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Rev. 0

River Corridor
Closure Contract

100-N Area Decision Unit Target Analyte List Development for Soil

March 2011

Washington Closure Hanford

Prepared for the U.S. Department of Energy, Richland Operations Office
Office of Assistant Manager for River Corridor

Washington Closure Hanford

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1.0 PURPOSE

This report documents the process used to identify source area target analytes in support of the 100-N Area Decision Unit (DU) remedial investigation/feasibility study (RI/FS) addendum to the *Integrated 100 Area Remedial Investigation/Feasibility Study (RI/FS) Work Plan* (DOE/RL-2008-46). A "target analyte" is defined as a constituent suspected of being site-related that is carried into an investigation plan for characterization through sampling and analysis by approved laboratory methods. Target analytes identified for 100 and 300 Area DUs must support RI/FS nature and extent characterization plus final remedial action decisions for source areas. This report also establishes the analyte exclusion criteria applicable for 100-N use and the analytical methods needed to analyze the target analytes.

2.0 APPROACH

The approach for development of vadose zone soil target analytes consists of two steps. The first step is to develop a master list of target analytes. The second step is to develop location specific (e.g., waste site) target analyte lists where additional characterization is proposed.

Step 1 – Decision Unit Master Target Analyte Identification

A master target analyte list is developed for each Decision Unit using the following approach:

- Review remediation and characterization information (historic and current) and identify appropriate information sources. Sources include:
  - Focused feasibility studies (FFS), limited field investigation (LFI) reports
  - Interim action records of decision (IARODs)
  - Cleanup verification documents (cleanup verification packages [CVPs], remaining sites verification packages [RSVPs])
  - Technical baseline reports
  - Dangerous waste permit applications
  - Databases containing analytical data resulting from these activities (i.e., characterization, remediation, waste management information)
  - Other pertinent documents.
- Develop a list of initial target analytes using the reference documents from bullet 1.

- Apply the following generally-accepted exclusion criteria that are listed below to the initial set of target analytes to develop the "master" target analyte list.
  - Radionuclides with half-lives less than 3 years (and no significant "daughters")
  - Naturally occurring radionuclides associated with background radiation (for example, K-40, Th-230, Th-232, and Ra-226)
  - Essential nutrients (minerals)
  - Analytes that have no toxicity values (based on the most-current version of the Cleanup Levels and Risk Calculation [CLARC] table).
- Compare the master target analyte list for vadose zone soil with the groundwater COPC list developed for the decision unit. Groundwater COPCs *not* found on the master target analyte list are further evaluated to determine if there is a valid basis for their inclusion.
- Identify appropriate analytical methods for each analyte on the master target analyte list. Determine if the detection limits for each target analyte can achieve the remedial action goals for direct exposure, groundwater protection, and Columbia River protection.

At the conclusion of Step 1, the master decision unit target analyte list is established. This list is comprehensive, including all the contaminants that could potentially be identified as "risk drivers" for waste site remediation within the decision unit under consideration.

Step 2 – Location Specific Target Analyte Identification

Location specific target analytes are identified using the following approach:

- Identify the contaminants of concern for the specific waste sites where characterization is proposed from the applicable interim action ROD (which reflects information from LFI and technical baseline reports). If the characterization location is not at a waste site, evaluate information from waste sites in the vicinity (where available). Include these analytes on the location specific target analyte list.
- Identify the contaminants of concern for the specific waste site locations from the verification documentation (CVPs or RSVPs). If the characterization location is not at a waste site, evaluate information from waste sites in the vicinity (where available). Include these analytes on the location specific target analyte list.
- Evaluate local groundwater monitoring well data (wells located within waste site "zones of influence"). Determine if groundwater COPCs have been analyzed-for in these local wells.
  - If the groundwater COPCs have been analyzed for but not detected, then these analytes are not included on the location specific target analyte list.
  - If the groundwater COPCs have been analyzed for and have been detected, then these analytes are included on the location specific target analyte list.

- If the groundwater COPCs have not been analyzed-for, then an additional evaluation will be performed to determine if there is a data need. If there is a data need, these COPCs are included on the waste-site specific target analyte list.

3.0 ASSUMPTIONS

- Historical resources (e.g., LFI, qualitative risk assessment, and CVP/RSVP documents) contain contaminant lists that are comprehensive with respect to characterizing environmental impacts from 100 and 300 Area Hanford Site operations.
- Older analytical data (e.g., pre-*Comprehensive Environmental Response, Compensation, and Liability Act of 1980* [CERCLA]) reflect laboratory state-of-the-art procedures. Analytical methods have improved, resulting in lower detection limits for many analytes and better data quality assurance/quality control.
- Characterization activities implemented since initiating remediation under the IARODs may provide additional contaminant information that should be considered during pending RI/FS field investigations.
- Post-remediation characterization and cleanup verification data reflect focused lists of analytes that are unique to each waste site and have been evaluated against IAROD cleanup requirements.
- Examining existing data and waste site process information will be useful in developing laboratory analytical needs for RI/FS characterization tasks.
- Universally-accepted exclusion criteria may be applied to the initial target analyte list to develop a "master" list.
- Additional exclusion criteria (e.g., statistical Hanford Site background comparisons, infrequently detected analytes, and analytes not detected at concentrations/activities exceeding required cleanup levels) may be applied during the RI/FS process as more data become available.

4.0 SOFTWARE CONSIDERATIONS

No statistical or algebraic calculations were performed for this activity. The evaluations conducted included analyte comparisons/sorting using Microsoft® Excel®.

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5.0 SOIL TARGET ANALYTE LIST DEVELOPMENT

Step 1 – Decision Unit Master Target Analyte Identification

1. The documents listed in Table 1 were used to develop the 100-N target analyte list.

Table 1. Documents Used to Develop the 100-N Area Decision Unit Analyte List. (2 Pages)

Reference	Document Number	Document Type
1. Cleanup Verification Package/Clean Closure Report for the Soil Column of the 120-N-1 and 120-N-2 Dangerous Waste Treatment and Disposal Sites and the 100-N-58 Site	CVP-2001-00021	CVP
2. Cleanup Verification Package/Clean Closure Report for the Soil Column of the 116-N-3 Trench, Crib, and 100-N-63:1 Pipeline	CVP-2002-00002	CVP
3. Cleanup Verification Package for the JA Jones 1 Site	CVP-2001-00019	CVP
4. Cleanup Verification Package/Clean Closure Report for the Soil Column of the 116-N-1 Crib and Trench	CVP-2006-00004	CVP
5. WA7890008967, Attachment 42, 1324-N Surface Impoundment, Dangerous Waste Permit Application Part A Form (August 2005)	WA7890008967, Attachment 42	Dangerous Waste Permit Application
6. WA7890008967, Attachment 41, 1301-N Liquid Waste Disposal Facility, Dangerous Waste Permit Application Part A Form (July 2005)	WA7890008967, Attachment 41	Dangerous Waste Permit Application
7. WA7890008967, Attachment 42, 1324-NA Percolation Pond, Dangerous Waste Permit Application Part A Form (August 2005)	WA7890008967, Attachment 42	Dangerous Waste Permit Application
8. WA7890008967, Attachment 41, 1325-N Liquid Waste Disposal Facility, Dangerous Waste Permit Application Part A Form (August 2005)	WA7890008967, Attachment 41	Dangerous Waste Permit Application
9. Remedial Design Report/Remedial Action Work Plan for the 100-N Area (October 2006)	DOE/RL-2005-93	RDR/RAWP
10. Remedial Design Report/Remedial Action Work Plan for the 100-NR-1 Treatment, Storage, and disposal Units (September 2000)	DOE/RL-2000-16	RDR/RAWP
11. Remedial Design Report/Remedial Action Work Plan for the 100-NR-2 Operable Unit (June 2002)	DOE/RL-2001-27	RDR/RAWP
12. 100-N Area Technical Baseline Report (July 1994)	WHC-SD-EN-TI-251	Technical Baseline Report
13. 100-NR-1 Qualitative Risk Assessment (March 1995)	BHI-00054	QRA
14. 1301-N and 1325-N Liquid Waste disposal Facilities Limited Field Investigation Report (December 1996)	DOE/RL-96-11	Limited Field Investigation

Table 1. Documents Used to Develop the 100-N Area Decision Unit Analyte List. (2 Pages)

Reference	Document Number	Document Type
15. Explanation of Significant Difference for the 100-NR-1 Operable Unit Treatment, Storage and Disposal Interim Action Record of Decision and 100-NR-I/I00-NR-2 Operable Unit Interim Action Record of Decision, Hanford Site, Benton County, Washington.	EPA/ESD/R10-03/605	Explanation of Significant Difference
16. Interim Remedial Action Record of Decision for the 100-NR-1 Operable Unit of the Hanford 100-N Area, Hanford Site, Benton County, Washington	EPA/541/R00/120	IAROD
17. Interim Action Record of Decision for the 100-NR-1 and 100-NR-2 Operable Units, Hanford Site, Benton County, Washington	EPA/541/R-99/112	IAROD
18. 100-N Area Sampling and Analysis Plan for CERCLA Waste Sites	DOE/RL-2005-92	SAP
19. Limited Field Investigation Report for the 100-NR-2 Operable Unit	DOE/RL-93-81	Limited Field Investigation
20. Limited Field Investigation Report for the 100-NR-1 Operable Unit (March 1995)	DOE/RL-93-80	Limited Field Investigation
21. Cleanup Verification Package for the Hanford Generating Plan UPR-100-37 Transformer Yard (SWMU #1), 100-N-51 Oil Storage Area (SWMU #2), 185-N Building Drains and Sumps (SWMU #3), and 100-N-50 Turbine Oil Filter Unit (SWMU #4) (June 2004)	HGP-CVP-SWMUs 1, 2, 3, & 4	CVP
22. Cleanup Verification Package for the Hanford Generating Plant 100- N-4 Tile Field (SWMU #5); 100-N-1 Settling Pond (SWMU #6); 1908-NE Outfall (SWMU #7); 1716-NE Maintenance Garage (SWMU #8) and 100-N-52 Underground Storage Tank; 100-N-3 Maintenance Garage French Drain, 100-N-41 Gate House Septic Tank, and 100-N-45 Office Building Septic Tank (SWMU #9); 100-N-5 Bone Yard (SWMU #10); and 100-N-46 Underground Storage Tank	HGP-CVP-SWMUs 5, 6, 7, 8, 9, & 10	CVP

CVP = cleanup verification package
IAROD = interim action record of decision
QRA = qualitative risk assessment
RDR/RAWP = remedial design report/remedial action work plan
SAP = sampling and analysis plan

2. The initial list of target analytes presented in Table 2 was created from the review and evaluation of the Table 1 documents.

