



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

01-ERD-074

MAY 4 2001

Ms. Jane A. Hedges
 Cleanup Section Manager
 Nuclear Waste Program
 State of Washington
 Department of Ecology
 1315 W. Fourth Avenue
 Kennewick, Washington 99336-6018

RECEIVED
 MAY 30 2001

EDMC

Dear Ms. Hedges:

TRANSMITTAL OF, "CONTAINED-IN REQUEST FOR 100-HR-3 OPERABLE UNIT
 GROUNDWATER IN THE VICINITY OF THE 183-H SOLAR EVAPORATION BASINS"

The U.S. Department of Energy, Richland Operations Office (RL) is requesting that the State of Washington Department of Ecology grant a contained-in determination for the groundwater in the 100-HR-3 Operable Unit (OU) in the vicinity of the 183-H Solar Evaporation Basins. The basins contributed to groundwater contamination in the 100-HR-3 OU. The basins received small quantities of U and P listed waste chemicals that could potentially have migrated into the underlying groundwater. The groundwater in this area is currently undergoing remediation in accordance with the 100-HR-3 and 100-KR-4 Interim Action Record of Decision.

Please find attached the contained-in request, which includes a history of listed waste discharges to the 183-H Basins and analytical data from the groundwater for the listed waste constituents of concern. Sampling was conducted in March 2001, to supplement the information contained in the Hanford Environmental Information System database. Upon approval of the this request, RL will remove the applicable U and P listed waste codes from the existing waste and will not include the code in future 100-HR-3 groundwater OU waste designations.

If you should have any questions regarding this request, please contact me at (509) 373-9631.

Sincerely,

Arlene C. Tortoso, Project Manager
 Environmental Restoration Division

ERD:ACT

Attachment

cc: See page 2

Ms. Jane A. Hedges
01-ERD-074

-2-

MAY 4 2001

cc w/attach:

G.B. Mitchem, BHI

J. Price, Ecology

W.W. Soper, Ecology

M. Harmon, EM-43

Admin Record (100-HR-3)

cc w/o attach:

J.G. Woolard, BHI

J.V. Borghese, CHI

J. Yokel, Ecology

CONTAINED-IN REQUEST FOR 100-HR-3 OPERABLE UNIT GROUNDWATER IN THE VICINITY OF THE 183-H SOLAR EVAPORATION BASINS

1.0 INTRODUCTION

This document provides data to support a contained-in determination for groundwater in the vicinity of the 100-HR-3 Operable Unit (OU). The groundwater beneath and near the 183-H Solar Evaporation Basins has been contaminated from past leaks from the basins. The basins received listed wastes that could have leached into the underlying groundwater. As a result, extracted groundwater and material that comes into contact with the groundwater (e.g., resins) are assumed to contain listed waste.

Contaminated media (e.g., groundwater) and debris may be determined to no longer contain the dangerous waste code (i.e., the "listing") if the contaminated media/debris fall below specific risk-based concentrations. As a general policy, the Washington State Department of Ecology (Ecology) has established these risk-based action levels as the residential standards calculated under the *Model Toxics Control Act* (MTCA) (*Washington Administrative Code* [WAC] 173-303-340-720). A groundwater sampling effort was conducted in March 2001 to obtain additional data necessary to demonstrate that the groundwater does not contain listed wastes. Approval of this contained-in request will eliminate the listed waste codes from the groundwater or the material that comes into contact with the groundwater.

2.0 BACKGROUND

The 183-H Solar Evaporation Basins received liquid effluents from 1973 through 1985. The basins primarily received spent acid-etch solutions (primarily nitric, sulfuric, hydrofluoric, and chromic acids) generated by the nuclear fuel fabrication process. Typically these acidic solutions were reacted (neutralized) with excess sodium hydroxide before being transported to the 183-H Basins. The basins received small quantities of listed waste (see Table 1). Leaks from the basins contaminated the groundwater beneath and near these basins. The primary contaminant of concern in the groundwater is hexavalent chromium. However, due to the potential for listed waste to have leaked from the basins (along with the other effluents), the groundwater is assumed to contain listed waste. It is not anticipated that these listed wastes would be detectable in the groundwater due to the small volumes and mixing with other effluents that would likely have been present in the basin effluent.

