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Waste Management Data Quality Objectives Summary Report For the Drilling of Well C5860 in the 200-BP-5 Operable Unit

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

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S. Lindberg
Freestone Environmental Services, Inc.

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TERMS

AA	alternative action
bgs	below ground surface
COC	contaminant of concern
COPC	contaminant of potential concern
DQO	data quality objective
DS	decision statement
DR	decision rule
K_d	distribution coefficient
MSW	miscellaneous solid waste
OU	Operable Unit
PPE	personal protective equipment
PSQ	principal study question
SAP	sampling and analysis plan
WAC	*Washington Administrative Code*

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1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this data quality objective (DQO) summary report is to support decision-making as it pertains to the handling, management, designation, and disposition of investigation-derived waste from the installation of the well C5860 in the 200 East Area of the Hanford Site. This well is being constructed to support the remedial investigation/feasibility study process at the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) 200-BP-5 Operable Unit (OU) as identified in the *Remedial Investigation/Feasibility Study Work Plan for the 200-BP-5 Groundwater Operable Unit* (DOE/RL-2007-18). The well identification number and a summary of the purpose of the new well are provided in Table 1.

Table 1. Well Identification Number and Purpose.

Well Construction ID Number	Well Name	Purpose
C5860	299-E29-54	C5860 (Well "K"*) will be drilled near the 216-B-6 Reverse Well to determine the extent of contamination in the deep vadose zone and groundwater near this reverse well.

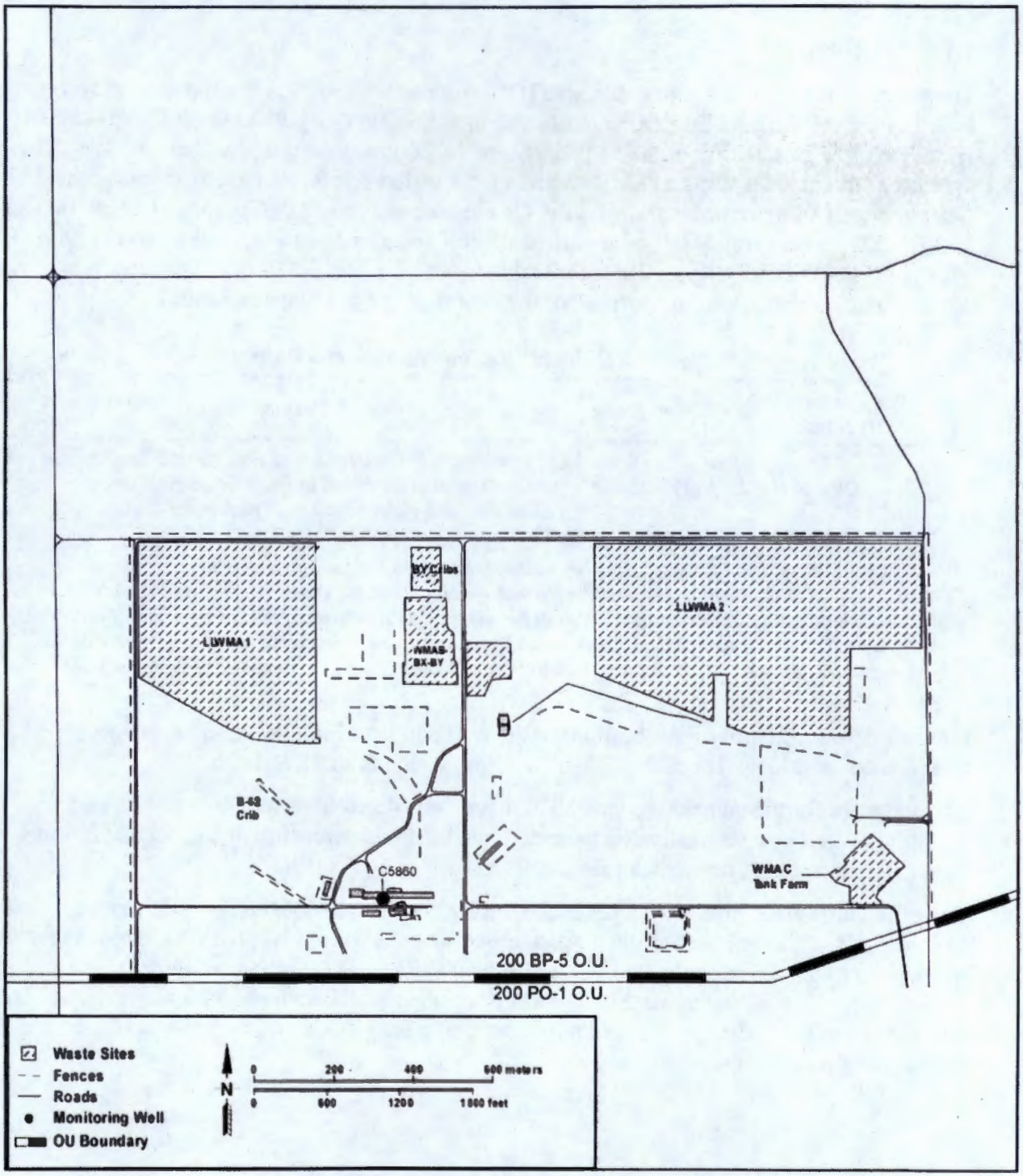
*The letter designation "K" reflects the well designation notation used in previous documentation (WMP-28945, *Data Quality Objective Summary Report in Support of the 200-BP-5 Groundwater Operable Unit Remedial Investigation/Feasibility Study Process*; DOE/RL-2007-18, *Remedial Investigation/Feasibility Study Work Plan for the 200-BP-5 Groundwater Operable Unit, Hanford Site, Richland, Washington*) and is provided for cross reference purposes. For the remainder of this document, the well will be referred to using the well construction ID number C5860 in this table.

Figure 1 depicts the proposed location for the well addressed in this summary report. Well C5860 is located just west of the 222-B Building, which is south of B Plant.

The activities for the subject well installation are considered to have a high risk to contact radiological and/or chemically contaminated media. Field screening and characterization will be used to verify the risk determination.

The principal wastes that will be generated during construction of the new well are vadose zone drill cuttings, saturated zone drill cuttings, miscellaneous solid waste (MSW), which includes waste such as used personal protective equipment (PPE) and sampling equipment, and purgewater. Each of these waste types has been separately considered by reviewing Hanford Site data sources to identify the contaminants of concern (COCs) that will be evaluated for determining waste disposition.

Figure 1. Site Map for C5860 at the 200-BP-5 Operable Unit.



1.2 PROJECT ASSUMPTIONS

The following project assumptions were taken into consideration during the preparation of this DQO summary report and are applicable to the well addressed herein.

- All waste generated from the installation of well C5860 will be managed in accordance with *Waste Control Plan for the 200-BP-5 Operable Unit* (DOE/RL-2003-30).
- Due to the high risk to contact radiological and/or chemically contaminated media, all soils will be drummed. The waste associated with this activity will be staged at an accumulation area and sampled for waste characterization and dispositioning. Waste characterization sampling and analysis will be performed in conjunction with the sampling and analysis activities as described in the associated project sampling and analysis plan (SAP) (Appendix A of DOE/RL-2007-18, *Remedial Investigation/Feasibility Study Work Plan for the 200-BP-5 Groundwater Operable Unit, Hanford Site, Richland, Washington*). The COCs identified in this DQO will be added to the SAP analytical requirements as required. The final disposition of the accumulated wastes will be in accordance with applicable requirements as determined from waste characterization.
- All waste generated between the historic high-groundwater elevation and the bottom of the well will be considered saturated zone waste.
- Groundwater-contacted waste will not be designated as "ignitable, corrosive, or reactive" based on "Waste Designation for Hanford Site Groundwater Contacted Waste" (CCN 0542880).
- No listed waste codes will be applied to groundwater-contacted waste at the monitoring well location C5860 based on "Application of Listed Waste Codes to Secondary Solid Waste Related to Well Construction, Maintenance and Sampling" (CCN 081034).
- Purgewater may be collected and contained at the well head until it is either transported to the Purgewater Storage and Treatment Facility or, if waste-acceptance criteria can be met, the Effluent Treatment Facility. Purgewater, groundwater samples, and decontamination fluids generated during well drilling, sample screening, and analysis shall be managed as purgewater in accordance with purgewater guidance provided in "Strategy for Handling and Disposing of Purgewater at the Hanford Site, Washington" (90-ERB-040).
- MSW (e.g., wipes, gloves and other PPE) generated from work in the vadose zone should be separated from the waste resulting from saturated zone drilling and sampling. The MSW from vadose zone drilling may be monitored in the field for release based on the provisions of the *PHMC Radiological Control Procedures* (HNF-13536), Section 4.1.1, "Standard Radiological Release Survey for Material and Equipment." If elevated readings are detected, the MSW shall be designated using the vadose analytical and characterization data. The MSW generated from work in the saturated zone will be designated using the saturated zone drill cuttings analytical and characterization data. The field survey results for any MSW with elevated readings will be used to scale the concentrations of COCs with analytical results assigned to the well site.

1.3 EXISTING REFERENCES

Table 2 lists references that are relevant to well C5860 along with a brief narrative summary of the pertinent information obtained from each reference.