Table 2. Summary of 100-N Area Target Analytes and References. (4 Pages)

Analyte	Reference	Analyte	Reference
Radionuclides			
1. Silver-108m	DOE/RL-2005-92	19. Niobium-94	DOE/RL-2005-92
2. Americium-241	CVP-2002-00002	20. Plutonium-238	BHI-00054
3. Antimony-125	EPA/541/R-99/112	21. Plutonium-239/240	CVP-2002-00002
4. Carbon-14	DOE/RL-2005-92	22. Potassium-40	BHI-00054

Table 2. Summary of 100-N Area Target Analytes and References. (4 Pages)

Analyte	Reference	Analyte	Reference
5. Cerium-144	BHI-00054	23. Radium-226	BHI-00054
6. Cesium-134	DOE/RL-2005-93	24. Ruthenium-103	DOE/RL-2005-93
7. Cesium-137	CVP-2002-00002	25. Ruthenium-106	DOE/RL-2005-93
8. Cobalt-60	CVP-2002-00002	26. Sodium-24	DOE/RL-2005-93
9. Curium-243	DOE/RL-2005-92	27. Strontium-90	CVP-2002-00002
10. Europium-152	DOE/RL-2005-93	28. Technetium-99	EPA/541/R-99/112
11. Europium-154	CVP-2002-00002	29. Thorium-228	BHI-00054
12. Europium-155	CVP-2002-00002	30. Thorium-230	DOE/RL-2005-92
13. Iodine-129	DOE/RL-2005-92	31. Thorium-232	BHI-00054
14. Iodine-131	DOE/RL-2005-93	32. Tritium	CVP-2002-00002
15. Manganese-54	BHI-00054	33. Uranium-233/234	BHI-00054
16. Manganese-56	DOE/RL-2005-93	34. Uranium-235	EPA/541/R-99/112
17. Neptunium-237	DOE/RL-2005-92	35. Uranium-238	BHI-00054
18. Nickel-63	CVP-2002-00002		
Nonradionuclides			
1. 2,4,5-Trichloro-phenoxyacetic acid	DOE/RL-2005-92	67. Di-n-butylphthalate	DOE/RL-2005-92
2. Acetone	DOE/RL-2005-92	68. Di-n-octylphthalate	DOE/RL-2005-92
3. Acenaphthene	DOE/RL-2005-92	69. Di-nitro-2-methylphenol; 4,6-	DOE/RL-2005-92
4. Acenaphthylene	DOE/RL-2005-92	70. Dinitrophenol; 2,4-	DOE/RL-2005-92
5. Aldrin	DOE/RL-2005-92	71. Dinitrotoluene; 2,4-	DOE/RL-2005-92
6. Aluminum sulfate (Aluminum)	DOE/RL-2005-93	72. Dinitrotoluene; 2,6-	DOE/RL-2005-92
7. Anthracene	DOE/RL-2005-93	73. Dinoseb (DNBP)	DOE/RL-2005-92
8. Antimony	EPA/541/R-99/112	74. Endosulfan (I, II, sulfate)	DOE/RL-2005-92
9. Arsenic	DOE/RL-2005-93	75. Endrin (and ketone, aldehyde)	DOE/RL-2005-92
10. Asbestos	DOE/RL-2005-93	76. Fluoranthene	DOE/RL-2005-93
11. Barium	CVP-2001-00021	77. Fluorene	DOE/RL-2005-93
12. Benzene	DOE/RL-93-80	78. Fluoride	DOE/RL-93-81
13. Benzo(a)anthrax-cene	DOE/RL-2005-93	79. Heptachlor	DOE/RL-2005-92
14. Benzo(a)pyrene	DOE/RL-2005-93	80. Heptachlor epoxide	DOE/RL-2005-92
15. Benzo(b)fluor-anthene	DOE/RL-2005-93	81. Hexachlorobenzene	DOE/RL-2005-92
16. Benzo(ghi)-perylene	DOE/RL-2005-93	82. Hexachlorobutadiene	DOE/RL-2005-92

Table 2. Summary of 100-N Area Target Analytes and References. (4 Pages)

Analyte	Reference	Analyte	Reference
17. Benzo(k)fluor-anthene	DOE/RL-2005-93	83. Hexachlorocyclopentadiene	DOE/RL-2005-92
18. Beryllium	DOE/RL-2005-93	84. Hexachloroethane	DOE/RL-2005-92
19. BHC; alpha	DOE/RL-2005-92	85. Indeno(1,2,3-cd)pyrene	DOE/RL-2005-93
20. BHC; beta	DOE/RL-2005-92	86. Iron	DOE/RL-93-81
21. BHC; delta	DOE/RL-2005-92	87. Isophorone	DOE/RL-2005-92
22. BHC; gamma (lindane)	DOE/RL-2005-92	88. Lead	CVP-2001-00021
23. Bis(2-chloro-1-methylethyl) ether	DOE/RL-2005-92	89. Lithium	DOE/RL-2005-92
24. Bis(2-chloroethoxy) methane	DOE/RL-2005-92	90. Manganese	DOE/RL-2005-93
25. Bis(2-ethylhexyl) phthalate	DOE/RL-93-80	91. Mercury	CVP-2001-00021
26. Boron	DOE/RL-2005-93	92. Methoxychlor	DOE/RL-2005-92
27. Bromophenyl-phenyl ether; 4-	DOE/RL-2005-92	93. Methylene chloride	DOE/RL-2005-92
28. Butanone; 2-	DOE/RL-2005-92	94. Methylnaphthalene; 2-	DOE/RL-2005-92
29. Butylbenzyl-phthalate	DOE/RL-2005-92	95. Methylphenol; 2- (cresol; o-)	DOE/RL-2005-92
30. Cadmium	CVP-2001-00019	96. Methylphenol; 4- (cresol; p-)	DOE/RL-2005-92
31. Carbon disulfide	DOE/RL-93-80	97. Molybdenum	DOE/RL-2005-92
32. Carbon tetrachloride	EPA/541/R-99/112	98. Naphthalene	DOE/RL-2005-92
33. Carbazole	DOE/RL-2005-92	99. Nickel	CVP-2001-00021
34. Chlordane (alpha, gamma)	DOE/RL-2005-92	100. Nitrate	CVP-2002-00002
35. Chlorine	DOE/RL-2005-93	101. Nitroaniline; 2-	DOE/RL-2005-92
36. Chloro-3-methylphenol;4-	DOE/RL-2005-92	102. Nitroaniline; 3-	DOE/RL-2005-92
37. Chloroanilene;4-	DOE/RL-2005-92	103. Nitroaniline; 4-	DOE/RL-2005-92
38. Chloronaphtha-lene;2-	DOE/RL-2005-92	104. Nitrobenzene	DOE/RL-2005-92
39. Chlorophenol;2-	DOE/RL-2005-92	105. Nitrophenol; 2-	DOE/RL-2005-92
40. Chlorophenyl-phenyl ether;4-	DOE/RL-2005-92	106. Nitrophenol; 4-	DOE/RL-2005-92
41. Chloroform	EPA/541/R-99/112	107. Nitroso-di-n-propylamine; N-	DOE/RL-2005-92
42. Chromium (hexavalent)	DOE/RL-2005-93	108. Nitrosodiphenylamine; N-	DOE/RL-2005-92
43. Chromium (total)	CVP-2001-00021	109. PCBs	DOE/RL-2005-93
44. Chrysene	DOE/RL-2005-93	110. Pentachlorophenol	DOE/RL-2005-92
45. Cobalt	DOE/RL-2005-93	111. Phenanthrene	DOE/RL-2005-93

Table 2. Summary of 100-N Area Target Analytes and References. (4 Pages)

Analyte	Reference	Analyte	Reference
46. Copper	CVP-2001-00021	112. Phenol	DOE/RL-2005-92
47. Cyanide	DOE/RL-2005-92	113. Phosphoric acid	DOE/RL-2005-93
48. Dalapon	DOE/RL-2005-92	114. Pyrene	DOE/RL-2005-93
49. D B 2;4-	DOE/RL-2005-92	115. Selenium	EPA/541/R-99/112
50. DDD; 4,4'-	DOE/RL-2005-92	116. Silver	DOE/RL-2005-92
51. DDE; 4,4'-	DOE/RL-2005-92	117. Silvex (TP; 2,4,5-)	DOE/RL-2005-92
52. DDT; 4,4'-	DOE/RL-2005-92	118. Sodium dichromate	DOE/RL-2005-93
53. Dibenz(a,h)-anthracene	DOE/RL-2005-93	119. Sodium hydroxide	DOE/RL-2005-93
54. Dibenzofuran	DOE/RL-2005-92	120. Sulfate	CVP-2001-00021
55. Dicamba	DOE/RL-2005-92	121. Sulfide	DOE/RL-2005-92
56. Dichlorobenzene; 1,2-	DOE/RL-2005-92	122. Tetrachloroethene	EPA/541/R-99/112
57. Dichlorobenzene; 1,3-	DOE/RL-2005-92	123. Tributyl phosphate	DOE/RL-2005-92
58. Dichlorobenzene; 1,4-	DOE/RL-2005-92	124. Trichlorobenzene; 1,2,4-	DOE/RL-2005-92
59. Dichlorobenzidine; 3,3'-	DOE/RL-2005-92	125. Trichloroethane; 1,1,1-	DOE/RL-93-80
60. Dichlorophenol; 2,4-	DOE/RL-2005-92	126. Trichlorophenol; 2,4,5-	DOE/RL-2005-92
61. Dichlorophenoxy-acetic acid; 2,4-	DOE/RL-2005-92	127. Trichlorophenol; 2,4,6-	DOE/RL-2005-92
62. Dichlorprop	DOE/RL-2005-92	128. Toluene	DOE/RL-2005-92
63. Dieldrin	DOE/RL-2005-92	129. Toxaphene	DOE/RL-2005-92
64. Diethylphthalate	DOE/RL-2005-92	130. TPH/diesel and motor oil	DOE/RL-2005-93
65. Dimethylphthalate	DOE/RL-2005-92	131. Vanadium	DOE/RL-2005-93
66. Dimethylphenol; 2,4-	DOE/RL-2005-92	132. Zinc	CVP-2001-00021

