2006 are presented in Figures 5 and 6 (Hartman 2007). While Tc-99 levels are generally at or below the maximum contaminant level (MCL) of 900 pCi/L, the concentrations of total uranium have exceeded the agreed upon MCL of 30 μg/L in two of the three downgradient wells since January 2006. However, data from the 2010 183-H groundwater monitoring report (CH2M Hill 2010) (Table 2) show Tc-99 detections well under the MCL at a maximum of 19 pCi/g. Uranium is also well under the MCL with a maximum detection of 12.2 μg/L.

Figure 4. Locations of 183-H Monitoring Wells (Hartman 2007).

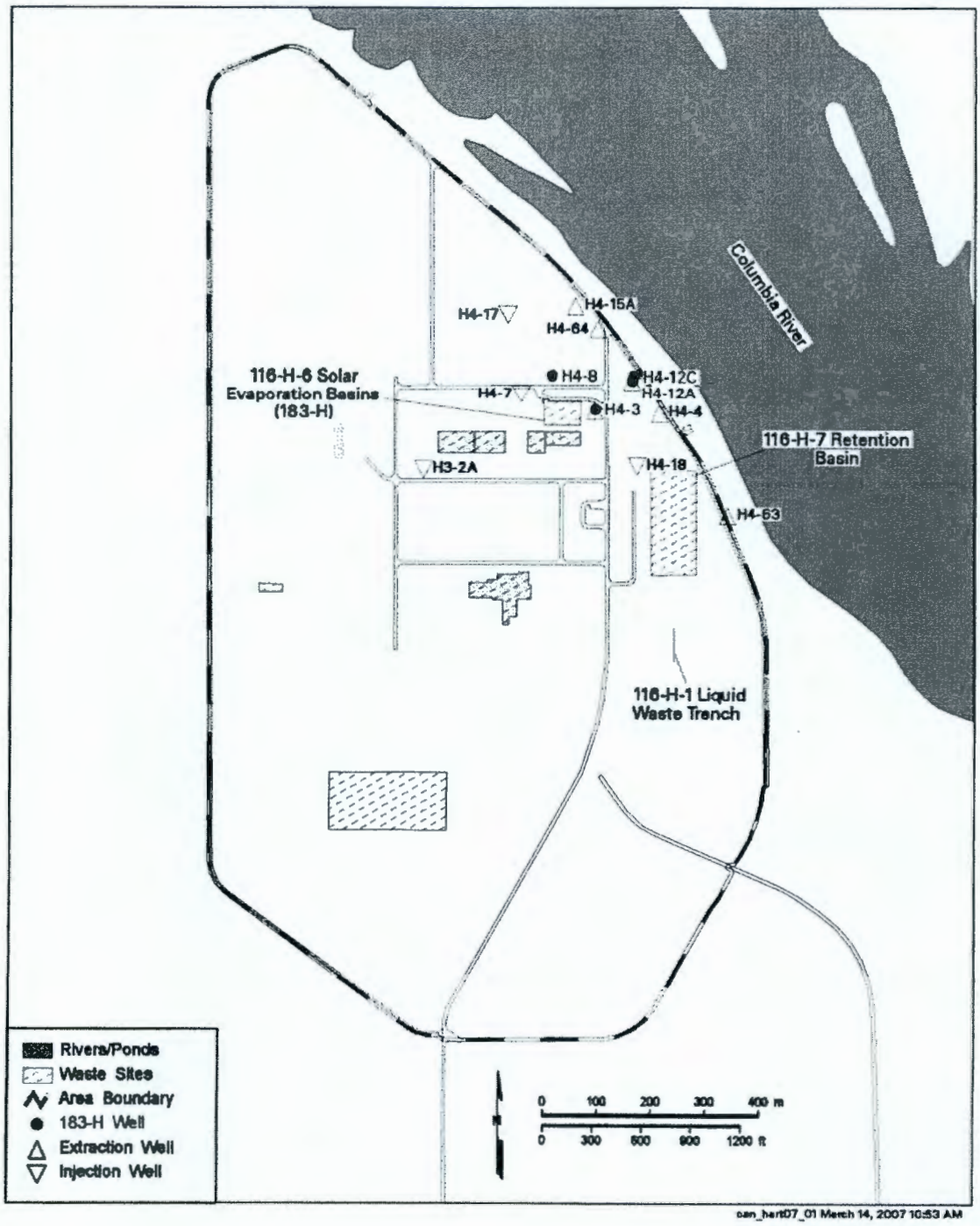

Figure 5. Technetium-99 Measured in 183-H Monitoring Wells (Hartman 2007).