A groundwater pump-and-treat system was installed to extract chromium-contaminated groundwater and remove the chromium with ion exchange. Operation of the pump-and-treat system has resulted in the generation of secondary waste materials (e.g., ion-exchange resins), which must subsequently be managed. Due to contact with groundwater containing listed waste, the listed waste codes must also be applied to the secondary waste unless it is determined that the

groundwater does not contain the listed waste. The application of listed waste codes to the secondary waste would result in costly unnecessary treatment (i.e., combustion and stabilization) of this waste.

Table 1. Listed Waste Chemicals Discharged to 183-H Basins.^a

Chemical	Quantity	Dangerous Waste Number
Unused formic acid	2 lb	U123
Unused cyanide solutions	2 gal	P030
Unused saturated vanadium pentoxide aqueous solution	0.25 gal	P120
Unused copper cyanide	1 lb	P029
Unused sodium cyanide	1 lb	P106
Unused potassium cyanide	0.5 lb	P098

^a Data taken from *183-H Solar Evaporation Basins Closure/Post-Closure Plan* (DOE-RL 1990).

3.0 CONTAINED-IN STRATEGY

The strategy for this contained-in determination request was documented in the *Sampling and Analysis Instruction for Contained-In Determination for Groundwater in Vicinity of 100-HR-3 Operable Unit* (BHI 2001). Ecology's concurrence with this document was obtained on February 22, 2001. If the concentration of listed waste constituents is less than the levels identified in Table 2 and chromium is not present in the groundwater at characteristic levels, then the groundwater would be determined to no longer contain the listed waste constituents. The levels are based on MTCA Method B formula values for groundwater. Groundwater data already exist for vanadium and cyanide; however, it was determined that additional data on current conditions would be obtained to supplement the existing data. There are no direct methods for measuring sodium cyanide, vanadium pentoxide, copper cyanide, or potassium cyanide, therefore total vanadium and total cyanide will be used to evaluate the presence of these constituents.

There are no existing data for formic acid, so groundwater sampling for formate is required to fill this data gap. Total chromium was to be analyzed to evaluate the potential for the groundwater to contain characteristic concentrations of contaminants. Other contaminants (based on historical data) are not anticipated to be present at levels that would result in the groundwater being designated as a characteristic, toxic, or persistent dangerous waste. While previous chromium data are available for this area, it was determined that additional data would be obtained to supplement the existing data.

Table 2. Results of March 2001 Sampling Event. (3 Pages)

Contaminant	Action Level (ppb)	Basis for Action Level	Well Number/ Sample #	Value Reported (ppb)	Data Qualifier ^a
Formic acid (formate analysis)	32,000	MTCA Method B formula values for groundwater	199-H4-3/B11KN7	0.25	U
			199-H4-4/B11KN8	0.25	U
			199-H4-8/B11KN9	0.25	U
			199-H4-12A/B11KP0	0.25	U
			199-H4-14/B11KP1	0.25	U
			199-H4-15A/B11KP2	0.25	U
			199-H4-18/B11KP3	0.25	U
			199-H4-64/B11KP4	0.25	U
			199-H4-11/B11KP6 ^b	N/A	N/A
			199-H4-11/B11KP8	0.25	U
			199-H4-11/B11KP9 ^c	0.25	U
Cyanide Copper cyanide Sodium cyanide Potassium cyanide	320 23 ^d 340 ^d 320 ^d	MTCA Method B formula values for groundwater	199-H4-3/B11KN7	5	U
			199-H4-4/B11KN8	5	U
			199-H4-8/B11KN9	5	U
			199-H4-12A/B11KNP0	5	U
			199-H4-14/B11KP1	5	U
			199-H4-15A/B11KP2	5	U
			199-H4-18/B11KP3	5	U
			199-H4-64/B11KP4	5	U
			199-H4-11/B11KP6 ^b	1.7	B
			199-H4-11/B11KP8	5	U
			199-H4-11/B11KP9 ^c	5	U
Vanadium pentoxide	81 ^e	MTCA Method B formula values for groundwater	199-H4-3/B11KN7	3.6	U
			199-H4-4/B11KN8	3.6	U
			199-H4-8/B11KN9	3.6	U
			199-H4-12A/B11KNP0	3.6	U
			199-H4-14/B11KP1	4.4	
			199-H4-15A/B11KP2	7.3	
			199-H4-18/B11KP3	3.6	U
			199-H4-64/B11KP4	4.8	

Table 2. Results of March 2001 Sampling Event. (3 Pages)