PCB = polychlorinated biphenyl
TPH = total petroleum hydrocarbons

3. The generally accepted exclusion criteria that follow were applied to the initial soil target analyte list to identify the excluded analytes listed in Table 3 and to develop the master target analyte list presented in Table 4.

   - Radionuclides with half-lives less than 3 years (and no significant "daughters")
   - Naturally occurring radionuclides associated with background radiation
   - Essential nutrients (minerals)
   - Analytes that have no toxicity values (per the most current CLARC table).

Table 3. 100-N Area Soil Analytes Excluded from Further Consideration.

Analyte	Exclusion Rationale	Daughters (half-life)
Radionuclides		
Antimony-125	Half-life less than 3 years (2.76 y)	Te-125m (58d) Te-125 (stable)
Cerium-144	Half-life less than 3 years (284.6d)	Ba-134 (stable)
Cesium-134	Half-life less than 3 years (2.065y)	Ba-134 (stable)
Iodine-131	Half-life less than 3 years (8.02 d)	Xe-131m (11.8d) Xe-131 (stable)
Manganese-54	Half-life less than 3 years (612.2d)	Fe-54 (stable)
Ruthenium-103	Half-life less than 3 years (39.27d)	Rh-103m (56.12m), Rh-103 (stable)
Ruthenium-106	Half-life less than 3 years (1.020y)	Rh-106 (29.9s), Pd-106 (stable)
Manganese-56	Half-life less than 3 years (2.5h)	Fe-56 (stable)
Potassium-40	Naturally occurring background radiation	1.28 E9 years
Radium-226	Only potential source from naturally occurring background radiation (insufficient in-growth time for Hanford introduced U as decay daughter of U-234/Th-230)	1.6 E3 years
Sodium-24	Half-life less than 3 years (15h)	Mg-24 (stable)
Thorium-228	Decay daughter of Th-232/Ra-228. Will be in equilibrium with parent	1.91 years
Thorium-230	Only potential source from naturally occurring background radiation (insufficient in-growth time for Hanford introduced U as decay daughter of U-234)	7.7 E4 years
Thorium-232	Naturally occurring background radiation	1.4 E10 years
Nonradionuclides		
Acetone	Laboratory contaminant	None
Bis(2-ethylhexyl) phthalate	Laboratory contaminant	None
Fluoride	Essential nutrient (minerals)	None
Iron	Essential nutrient	None
Methylene chloride	Laboratory contaminant	None
Phenol	Naturally occurring, readily biodegradable organic compound	None
Sulfate	No soil toxicity information available	None
Sulfide	No soil toxicity information available	None

Table 4. Master 100-N Area Target Analytes, Analytical Methods, and Laboratory Detection Limits. (7 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Radionuclides					
Americium-241 [c]	1	31.1	NV	NV	Am-241/ Cm-244 AEA
Curium-243	1	22.1	NV	NV	Am-241/ Cm-244 AEA
Cesium-137	0.1	6.2	1,465	2,930	GEA
Cobalt-60	0.05	1.4	13,900	27,800	
Europium-152	0.1	3.3	NV	NV	
Europium-154	0.1	3.0	NV	NV	
Europium-155	0.1	125	NV	NV	
Niobium-94	0.2	2.43	NV	NV	
Silver-108m	0.2	2.38	NV	NV	
Strontium-90	1	4.5	27.6	55.2	Gas flow proportional counting
Iodine-129	2	2 [b]	2 [b]	2 [b]	Low energy GEA
Plutonium-238	1	35.1	NV	NV	Isotopic Pu AEA
Plutonium-239/240	1	33.9	NV	NV	
Uranium-233/234	1	1.1 [b]	1.1 [b]	1.1 [b]	Isotopic U AEA
Uranium-235	1	0.61	0.185 [d]	0.185 [d]	
Uranium-238	1	1.1 [b]	1.1 [b]	1.1 [b]	
Carbon-14	2	8.7	NV	NV	Liquid scintillation counting
Nickel-63	30	4,026	83	166	
Technetium-99	0.25	5.7	0.46	0.46	
Tritium	10	510	12.6	25.2	
Neptunium-237	1	2.44	0.9 [d]	1.80 [d]	Np-237 AEA
Nonradionuclides					
Chloride	2	NV	25,000	NA	EPA 300.0 (anions by IC)
Fluoride	5	4,800	2,800	2,890	
Nitrate (as nitrogen)	2.5	128,000	40	40	
Nitrite (as nitrogen)	2.5	8,000	40	4	
Sulfate	5	NV	1,030	1,030	

Table 4. Master 100-N Area Target Analytes, Analytical Methods, and Laboratory Detection Limits. (7 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Aluminum	5	80,000	480,000	480,000	EPA 6010 or 200.8 (ICP or ICP/MS)
Antimony	6	32	5.4	12.7	
Arsenic	10	TBD [b]	TBD [b]	TBD [b]	
Barium	2	16,000	1,650	1,600	
Beryllium	0.5	160	63.2	63	
Boron	2	16,000	210	NV	
Cadmium	0.5	80	0.69	0.125 [d]	
Chromium (total)	1	120,000	2,000	1,300	
Cobalt	2	24	15.7	NV	
Copper	1	3,200	284	575	
Lead	5	250	3,000	420	
Lithium	2.5	160	192	NV	
Manganese	5	3,760	512 [b]	256 [b]	
Molybdenum	2	400	32	NV	
Nickel	4	1,600	130	179	
Selenium	10	400	5.2 [d]	0.52 [d]	
Silver	1	400	13.6	0.442	
Thallium	5	5.6	1.59	4.46	
Vanadium	2.5	560	2,240	NV	
Zinc	1	24,000	5,970	226	
Chromium (hexavalent)	0.5	TBD	TBD	TBD	EPA 7196 (hexavalent chromium)
Mercury	0.2	24	2.09	0.33 [b]	EPA 7471 (Hg cold vapor) or 200.8 (ICP/MS)
Ethylene glycol	5.0	160,000	64.3	NV	EPA 8015
Propylene glycol	5	1,600,000	NV	NV	EPA 8015
Methanol	1.0	4,000	16.1	NV	EPA 8015M

Table 4. Master 100-N Area Target Analytes, Analytical Methods, and Laboratory Detection Limits. (7 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Aldrin	0.00165	0.0588	0.00504	0.0008 [d]	EPA 8081 (pesticide)
BHC; alpha	0.00165	0.159	0.0005 [d]	0.00031 [d]	
BHC; beta	0.00165	0.556	0.00227	0.00259	
BHC; delta	0.00165	NV	NV	NV	
BHC; gamma (lindane)	0.00165	0.769	0.00209	0.00119	
Chlordane	0.0165	2.86	2.06	0.00055 [d]	
DDD; 4,4'-	0.0033	4.17	0.335	0.00024 [d]	
DDE; 4,4'-	0.0033	2.94	0.446	0.006 [d]	
DDT; 4,4'-	0.0033	2.94	3.49	0.00493	
Dieldrin	0.0033	0.0625	0.0028 [d]	0.00004 [d]	
Endosulfan I	0.00165	480	4.3	0.0417	
Endosulfan II	0.0033	480	4.3	0.0417	
Endosulfan sulfate	0.0033	480	4.3	0.0417	
Endrin	0.0033	24	0.44	0.168	
Endrin aldehyde	0.0033	24	0.44	0.168	
Endrin ketone	0.0033	24	0.44	0.168	
Heptachlor	0.00165	0.222	0.0370	0.000025 [d]	
Heptachlor epoxide	0.00165	0.11	0.008	0.0001 [d]	
Methoxychlor	0.0165	400	64.2	13.4	
Toxaphene	0.165	0.909	0.153	0.0005	
Aroclor-1016 (PCB)	0.0165	0.5	0.094	0.000224 [d]	EPA 8082 (PCBs)
Aroclor-1221 (PCB)	0.0165	0.5	0.00920 [d]	0.0000219 [d]	
Aroclor-1232 (PCB)	0.0165	0.5	0.00920 [d]	0.0000219 [d]	
Aroclor-1242 (PCB)	0.0165	0.5	0.0394	0.0000935 [d]	
Aroclor-1248 (PCB)	0.0165	0.5	0.0386	0.0000935 [d]	
Aroclor-1254 (PCB)	0.0165	0.5	0.0664	0.000158 [d]	
Aroclor-1260 (PCB)	0.0165	0.5	0.721	0.00171 [d]	
Aroclor-1262 (PCB)	0.0165	NV	NV	NV	