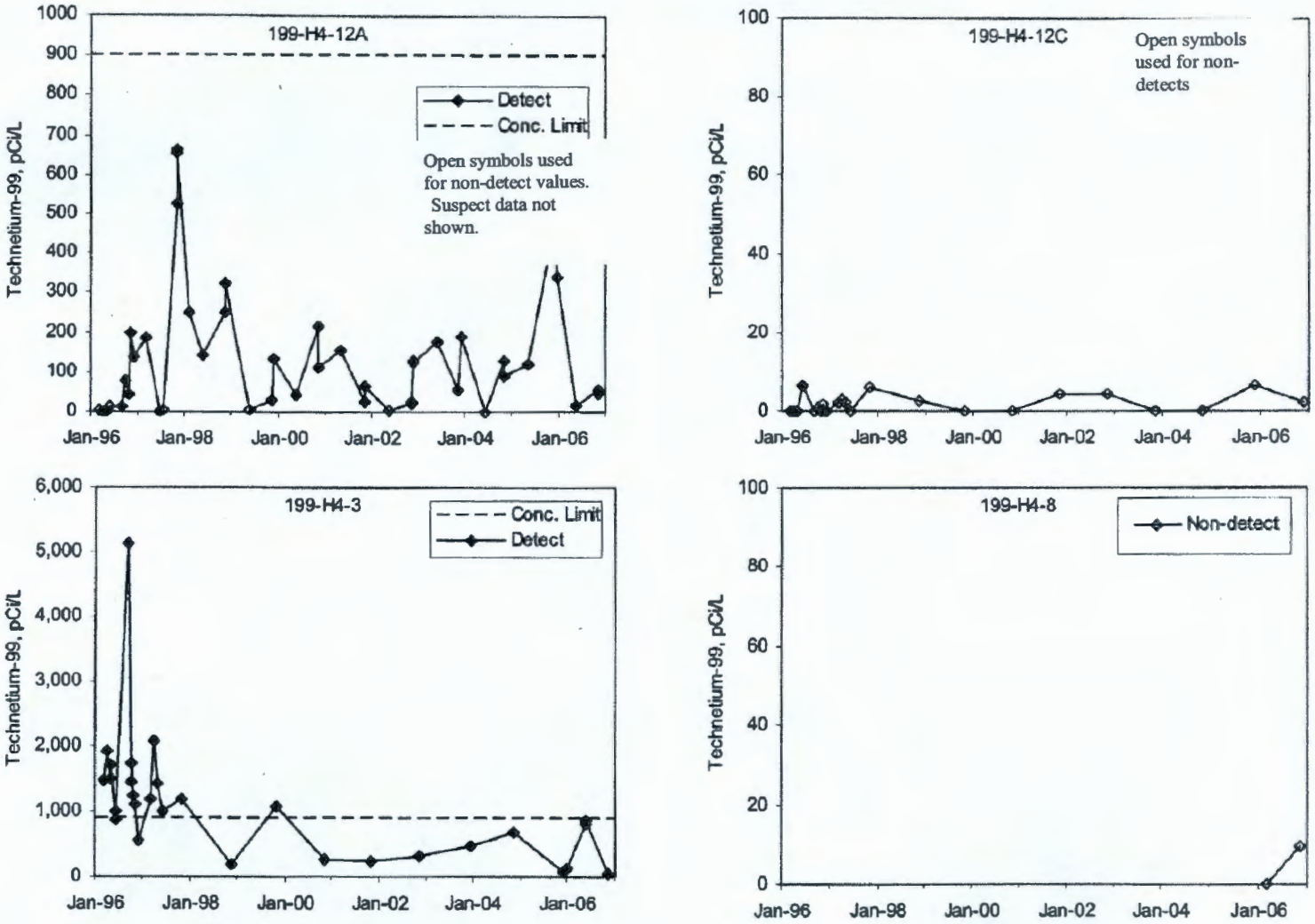

Figure 6. Uranium Measured in 183-H Monitoring Wells (Hartman 2007).