Table 2. Summary of General References for Well 5860 (3 sheets)

References	Summary
WIDS Database 216-B-6 Reverse Well	The reverse well is located 3.6 m (12 ft) west and 0.9 m (3 ft) north of the 222-B Building. 216-B-6 Reverse Well is mapped approximately 4.2 m (14 ft) east of well 299-E28-51 and approximately 5 m (16.5 ft) from the planned well C5860. This reverse well is associated with the 222-B Laboratory. The reverse well at 222-B was installed to provide disposal for the laboratory hot sink and sample table. During the bismuth phosphate fuel separation process, batch samples were analyzed in the 222-T and 222-B Laboratories. HW-4850, written in 1945, states that the 222-T Laboratory was discharging approximately 2.6 curies of fission products and 600 mg of plutonium to the dry well per month. Since similar work was done at the 222-B Laboratory, similar waste inventory can be assumed. The reported depth of the 216-B-6 Reverse Well ranges from 22.9 m (75 ft) deep to 92 m (302 ft). Although no reports have been made to indicate the contaminated effluent ever reached groundwater, the monitoring well 299-E28-17 was not optimally placed to detect gamma emitters from the 216-B-6 and 216-B-10A&B waste sites. An estimated volume of 6 million liters of liquid mixed waste in the form of process effluent was discharged to 216-B-6 reverse well.
WIDS Database 216-B-10A&B Cribs	216 B 10A&B Cribs are located south of the west end of 222-B Building and approximately 62 m (204 ft) south of the planned well C5860. Until December 1951, the 216-B-10A Crib received the decontamination sink and sample slurper waste from 222-B Building and floor drainage from 292-B Building. After December 1951, the site received only floor drainage waste from 292-B Building. The waste is acidic and contains transuranics and fission products. From December 1949 to December 1951, the 216-B-10B Crib received the decontamination sink and sample slurper waste from the 222-B Building and the floor drainage from the 292-B Building. From December 1951 to May 1969 the site received only the floor drainage from the 292-B Building. From May 1969 to October 1973 the site received only the decontamination sink and shower waste from the 221-B Building. An estimated volume of 9.99 million liters and 28,000 liters of liquid mixed waste in the form of process effluent was discharged to 216-B-10A crib and 216-B-10B crib, respectively.
WIDS Database 216-B-13 French Drain	The french drain is located south of 221-B and northeast of the 291-B-1 Stack. The french drain is associated with the 291-B Stack. The unit operated from August 1947 to June 1976. In June 1976, the stack drainage was rerouted to a cell drainage sample tank. The site received the 291-B-1 Stack drainage. The waste is low in salt and is neutral to basic. An estimated volume 21,000 liters of liquid mixed waste in the form of process effluent was discharged to the 216-B-13 french drain.

Table 2. Summary of General References for Well 5860 (3 sheets)

References	Summary
WIDS Database 216-B-4 French Drain	The french drain is located south of the 221-B Building, east of the 222-B Building and north of the 292-B Building. The french drain is related to the 291-B Stack and the 292-B Building. Before August 1947, the site received 291-B Stack drainage. After August 1947, the site received floor drainage from the 292-B Building. The waste is neutral to basic and low salt with less than one curie of total beta contaminants. The B Plant Aggregate Area Management Study Report also mentions transuranic fission products. An estimated volume of 10,000 liters of radioactively contaminated water was discharged to the 216-B-4 french drain.
QMap database	Identifies the surrounding wells and the nearest waste sites to the proposed well locations.
Virtual Library	Provides historical water level measurements and analytical results for Hanford Site wells.
BHI-00139, *Environmental Restoration Disposal Facility Waste Acceptance Criteria.*	Identifies waste acceptance criteria for ERDF.
000X-DC-W001, *Supplemental Waste Acceptance Criteria for Bulk Shipments to the Environmental Restoration Disposal Facility*	Provides additional waste acceptance criteria for the ERDF.
CCN 081034, *Application of Listed Waste Codes to Secondary Solid Waste Related to Well Construction, Maintenance, and Sampling.*	No listed waste codes are applicable to secondary solid wastes generated during the installation of well C5860 per CCN 081034.
DOE/RL-2007-18, *Remedial Investigation/Feasibility Study Work Plan for the 200-BP-5 Groundwater Operable Unit, Hanford Site, Richland, Washington*	Defines the approach, tasks, and schedules associated with the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* RI/FS activities for the 200-BP-5 groundwater OU. Identifies the purpose of well C5860. States that vadose zone contamination likely to pose a significant threat to groundwater quality is suspected below the 216-B-6 Reverse Well.
DOE/RL-2007-18, Appendix A, Sampling and Analysis Plan	Describes the sampling and analysis requirements for the drilling of well C5860.
Letter 90-ERB-040, "Strategy for Handling and Disposition of Purgewater at the Hanford Site, Washington"	Provides direction on purgewater designation and disposal.
Ecology 94-145, *Model Toxics Control Act Cleanup Levels & Risk Calculation (CLARC)*	Provides typical K_d values for MTCA-regulated contaminants and specifies concentration limits for potable water and for unrestricted land use, both based upon MTCA Method B (WAC 173-340).
PNNL-13895, *Hanford Contaminant Distribution Coefficient Database and Users Guide.*	Lists K_d experimentally determined using sediment samples, groundwater, and process solutions that are typical of conditions at the Hanford Site.
PNNL-15670, *Hanford Site Groundwater Monitoring for Fiscal Year 2006*	Provides the COPCs in the 200-BP-5 OU, plume maps for significant contaminants, and a groundwater quality summary.

Table 2. Summary of General References for Well 5860 (3 sheets)

References	Summary
WMP-28945, *Data Quality Objective Summary Report in Support of the 200-BP-5 Groundwater Operable Unit Remedial Investigation/Feasibility Study Process*	Provides lists of COPCs for the vadose zone and COPCs/COCs for the groundwater for the 200-BP-5 OU RI/FS process.

Reference details are provided in Section 8.0 of this document.
COC = contaminant of concern
COPC = contaminant of potential concern
ERDF = Environmental Restoration Disposal Facility
K_d = distribution coefficient
MTCA= *Model Toxic Control Act*
OU = Operable Unit
RI/FS = Remedial Investigation/Feasibility Study
WAC = *Washington Administrative Code*
WIDS = *Waste Information Data System*

1.4 WELL C5860

Well C5860 will be drilled in a location where soils may have been affected by contamination from nearby waste sites. Because of the proximal location of documented waste sites, there is a potential for vadose zone contamination associated with well C5860. The nearby (within 100 m [328 ft]) waste sites that were considered as potential sources for contamination at the proposed well location include:

- 216-B-4 French Drain
- 216-B-6 Reverse Well
- 216-B-10A&B Cribs
- 216-B-13 French Drain

The following subsections summarize applicable waste site information found during the review of available references.

1.4.1 216-B-4 French Drain

The 216-B-4 French Drain is located south of the 221-B Building, east of the 222-B Building and north of the 292-B Building. The french drain is related to the 291-B Stack and the 292-B Building. Before August 1947, the site received 291-B Stack drainage. After August 1947, the site received floor drainage from the 292-B Building. The waste is neutral to basic and low salt with less than one curie of total beta contaminants. The B Plant Aggregate Area Management Study Report also mentions transuranic fission products. An estimated volume of 10,000 liters of radioactively contaminated water was discharged to the 216-B-4 french drain.

1.4.2 216-B-6 Reverse Well

The 222-B Laboratory was used from 1945 until 1952 for small-scale experiments in support of B Plant bismuth-phosphate fuel processing. The facility disposed liquid waste to the 216-B-6 Reverse Well and the 216-B-10A Crib. The 216-B-6 Reverse Well operated from April 1945 to

November 1949, receiving approximately 6.1 million L (1.6 million gal) of liquid waste from the 222-B Laboratory. The site received liquid effluent from decontamination sinks and sample slurper waste from the 222-B Building from 1945 to 1949. The waste was acidic, containing nitric and sulfuric acid and also transuranic fission products. The waste inventory indicates that this waste site received 22.7 million L (6 million gal) of effluent with 100 kg of $Na_2Cr_2O_7$. Recent Soil Inventory Model estimates indicate that the median inventory for chromium is nearly 2,500 kg and the mobile radionuclide inventory did not exceed 1 Ci. The highest mobile radionuclide curie content according to the Soil Inventory Model was associated with tritium and technetium. Nitrate, chloride, and sodium concentrations were also significant (58,373 kg, 675 kg, and 26,954 kg, respectively). An estimated volume of 6 million liters liquid mixed waste in the form of process effluent was discharged to 216-B-6 reverse well.

The construction of the reverse well is uncertain, with three conflicting screen intervals (i.e., 23 m [75 ft] below ground surface [bgs], 49 m [161 ft] bgs, and 92 m [302 ft] bgs) presented in the databases. The *Waste Information Data System* database indicated that discharges to this waste site were similar to the discharges associated with the 222-T Laboratory, with 2.6 Ci of fission product and 600 mg of plutonium per month. A lack of proximal groundwater monitoring wells, high inventory levels for chromium and nitrate, and uncertainty of the depth of 216-B-6 Reverse Well are the basis for further investigation.

1.4.3 216-B-10A&B Cribs

216-B-10A&B Cribs are located south of the west end of 222-B Building and approximately 62 m (204 ft) south of the planned well C5860. Until December 1951, the 216-B-10A Crib received the decontamination sink and sample slurper waste from 222-B Building and floor drainage from 292-B Building. After December 1951, the site received only the floor drainage from 292-B Building. The waste was acidic and contained transuranics and fission products.

From December 1949 to December 1951, the 216-B-10B Crib received the decontamination sink and sample slurper waste from the 222-B Building and the floor drainage from the 292-B Building. From December 1951 to May 1969 the site received only the floor drainage from the 292-B Building. From May 1969 to October 1973, the site received only the decontamination sink and shower waste from the 221-B Building. An estimated volume of 9.99 million liters and 28,000 liters of liquid mixed waste in the form of process effluent was discharged to 216-B-10A crib and 216-B-10B crib, respectively.

1.4.4 216-B-13 French Drain

The french drain is located south of 221-B Building and northeast of the 291-B-1 Stack. The french drain is associated with the 291-B Stack. The site received the 291-B-1 Stack drainage. The unit operated from August 1947 to June 1976. In June 1976, the stack drainage was rerouted to a cell drainage sample tank. The waste is low in salt and is neutral to basic. An estimated volume 21,000 liters of liquid mixed waste in the form of process effluent was discharged to the 216-B-13 french drain.

1.4.5 Well C5860 Vadose Zone Contaminants of Potential Concern

Data Quality Objective Summary Report in Support of the 200-BP-5 Groundwater Operable Unit Remedial Investigation/Feasibility Study Process (WMP-28945) provides a final list of vadose zone RI/FS contaminants of potential concern (COPC) for the 200-BP-5 OU. The process of developing preliminary COPCs and the subsequent exclusion process utilized to determine the final list of RI/FS COPCs for the vadose zone is also documented in this report. The exclusion criteria used for the RI/FS COPCs was reviewed for IDW management purposes and some analytes previously excluded for RI/FS purposes are included as IDW COPCs for this DQO. These additional contaminants are noted by a superscript in the table. The vadose zone IDW COPCs for this DQO are listed in Table 3.