Contaminant	Action Level (ppb)	Basis for Action Level	Well Number/ Sample #	Value Reported (ppb)	Data Qualifier ^a
			199-H4-11/B11KP6 ^b	4.7	U
			199-H4-11/B11KP8	3.6	U
			199-H4-11/B11KP9 ^c	3.6	
Chromium	5,000	Characteristic designation limit	199-H4-3/B11KN7	112	
			199-H4-4/B11KN8	115	
			199-H4-8/B11KN9	75.3	
			199-H4-12A/B11KNP0	65.1	
			199-H4-14/B11KP1	106	
			199-H4-15A/B11KP2	59.7	
			199-H4-18/B11KP3	43.3	
			199-H4-64/B11KP4	59.7	
			199-H4-11/B11KP6 ^b	32	
			199-H4-11/B11KP8	32.7	
			199-H4-11/B11KP9 ^c	35.7	
Potassium	N/A	N/A	199-H4-3/B11KN7	5,400	
			199-H4-4/B11KN8	5,000	
			199-H4-8/B11KN9	5,700	
			199-H4-12A/B11KNP0	4,830	
			199-H4-14/B11KP1	5,420	
			199-H4-15A/B11KP2	5,220	
			199-H4-18/B11KP3	4,730	
			199-H4-64/B11KP4	5,250	
			199-H4-11/B11KP6 ^b	3,860	B
			199-H4-11/B11KP8	3,040	
199-H4-11/B11KP9 ^c	3,130				
Sodium	N/A	N/A	199-H4-3/B11KN7	71,400	
			199-H4-4/B11KN8	65,800	
			199-H4-8/B11KN9	21,300	
			199-H4-12A/B11KNP0	28,800	
			199-H4-14/B11KP1	12,700	
			199-H4-15A/B11KP2	13,700	
			199-H4-18/B11KP3	14,400	
			199-H4-64/B11KP4	11,700	
			199-H4-11/B11KP6 ^b	11,500	
			199-H4-11/B11KP8	11,300	
199-H4-11/B11KP9 ^c	11,000				

Table 2. Results of March 2001 Sampling Event. (3 Pages)

Contaminant	Action Level (ppb)	Basis for Action Level	Well Number/ Sample #	Value Reported (ppb)	Data Qualifier ^a
Copper	592	MTCA Method B formula values for groundwater	199-H4-3/B11KN7	3	
			199-H4-4/B11KN8	2.4	U
			199-H4-8/B11KN9	2.6	
			199-H4-12A/B11KNP0	6.3	
			199-H4-14/B11KP1	2.4	U
			199-H4-15A/B11KP2	4.9	
			199-H4-18/B11KP3	3.7	
			199-H4-64/B11KP4	2.4	U
			199-H4-11/B11KP6 ^b	4.0	U
			199-H4-11/B11KP8	7.8	
			199-H4-11/B11KP9 ^c	2.4	U

^a Data qualifiers:

U = not detected above the limiting criteria

B = the analyte was detected at a value less than the contract required detection limit.

^b Sample is a split of B11KP8 and was analyzed at a different laboratory.

^c Sample was a duplicate of B11KP8 and was analyzed in the same laboratory.

^d Action levels for cyanide compounds expressed in terms of cyanide ion.

^e Action level for vanadium pentoxide expressed as vanadium.

N/A = not applicable

4.0 SAMPLE COLLECTION AND HANDLING

A sampling and analysis instruction (SAI) (BHI 2001) was prepared to define the sampling and analysis activities to be performed in support of this contained-in determination. The SAI required samples to be obtained from groundwater wells 199-H4-3, 199-H4-4, 199-H4-8, 199-H4-11, 199-H4-12A, 199-H4-14, 199-H4-15A, 199-H4-18, and 199-H4-64. The samples were to be analyzed for formate, cyanide, sodium, vanadium, copper, potassium, and chromium. The samples were collected during March 2001 in accordance with the SAI, which identified requirements for obtaining, managing, and analyzing the samples.

5.0 SAMPLING RESULTS

The results of the March 2001 sampling event are shown in Table 2. The cyanide and vanadium values demonstrate that the listed waste constituents cyanide, sodium cyanide, copper cyanide, potassium cyanide, and vanadium pentoxide would be below MTCA Method B formula values for groundwater. The formate values are all below the 0.25 ppb detection limit. The total chromium values are below the characteristic designation limit of 5 parts per million (ppm) (WAC 173-303-090).