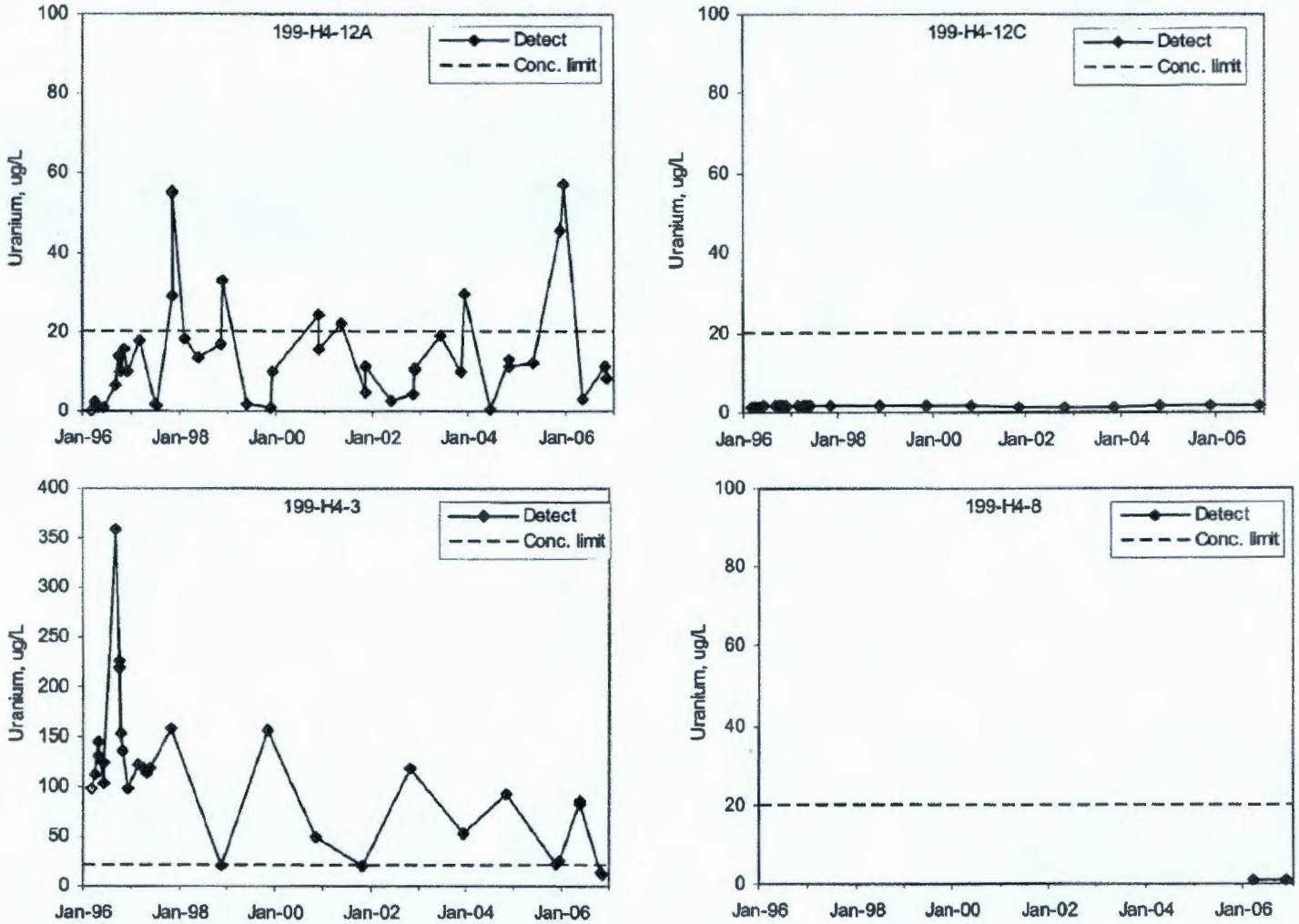

Table 2. Data from January through June 2010 183-H Groundwater Monitoring (CH2M HILL 2010).