Table 4. Master 100-N Area Target Analytes, Analytical Methods, and Laboratory Detection Limits. (7 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Dalapon	0.1	2,400	0.811	0.81	EPA 8151 (herbicides)
DB; 2,4-	0.1	640	0.768	NV	
Dicamba	0.1	2,400	2.2	2.20	
Dichlorophenoxyacetic acid; 2,4-	0.4	800	0.321 [d]	0.321	
Dichlorprop	0.1	640	0.321	0.321	
Dinoseb (DNBP){2-sec-butyl-4,6-dinitrophenol}	0.012	80	0.0524	1.05	
TP; 2,4,5- (Silvex)	0.02	640	0.28	0.28	
Trichlorophenoxyacetic acid; 2,4,5-	0.02	800	0.761	0.79	
Acetone	0.02	72,000	28.9	NV	EPA 8260 (VOCs)
Benzene	0.005	18.2	0.004	0.007	
Butanol; 1-	0.1	8,000	3.31	6.6	
Butanone; 2-	0.01	48,000	19.6	NV	
Carbon disulfide	0.005	800	5.65	12.4	
Carbon tetrachloride	0.005	7.69	0.031	0.0023 [d]	
Chloroform	0.005	164	0.038	0.0304	
Cyclohexanone	1	400,000	172	NV	
Ethyl acetate	5	NV	29.8	NV	
Ethyl ether	0.005	16,000	6.68	NV	
Ethylbenzene	0.005	8,000	6.05	26.8	
Methyl isobutyl ketone	0.01	6,400	2.71	NV	
Methylene chloride	0.005	133	0.218	0.0205	
Tetrachloroethene	0.005	1.85	0.008	0.004	
Toluene	0.005	6,400	4.65	49.5	
Trichlorobenzene; 1,2,4-	0.01	800	2.98	1.31	
Trichloroethane; 1,1,1-	0.005	NV	1.58	1.59	
Trichloroethene	0.005	11.2	0.00323	0.0178	
Vinyl chloride	0.005	240	0.00184	0.0126	
Xylenes (total)	0.01	16,000	3.09	5.15	

Table 4. Master 100-N Area Target Analytes, Analytical Methods, and Laboratory Detection Limits. (7 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Tributyl phosphate	3.3	185	0.677 [d]	NV	EPA 8270 (SVOCs)
Bis(2-chloro-1-methylethyl) ether	0.33	14.3	NV	0.180	
Bis(2-chloroethoxy) methane	0.33	0.909	NV	NV	
Bis(2-ethylhexyl)phthalate	0.33	71.4	13.9	4.01	
Bromophenylphenyl ether; 4-	0.33	NV	NV	NV	
Butylbenzylphthalate	0.33	16,000	893	349	
Carbazole	0.33	50	0.314 [d]	NV	
Chloro-3-methylphenol;4-	0.33	4,000	NV	NV	
Chlorophenylphenyl ether;4-	0.33	4,000	NV	NV	
Dibenzofuran	0.33	160	7.36	NV	
Diethylphthalate	0.33	64,000	72.2	130	
Di-n-butylphthalate	0.33	8,000	56.5	95.5	
Di-n-octylphthalate	0.33	1,600	532,000	NV	
Isophorone	0.33	1,050	0.228 [d]	7.7	
Methylnaphthalene; 2-	0.33	320	2.03	2.04	
Methylphenol; 4-(cresol; p-)	0.33	400	0.507	0.505	
Chloroaniline;4-	0.33	320	0.264 [d]	NV	
Chloronaphthalene;2-	0.33	6,400	40.7	56.5	
Chlorophenol;2-	0.33	400	0.472	2.28	
Dichlorobenzene; 1,2-	0.33	7,200	7.03	31.7	
Dichlorobenzene; 1,3-	0.33	2,400	3.09	5.15	
Dichlorobenzene; 1,4-	0.33	41.7	0.030 [d]	0.080 [d]	
Dichlorobenzidine; 3,3'-	0.33	2.22	0.003 [d]	0.0005 [d]	
Dichlorophenol; 2,4-	0.33	240	NV	2.65	
Dimethylphenol; 2,4-	0.33	1,600	2.62	4.52	
Dimethylphthalate	0.33	64,000	72.2	130	
Di-nitro-2-methylphenol; 4,6-	0.33	8.00	0.0256 [d]	NV	
Dinitrophenol; 2,4-	0.825	160	0.125 [d]	0.560 [d]	
Dinitrotoluene; 2,4-	0.33	160	0.189 [d]	0.0005 [d]	

Table 4. Master 100-N Area Target Analytes, Analytical Methods, and Laboratory Detection Limits. (7 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Dinitrotoluene; 2,6-	0.33	80	NV	NV	EPA 8270 (SVOCs)
Hexachlorobenzene	0.33	0.625	0.015 [d]	0.001 [d]	
Hexachlorobutadiene	0.33	12.8	0.605	0.475	
Hexachlorocyclopentadiene	0.33	480	NV	960	
Hexachloroethane	0.33	71.4	0.125	0.076	
Methylphenol; 2-(cresol; o-)	0.33	4,000	5.14	5.15	
Nitroaniline; 2-	0.33	240	0.121	NV	
Nitroaniline; 3-	0.33	47.6	0.010	NV	
Nitroaniline; 4-	0.33	47.6	0.010	NV	
Nitrobenzene	0.33	160	0.102 [d]	0.109 [d]	
Nitrophenol; 2-	0.66	NV	NV	NV	
Nitrophenol; 4-	0.66	640	1.30	128	
Nitroso-di-n-propylamine; N-	0.33	0.143 [d]	0.000056	0.0035	
Pentachlorophenol	0.33	8.33	0.016 [d]	0.00444 [d]	
Trichlorophenol; 2,4,5-	0.33	8,000	28.8	NV	
Trichlorophenol; 2,4,6-	0.33	90.9	0.0462 [d]	0.049 [d]	
Nitrosodiphenylamine; N-	0.33	204	NV	NV	
Acenaphthene	0.1	4,800	97.9	65.5	EPA-8310 (PAHs)
Acenaphthylene	0.1	4,800	97.9	65.5	
Anthracene	0.05	24,000	2.270	4,550	
Benzo(a)anthracene	0.015	1.37	0.856	0.02400	
Benzo(a)pyrene	0.015	0.137	2.33	0.0545	
Benzo(b)fluoranthene	0.015	1.37	2.95	0.069	
Benzo(ghi)perylene	0.03	2,400	25,700	3,540	
Benzo(k)fluoranthene	0.015	1.37	21.5	0.069	
Chrysene	0.1	13.7	9.56	0.0223 [d]	
Dibenz(a,h)anthracene	0.3	1.37	4.29	0.1	
Fluoranthene	0.05	3,200	631	89	
Fluorene	0.03	3,200	101	206	
Indeno(1,2,3-cd)pyrene	0.03	1.37	8.33	0.195	

Table 4. Master 100-N Area Target Analytes, Analytical Methods, and Laboratory Detection Limits. (7 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Naphthalene	0.1	1,600	4.46	138	EPA-8310 (PAHs)
Phenanthrene	0.05	24,000	1,140	4,5500	
Pyrene	0.05	2,400	655	1,3100	
Cyanide	0.5	1,600	0.80	0.8	EPA 9010 or 9012
Asbestos	1%	NA	NA	NA	Microscopy
TPH/diesel and motor oil	5	2,000	2,000	NV	NWTPH-D+
TPH/gasoline range	5	30	30	30	NWTPH-G

[a] Units are mg/kg (nonradionuclides) and pCi/g (radionuclides) unless otherwise noted. Cleanup levels are established in the most current CLARC table (updated February 12, 2009) calculated per *Washington Administrative Code* 173-340 (Ecology 2007) using input parameters stated in the CLARC table.

[b] Where cleanup levels are less than background, cleanup levels default to background as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL-96-17, Rev 5).

[c] If strong gamma emissions interfere with analysis of Am-241, Am-241 can be analyzed using Cm/Am Alpha Emission Analysis method.

[d] Where cleanup levels are less than PQLs, cleanup levels default to PQLs as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL-96-17, Rev 5).

Reference: Ecology, 2007, "Model Toxics Control Act Statute and Regulation," Publication No. 94-06, revised November 2007, Washington State Department of Ecology, Olympia, Washington.

AEA = alpha energy analysis
CLARC = Cleanup Levels and Risk Calculation
EPA = U.S. Environmental Protection Agency
GC = gas chromatograph
GEA = gamma energy analysis
IC = ion chromatograph
ICP = inductively coupled plasma
MS = mass spectroscopy
NA = not applicable
NWTPH = Northwest total petroleum hydrocarbons
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
PQL = practical quantitation limit
RDR/RAWP = remedial design report/remedial action work plan
SVOA = semivolatile organic analysis
TBD = to be determined
TPH = total petroleum hydrocarbons
VOC = volatile organic compound

NV = No value. The generic RESidual RADioactivity modeling reported in the 100 Area RDR/RAWP predicts the contaminant will not reach groundwater within 1,000 years.

4. This step reconciles the master soil target analytes with the groundwater COPCs developed for the DU. Groundwater COPCs *not* found on the master soils list are further evaluated. The default action is to include all groundwater COPCs on the master soil target analyte list, unless there is a valid basis for their exclusion. Groundwater COPCs added to Table 4 are *italicized.*

5. The appropriate analytical methods for the master target analytes, taking into account action levels and detection limits, are presented in Table 5.

Step 2 – Location Specific Target Analyte Identification (per agreement with regulators, Step 2 was not completed.)

1. Identify the contaminants of concern for the specific waste sites where characterization is proposed from the applicable interim action ROD (which reflects information from LFI and technical baseline reports). If the characterization location is not at a waste site, evaluate information from waste sites in the vicinity (where available). Include these analytes on the location specific target analyte list (Tables 5 through 8).