Table 3. Well C5860 Vadose Zone IDW Contaminants of Potential Concern. (Two Sheets)

Radioactive COPCs			
Am-241	Cm-244[1]	Pu-239	Tc-99
Am-242[1]	Cm-245[1]	Pu-240	Th-231[1]
Am-242m[1]	Eu-152	Pu-241[1]	Th-232
Am-243[1]	Eu-154	K-40[1]	Th-234
Sb-125[1]	Eu-155	Pm-147[1]	Tritium (H-3)
Ba-137m[1]	I-129	Pa-231[1]	U-233
C-14	Nb-93m[1]	Pa-234[1]	U-234
Cs-134[1]	Np-237	Pa-234m[1]	U-235
Cs-135[1]	Np-239[1]	Sm-151[1]	U-236
Cs-137		Se-79[1]	U-238
Co-60	Ni-63	Sr-90	Y-90[1]
	Pu-238		Zr-93[1]
Metal COPCs			
Aluminum	Cadmium	Lithium	Strontium
Antimony	Chromium (total)	Manganese	Thallium
Arsenic	Chromium (VI)	Mercury	Titanium[1]
Barium	Cobalt	Nickel	Uranium (total)
Beryllium	Copper	Selenium	Vanadium
Bismuth[1]	Iron	Silver	Zinc
Boron	Lead		
Inorganic COPCs			
Chloride	Cyanide	Nitrate	Sulfate
	Fluoride	Nitrite	
Volatile Organic Analyte COPCs			
Acetone	Chloroform	Ethylbenzene	Trans-1,2-dichloroethene
Benzene	cis-1,2-dichloroethene	Ethylene glycol	1,1,1-trichloroethane
1-butanol (butyl alcohol)	Dichloromethane (methylene chloride)	4-methyl-2-pentanone (MIBK)	1,1,2-trichloroethane
2-butanone (MEK)	1,1-dichloroethane	n-butyl benzene[1]	Trichloroethene
Carbon tetrachloride	1,2-dichloroethane	Styrene	Trichloromonofluoromethane
Chlorobenzene		Toluene	Tetrachloroethene
			Xylene

Table 3. Well C5860 Vadose Zone IDW Contaminants of Potential Concern. (Two Sheets)

Semi-Volatile Organic Analyte COPCs			
Aldrin[1] Aroclor 1260[1] Benzo(a)anthracene[1] Benzo(a)pyrene[1] Benzo(b)fluoranthene[1] Gamma-BHC[1] Bis(2-ethylhexyl)phthalate Chrysene[1] 4-chloro-3-methylphenol[1]	2-chlorophenol Cyclohexanone[1] Dibenz(a,h)anthracene[1] Dibutylphosphate[1] 2-4-dichlorophenol[1] Dieldrin[1] Dimethoate[1] 2,4- dimethylphenol[1] 2,4-dinitrophenol[1]	2,4-dinitrotoluene[1] Endrin[1] Edrine aldehyde[1] Heptachlor[1] Indeno(1,2,3-cd)pyrene[1] 3-methylphenol 4-methylphenol Naphthalene 2-nitrophenol[1]	Pentachlorophenol Phenol Phorate[1] Pyrene 2,3,4,6-tetrachlorophenol[1] Total petroleum hydrocarbons Tributyl phosphate[1]
Other Organic Analyte COPCs			
Pesticides[1] Herbicides[1]			

COPC = contaminant of potential concern

[1]Contaminant previously excluded in the *Data Quality Objective Summary Report in Support of the 200-BP-5 Groundwater Operable Unit Remedial Investigation/Feasibility Study Process* (WMP-28945)

1.4.6 Well C5860 Vadose Zone Contaminants of Potential Concern Exclusions

Table 4 lists each of the vadose zone COPCs that were excluded from the final list of vadose zone COCs for well C5860 and the applicable rationale for the exclusion. The criteria for exclusion include:

- Below regulatory (WAC 173-303) limits
- No regulatory driver (WAC 173-303)
- Radionuclides with a half-life of less than two years

Table 4. Well C5860 Excluded Vadose Zone Contaminants of Potential Concern. (Two Sheets)

Radioactive COPCs	
Ba-137m Pa-234 Pa-234m Th-231 Th-234 Y-90	Half-life less than two years.
K-40	Naturally occurring isotope of potassium. No significant production at Hanford.

Table 4. Well C5860 Excluded Vadose Zone Contaminants of Potential Concern. (Two Sheets)

Metal COPCs	
Aluminum Copper Iron Lithium Manganese Strontium Titanium Vanadium Zinc	Not a Washington State toxic or persistent waste and not a UHC as defined in 40 CFR 268.48.
Chromium (VI)	Included with total chromium analysis.
Uranium Cobalt	Radiological analysis will supersede any chemical analysis performed for this constituent.
Nonmetal COPCs	
Chloride Fluoride Nitrate Nitrite Sulfate	Not a Washington State toxic or persistent waste and not a UHC as defined in 40 CFR 268.48
VOA COPCs	
1-Butanol	Extremely water soluble, with higher evaporation rate than water; subject to biodegradation, and highly mobile in soil. A Virtual Library review of all soil samples from wells in the 200 East area revealed 33 non-detects and one detected result below LDR universal treatment standards. The one detected result was in a layer underlying the 216-A-4 Crib that was clearly organic in nature, both visibly and by scent.
n-butyl benzene	This constituent could carry a D001 code for flammable liquid; however, after mixing in the aqueous discharge and percolation through the soil column, it will not exist as a flammable liquid. It is also not a UHC listed in 40 CFR 268.48.
Ethylene glycol	Miscible with water; subject to biodegradation; highly mobile in soil; water discharges diluted and dispersed through the soil column, unlikely to be detectable in soil samples, not a UHC, and will not be present at concentrations high enough to merit designation as WT02.
SemiVOA COPCs	
Dibutylphosphate	Does not cause a waste to designate as hazardous as defined in 40 CFR 261.3; not a UHC as defined in 40 CFR 268.48; nor to designate as a Washington State dangerous waste as defined in WAC 173-303-090.

Reference details are provided in Section 8.0 of this document.
COPC = contaminant of potential concern
RCRA = *Resource Conservation and Recovery Act of 1976*
WAC = *Washington Administrative Code*

1.4.7 Well C5860 Vadose Zone Final Contaminants of Concern

The following Table 5 and Table 6 represent the final list of COCs for the vadose zone contacted waste for well C5860. The COCs include those constituents that are already identified for analysis of vadose zone samples as specified in the characterization SAP (DOE/RL-2007-18, Appendix A).

Table 5. Well C5860 Final Vadose Zone Contaminants of Concern to be Determined by Analysis. (2 sheets).

Radioactive COCs			
Am-241 Sb-125 C-14 Cs-134 Cs-137 Co-60	Eu-152 Eu-154 Eu-155 I-129 Np-237 Ni-63	Pu-238 Pu-239 Pu-240 Sr-90 Tc-99 Th-232	Tritium (H-3) U-233 U-234 U-235 U-238
Metal COCs			
Antimony Arsenic Barium Beryllium	Bismuth Boron Cadmium Chromium (total)	Lead Mercury Nickel	Selenium Silver Thallium
Non-Metal COCs			
Cyanide			
Volatile Organic Analyte COCs			
Acetone Benzene 2-butanone (MEK) Carbon tetrachloride Chlorobenzene Chloroform	cis-1,2-dichloroethene Dichloromethane (methylene chloride) 1,1-dichloroethane 1,2-dichloroethane Ethylbenzene	4-methyl-2-pentanone (MIBK) Styrene Toluene Trans-1,2-dichloroethene	1,1,1-trichloroethane 1,1,2-trichloroethane Trichloroethene Trichloromonofluoromethane Tetrachloroethene Xylene
Semi-Volatile Organic Analyte COCs			
Aldrin[1] Aroclor 1260 Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Gamma-BHC[1] Bis(2-ethylhexyl)phthalate Chrysene	4-chloro-3-methylphenol 2-chlorophenol Cyclohexanone Dibenz(a,h)anthracene 2-4-dichlorophenol Dieldrin[1] Dimethoate[1] 2,4- dimethylphenol 2,4-dinitrophenol	2,4-dinitrotoluene Endrin[1] Edrine aldehyde[1] Heptachlor[1] Indeno(1,2,3-cd)pyrene 3-methylphenol 4-methylphenol Naphthalene 2-nitrophenol	Pentachlorophenol Phenol Phorate Pyrene 2,3,4,6-tetrachlorophenol[1] Total petroleum hydrocarbons Tributyl phosphate
Other Organic Analyte COPCs			
Pesticides Herbicides			

Table 5. Well C5860 Final Vadose Zone Contaminants of Concern to be Determined by Analysis. (2 sheets).

COC = contaminant of concern
[1]These semi-VOA COCs are included as standard analytes reported in an 8081 pesticide analysis.

Table 6. Well C5860 Final Vadose Zone Contaminants of Concern to be Determined by Calculation.

Radioactive COCs			
Am-242	Cs-135	Np-239	Se-79
Am-242m	Cm-244	Pu-241	Sm-151
Am-243	Cm-245	Pa-231	U-236
	Nb-93m	Pm-147	Zr-93

1.4.8 Well C5860 Saturated Zone Contaminants of Potential Concern

WMP-28945 documents a thorough investigation of historical groundwater sampling results and subsequent exclusions of analytes and establishes a final list of RI/FS COPCs and COCs for the 200-BP-5 OU. The exclusion process was reviewed for applicability to this DQO and additional COPCs applicable for IDW management purposes were identified as COPCs for well C5860. Table 7 presents the saturated zone COPCs for well C5860.

Table 7. Well C5860 Saturated Contaminants of Potential Concern. (Two Sheets)

Radioactive COPCs			
Am-241	Cs-135	Pu-238	Th-231
Am-242	Cs-137	Pu-239	Th-232
Am-242m	Cl-36	Pu-240	Th-234
Sb-125	Co-60	Pu-241	Tritium (H-3)
Sb-126	Cm-244	K-40	U-233
Sb-126m	Eu-154	Pm-147	U-234
Ba-137m	I-129	Pa-234m	U-235
Be-7	Nb-93m	Sm-151	U-236
C-14	Np-237	Se-79	U-238
Ce-144	Ni-63	Sr-90	Y-90
Cs-134		Tc-99	Zr-93
Metal COPCs			
Aluminum	Calcium	Lead	Selenium
Antimony	Chromium (total)	Lithium	Silver
Arsenic	Chromium (VI)	Magnesium	Strontium
Barium	Cobalt	Manganese	Thallium
Beryllium	Copper	Mercury	Titanium
Bismuth	Iron	Nickel	Uranium (total)
Boron	Lanthanum	Potassium	Vanadium
Cadmium			Zinc

Table 7. Well C5860 Saturated Contaminants of Potential Concern. (Two Sheets)

Non-Metal COPCs			
Chloride	Cyanide	Nitrate Nitrite	Sulfate
Volatile Organic Analyte COPCs			
Acetone Benzene 2-butanone (MEK) Carbon tetrachloride Chloroform Cyclohexanone	Dichloromethane (methylene chloride) 1,1-dichloroethane 1,2-dichloroethane	Diethyl ether Ethylbenzene 4-methyl-2-pentanone (MIBK)	Toluene 1,1,1-trichloroethane Trichloroethane Tetrachloroethene
Semi-Volatile Organic Analyte COPCs			
Gamma-BHC[1] Bis(2-ethylhexyl)phthalate	Dibutylphosphate Edrine aldehyde[1] Naphthalene	Pentachlorophenol Phenol Pyrene	Total petroleum hydrocarbons

COPC = contaminant of potential concern

[1]These semi-VOA COCs are included as standard analytes reported in an 8081 pesticide analysis.