Well	Date	Sampling Purpose	Technetium-99 (pCi/L)	Q	Uranium (µg/L)	Q
Concentration Limit [a]			900 pCi/L		20 µg/L	
199-H4-12A	5/20/2010	CERCLA	-2.4	U	3.09	D
199-H4-3	1/11/2010	CERCLA	19		12.2	D
199-H4-3	4/22/2010	CERCLA	7.9		8.28	D
199-H4-3	5/20/2010	CERCLA	9.6		6.68	D
199-H4-8	1/11/2010	CERCLA	-0.2	U	0.61	D

[a] Concentration limits defined in the Hanford Facility RCRA Permit, Part VI, Post-Closure Unit 2. Analyses are from unfiltered samples unless otherwise noted. Italics indicate filtered samples.

CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
D = sample diluted for analysis; result corrected for dilution
Q = qualifier
RCRA = Resource Conservation and Recovery Act
U = undetected

In February 2011, borehole C7860 (well 199-H4-84) was drilled in 183-H Basin 1 approximately 5.8 m (19 ft) north of the 1991 borehole in support of the 100-HR-1 remedial investigation/feasibility study (RI/FS) (DOE/RL 2010a). This location roughly corresponds to the middle of the former sedimentation basin where the most contaminated samples were collected in 1991. Borehole samples were collected in accordance with the *Sampling and Analysis Plan for 100-DR-1, 100-DR-2, 100-DR-3, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units Remedial Investigation/Feasibility Study* (DOE/RL 2010b) at intervals through the vadose zone and into the aquifer. Samples for radionuclide analysis were collected at nine sample intervals, with the deepest interval collected several feet into the aquifer. The water table was encountered at approximately 12.2 m (40 ft) bgs. Results for detected radiological analytes are presented in Table 3.

The only radionuclides detected above background in the borehole were strontium-90 (Sr-90), Tc-99, and tritium. There were no detections in the upper two sample intervals extending up to about 4.6 m (15.1 ft) bgs, indicating sampling had occurred in backfill material. In the remaining samples, Tc-99 was detected at low activities, with the highest activity (0.544 pCi/g) measured at the water table at 12.1 m (39.8 ft). Two low-level detections of tritium (maximum 7.10 pCi/g) were measured in intervals extending to 8.3 and 9.8 m (27.1 and 32.0 ft) bgs, and a third detection of 5.55 pCi/g from the aquifer sample at 13.1 m (43.0 ft) bgs. A single low-level detection of Sr-90 at 0.383 pCi/g was measured in a duplicate sample from approximately 11.3 m (37 ft) bgs. Uranium was below background in all borehole samples. The data indicate that the source of contamination has been removed, and low concentrations of residual radionuclides are present in the deep vadose zone beneath the former 183-H Basin 1 at the 100-H-33 waste site.

Additional analyses for Tc-99 and uranium were performed on groundwater sample B2C6D2 collected from 199-H4-84 in June 2011. The combined activity from the uranium isotopes was 33.5 pCi/L, which is above the activity-equivalent EPA MCL of 21 pCi/L. Assuming isotopic natural abundances, 21 pCi/L is equivalent to 30 µg/L. Technetium-99 was measured at 53.4

pCi/L.

Table 3. Radiological Analytes Detected in Remedial Investigation Borehole C7860 at the 100-H-33 Waste Site.