2. Identify the contaminants of concern for the specific waste site locations from the verification documentation (CVPs or RSVPs). If the characterization location is not at a waste site, evaluate information from waste sites in the vicinity (where available). Include these analytes on the location specific target analyte list (Tables 5 through 8).

3. Evaluate local groundwater monitoring well data (wells located within waste site "zones of influence"). Determine if groundwater COPCs have been analyzed for in these wells.

   a. If the groundwater COPCs have been analyzed for but not detected, then these analytes will not be included on the location specific target analyte list.

   b. If the groundwater COPCs have been analyzed for and have been detected, then these analytes are included on the location specific target analyte list.

   c. If the groundwater COPCs have not been analyzed for, then an additional evaluation will be performed to determine if there is a data need. If there is a data need, these COPCs are included on the location specific target analyte list.

Table 5. Wells #1 and #R1 Target Analytes, Analytical Methods, and Contract-Required Detection Limits. (4 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Radionuclides					
Cesium-137	0.1	6.2	1,465	2,930	EPA 8310 (PAHs)
Cobalt-60	0.05	1.4	13,900	27,800	EPA 8310 (PAHs)
Strontium-90	1	4.5	27.6	55.2	Gas flow proportional counting
Iodine-129	2	2 [b]	2 [b]	2 [b]	Low energy GEA
Plutonium-239/240	1	33.9	NV	NV	Isotopic Pu AEA
Carbon-14	2	8.7	NV	NV	Liquid scintillation counting
Technetium-99	0.25	5.7	0.46	0.46	Liquid scintillation counting

Table 5. Wells #1 and #R1 Target Analytes, Analytical Methods, and Contract-Required Detection Limits. (4 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Tritium	10	510	12.6	25.2	Liquid scintillation counting
Nonradionuclides					
Fluoride	5	4,800	2,800	2,890	EPA 300.0 (anions by IC)
Nitrate (as nitrogen)	2.5	128,000	40	40	EPA 300.0 (anions by IC)
Nitrite (as nitrogen)	2.5	8,000	40	4	EPA 300.0 (anions by IC)
Sulfate	5	NV	1,030	1,030	EPA 300.0 (anions by IC)
Aluminum	5	80,000	480,000	480,000	EPA 6010 or 200.8 (ICP or ICP/MS)
Antimony	6	32	5.4	12.7	EPA 6010 or 200.8 (ICP or ICP/MS)
Arsenic	10	TBD [b]	TBD [b]	TBD [b]	EPA 6010 or 200.8 (ICP or ICP/MS)
Barium	2	16,000	1,650	1,600	EPA 6010 or 200.8 (ICP or ICP/MS)
Beryllium	0.5	160	63.2	63	EPA 6010 or 200.8 (ICP or ICP/MS)
Boron	2	16,000	210	NV	EPA 6010 or 200.8 (ICP or ICP/MS)
Chromium (total)	1	120,000	2,000	1,300	EPA 6010 or 200.8 (ICP or ICP/MS)
Cobalt	2	24	15.7	NV	EPA 6010 or 200.8 (ICP or ICP/MS)
Copper	1	3,200	284	575	EPA 6010 or 200.8 (ICP or ICP/MS)
Lead	5	250	3,000	420	EPA 6010 or 200.8 (ICP or ICP/MS)
Lithium	2.5	160	192	NV	EPA 6010 or 200.8 (ICP or ICP/MS)
Manganese	5	3,760	512 [b]	256 [b]	EPA 6010 or 200.8 (ICP or ICP/MS)

Table 5. Wells #1 and #R1 Target Analytes, Analytical Methods, and Contract-Required Detection Limits. (4 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Nickel	4	1,600	130	179	EPA 6010 or 200.8 (ICP or ICP/MS)
Selenium	10	400	5.2[c]	0.52[c]	EPA 6010 or 200.8 (ICP or ICP/MS)
Silver	1	400	13.6	0.442	EPA 6010 or 200.8 (ICP or ICP/MS)
Vanadium	2.5	560	2,240	NV	EPA 6010 or 200.8 (ICP or ICP/MS)
Zinc	1	24,000	5,970	226	EPA 6010 or 200.8 (ICP or ICP/MS)
Chromium (hexavalent)	0.5	TBD	TBD	TBD	EPA 7196 (hexavalent chromium)
Mercury	0.2	24	2.09	0.33[b]	EPA 7471 (Hg cold vapor) or 200.8 (ICP/MS)
Chloroform	0.005	164	0.038	0.0304	EPA 8260 (VOCs)
Tetrachloroethene	0.005	1.85	0.008	0.004	EPA 8260 (VOCs)
Acenaphthene	0.1	4,800	97.9	65.5	EPA 8310 (PAHs)
Acenaphthylene	0.1	4,800	97.9	65.5	EPA 8310 (PAHs)
Anthracene	0.05	24,000	2.270	4,550	EPA 8310 (PAHs)
Benzo(a)anthracene	0.015	1.37	0.856	0.02400	EPA 8310 (PAHs)
Benzo(a)pyrene	0.015	0.137	2.33	0.0545	EPA 8310 (PAHs)
Benzo(b)fluoranthene	0.015	1.37	2.95	0.069	EPA 8310 (PAHs)
Benzo(ghi)perylene	0.03	2,400	25,700	3,540	EPA 8310 (PAHs)
Benzo(k)fluoranthene	0.015	1.37	21.5	0.069	EPA 8310 (PAHs)
Chrysene	0.1	13.7	9.56	0.0223 [c]	EPA 8310 (PAHs)
Dibenz(a,h)anthracene	0.3	1.37	4.29	0.1	EPA 8310 (PAHs)
Fluoranthene	0.05	3,200	631	89	EPA 8310 (PAHs)

Table 5. Wells #1 and #R1 Target Analytes, Analytical Methods, and Contract-Required Detection Limits. (4 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Fluorene	0.03	3,200	101	206	EPA 8310 (PAHs)
Indeno(1,2,3-cd)pyrene	0.03	1.37	8.33	0.195	EPA 8310 (PAHs)
Naphthalene	0.1	1,600	4.46	138	EPA 8310 (PAHs)
Phenanthrene	0.05	24,000	1,140	4,5500	EPA 8310 (PAHs)
Pyrene	0.05	2,400	655	1,3100	EPA 8310 (PAHs)
Cyanide	0.5	1,600	0.80	0.8	EPA 9010 or 9012
TPH/diesel and motor oil	5	2,000	2,000	NV	NWTPH-D+

[a] Units are mg/kg (nonradionuclides) and pCi/g (radionuclides) unless otherwise noted. Cleanup levels are established in the most current CLARC table (updated February 12, 2009) calculated per *Washington Administrative Code* 173-340 (Ecology 2007) using input parameters stated in the CLARC table.

[b] Where cleanup levels are less than background, cleanup levels default to background as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL-96-17, Rev 5).

[c] Where cleanup levels are less than PQLs, cleanup levels default to PQLs as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL-96-17, Rev 5).

Reference: Ecology, 2007, "Model Toxics Control Act Statute and Regulation," Publication No. 94-06, revised November 2007, Washington State Department of Ecology, Olympia, Washington.

AEA = alpha energy analysis
CLARC = Cleanup Levels and Risk Calculation
EPA = U.S. Environmental Protection Agency
GEA = gamma energy analysis
IC = ion chromatograph
ICP = inductively coupled plasma
MS = mass spectroscopy
NWTPH = Northwest total petroleum hydrocarbons
PAH = polycyclic aromatic hydrocarbons
PQL = practical quantitation limit
RDR/RAWP = remedial design report/remedial action work plan
TPH = total petroleum hydrocarbons
TBD = to be determined
VOC = volatile organic compound

NV = No value. The generic RESidual RADioactivity modeling reported in the 100 Area RDR/RAWP predicts the contaminant will not reach groundwater within 1,000 years.

Table 6. Well #2 Target Analytes, Analytical Methods, and Contract-Required Detection Limits. (4 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Radionuclides					
Cesium-137	0.1	6.2	1,465	2,930	GEA
Cobalt-60	0.05	1.4	13,900	27,800	GEA
Strontium-90	1	4.5	27.6	55.2	Gas flow proportional counting
Iodine-129	2	2 [b]	2 [b]	2 [b]	Low energy GEA

Table 6. Well #2 Target Analytes, Analytical Methods, and Contract-Required Detection Limits. (4 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Plutonium-239/240	1	33.9	NV	NV	Isotopic Pu AEA
Carbon-14	2	8.7	NV	NV	Liquid scintillation counting
Technetium-99	0.25	5.7	0.46	0.46	Liquid scintillation counting
Tritium	10	510	12.6	25.2	Liquid scintillation counting
Nonradionuclides					
Fluoride	5	4,800	2,800	2,890	EPA 300.0 (anions by IC)
Nitrate (as nitrogen)	2.5	128,000	40	40	EPA 300.0 (anions by IC)
Nitrite (as nitrogen)	2.5	8,000	40	4	EPA 300.0 (anions by IC)
Sulfate	5	NV	1,030	1,030	EPA 300.0 (anions by IC)
Aluminum	5	80,000	480,000	480,000	EPA 6010 or 200.8 (ICP or ICP/MS)
Antimony	6	32	5.4	12.7	EPA 6010 or 200.8 (ICP or ICP/MS)
Arsenic	10	TBD [b]	TBD [b]	TBD [b]	EPA 6010 or 200.8 (ICP or ICP/MS)
Barium	2	16,000	1,650	1,600	EPA 6010 or 200.8 (ICP or ICP/MS)
Beryllium	0.5	160	63.2	63	EPA 6010 or 200.8 (ICP or ICP/MS)
Boron	2	16,000	210	NV	EPA 6010 or 200.8 (ICP or ICP/MS)
Chromium (total)	1	120,000	2,000	1,300	EPA 6010 or 200.8 (ICP or ICP/MS)
Cobalt	2	24	15.7	NV	EPA 6010 or 200.8 (ICP or ICP/MS)
Copper	1	3,200	284	575	EPA 6010 or 200.8 (ICP or ICP/MS)