The Hanford Environmental Information System database contains historical groundwater information for the wells that were sampled in March 2001. The results of historical

groundwater sampling data are summarized in Table 3. The table demonstrates that all total chromium values are below the characteristic designation limit of 5 ppm. (Note: For certain wells, analysis of total chromium began several years later than the initiation of hexavalent chromium analysis.) Hexavalent chromium exceeded the 5-ppm designation limit in 1978 in well 199-H4-3. Since 1978, the hexavalent chromium values have been well below 5 ppm. Vanadium and cyanide values demonstrate that the listed waste constituents cyanide, sodium cyanide, copper cyanide, potassium cyanide, and vanadium pentoxide are below MTCA Method B formula values.

6.0 REQUEST FOR CONTAINED-IN DETERMINATION

Based on the data presented in Sections 4.0 and 5.0, the U.S. Department of Energy, Richland Operations Office requests that Ecology grant a contained-in determination for the groundwater associated with 100-HR-3 OU (the area of interest identified in Figure 1) for the following listed waste codes:

- U123 – formic acid
- P030 – cyanide solutions
- P120 – vanadium pentoxide
- P029 – copper cyanide
- P106 – sodium cyanide
- P098 – potassium cyanide.

Table 3. Data Based on the Results of Historical Groundwater Sampling. (2 Pages)

Contaminant	Action Level ^a	Well Number	Number of Analyses	Sampling Dates	Maximum Detected Value (ppb) ^{b,c}	Sampling Date
Total chromium	5,000 ppb	199-H4-11	78	1986-1996	190	1992
		199-H4-12A	100	1987-2000	306	1987
		199-H4-14	74	1987-2000	474	1988
		199-H4-15A	68	1987-2000	205	1987
		199-H4-18	96	1987-2000	293	1988
		199-H4-3	196	1985-2000	1,130	1985
		199-H4-4	209	1985-2000	729	1985
		199-H4-64	10	1998-2000	143	1998
		199-H4-8	58	1986-2000	283	1994
Hexavalent chromium	5,000 ppb	199-H4-11	22	1996-2001	117	1998
		199-H4-12A	22	1996-2001	158	1998
		199-H4-14	14	1994-2000	430	1998

Table 3. Data Based on the Results of Historical Groundwater Sampling. (2 Pages)

Contaminant	Action Level ^a	Well Number	Number of Analyses	Sampling Dates	Maximum Detected Value (ppb) ^{b,c}	Sampling Date
		199-H4-15A	20	1996-2001	80	2001
		199-H4-18	12	1996-2000	235	1988
		199-H4-3	84	1974-2000	12,000	1978
		199-H4-4	71	1983-2001	1,400	1983
		199-H4-64	58	1996-2001	87	1998
		199-H4-8	10	1997-2000	166	1997
Vanadium	81 ppb	199-H4-11	78	1986-1996	19 L	1993
		199-H4-12A	100	1987-2000	16.8	1997
		199-H4-14	74	1987-2000	23 L	1993
		199-H4-15A	68	1987-2000	26 L	1993
		199-H4-18	96	1987-2000	22 L	1993
		199-H4-3	196	1985-2000	33.2 B	1996
		199-H4-4	209	1985-2000	22 L	1993
		199-H4-64	10	1998-2000	33.2 B	1998
		199-H4-8	58	1986-2000	26 L	1993
Cyanide	23 ppb	199-H4-11	5	1989-1993	20 U	1992
		199-H4-12A	2	1989-1992	10 U	1989
		199-H4-14	5	1989-1993	20 U	1992
		199-H4-15A	5	1989-1993	20 U	1992
		199-H4-18	2	1989-1992	10 U	1989
		199-H4-3	24	1985-1993	20 U	1992
		199-H4-4	16	1985-1993	20 U	1992
		199-H4-64	0	N/A	N/A	N/A
		199-H4-8	1	1989	10 U	1989

^a Action level:

Total chromium = based on the designation limit

Hexavalent chromium = based on the designation limit

Vanadium = based on the MTCA Method B formula value for vanadium pentoxide, expressed as vanadium.

Cyanide = based on the MTCA Method B formula value for copper cyanide, expressed as cyanide ion.

^b Maximum detected value for all constituents with the exception of cyanide. All cyanide values were report as undetected.

^c Laboratory qualifiers:

L = MDL <= value <= CRQL

B = the analyte was detected at a value less than the contract required detection limit, but greater than or equal to the IDL/MDL (as appropriate).

U = not detected above the limiting criteria

^d Only two values are above the 5,000 ppb action level. All values have been below 5,000 ppb since 1978.