1.4.9 Well C5860 Saturated Zone Contaminants of Potential Concern Exclusions

Table 8 lists saturated zone COPCs that have been excluded and the justifications for the exclusions. The exclusion processes are as follows:

- Radionuclides with a half-life of less than two years .
- Contaminants that are not regulated per WAC 173-303.
- Contaminants with highest recorded data from surrounding wells reported as "non-detected." The results for the following wells were evaluated: 299-E28-3, 299-E28-6, 299-E28-7, 299-E28-9, 299-E28-11, 299-E28-13, 299-E28-15, 299-E28-16, 299-E28-17, 299-E28-23, and 299-E28-25.
- Contaminants with calculated saturated sediment concentrations below regulated limits, using the distribution coefficient (K_d) values and the highest historical groundwater concentrations to calculate the concentration. The K_d values were taken from *Model Toxics Control Act Cleanup Levels & Risk Calculation (CLARC)* (Ecology 94-145), *Hanford Contaminant Distribution Coefficient Database and Users Guide* (PNNL-13895), and *Data Collection Handbook to Support Modeling Impacts of Radioactive Materials in Soil* (Yu et al. 1993). The calculated result for each constituent was compared to the regulated limits as listed in *Environmental Restoration Disposal Facility Waste Acceptance Criteria* (BHI-00139), *Supplemental Waste Acceptance Criteria for Bulk Shipments to the Environmental Restoration Disposal Facility* (000X-DC-W001), or WAC 173-303.

Table 8. Well C5860 Excluded Saturated Zone Contaminants of Potential Concern. (Two Sheets)

Radioactive COPCs	***Reason for Exclusion***
Ba-137m Pa-234m Th-231 Th-234 Y-90	Half-life less than two years.
Be-7	One result in 1990 was above detection limit out of 62 total analyses.
C-14	No results above detection limit reported (3 analyses).
Ce-144	No results above detection limit reported. (3 analyses).
Cs-134	Only three results from 1990 to 1994 were above detection limit reported. (A total of 72 analyses conducted from 1990 to 2007; 44 analyses with only nondetects since 2000).
Eu-154	No results above detection limits reported. (83 analyses).
K-40	Naturally occurring isotope of potassium. No significant production at Hanford.
Np-237	No results above detection limits reported. (21 analyses).
Metal COPCs	***Reason for Exclusion***
Aluminum Calcium Copper Iron Lanthanum Lithium Manganese Magnesium Potassium Strontium Titanium Vanadium Zinc	Not a Washington State toxic or persistent waste and not a UHC as defined in 40 CFR 268.2
Chromium (VI)	Included with total chromium analysis.
Uranium Cobalt	Radiological analysis will supersede any chemical analysis performed for this constituent.
Inorganic COPCs	***Reason for Exclusion***
Chloride Nitrate Nitrite Sulfate	Not a Washington State toxic or persistent waste and not a UHC as defined in 40 CFR 268.2

Table 8. Well C5860 Excluded Saturated Zone Contaminants of Potential Concern. (Two Sheets)

Cyanide	Only one result above detection limit reported in 1995. (20 analyses). Estimated adsorption coefficient of 0 suggests analyte should primarily remain in groundwater rather than sorbing to soils.
Organic COPCs	***Reason for Exclusion***
VOA and Semi-VOA COPCs	Historical groundwater sampling results were reviewed for VOA and semi-VOA organic analyses. Results were less than detectable for the COPCs with the exception of acetone that had one result reported above detection limit in 1988 and toluene with one result reported above detection limit in 1988. No listed waste codes are applicable per CCN 081034. Additionally, for those semi-VOAs that are included as standard analytes reported in an 8081 pesticide analysis, no herbicides or pesticides have been detected in groundwater at the Hanford Site.

Reference details are provided in Section 8.0 of this document.
COPC = contaminant of potential concern
RCRA = *Resource Conservation and Recovery Act of 1976*
WAC = *Washington Administrative Code*

1.4.10 Well C5860 Saturated Zone Final Contaminants of Concern

Tables 9 and 10 presents the final COCs for the saturated zone waste for well C5860.

Table 9. Well C5860 Final Saturated Contaminants of Concern to be Determined by Analysis. (Two Sheets)

Radioactive COCs			
Am-241	I-129	Sr-90	U-233
Sb-125	Pu-238	Tc-99	U-234
Cm-244	Pu-239	Th-232	U-235
Cs-137	Pu-240	Tritium (H-3)	U-238
Co-60			
Metal COCs			
Antimony	Bismuth	Lead	Silver
Arsenic	Boron	Mercury	Thallium
Barium	Cadmium	Nickel	
Beryllium	Chromium (total)	Selenium	

COC = contaminant of concern

Table 10. Well C5860 Final Saturated Contaminants of Concern to be Determined by Calculation.

Table 10. Well C5860 Final Saturated Contaminants of Concern to be Determined by Calculation.

Radioactive COCs			
Am-242	Cs-135	Pu-241	Se-79
Am-242m	Cl-36	Pm-147	U-236
Sb-126	Nb-93m	Sm-151	Zr-93
Sb-126m	Ni-63		

2.0 STATEMENT OF THE PROBLEM

Additional data may be needed to properly manage and dispose of waste generated as a result of drilling a new monitoring well, C5860 in the 200 East Area of the Hanford Site.

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3.0 IDENTIFY THE DECISION

To address the problem of waste designation, a series of principal study questions (PSQ) needs to be answered. Table 11 presents the PSQs and the alternative actions (AA) that will be taken when each PSQ is answered, along with a description and severity rating of the consequences of implementing the wrong AA. Each PSQ and the corresponding AAs then are combined into a decision statement (DS).

Table 11. Summary of Data Quality Objective Step 2 Information. (5 sheets)

PSQ-AA#	Description of Alternative Action	Description of Consequences of Implementing the Wrong Alternative Action	Severity of Consequences (Low/Moderate/ Severe)
PSQ #1 – Is the material radiologically contaminated?			
1-1	Determine if the material is radiologically contaminated and evaluate material for treatment/disposal at ERDF or storage at CWC.	Unnecessary cost of decontaminating clean material as if it were contaminated.	Low to moderate
1-2	Determine if the material is not radiologically contaminated and evaluate material for return to the environment or disposal at ERDF.	Loss of control of radiological contamination. Environmental harm from improper disposal of radioactive waste.	Severe
DS #1 – Determine if the material is radiologically contaminated and will be evaluate for treatment/disposal at ERDF or storage at CWC OR if it is not radiologically contaminated and will be evaluated for return to the environment.			
PSQ #2 – Is the material a listed dangerous waste?			
Radiologically Contaminated:			
2-1	Determine if the material is a listed dangerous waste and evaluate material for treatment/disposal at the ERDF or storage at CWC.	Unnecessary cost of treating the material as if it were a dangerous listed waste.	Low to moderate
2-2	Determine if the material is not a listed dangerous waste and evaluate material for disposal at the ERDF.	Waste placed in the ERDF would be misclassified.	Moderate
Not Radiologically Contaminated:			
2-3	Determine if the material is a listed dangerous waste and evaluate for disposal at ERDF.	Unnecessary cost of treating non-listed dangerous material as if it were listed.	Low to moderate
2-4	Determine if the material is not a listed dangerous waste and evaluate for return to the environment.	Environmental harm from improper disposal of listed dangerous waste.	Severe

Table 11. Summary of Data Quality Objective Step 2 Information. (5 sheets)

PSQ-AA#	Description of Alternative Action	Description of Consequences of Implementing the Wrong Alternative Action	Severity of Consequences (Low/Moderate/ Severe)
Radiologically Contaminated: **DS #2-1** – Determine if the material is a listed dangerous waste and will be evaluated for treatment/disposal at ERDF or storage at CWC OR if the material is not a listed dangerous waste and will be evaluated for disposal at ERDF. Not Radiologically Contaminated: **DS #2-2** – Determine if the material is a listed dangerous waste and will be evaluated for disposal at ERDF OR if the material is not a listed dangerous waste and will be evaluated for return to the environment.			
PSQ #3 – Is the material a characteristic waste (e.g., ignitable, corrosive, reactive, or toxic)?			
Radiologically Contaminated:			
3-1	Determine if the material is a characteristic dangerous waste and evaluate for treatment/disposal at the ERDF or storage at CWC.	Unnecessary cost of treating non-characteristic dangerous material as if it were characteristic.	Low to moderate
3-2	Determine if the material is not a characteristic dangerous waste and evaluate for disposal at the ERDF.	Waste placed in the ERDF would be misclassified.	Moderate
Not Radiologically Contaminated:			
3-3	Determine if the material is a characteristic dangerous waste and evaluate for disposal at the ERDF.	Unnecessary cost of treating non-characteristic dangerous material as if it were characteristic.	Low to moderate
3-4	Determine if the material is not a characteristic dangerous waste and evaluate for return to the environment.	Environmental harm from improper disposal of characteristic dangerous waste.	Severe
Radiologically Contaminated: **DS # 3-1** – Determine if the material is a characteristic waste and will be evaluated for treatment/disposal at ERDF or storage at CWC OR if the material is not a characteristic waste and will be evaluated for disposal at ERDF. Not Radiologically Contaminated: **DS # 3-2** – Determine if the material is a characteristic waste and will be evaluated for disposal at ERDF OR if the material is not a characteristic waste and will be evaluated for return to the environment.			
PSQ #4 – Is the material a toxic dangerous waste as defined by Washington State criteria?			
Radiologically Contaminated:			
4-1	Determine if the material is a toxic dangerous waste and evaluate for treatment/disposal at the ERDF or storage at CWC.	Unnecessary cost of treating non-toxic material as if it were toxic.	Low to moderate
4-2	Determine if the material is not a toxic dangerous waste and evaluate for disposal at the ERDF.	Waste placed in the ERDF would be misclassified.	Moderate