Table 6. Well #2 Target Analytes, Analytical Methods, and Contract-Required Detection Limits. (4 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Lead	5	250	3,000	420	EPA 6010 or 200.8 (ICP or ICP/MS)
Lithium	2.5	160	192	NV	EPA 6010 or 200.8 (ICP or ICP/MS)
Manganese	5	3,760	512 [b]	256 [b]	EPA 6010 or 200.8 (ICP or ICP/MS)
Nickel	4	1,600	130	179	EPA 6010 or 200.8 (ICP or ICP/MS)
Selenium	10	400	5.2 [c]	0.52 [c]	EPA 6010 or 200.8 (ICP or ICP/MS)
Silver	1	400	13.6	0.442	EPA 6010 or 200.8 (ICP or ICP/MS)
Vanadium	2.5	560	2,240	NV	EPA 6010 or 200.8 (ICP or ICP/MS)
Zinc	1	24,000	5,970	226	EPA 6010 or 200.8 (ICP or ICP/MS)
Chromium (hexavalent)	0.5	TBD	TBD	TBD	EPA 7196 (hexavalent chromium)
Mercury	0.2	24	2.09	0.33 [b]	EPA 7471 (Hg cold vapor)
Benzene	0.005	18.2	0.004	0.007	EPA 8260 (VOCs)
Ethylbenzene	0.005	8,000	6.05	26.8	EPA 8260 (VOCs)
Toluene	0.005	6,400	4.65	49.5	EPA 8260 (VOCs)
Xylenes (total)	0.01	16,000	3.09	5.15	EPA 8260 (VOCs)
Acenaphthene	0.1	4,800	97.9	65.5	EPA-8310 (PAHs)
Acenaphthylene	0.1	4,800	97.9	65.5	EPA-8310 (PAHs)
Anthracene	0.05	24,000	2.270	4,550	EPA-8310 (PAHs)
Benzo(a)anthracene	0.015	1.37	0.856	0.02400	EPA-8310 (PAHs)
Benzo(a)pyrene	0.015	0.137	2.33	0.0545	EPA-8310 (PAHs)

Table 6. Well #2 Target Analytes, Analytical Methods, and Contract-Required Detection Limits. (4 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Benzo(b)fluoranthene	0.015	1.37	2.95	0.069	EPA-8310 (PAHs)
Benzo(ghi)perylene	0.03	2,400	25,700	3,540	EPA-8310 (PAHs)
Benzo(k)fluoranthene	0.015	1.37	21.5	0.069	EPA-8310 (PAHs)
Chrysene	0.1	13.7	9.56	0.0223 [c]	EPA-8310 (PAHs)
Dibenz(a,h)anthracene	0.3	1.37	4.29	0.1	EPA-8310 (PAHs)
Fluoranthene	0.05	3,200	631	89	EPA-8310 (PAHs)
Fluorene	0.03	3,200	101	206	EPA-8310 (PAHs)
Indeno(1,2,3-cd) pyrene	0.03	1.37	8.33	0.195	EPA-8310 (PAHs)
Naphthalene	0.1	1,600	4.46	138	EPA-8310 (PAHs)
Phenanthrene	0.05	24,000	1,140	4,5500	EPA-8310 (PAHs)
Pyrene	0.05	2,400	655	1,3100	EPA-8310 (PAHs)
TPH/diesel and motor oil	5	2,000	2,000	NV	NWTPH-D+
TPH/gasoline range	5	30	30	30	NWTPH-G

[a] Units are mg/kg (nonradionuclides) and pCi/g (radionuclides) unless otherwise noted. Cleanup levels are established in the most current CLARC table (updated February 12, 2009) calculated per *Washington Administrative Code* 173-340 (Ecology 2007) using input parameters stated in the CLARC table.

[b] Where cleanup levels are less than background, cleanup levels default to background as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL-96-17, Rev 5).

[c] Where cleanup levels are less than PQLs, cleanup levels default to PQLs as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL-96-17, Rev 5).

Reference: Washington State Department of Ecology, 2007, "Model Toxics Control Act Statute and Regulation," Publication No. 94-06, revised November 2007, Washington State Department of Ecology, Olympia, Washington.

AEA = alpha energy analysis
CLARC = Cleanup Levels and Risk Calculation
EPA = U.S. Environmental Protection Agency
GEA = gamma energy analysis
IC = ion chromatograph
ICP = inductively coupled plasma
MS = mass spectroscopy
NWTPH = northwest total petroleum hydrocarbons
PAH = polycyclic aromatic hydrocarbons
PQL = practical quantitation limit
RDR/RAWP = remedial design report/remedial action work plan
TBD = to be determined
TPH = total petroleum hydrocarbons
VOC = volatile organic compound

NV = No value. The generic RESidual RADioactivity modeling reported in the 100 Area RDR/RAWP predicts the contaminant will not reach groundwater within 1,000 years.

Table 7. Wells #6 and #R2 Target Analytes, Analytical Methods, and Contract-Required Detection Limits. (2 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Radionuclides					
Cesium-137	0.1	6.2	1,465	2,930	GEA
Cobalt-60	0.05	1.4	13,900	27,800	GEA
Europium-152	0.1	3.3	NV	NV	GEA
Europium-154	0.1	3.0	NV	NV	GEA
Strontium-90	1	4.5	27.6	55.2	Gas flow proportional counting
Tritium	10	510	12.6	25.2	Liquid scintillation counting
Nonradionuclides					
Antimony	6	32	5.4	12.7	EPA 6010 or 200.8 (ICP or ICP/MS)
Arsenic	10	TBD [b]	TBD [b]	TBD [b]	EPA 6010 or 200.8 (ICP or ICP/MS)
Beryllium	0.5	160	63.2	63	EPA 6010 or 200.8 (ICP or ICP/MS)
Cadmium	0.5	80	0.69	0.125 [c]	EPA 6010 or 200.8 (ICP or ICP/MS)
Chromium (total)	1	120,000	2,000	1,300	EPA 6010 or 200.8 (ICP or ICP/MS)
Cobalt	2	24	15.7	NV	EPA 6010 or 200.8 (ICP or ICP/MS)
Copper	1	3,200	284	575	EPA 6010 or 200.8 (ICP or ICP/MS)
Lead	5	250	3,000	420	EPA 6010 or 200.8 (ICP or ICP/MS)
Manganese	5	3,760	512 [b]	256 [b]	EPA 6010 or 200.8 (ICP or ICP/MS)
Nickel	4	1,600	130	179	EPA 6010 or 200.8 (ICP or ICP/MS)

Table 7. Wells #6 and #R2 Target Analytes, Analytical Methods, and Contract-Required Detection Limits. (2 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Selenium	10	400	5.2 [c]	0.52 [c]	EPA 6010 or 200.8 (ICP or ICP/MS)
Silver	1	400	13.6	0.442	EPA 6010 or 200.8 (ICP or ICP/MS)
Thallium	5	5.6	1.59	4.46	EPA 6010 or 200.8 (ICP or ICP/MS)
Vanadium	2.5	560	2,240	NV	EPA 6010 or 200.8 (ICP or ICP/MS)
Zinc	1	24,000	5,970	226	EPA 6010 or 200.8 (ICP or ICP/MS)
Chromium (hexavalent)	0.5	TBD	TBD	TBD	EPA 7196 (hexavalent chromium)

[a] Units are mg/kg (nonradionuclides) and pCi/g (radionuclides) unless otherwise noted. Cleanup levels are established in the most current CLARC table (updated February 12, 2009) calculated per *Washington Administrative Code* 173-340 (Ecology 2007) using input parameters stated in the CLARC table.

[b] Where cleanup levels are less than background, cleanup levels default to background as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL-96-17, Rev 5).

[c] Where cleanup levels are less than PQLs, cleanup levels default to PQLs as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL-96-17, Rev 5).

Reference: Washington State Department of Ecology, 2007, "Model Toxics Control Act Statute and Regulation," Publication No. 94-06, revised November 2007, Washington State Department of Ecology, Olympia, Washington.

CLARC = Cleanup Levels and Risk Calculation
EPA = U.S. Environmental Protection Agency
GEA = gamma energy analysis
ICP = inductively coupled plasma
MS = mass spectroscopy
PQL = practical quantitation limit
RDR/RAWP= remedial design/remedial action work plan
TBD = to be determined

NV = No value. The generic RESidual RADioactivity modeling reported in the 100 Area RDR/RAWP predicts the contaminant will not reach groundwater within 1,000 years.