Sample Interval	Sample Identification	Sample Depth (ft) [a]	Date	Stronium-90		Technetium-99		Tritium		Uranium-233/234		Uranium-235		Uranium-238	
				pCi/g	Q	pCi/g	Q	pCi/g	Q	pCi/g	Q	pCi/g	Q	pCi/g	Q
C7860 (116-H-6); I-001	B29MJ3	12.6	7-Feb-11	0.022	U	-0.017	U	2.63	U	0.560		0.008	U	0.535	
C7860 (116-H-6); I-002	B29MJ4	15.1	7-Feb-11	-0.008	U	-0.001	U	1.54	U	0.520		0.032	U	0.579	
C7860 (116-H-6); I-003	B29MJ6	21.8	7-Feb-11	0.033	U	0.232		2.99	U	0.288		0.070	U	0.346	
C7860 (116-H-6); I-004	B29MJ7	27.1	7-Feb-11	-0.106	U	0.213		7.10		0.605		0.033	U	0.495	
C7860 (116-H-6); I-005	B29MJ8	32.0	8-Feb-11	0.023	U	0.222		6.16		0.271		0.060	U	0.517	
C7860 (116-H-6); I-006	B29MJ9	34.8	8-Feb-11	-0.068	U	0.303		2.84	U	0.538		0.041	U	0.403	
C7860 (116-H-6); I-007	B29MK0	37.0	8-Feb-11	0.012	U	0.328		-0.342	U	0.452		0.050		0.424	
C7860 (116-H-6); I-007 Duplicate of B29MK0	B29MK1	37.0	8-Feb-11	0.383		0.304		0.327	U	0.515		0.011	U	0.452	
C7860 (116-H-6); I-008	B29MK2	39.8	9-Feb-11	0.003	U	0.544		0	U	0.429		0.011	U	0.462	
C7860 (116-H-6); I-010	B29MK4	43.0	9-Feb-11	-0.043	U	0.148		5.55		0.549		0.039	U	0.613	

[a] Reported sample depth is the deeper end of the sample interval obtained using a split spoon.

SUMMARY FOR RECLASSIFICATION TO NO ACTION

The combination of borehole results and groundwater sampling indicate that source removal has occurred and that residual contamination warranting cleanup is not present in the deep vadose zone. Although the uranium result of 33.5 pCi/L from groundwater sample B2C6D2 is above the MCL of 30 μg/L (21 pCi/L), this result represents a small exceedance at a single point in time in the groundwater. This location will continue to be monitored through the DOE groundwater monitoring program for both uranium and Tc-99 in coordination with the nonradionuclide monitoring conducted as part of the 183-H RCRA Postclosure Plan (DOE/RL 1995).

REFERENCES

DOE/RL, 1995, *RCRA Closure Data Evaluation Report: 183-H Solar Evaporation Basins Soil and Concrete*, DOE/RL-95-29, Rev. 0, U.S. Department of Energy, Richland, Washington.

DOE/RL, 1997, *183-H Solar Evaporation Basins Postclosure Plan*, DOE/RL-97-48, Rev. 0, U.S. Department of Energy, Richland, Washington.

DOE/RL, 2010a, *Integrated 100 Area Remedial Investigation/Feasibility Study Work Plan, Addendum 1: 100-DR-1, 100-DR-2, 100-DR-3, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units*, DOE/RL-2008-46-ADD1, Rev. 0, U.S. Department of Energy, Richland, Washington.

DOE/RL, 2010b, *Sampling and Analysis Plan for 100-DR-1, 100-DR-2, 100-DR-3, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units Remedial Investigation/Feasibility Study*, DOE/RL-2009-40, Rev. 0, U.S. Department of Energy, Richland, Washington.

Hartman, M. J., 2007, *Results of Groundwater Monitoring for the 183-H Solar Evaporation Basins; Reporting Period: July – December 2006,* PNNL-16491, Pacific Northwest National Laboratory, Richland, Washington.

CH2M Hill, 2010, *Results of Groundwater Monitoring for the 183-H Solar Evaporation Basins and 300 Area Process Trenches, January-June, 2010*, SGW-47971, Rev. 0, U.S. Department of Energy, Richland, Washington.