Table 11. Summary of Data Quality Objective Step 2 Information. (5 sheets)

PSQ-AA#	Description of Alternative Action	Description of Consequences of Implementing the Wrong Alternative Action	Severity of Consequences (Low/Moderate/ Severe)
Not Radiologically Contaminated:			
4-3	Determine if the material is a toxic dangerous waste and evaluate for disposal at the ERDF.	Unnecessary cost of treating non-toxic material as if it were toxic.	Low to moderate
4-4	Determine if the material is not a toxic dangerous waste and evaluate for return to the environment.	Environmental harm from improper disposal of toxic dangerous waste.	Severe
Radiologically Contaminated: **DS #4-1** – Determine if the material is a toxic dangerous waste and will be evaluated for treatment/disposal at ERDF or storage at CWC OR if the material is not a toxic dangerous waste and will be evaluated for disposal at ERDF. Not Radiologically Contaminated: **DS #4-2** – Determine if the material is a toxic dangerous waste and will be evaluated for disposal at ERDF OR if the material is not a toxic dangerous waste and will be evaluated for return to the environment.			
PSQ #5 – Is the material a persistent waste as defined by Washington State criteria?			
Radiologically Contaminated:			
5-1	Determine if the material is a persistent dangerous waste and evaluate for treatment/disposal at the ERDF or storage at CWC.	Unnecessary cost of treating non-persistent material as if it were persistent.	Low to moderate
5-2	Determine if the material is not a persistent dangerous waste and evaluate disposal at the ERDF.	Waste placed in the ERDF would be misclassified.	Moderate
Not Radiologically Contaminated:			
5-3	Determine if the material is a persistent dangerous waste and evaluate for disposal at the ERDF.	Unnecessary cost of treating non-persistent material as if it were persistent.	Low to moderate
5-4	Determine if the material is not a persistent dangerous waste and evaluate for return to the environment.	Environmental harm from improper disposal of persistent dangerous waste.	Severe
Radiologically Contaminated: **DS #5-1** – Determine if the material is a persistent waste and will be evaluated for treatment/disposal at ERDF or storage at CWC OR if the material is not a persistent waste and will be evaluated for disposal at ERDF. Not Radiologically Contaminated: **DS #5-2** – Determine if the material is a persistent waste and will be evaluated for disposal at ERDF or an offsite TSD unit OR if the material is not a persistent waste and will be evaluated for return to the environment.			

Table 11. Summary of Data Quality Objective Step 2 Information. (5 sheets)

PSQ-AA#	Description of Alternative Action	Description of Consequences of Implementing the Wrong Alternative Action	Severity of Consequences (Low/Moderate/ Severe)
PSQ #6 – Does the material exceed WAC 173-340 Method B cleanup levels?			
Radiologically Contaminated:			
6-1	Determine if the material is above WAC 173-340 Method B levels and evaluate for treatment/disposal at the ERDF or storage at CWC.	Unnecessary cost of treating non-WAC 173-340 Method B contaminated material as if it were contaminated.	Low to moderate
6-2	Determine if the material is not above WAC 173-340 Method B levels and evaluate for disposal at the ERDF.	Waste placed in the ERDF would be misclassified.	Moderate
Not Radiologically Contaminated:			
6-3	Determine if the material is above WAC 173-340 Method B levels and evaluate for disposal at the ERDF or an offsite TSD unit.	Unnecessary cost of treating non-WAC 173-340 Method B contaminated material as if it were contaminated.	Low to moderate
6-4	Determine if the material is not above WAC 173-340 Method B levels and evaluate for return to the environment.	Environmental harm from improperly disposed wastes contaminated above WAC 173-340 Method B levels.	Severe
Radiologically Contaminated: **DS # 6-1** – Determine if the material is above WAC 173-340 Method B levels and will be evaluated for treatment/disposal at ERDF or storage at CWC OR if the material is not above the WAC 173-340 Method B levels and will be evaluated for disposal at ERDF. Not Radiologically Contaminated: **DS # 6-2** – Determine if the material is above WAC 173-340 Method B levels and will be evaluated for disposal at ERDF OR if the material is not above the WAC 173-340 Method B levels and will be evaluated for return to the environment.			
PSQ #7 – Is the material a PCB waste?			
Radiologically Contaminated:			
7-1	Determine if the material is a PCB waste and evaluate for treatment/disposal at the ERDF or storage at CWC.	Unnecessary cost of treating non-PCB waste as if it were PCB waste.	Low to moderate
7-2	Determine if the material is not a PCB waste and evaluate for disposal at the ERDF.	Waste placed in the ERDF would be misclassified.	Moderate
Not Radiologically Contaminated:			
7-3	Determine if the material is a PCB waste and evaluate for disposal at the ERDF or an offsite TSD unit.	Unnecessary cost of treating non-PCB waste as if it were PCB waste.	Low to moderate
7-4	Determine if the material is not a PCB waste and evaluate for return to the environment or for disposal at a solid waste landfill.	Environmental harm from improper disposal of PCB waste.	Severe

Table 11. Summary of Data Quality Objective Step 2 Information. (5 sheets)

PSQ-AA#	Description of Alternative Action	Description of Consequences of Implementing the Wrong Alternative Action	Severity of Consequences (Low/Moderate/ Severe)
Radiologically Contaminated: **DS #7-1** – Determine if the material is a PCB waste and will be evaluated for treatment/disposal at ERDF or storage at CWC OR if the material is not a PCB waste and will be evaluated for disposal at ERDF. Not Radiologically Contaminated: **DS #7-2** – Determine if the material is a PCB waste and will be evaluated for disposal at ERDF OR if the material is not a PCB waste and will be evaluated for return to the environment.			
PSQ #8 – Does the material's radiological activity exceed the disposal facility's waste acceptance criteria limits?			
8-1	Determine if the radiological composition of the waste material does exceed the ERDF waste acceptance criteria and therefore requires storage at CWC.	Unnecessary disposal cost of treating waste material as if it exceeded the ERDF radiological waste acceptance criteria.	Low to moderate
8-2	Determine if the radiological composition of the waste material does not exceed the ERDF waste acceptance criteria and therefore can be disposed of at the ERDF.	Waste placed in the ERDF would be misclassified.	Moderate
DS #8 – Determine if the material does exceed the ERDF radiological waste acceptance criteria and must be store at CWC OR if the material does not exceed the ERDF radiological waste acceptance criteria and can be disposed of at ERDF.			
PSQ #9 – Is the material land-disposal restricted?			
9-1	Determine if the material is land-disposal restricted and treat material before disposal.	Unnecessary cost of treating clean material as if it were land-disposal restricted.	Low to moderate
9-2	Determine if the material is not land-disposal restricted and do not treat the material before disposal. Dispose of the material in an onsite facility without treatment.	Public may be exposed to land-disposal restricted waste.	Severe
DS #9 – Determine if the material is land-disposal restricted and requires treatment before disposal OR if the material is not land-disposal restricted and may be disposed of in an onsite facility without treatment.			

Reference details are provided in Section 8.0 of this document.

AA = alternative action
CWC = Central Waste Complex
DS = decision statement
ERDF = Environmental Restoration Disposal Facility
PCB = polychlorinated biphenyl
PSQ = principal study question
TSD = treatment, storage, and disposal
WAC = Washington Administrative Code

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4.0 IDENTIFY INPUTS TO THE DECISION

This section identifies the inputs needed to resolve each of the DSs identified in Section 3.0. Table 12 identifies the data needed to resolve each of the DSs and identifies whether or not the data already exist and are of sufficient quality to resolve the DSs.

Table 12. Required Information and Reference Sources. (2 sheets)

DS #	Information	Criteria	Do Data Exist? (Y/N)	Data Source	Sufficient Quality? (Y/N)	Additional Information Required? (Y/N)
1	Radiological composition of waste	Requirements specified in GRP-EE-02-14.5, BHI-00139, and 000X-DC-W001	Y	HEIS database. Data from surrounding wells	N	Y
2	Listed dangerous waste codes that apply to the waste	Listed dangerous waste code status per WAC 173-303	Y	WIDS database (process knowledge); CCN 081034	Y	N
3	Characteristic waste codes that apply to the waste	Characteristic waste code status per WAC 173-303	Y	HEIS database. Data from surrounding wells.	N	Y
4	Toxic waste codes that apply to the waste	Toxic waste code status per WAC 173-303	Y	WIDS database (process knowledge); HEIS database; Data from surrounding wells.	N	Y
5	Persistent waste codes that apply to the waste	Persistent waste code status per WAC 173-303	Y	Waste designation per WAC 173-303 based on HEIS database	Y	N
6	Chemical composition of waste for comparison against WAC 173-340 Method B risk levels	Information specified in WAC 173-340 Method B	Y	HEIS database	N	N
7	PCB concentrations	Process knowledge	Y	Surrounding wells data from HEIS.	Y	N
8	ERDF Waste Acceptance Criteria	Requirements specified in BHI-00139 and 000X-DC-W001	Y	WIDS database (process knowledge); HEIS database; Data from surrounding wells.	N	Y

Table 12. Required Information and Reference Sources. (2 sheets)

DS #	Information	Criteria	Do Data Exist? (Y/N)	Data Source	Sufficient Quality? (Y/N)	Additional Information Required? (Y/N)
9	Land disposal restricted materials	Requirements specified in 40 CFR 268.40	Y	WIDS database, HEIS data from surrounding wells	N	Y

Reference details are provided in Section 8.0 of this document.
CFR = *Code of Federal Regulations.*
DS = decision statement.
ERDF = Environmental Restoration Disposal Facility.
HEIS = *Hanford Environmental Information System.*
PCB = polychlorinated biphenyl.
WAC = *Washington Administrative Code.*
WIDS = *Waste Information Data System.*

4.1 ANALYTICAL PERFORMANCE REQUIREMENTS

Tables 13 and 14 define the analytical performance requirements for the data that needs to be collected to resolve the DSs for waste generated while drilling through the saturated zone. These performance requirements include the detection level limit and the precision and accuracy for each of the COCs. Action levels also are provided for each COC.