Table 8. Wells #3, #4, and #5 Target Analytes, Analytical Methods, and Contract-Required Detection Limits. (9 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Radionuclides					
Americium-241 [c]	1	31.1	NV	NV	Am-241/ Cm-244 AEA
Curium-243	1	22.1	NV	NV	Am-241/ Cm-244 AEA
Cesium-137	0.1	6.2	1,465	2,930	GEA

Table 8. Wells #3, #4, and #5 Target Analytes, Analytical Methods, and Contract-Required Detection Limits. (9 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Cobalt-60	0.05	1.4	13,900	27,800	GEA
Europium-152	0.1	3.3	NV	NV	GEA
Europium-154	0.1	3.0	NV	NV	GEA
Europium-155	0.1	125	NV	NV	GEA
Niobium-94	0.2	2.43	NV	NV	GEA
Silver-108m	0.2	2.38	NV	NV	GEA
Strontium-90	1	4.5	27.6	55.2	Gas flow proportional counting
Iodine-129	2	2 [b]	2 [b]	2 [b]	Low energy GEA
Plutonium-238	1	35.1	NV	NV	Isotopic Pu AEA
Plutonium-239/240	1	33.9	NV	NV	
Uranium-233/234	1	1.1 [b]	1.1 [b]	1.1 [b]	Isotopic U AEA
Uranium-235	1	0.61	0.185 [d]	0.185 [d]	Isotopic U AEA
Uranium-238	1	1.1 [b]	1.1 [b]	1.1 [b]	Isotopic U AEA
Carbon-14	2	8.7	NV	NV	Liquid scintillation counting
Nickel-63	30	4,026	83	166	Liquid scintillation counting
Technetium-99	0.25	5.7	0.46	0.46	Liquid scintillation counting
Tritium	10	510	12.6	25.2	Liquid scintillation counting
Neptunium-237	1	2.44	0.9 [d]	1.80 [d]	Np-237 AEA
Nonradionuclides					
Chloride	2	NV	25,000	NA	EPA 300.0 (anions by IC)
Fluoride	5	4,800	2,800	2,890	EPA 300.0 (anions by IC)
Nitrate (as nitrogen)	2.5	128,000	40	40	EPA 300.0 (anions by IC)
Nitrite (as nitrogen)	2.5	8,000	40	4	EPA 300.0 (anions by IC)
Sulfate	5	NV	1,030	1,030	EPA 300.0 (anions by IC)

Table 8. Wells #3, #4, and #5 Target Analytes, Analytical Methods, and Contract-Required Detection Limits. (9 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Aluminum	5	80,000	480,000	480,000	EPA 6010 or 200.8 (ICP or ICP/MS)
Antimony	6	32	5.4	12.7	EPA 6010 or 200.8 (ICP or ICP/MS)
Arsenic	10	TBD [b]	TBD [b]	TBD [b]	EPA 6010 or 200.8 (ICP or ICP/MS)
Barium	2	16,000	1,650	1,600	EPA 6010 or 200.8 (ICP or ICP/MS)
Beryllium	0.5	160	63.2	63	EPA 6010 or 200.8 (ICP or ICP/MS)
Boron	2	16,000	210	NV	EPA 6010 or 200.8 (ICP or ICP/MS)
Cadmium	0.5	80	0.69	0.125 [d]	EPA 6010 or 200.8 (ICP or ICP/MS)
Chromium (total)	1	120,000	2,000	1,300	EPA 6010 or 200.8 (ICP or ICP/MS)
Cobalt	2	24	15.7	NV	EPA 6010 or 200.8 (ICP or ICP/MS)
Copper	1	3,200	284	575	EPA 6010 or 200.8 (ICP or ICP/MS)
Lead	5	250	3,000	420	EPA 6010 or 200.8 (ICP or ICP/MS)
Lithium	2.5	160	192	NV	EPA 6010 or 200.8 (ICP or ICP/MS)
Manganese	5	3,760	512 [b]	256 [b]	EPA 6010 or 200.8 (ICP or ICP/MS)
Molybdenum	2	400	32	NV	EPA 6010 or 200.8 (ICP or ICP/MS)
Nickel	4	1,600	130	179	EPA 6010 or 200.8 (ICP or ICP/MS)
Selenium	10	400	5.2 [d]	0.52 [d]	EPA 6010 or 200.8 (ICP or ICP/MS)

Table 8. Wells #3, #4, and #5 Target Analytes, Analytical Methods, and Contract-Required Detection Limits. (9 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Silver	1	400	13.6	0.442	EPA 6010 or 200.8 (ICP or ICP/MS)
Thallium	5	5.6	1.59	4.46	EPA 6010 or 200.8 (ICP or ICP/MS)
Vanadium	2.5	560	2,240	NV	EPA 6010 or 200.8 (ICP or ICP/MS)
Zinc	1	24,000	5,970	226	EPA 6010 or 200.8 (ICP or ICP/MS)
Chromium (hexavalent)	0.5	TBD	TBD	TBD	EPA 7196 (hexavalent chromium)
Mercury	0.2	24	2.09	0.33 [b]	EPA 7471 (Hg cold vapor)
Ethylene glycol	5.0	160,000	64.3	NV	EPA 8015
Propylene glycol	5	1,600,000	NV	NV	EPA 8015
Methanol	1.0	4,000	16.1	NV	EPA 8015M
Aldrin	0.00165	0.0588	0.00504	0.0008 [d]	EPA 8081 (pesticides)
BHC; alpha	0.00165	0.159	0.0005 [d]	0.00031 [d]	EPA 8081 (pesticides)
BHC; beta	0.00165	0.556	0.00227	0.00259	EPA 8081 (pesticides)
BHC; delta	0.00165	NV	NV	NV	EPA 8081 (pesticides)
BHC; gamma (lindane)	0.00165	0.769	0.00209	0.00119	EPA 8081 (pesticides)
Chlordane	0.0165	2.86	2.06	0.00055 [d]	EPA 8081 (pesticides)
DDD; 4,4'-	0.0033	4.17	0.335	0.00024 [d]	EPA 8081 (pesticides)
DDE; 4,4'-	0.0033	2.94	0.446	0.006 [d]	EPA 8081 (pesticides)
DDT; 4,4'-	0.0033	2.94	3.49	0.00493	EPA 8081 (pesticides)
Dieldrin	0.0033	0.0625	0.0028 [d]	0.00004 [d]	EPA 8081 (pesticides)
Endosulfan I	0.00165	480	4.3	0.0417	EPA 8081 (pesticides)
Endosulfan II	0.0033	480	4.3	0.0417	EPA 8081 (pesticides)
Endosulfan sulfate	0.0033	480	4.3	0.0417	EPA 8081 (pesticides)

Table 8. Wells #3, #4, and #5 Target Analytes, Analytical Methods, and Contract-Required Detection Limits. (9 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Endrin	0.0033	24	0.44	0.168	EPA 8081 (pesticides)
Endrin aldehyde	0.0033	24	0.44	0.168	EPA 8081 (pesticides)
Endrin ketone	0.0033	24	0.44	0.168	EPA 8081 (pesticides)
Heptachlor	0.00165	0.222	0.0370	0.000025 [d]	EPA 8081 (pesticides)
Heptachlor epoxide	0.00165	0.11	0.008	0.0001 [d]	EPA 8081 (pesticides)
Methoxychlor	0.0165	400	64.2	13.4	EPA 8081 (pesticides)
Toxaphene	0.165	0.909	0.153	0.0005	EPA 8081 (pesticides)
Aroclor-1016 (PCB)	0.0165	0.5	0.094	0.000224 [d]	EPA 8082 (PCBs)
Aroclor-1221 (PCB)	0.0165	0.5	0.00920[d]	0.0000219 [d]	EPA 8082 (PCBs)
Aroclor-1232 (PCB)	0.0165	0.5	0.00920 [d]	0.0000219 [d]	EPA 8082 (PCBs)
Aroclor-1242 (PCB)	0.0165	0.5	0.0394	0.0000935 [d]	EPA 8082 (PCBs)
Aroclor-1248 (PCB)	0.0165	0.5	0.0386	0.0000935 [d]	EPA 8082 (PCBs)
Aroclor-1254 (PCB)	0.0165	0.5	0.0664	0.000158 [d]	EPA 8082 (PCBs)
Aroclor-1260 (PCB)	0.0165	0.5	0.721	0.00171 [d]	EPA 8082 (PCBs)
Aroclor-1262 (PCB)	0.0165	NV	NV	NV	EPA 8082 (PCBs)
Dalapon	0.1	2,400	0.811	0.81	EPA 8151 (herbicides)
DB; 2,4-	0.1	640	0.768	NV	EPA 8151 (herbicides)
Dicamba	0.1	2,400	2.2	2.20	EPA 8151 (herbicides)
Dichlorophenoxyacetic acid; 2,4-	0.4	800	0.321 [d]	0.321	EPA 8151 (herbicides)
Dichlorprop	0.1	640	0.321	0.321	EPA 8151 (herbicides)
Dinoseb (DNBP){2-sec-butyl-4,6-dinitrophenol}	0.012	80	0.0524	1.05	EPA 8151 (herbicides)
TP; 2,4,5- (Silvex)	0.02	640	0.28	0.28	EPA 8151 (herbicides)
Trichlorophenoxyacetic acid; 2,4,5-	0.02	800	0.761	0.79	EPA 8151 (herbicides)
Acetone	0.02	72,000	28.9	NV	EPA 8260 (VOCs)

Table 8. Wells #3, #4, and #5 Target Analytes, Analytical Methods, and Contract-Required Detection Limits. (9 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Benzene	0.005	18.2	0.004	0.007	EPA 8260 (VOCs)
Butanol; 1-	0.1	8,000	3.31	6.6	EPA 8260 (VOCs)
Butanone; 2-	0.01	48,000	19.6	NV	EPA 8260 (VOCs)
Carbon disulfide	0.005	800	5.65	12.4	EPA 8260 (VOCs)
Carbon tetrachloride	0.005	7.69	0.031	0.0023 [d]	EPA 8260 (VOCs)
Chloroform	0.005	164	0.038	0.0304	EPA 8260 (VOCs)
Cyclohexanone	1	400,000	172	NV	EPA 8260 (VOCs)
Ethyl acetate	5	NV	29.8	NV	EPA 8260 (VOCs)
Ethyl ether	0.005	16,000	6.68	NV	EPA 8260 (VOCs)
Ethylbenzene	0.005	8,000	6.05	26.8	EPA 8260 (VOCs)
Methyl isobutyl ketone	0.01	6,400	2.71	NV	EPA 8260 (VOCs)
Methylene chloride	0.005	133	0.218	0.0205	EPA 8260 (VOCs)
Tetrachloroethene	0.005	1.85	0.008	0.004	EPA 8260 (VOCs)
Toluene	0.005	6,400	4.65	49.5	EPA 8260 (VOCs)
Trichlorobenzene; 1,2,4-	0.01	800	2.98	1.31	EPA 8260 (VOCs)
Trichloroethane; 1,1,1-	0.005	NV	1.58	1.59	EPA 8260 (VOCs)
Trichloroethene	0.005	11.2	0.00323	0.0178	EPA 8260 (VOCs)
Vinyl chloride	0.005	240	0.00184	0.0126	EPA 8260 (VOCs)
Xylenes (total)	0.01	16,000	3.09	5.15	EPA 8260 (VOCs)
Tributyl phosphate	3.3	185	0.677 [d]	NV	EPA 8270 (SVOCs)
Bis(2-chloro-1-methylethyl) ether	0.33	14.3	NV	0.180	EPA 8270 (SVOCs)
Bis(2-chloroethoxy) methane	0.33	0.909	NV	NV	EPA 8270 (SVOCs)
Bis(2-ethylhexyl)phthalate	0.33	71.4	13.9	4.01	EPA 8270 (SVOCs)
Bromophenylphenyl ether;4-	0.33	NV	NV	NV	EPA 8270 (SVOCs)