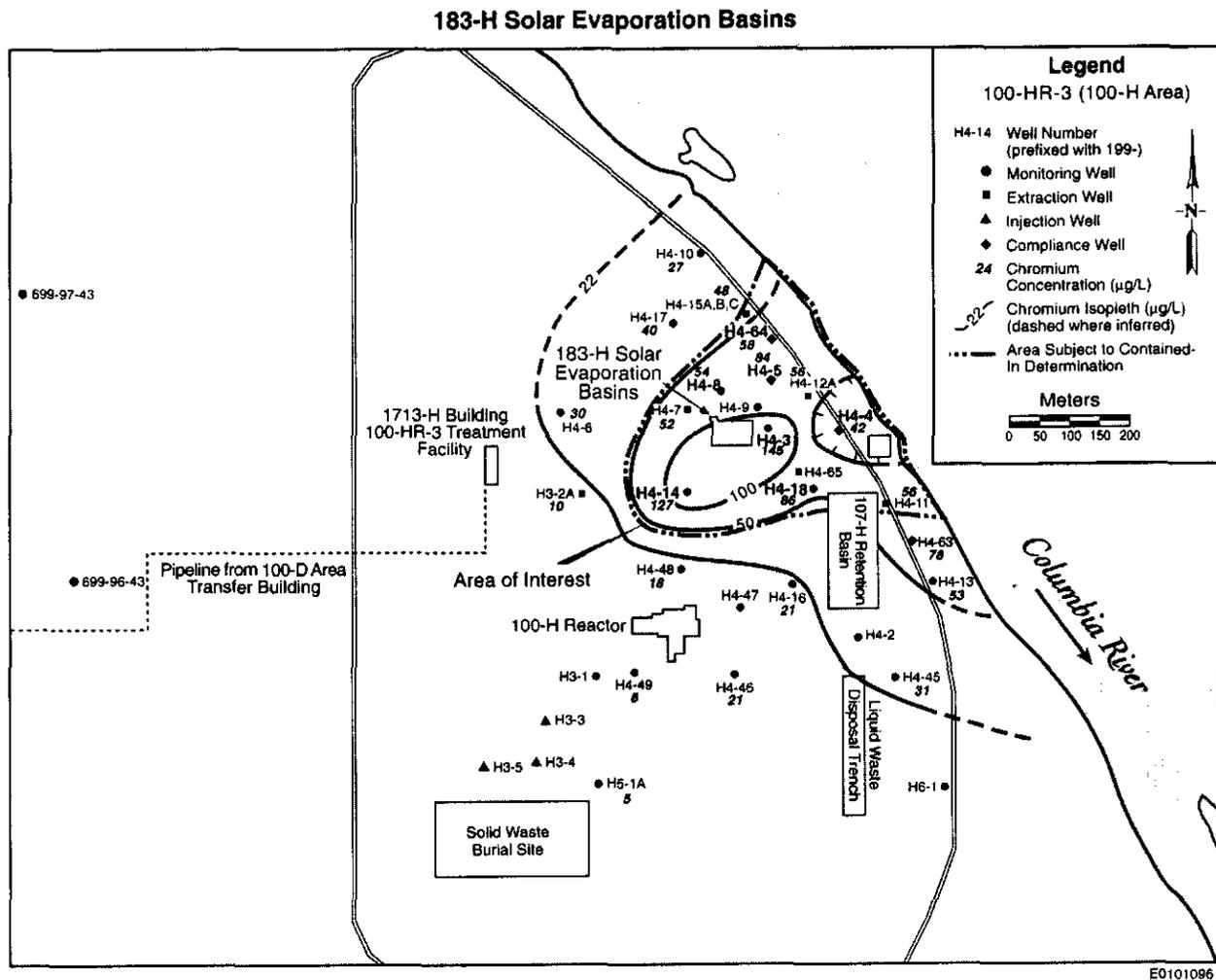
CRQL = contract required quantitation limit

IDL = instrument detection limit

MDL = minimum detectable activity

N/A = not applicable

Figure 1. 183-H Solar Evaporation Basins.



7.0 REFERENCES

- BHI, 2001, *Sampling and Analysis Instruction for Contained-In Determination for Groundwater in Vicinity of 100-HR-3 Operable Unit*, BHI-01485, Rev. 0, Bechtel Hanford, Inc., Richland, Washington
- DOE-RL, 1990, *183-H Solar Evaporation Basins Closure/Post-Closure Plan*, DOE/RL-88-04, Rev. 3, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.
- WAC 173-340, "Model Toxics Control Act – Cleanup," *Washington Administrative Code*, as amended.