Table 13. Performance Requirements for Radiological Analyses. (2 sheets)

COCs	CAS #	Name/Analytical Technology	Target Required Quantitation Limits	Precision Soil	Accuracy Soil
			Soil – Other Low Activity (pCi/g)		
Radionuclides					
Americium-241	14596-10-2	Americium isotopic – AEA	1	±35%	65-135%
Antimony-125	14234-35-6	GEA	0.3	±35%	65-135%
Carbon-14	14762-75-5	Carbon-14 – liquid scintillation	5	±35%	65-135%
Cesium-134	13967-70-9	GEA	0.3	±35%	65-135%
Cesium-137	10045-97-3	GEA	0.3	±35%	65-135%
Cobalt-60	10198-40-0	GEA	0.3	±35%	65-135%
Curium-244	13981-15-2	GEA	1	±35%	65-135%
Europium-152	14683-23-9	GEA	0.3	±35%	65-135%
Europium-154	15585-10-1	GEA	0.3	±35%	65-135%

Table 13. Performance Requirements for Radiological Analyses. (2 sheets)

COCs	CAS #	Name/Analytical Technology	Target Required Quantitation Limits	Precision Soil	Accuracy Soil
			Soil – Other Low Activity (pCi/g)		
Europium-155	14391-16-3	GEA	0.3	±35%	65-135%
Iodine-129	15046-84-1	I-129 – liquid scintillation	2	±30%	70-130%
Neptunium-237	13994-20-2	Neptunium-237 – AEA	1	±35%	65-135%
Nickel-63	13981-37-8	Nickel-63 – liquid scintillation	30	±35%	65-135%
Plutonium-238	13981-16-3	Plutonium isotopic – AEA	1	±35%	65-135%
Plutonium-239/240	Pu-239/240	Plutonium isotopic – AEA	1	±35%	65-135%
Strontium-90	Rad-Sr	Total radioactive strontium – GPC	1	±35%	65-135%
Technetium-99	14133-76-7	Technetium-99 – liquid scintillation	15	±35%	65-135%
Thorium-232	Th-232	Thorium isotopic – AEA (pCi) ICPMS (mg)	1	±35%	65-135%
Thorium-234	15065-10-8	Thorium isotopic – AEA (pCi)	1	±35%	65-135%
Tritium	10028-17-8	Tritium – liquid scintillation	400	±35%	65-135%
Uranium-234/233	13966-29-5	Uranium isotopic – AEA (pCi) ICPMS (mg)	1	±35%	65-135%
Uranium-235/236	15117-96-1	Uranium isotopic – AEA (pCi) ICPMS (mg)	1	±35%	65-135%
Uranium-238	U-238	Uranium isotopic – AEA (pCi) ICPMS (mg)	1	±35%	65-135%

AEA = alpha energy analysis
CAS = Chemical Abstracts Service
COC = contaminant of concern
GEA = gamma energy analysis
GPC = gas proportional counting
ICPMS = inductively coupled plasma/mass spectrometry

Table 14. Performance Requirements for Chemical Analyses. (4 sheets)

COCs	CAS #	Preliminary Action Level		Name/Analytical Technology[c]	Target Required Quantitation Limits	Precision Soil	Accuracy Soil
		TC Dangerous Waste Threshold (mg/kg)[a]	Universal Treatment Standard[b] (mg/kg[3])		Soil – Other Low Conc. (mg/kg)		
Inorganics (Metals)							
Antimony	7440-36-0	N/A	1.15[d]	EPA Method 6010 EPA Method 200.8	0.6	±30%[e]	70-130%[e]
Arsenic	7440-38-2	100	5	EPA Method 6010 EPA Method 200.8	1	±30%[e]	70-130%[e]
Barium	7440-39-3	2000	21	EPA Method 6010 EPA Method 200.8	1	±30%[e]	70-130%[e]
Beryllium	7440-41-7	N/A	1.22[d]	EPA Method 6010 EPA Method 200.8	1	±30%[e]	70-130%[e]
Bismuth	7440-69-9	N/A	N/A	EPA Method 6010 EPA Method 200.8	10	±30%[e]	70-130%[e]
Boron	7440-42-8	N/A	N/A	EPA Method 6010 EPA Method 200.8	2	±30%[e]	70-130%[e]
Cadmium	7440-43-9	20	0.11[d]	EPA Method 6010 EPA Method 200.8	0.2	±30%[e]	70-130%[e]
Chromium	7440-47-3	100	0.60[d]	EPA Method – 6010 EPA Method 200.8	0.2	±30%[e]	70-130%[e]
Lead	7439-92-1	100	0.75[d]	EPA Method – 6010 EPA Method 200.8	0.5	±30%[e]	70-130%[e]
Mercury	7439-97-6	4	0.025[d]	EPA Method 7471 EPA Method 200.8	0.2	±30%[e]	70-130%[e]
Nickel	7440-02-0	N/A	11	EPA Method – 6010	4	±30%[e]	70-130%[e]
Selenium	7782-49-2	20	5.7[d]	EPA Method 6010 EPA Method 200.8	1	±30%[e]	70-130%[e]
Silver	7440-22-4	100	0.14[d]	EPA Method 6010 EPA Method 200.8	0.2	±30%[e]	70-130%[e]
Thallium	7440-28-0	0.5	N/A	EPA Method – 6010 EPA Method 200.8	0.5	±30%	70-130%
General Inorganics							
Cyanide	57-12-5	N/A	590	Total Cyanide - 9010	0.5	±30%[e]	70-130%[e]

VOAs							
1,1,1-Trichloroethane	71-55-6	N/A	6.0	EPA Method – 8260	5	±30%[f]	65-135%
1,1,2-Trichloroethane	79-00-5	0.005	N/A	EPA Method – 8260	0.005	±30%	50-150%
1,1-Dichloroethane	75-34-3	N/A	6	EPA Method – 8260	0.01	±30%[f]	65-135%
1,2-Dichloroethane	107-06-2	10	6	EPA Method – 8260	0.005	±30%[f]	65-135%
2-Butanone (MEK)	78-93-3	4,000	36	EPA Method – 8260	1	±30%[f]	65-135%
Acetone	67-64-1	N/A	160	EPA Method – 8260	1	±30%[f]	65-135%
Benzene	71-43-2	10	10	EPA Method – 8260	0.005	±30%[f]	65-135%
Carbon tetrachloride	56-23-5	10	6	EPA Method – 8260	0.005	±30%[f]	65-135%
Chlorobenzene	108-90-7	2000	6.0	EPA Method – 8260	0.005	±30%[f]	65-135%
Chloroform	67-66-3	120	6	EPA Method – 8260	0.005	±30%[f]	65-135%
Cis-1,2-dichloroethylene	156-59-2	N/A	N/A	EPA Method – 8260	0.005	±30%[f]	65-135%
Ethyl Benzene	100-41-4	N/A	10	EPA Method – 8260	0.005	±30%[f]	65-135%
Methyl isobutyl ketone (MIBK)	108-10-1	N/A	33	EPA Method – 8260	1	±30%[f]	65-135%
Methylene chloride	75-09-2	N/A	30	EPA Method – 8260	0.005	±30%[f]	65-135%
Styrene	100-42-5	0.005	N/A	EPA Method – 8260	0.005	±30%	50-150%
Trichlorofluoromethane	75-69-4	0.010	N/A	EPA Method – 8260	0.010	±30%	50-150%
Tetrachloroethene	127-18-4	14	6	EPA Method – 8260	0.005	±30%[f]	65-135%
Toluene	108-88-3	N/A	10	EPA Method – 8260	0.005	±30%[f]	65-135%
Trans-1,2-dichloroethylene	156-60-5	N/A	30	EPA Method – 8260	0.005	±30%[f]	65-135%
Trichloroethene	79-01-6	N/A	6	EPA Method – 8260	0.005	±30%[f]	65-135%
Xylene	1330-20-7	N/A	N/A	EPA Method – 8260	0.010	±30%[f]	65-135%
Semi-VOAs							
Aldrin	309-00-2	N/A	0.066	EPA Method – 8270	0.66	±30%	50-150%
Aroclor-1260	11096-82-5	N/A	N/A	EPA Method – 8270	0.66	±30%	50-150%
Benzo(a)anthracene	56-55-3	N/A	3.4	EPA Method – 8270	0.33	±30%	50-150%
Benzo(a)pyrene	50-32-8	N/A	3.4	EPA Method – 8270	0.33	±30%	50-150%
Benzo(b)fluoranthene	205-99-2	N/A	6.8	EPA Method – 8270	0.33	±30%	50-150%
Gamma-BHC (Lindane)	58-89-9	8	0.066	EPA Method – 8270	0.66	±30%	50-150%
Bis(2-ethylhexyl)phthalate	117-81-7	0.330	N/A	EPA Method – 8270	0.33	±30%	50-150%
Chrysene	218-01-9	N/A	3.4	EPA Method – 8270	0.33	±30%	50-150%
Cyclohexanone	108-94-1	N/A	0.75[e]	EPA Method – 8270	0.4	±30%[f]	50-150%[f]
2-Chlorophenol	95-57-8	N/A	5.7	EPA Method – 8270	0.33	±30%	50-150%

Table 14. Performance Requirements for Chemical Analyses. (4 sheets)