Table 8. Wells #3, #4, and #5 Target Analytes, Analytical Methods, and Contract-Required Detection Limits. (9 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Butylbenzylphthalate	0.33	16,000	893	349	EPA 8270 (SVOCs)
Carbazole	0.33	50	0.314 [d]	NV	EPA 8270 (SVOCs)
Chloro-3-methylphenol;4-	0.33	4,000	NV	NV	EPA 8270 (SVOCs)
Chlorophenylphenyl ether;4-	0.33	4,000	NV	NV	EPA 8270 (SVOCs)
Dibenzofuran	0.33	160	7.36	NV	EPA 8270 (SVOCs)
Diethylphthalate	0.33	64,000	72.2	130	EPA 8270 (SVOCs)
Di-n-butylphthalate	0.33	8,000	56.5	95.5	EPA 8270 (SVOCs)
Di-n-octylphthalate	0.33	1,600	532,000	NV	EPA 8270 (SVOCs)
Isophorone	0.33	1,050	0.228 [d]	7.7	EPA 8270 (SVOCs)
Methylnaphthalene; 2-	0.33	320	2.03	2.04	EPA 8270 (SVOCs)
Methylphenol; 4-(cresol; p-)	0.33	400	0.507	0.505	EPA 8270 (SVOCs)
Chloroaniline;4-	0.33	320	0.264 [d]	NV	EPA 8270 (SVOCs)
Chloronaphthalene;2-	0.33	6,400	40.7	56.5	EPA 8270 (SVOCs)
Chlorophenol;2-	0.33	400	0.472	2.28	EPA 8270 (SVOCs)
Dichlorobenzene; 1,2-	0.33	7,200	7.03	31.7	EPA 8270 (SVOCs)
Dichlorobenzene; 1,3-	0.33	2,400	3.09	5.15	EPA 8270 (SVOCs)
Dichlorobenzene; 1,4-	0.33	41.7	0.030 [d]	0.080 [d]	EPA 8270 (SVOCs)
Dichlorobenzidine; 3,3'-	0.33	2.22	0.003 [d]	0.0005 [d]	EPA 8270 (SVOCs)
Dichlorophenol; 2,4-	0.33	240	NV	2.65	EPA 8270 (SVOCs)
Dimethylphenol; 2,4-	0.33	1,600	2.62	4.52	EPA 8270 (SVOCs)
Dimethylphthalate	0.33	64,000	72.2	130	EPA 8270 (SVOCs)
Di-nitro-2-methylphenol; 4,6-	0.33	8.00	0.0256 [d]	NV	EPA 8270 (SVOCs)
Dinitrophenol; 2,4-	0.825	160	0.125 [d]	0.560 [d]	EPA 8270 (SVOCs)
Dinitrotoluene; 2,4-	0.33	160	0.189 [d]	0.0005 [d]	EPA 8270 (SVOCs)

Table 8. Wells #3, #4, and #5 Target Analytes, Analytical Methods, and Contract-Required Detection Limits. (9 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Dinitrotoluene; 2,6-	0.33	80	NV	NV	EPA 8270 (SVOCs)
Hexachlorobenzene	0.33	0.625	0.015 [d]	0.001 [d]	EPA 8270 (SVOCs)
Hexachlorobutadiene	0.33	12.8	0.605	0.475	EPA 8270 (SVOCs)
Hexachlorocyclopentadiene	0.33	480	NV	960	EPA 8270 (SVOCs)
Hexachloroethane	0.33	71.4	0.125	0.076	EPA 8270 (SVOCs)
Methylphenol; 2-(cresol; o-)	0.33	4,000	5.14	5.15	EPA 8270 (SVOCs)
Nitroaniline; 2-	0.33	240	0.121	NV	EPA 8270 (SVOCs)
Nitroaniline; 3-	0.33	47.6	0.010	NV	EPA 8270 (SVOCs)
Nitroaniline; 4-	0.33	47.6	0.010	NV	EPA 8270 (SVOCs)
Nitrobenzene	0.33	160	0.102 [d]	0.109 [d]	EPA 8270 (SVOCs)
Nitrophenol; 2-	0.66	NV	NV	NV	EPA 8270 (SVOCs)
Nitrophenol; 4-	0.66	640	1.30	128	EPA 8270 (SVOCs)
Nitroso-di-n-propylamine; N-	0.33	0.143 [d]	0.000056	0.0035	EPA 8270 (SVOCs)
Nitrosodiphenylamine; N-	0.33	204	NV	NV	EPA 8270 (SVOCs)
Pentachlorophenol	0.33	8.33	0.016 [d]	0.00444 [d]	EPA 8270 (SVOCs)
Trichlorophenol; 2,4,5-	0.33	8,000	28.8	NV	EPA 8270 (SVOCs)
Trichlorophenol; 2,4,6-	0.33	90.9	0.0462 [d]	0.049 [d]	EPA 8270 (SVOCs)
Acenaphthene	0.1	4,800	97.9	65.5	EPA 8310 (PAHs)
Acenaphthylene	0.1	4,800	97.9	65.5	EPA 8310 (PAHs)
Anthracene	0.05	24,000	2.270	4,550	EPA 8310 (PAHs)
Benzo(a)anthracene	0.015	1.37	0.856	0.02400	EPA 8310 (PAHs)
Benzo(a)pyrene	0.015	0.137	2.33	0.0545	EPA 8310 (PAHs)
Benzo(b)fluoranthene	0.015	1.37	2.95	0.069	EPA 8310 (PAHs)
Benzo(ghi)perylene	0.03	2,400	25,700	3,540	EPA 8310 (PAHs)

Table 8. Wells #3, #4, and #5 Target Analytes, Analytical Methods, and Contract-Required Detection Limits. (9 Pages)

Target Analyte	Practical Quantitation Limits [a]	Preliminary Cleanup Goals [a, b]			Analytical Methods
		Direct Exposure	Groundwater Protection	River Protection	
Benzo(k)fluoranthene	0.015	1.37	21.5	0.069	EPA 8310 (PAHs)
Chrysene	0.1	13.7	9.56	0.0223 [d]	EPA 8310 (PAHs)
Dibenz(a,h)anthracene	0.3	1.37	4.29	0.1	EPA 8310 (PAHs)
Fluoranthene	0.05	3,200	631	89	EPA 8310 (PAHs)
Fluorene	0.03	3,200	101	206	EPA 8310 (PAHs)
Indeno(1,2,3-cd)pyrene	0.03	1.37	8.33	0.195	EPA 8310 (PAHs)
Naphthalene	0.1	1,600	4.46	138	EPA 8310 (PAHs)
Phenanthrene	0.05	24,000	1,140	9,100	EPA 8310 (PAHs)
Pyrene	0.05	2,400	655	2,620	EPA 8310 (PAHs)
Cyanide	0.5	1,600	0.80	0.8	EPA 9010 or 9012
Asbestos	1%	NA	NA	NA	Microscopy
TPH/diesel and motor oil	5	2,000	2,000	NV	NWTPH-D+
TPH/gasoline range	5	30	30	30	NWTPH-G

[a] Units are mg/kg (nonradionuclides) and pCi/g (radionuclides) unless otherwise noted. Cleanup levels are established in the most current CLARC table (updated February 12, 2009) calculated per *Washington Administrative Code* 173-340 (Ecology 2007) using input parameters stated in the CLARC table.

[b] Where cleanup levels are less than background, cleanup levels default to background as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL-96-17, Rev 5).

[c] If strong gamma emissions interfere with analysis of Am-241, Am-241 can be analyzed using Cm/Am Alpha Emission Analysis method.

[d] Where cleanup levels are less than PQLs, cleanup levels default to PQLs as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL-96-17, Rev 5).

Reference: Washington State Department of Ecology, 2007, "Model Toxics Control Act Statute and Regulation," Publication No. 94-06, revised November 2007, Washington State Department of Ecology, Olympia, Washington.

AEA = alpha energy analysis
CLARC = Cleanup Levels and Risk Calculation
EPA = U.S. Environmental Protection Agency
GEA = gamma energy analysis
IC = ion chromatograph
ICP = inductively coupled plasma
MS = mass spectography
NA = not applicable
NWTPH = Northwest total petroleum hydrocarbons
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
PQL = practical quantitation limit
RDR/RAWP = remedial design report/remedial action work plan
SVOC = semivolatile organic compound
TBD = to be determined
VOC = volatile organic compound

NV = No value. The generic RESidual RADioactivity modeling reported in the 100 Area RDR/RAWP predicts the contaminant will not reach groundwater within 1,000 years.

6.0 CONCLUSIONS

This approach should be followed to identify target analytes for the other 100 and 300 Area RI/FS Work Plans under development.

The analytical methods in Table 4, particularly those identified for radionuclides, should be verified and documented in the quality assurance project plan section of the sampling and analysis plan for the 300 Area decision unit. As additional soil data become available, other suitable exclusion criteria should be considered and evaluated for use in the target analyte list development process.

7.0 REFERENCES

The references used in this document are listed in Table 1.

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