COCs	CAS #	Preliminary Action Level		Name/Analytical Technology[c]	Target Required Quantitation Limits	Precision Soil	Accuracy Soil
		TC Dangerous Waste Threshold (mg/kg)[a]	Universal Treatment Standard[b] (mg/kg[3])		Soil – Other Low Conc. (mg/kg)		
Dibenz[a,h]anthracene	53-70-3	N/A	8.2	EPA Method – 8270	0.33	±30%	50-150%
2,4-Dichlorophenol	120-83-2	N/A	14	EPA Method – 8270	0.33	±30%	50-150%
Dieldrin	60-57-1	N/A	0.13	EPA Method – 8270	0.66	±30%	50-150%
Dimethoate	60-51-5	N/A	N/A	EPA Method – 8270	0.66	±30%	50-150%
2,4-Dimethylphenol	105-67-9	N/A	14	EPA Method – 8270	0.33	±30%	50-150%
2,4-Dinitrophenol	51-28-5	N/A	160	EPA Method – 8270	0.83	±30%	50-150%
2,4-Dinitrotoluene	121-14-2	3	140	EPA Method – 8270	0.33	±30%	50-150%
Endrin	72-20-8	0.4	0.13	EPA Method – 8270	0.66	±30%	50-150%
Heptachlor	76-44-8	0.2	0.066	EPA Method – 8270	0.66	±30%	50-150%
Indeno(1,2,3-cd)pyrene	193-39-5	N/A	3.4	EPA Method – 8270	0.33	±30%	50-150%
3-Methylphenol (cresol, m-)	108-39-4	4000	5.6	EPA Method – 8270	0.66	±30%	50-150%
4-Methylphenol (cresol, p-)	106-44-5	4000	5.6	EPA Method – 8270	0.33	±30%	50-150%
Naphthalene	91-20-3	0.330	N/A	EPA Method – 8270	0.330	±30%	50-150%
2-Nitrophenol	88-75-5	N/A	13	EPA Method – 8270	0.66	±30%	50-150%
Pentachlorophenol	87-86-5	2000	7.4	EPA Method – 8270	0.330	±30%	50-150%
Phenol	108-95-2	N/A	6.2	EPA Method – 8270	0.33	±30%[f]	65-135%
Phorate	298-02-2	N/A	4.6	EPA Method – 8270	1.65	±30%	50-150%
Pyrene	129-00-0	0.330	N/A	EPA Method – 8270	0.330	±30%	50-150%
2,3,4,6-Tetrachlorophenol	58-90-2	N/A	7.4	EPA Method – 8270	0.66	±30%	50-150%
Diesel and kerosene range organics	TPH Diesel/ TPH Kerosene	5	N/A	WTPH-DX (extended to kerosene range)	5	±30%	50-150%
Normal Paraffin Hydrocarbon	--	N/A	N/A	WTPH-Dx modified for kerosene range	5	±30%[f]	65-135%
Tributyl phosphate	126-73-8	5,000	N/A	EPA Method – 8270	3.3	±30%[f]	50-150%[f]
Other Organic Analyses							
Herbicides	--	N/A	N/A	EPA Method –8151	TBD	±30%[f]	50-150%[f]

Table 14. Performance Requirements for Chemical Analyses. (4 sheets)

COCs	CAS #	Preliminary Action Level		Name/Analytical Technology[c]	Target Required Quantitation Limits	Precision Soil	Accuracy Soil
		TC Dangerous Waste Threshold (mg/kg)[a]	Universal Treatment Standard[b] (mg/kg[3])		Soil – Other Low Conc. (mg/kg)		
Pesticides	--	N/A	N/A	EPA Method – 8081	TBD	±30%[f]	50-150%[f]
Endrin aldehyde	7421-93-4	N/A	N/A	EPA Method – 8081	3.3	±30%	50-150%

[a]Waste disposition for this project will comply with the "Toxicity Characteristic," 40 CFR 268.40, "Land Disposal Restrictions," and "Applicability of Treatment Standards." This value applies to the maximum concentration of contaminants for designation as a dangerous waste under the toxicity characteristic. This value is 20 times the TCLP value. EPA allows the use of 20 times the TCLP values to determine the total action levels because of the "20 times" dilution used in the TCLP process.
[b]Value reflects the Universal Treatment standard as an underlying hazardous constituent in accordance with 40 CFR 268.48, "Land Disposal Restrictions," "Universal Treatment Standards." The unit value is in mg/kg[3].
[c]For EPA Methods 300.0 and 350.1, see EPA/600/4-79/020. For EPA Method 200.8, see EPA/600/R-94/111. For 4-digit EPA methods, see EPA/SW-846.
[d]Value reflects the Universal Treatment standard as an underlying hazardous constituent in accordance with 40 CFR 268.48, "Land Disposal Restrictions," "Universal Treatment Standards." The unit value is in mg/L TCLP.
[e]Precision and accuracy requirements are identified and defined in the referenced EPA procedures.
[f]Accuracy criteria is the minimum for associated batch laboratory control sample percent recoveries. Laboratories must meet statistically based control if more stringent. Additional analyte-specific evaluations also performed for matrix spikes, and surrogates as appropriate to the method. Precision criteria for batch laboratory replicate matrix spike analyses.

CAS = Chemical Abstracts Service
CFR = *Code of Federal Regulations*
COC = contaminant of concern
EPA = U.S. Environmental Protection Agency
IC = ion chromatograph
N/A = not applicable
TC = toxicity characteristic
TCLP = toxicity characteristic leaching procedure
VOA = volatile organic analysis
WTPH-Dx = Washington total petroleum hydrocarbon-diesel extended

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5.0 DEFINE THE PROJECT BOUNDARIES

The project boundaries for this DQO include vadose zone and saturated zone drill cuttings and small-volume miscellaneous waste from the installation of well C5860 in the 200 East Area within the 200-BP-5 OU, as addressed in Section 1.0. Two hydrologic strata are defined for the well. Decision-making is scaled to all cuttings and waste from each stratum.

5.1 VADOSE ZONE CUTTINGS

The vadose zone cuttings define the first stratum that will be assessed during each well installation. Included with the cuttings is small-volume MSW generated while working with the vadose zone cuttings. This vadose zone stratum is defined by the ground surface, extending down to the high-groundwater elevation. The historic high groundwater elevation is estimated for the new well in Table 15.

Table 15. Estimated Historic High Groundwater Elevation for Well C5860.

Proposed Well ID	Historic High Groundwater (ft bgs)	Basis for Historic High Estimate
C5860	283	299-E28-25 3/23/1990

bgs = below ground surface

5.2 SATURATED ZONE CUTTINGS

The saturated zone cuttings define the second stratum to be assessed during each well installation. This stratum is defined by the historic high-groundwater elevation and extends downward to bottom of the well. This includes the small-volume MSW generated while working with saturated zone cuttings.

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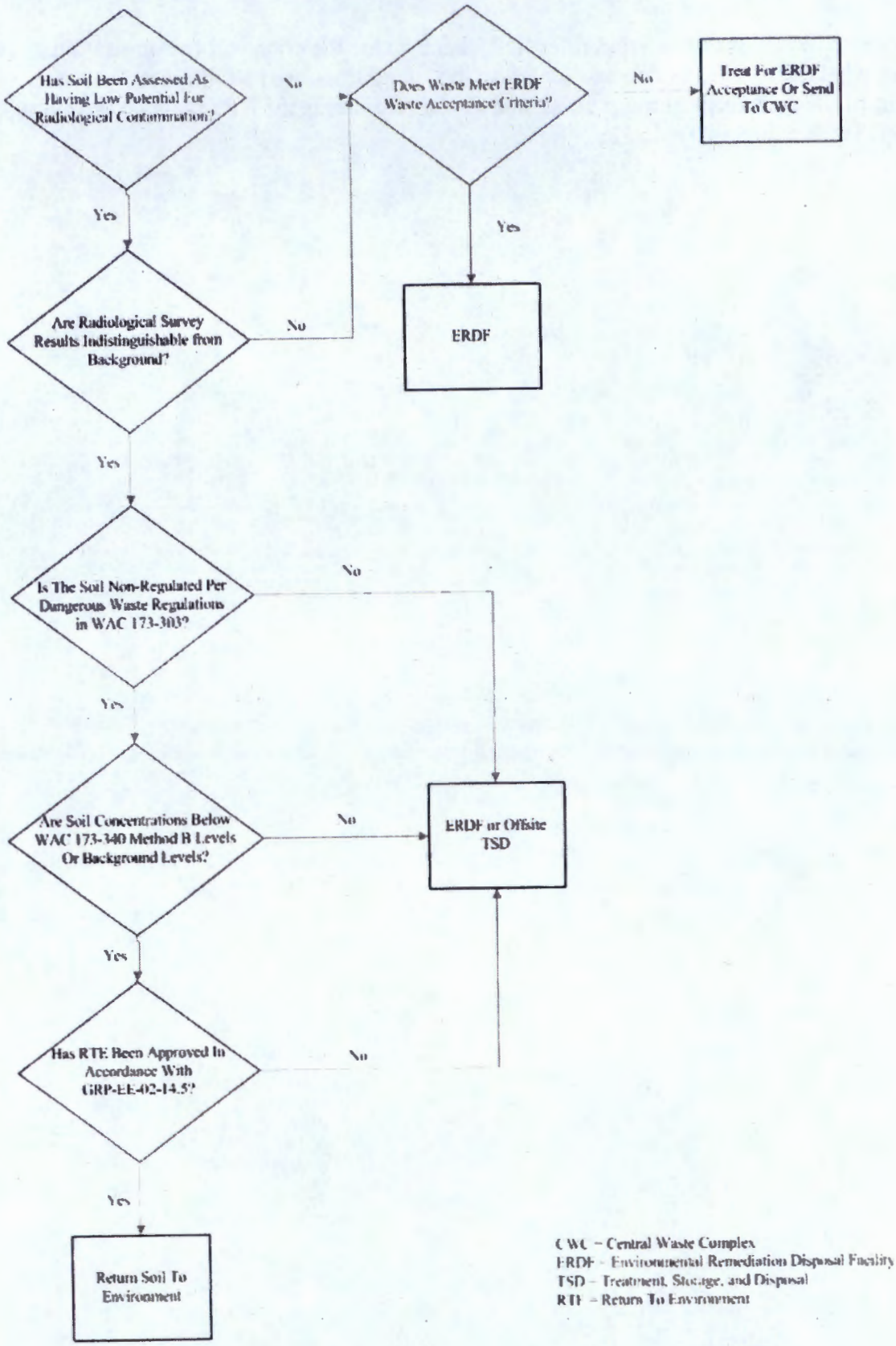
6.0 DECISION RULE

This step develops the decision rules (DR) that provide the criteria for taking actions. The DRs state what action is to be taken when prescribed conditions are met. Figure 2 presents a flow chart of the decision making process, and Table 16 presents the DRs that correspond to each of the DSs identified in Table 11.

Figure 2. Vadose Zone Soil Cuttings Waste Disposition Flowchart.



CWC – Central Waste Complex
ERDF – Environmental Remediation Disposal Facility
TSD – Treatment, Storage, and Disposal
RTE – Return To Environment

Table 16. Decision Rules. (4 sheets)

DS #	DR #	Decision Rule
1	1	Radiologically Contaminated: 1. If the drill cuttings **does not meet** the criteria for RTE in accordance with GRP-EE-02-14.5 and **is not** a dangerous, PCB, or asbestos waste, treat the material as radiologically contaminated and evaluate the material for treatment/disposal at the ERDF. Proceed to DS #2. 2. If the drill cuttings **does not meet** the criteria for RTE in accordance with GRP-EE-02-14.5 and **is** a dangerous, PCB, or asbestos waste, treat the material as radiologically and chemically contaminated and evaluate the material for treatment/disposal at the ERDF or storage at CWC. Proceed to DS #2. Not Radiologically Contaminated: 1. If the drill cuttings **does meet** the criteria for RTE in accordance with GRP-EE-02-14.5 and **is not** a dangerous, PCB, or asbestos waste, then return the soil cuttings to the environment or evaluate for disposal at ERDF. Proceed to DS #2. 2. If the drill cuttings **does meet** the criteria for RTE in accordance with GRP-EE-02-14.5 and **is** a dangerous, PCB, or asbestos waste, then evaluate the drill cuttings for treatment/disposal at the ERDF. Proceed to DS #2.
2	2	Radiologically Contaminated: 1. If the drill cuttings **are** being managed as radiologically contaminated and **are** a listed dangerous waste, evaluate for treatment/disposal at the ERDF or storage at CWC. Proceed to DS #3. 2. If the drill cuttings **are** being managed as radiologically contaminated and **are not** a listed dangerous waste, then evaluate for treatment/disposal at the ERDF. Proceed to DS #3. Not Radiologically Contaminated: 1. If the drill cuttings **are not** being managed as radiologically contaminated and **are** a listed dangerous waste, evaluate for treatment/disposal at the ERDF. Proceed to DS #3. 2. If the drill cuttings **are not** being managed as radiologically contaminated and **are not** a listed dangerous waste, evaluate for return to the environment. Proceed to DS #3.
3	3	Radiologically Contaminated: 1. If the drill cuttings **are** being managed as radiologically contaminated and chemical concentrations in drill cuttings **do exceed** the criteria for being a characteristic dangerous waste, treat the material as a radiologically contaminated characteristic dangerous waste and evaluate for treatment/disposal at the ERDF or storage at CWC. Proceed to DS #4. 2. If the drill cuttings **are** being managed as radiologically contaminated and chemical concentrations in drill cuttings **do not exceed** the criteria for being a characteristic dangerous waste, do not treat the material as a characteristic dangerous waste and evaluate for treatment/disposal at the ERDF. Proceed to DS #4. Not Radiologically Contaminated: 1. If the drill cuttings **are not** being managed as radiologically contaminated and chemical concentrations in drill cuttings **do exceed** the criteria for being a characteristic dangerous waste, treat the material as a characteristic dangerous waste and evaluate for treatment/disposal at the ERDF. Proceed to DS #4. 2. If the drill cuttings **are not** being managed as radiologically contaminated and chemical concentrations in drill cuttings **do not exceed** the criteria for being a characteristic dangerous waste, do not treat the material as a radiologically or chemically contaminated waste and evaluate for return to the environment. Proceed to DS #4.

Table 16. Decision Rules. (4 sheets)

DS #	DR #	Decision Rule
4	4	Radiologically Contaminated: 1. If the drill cuttings **are** being managed as radiologically contaminated and chemical concentrations in drill cuttings do exceed the criteria for being a toxic dangerous waste, treat the material as a radiologically contaminated toxic dangerous waste and evaluate for treatment/disposal at the ERDF or storage at CWC. Proceed to DS #5. 2. If the drill cuttings **are** being managed as radiologically contaminated and chemical concentrations in drill cuttings **do not exceed** the criteria for being a toxic dangerous waste, do not treat the material as a toxic dangerous waste and evaluate for treatment/disposal at the ERDF. Proceed to DS #5. Not Radiologically Contaminated: 1. If the drill cuttings **are not** being managed as radiologically contaminated and chemical concentrations in drill cuttings **do exceed** the criteria for being a toxic dangerous waste, treat the material as a toxic dangerous waste and evaluate for treatment/disposal at the ERDF. Proceed to DS #5. 2. If the drill cuttings **are not** being managed as radiologically contaminated and chemical concentrations in drill cuttings **do not exceed** the criteria for being a toxic dangerous waste, do not treat the material as a radiologically or chemically contaminated waste and evaluate for return to the environment. Proceed to DS #5.
5	5	Radiologically Contaminated: 1. If the drill cuttings **are** being managed as radiologically contaminated and chemical concentrations in drill cuttings **do exceed** the criteria for being a persistent dangerous waste, treat the material as a radiologically contaminated persistent dangerous waste and evaluate for treatment/disposal at the ERDF or storage at CWC. Proceed to DS #6. 2. If the drill cuttings **are** being managed as radiologically contaminated and chemical concentrations in drill cuttings **do not exceed** the criteria for being a persistent dangerous waste, do not treat the material as a persistent dangerous waste and evaluate for treatment/disposal at the ERDF. Proceed to DS #6. Not Radiologically Contaminated: 1. If the drill cuttings **are not** being managed as radiologically contaminated and chemical concentrations in drill cuttings **do exceed** the criteria for being a persistent dangerous waste, treat the material as a persistent dangerous waste and evaluate for treatment/disposal at the ERDF. Proceed to DS #6. 2. If the drill cuttings **are not** being managed as radiologically contaminated and chemical concentrations in drill cuttings **do not exceed** the criteria for being a persistent dangerous waste, do not treat the material as a radiologically or chemically contaminated waste and evaluate for return to the environment. Proceed to DS #6.

Table 16. Decision Rules. (4 sheets)

DS #	DR #	Decision Rule
6	6	Radiologically Contaminated: 1. If the drill cuttings **are** being managed as radiologically contaminated and chemical concentrations in drill cuttings **do exceed** WAC 173-340 Method B cleanup levels, evaluate for treatment/disposal at the ERDF or storage at CWC. Proceed to DS #7. 2. If the drill cuttings **are** being managed as radiologically contaminated and chemical concentrations in drill cuttings **do not exceed** WAC 173-340 Method B cleanup levels, evaluate for treatment/disposal at the ERDF. Proceed to DS #7. Not Radiologically Contaminated: 1. If the drill cuttings **are not** being managed as radiologically contaminated and chemical concentrations in drill cuttings **do exceed** WAC 173-340 Method B cleanup levels, evaluate for treatment/disposal at the ERDF. Proceed to DS #7. 2. If the drill cuttings **are not** being managed as radiologically contaminated and chemical concentrations in drill cuttings **do not exceed** WAC 173-340 Method B cleanup levels, evaluate for return to the environment. Proceed to DS #7.
7	7	Radiologically Contaminated: 1. If the drill cuttings **are** being managed as radiologically contaminated and chemical concentrations in drill cuttings **do exceed** the criteria for being a PCB waste, treat the material as a radiologically contaminated PCB waste and evaluate for treatment/disposal at the ERDF or storage at CWC. Proceed to DS #8. 2. If the drill cuttings **are** being managed as radiologically contaminated and chemical concentrations in drill cuttings **do not exceed** the criteria for being a PCB waste, do not treat the material as a PCB waste and evaluate for treatment/disposal at the ERDF. Proceed to DS #8. Not Radiologically Contaminated: 1. If the drill cuttings **are not** being managed as radiologically contaminated and chemical concentrations in drill cuttings **do exceed** the criteria for being a PCB waste, treat the material as a PCB waste and evaluate for treatment/disposal at the ERDF. Proceed to DS #8. 2. If the drill cuttings **are not** being managed as radiologically contaminated and chemical concentrations in drill cuttings **do not exceed** the criteria for being a PCB waste, do not treat the material as a radiologically or chemically contaminated waste and evaluate for return to the environment. Proceed to DS #8.
8	8	Radiologically Contaminated: If the maximum concentration of radionuclides in drill cuttings does exceed the disposal facility waste acceptance criteria, perform a chemical waste designation and evaluate other storage and disposal options, including other onsite waste burial grounds or storage at CWC pending disposal at the WIPP. Proceed to DS #9. Not Radiologically Contaminated: If the maximum concentration of radionuclides in drill cuttings **does not exceed** the disposal facility waste acceptance criteria, evaluate the waste for chemical waste designation and dispose of material in an approved facility. Proceed to DS #9.

Table 16. Decision Rules. (4 sheets)

DS #	DR #	Decision Rule
9	9	Radiologically Contaminated: If process knowledge or analytical results **do dictate** land-disposal restriction-imposed treatment, the material shall be treated and disposed of at the ERDF or sent to CWC. Not Radiologically Contaminated: If process knowledge or analytical results **do not dictate** land-disposal restriction-imposed treatment, the material shall be disposed of at the ERDF.

Reference details are provided in Section 8.0 of this document.
CWC = Central Waste Complex
DR = decision rule
DS = decision statement
ERDF = Environmental Restoration Disposal Facility
PCB = polychlorinated biphenyl
RTE = return-to-earth
WAC = *Washington Administrative Code*
WIPP = Waste Isolation Pilot Plant

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7.0 SELECTED SAMPLING DESIGN

The following subsections provide details on the type of sampling that will be performed to determine the disposition of the vadose zone drill cuttings, saturated zone drill cuttings, decontamination fluids, well purgewater, and small-volume MSW.

Based on the results from previous sampling and field survey sampling, the process flow diagram presented in Figure 2 shall be used to determine where the waste will be disposed.

An offsite determination by the U.S. Environmental Protection Agency (in accordance with 40 CFR 300.40, "National Oil and Hazardous Substances Pollution Contingency Plan") is required for waste that does not meet the Environmental Restoration Disposal Facility waste acceptance criteria (BHI-00139 and 000X-DC-W001). The waste is subsequently shipped to the Central Waste Complex for storage or other approved facility for disposal.

7.1 VADOSE ZONE DRILL CUTTINGS

The vadose zone extends from the ground surface down to the highest historically recorded groundwater level for the well (Table 15). As a result of the risk for contamination, all vadose zone drill cuttings associated with this activity will be drummed, staged at an accumulation area and sampled for waste characterization and dispositioning. Waste characterization sampling and analysis will be performed in conjunction with the sampling and analysis activities as described in the associated project SAP (DOE/RL-2007-18, Appendix A). The COCs identified in this DQO will be added to the SAPs analytical requirements as required. Those pesticides and herbicides identified in Table 5 will only be analyzed once, from a sample taken at a depth of 6 inches. The final disposition of the accumulated wastes will be in accordance with applicable requirements as determined from waste characterization.

Because of the high risk associated with the drilling of C5860, the vadose zone drill cuttings do not meet the return-to-environment criteria as defined per GRP-EE-02-14.5 ("Process Description for Returning Vadose Zone Drill Cuttings/Soils to the Environment"):

- They have been determined to have a low risk of being radiologically contaminated.
- They have been field surveyed to verify they contain no detectable radioactivity above background.
- They are not a dangerous waste in accordance with WAC 173-303, based on process knowledge and available data.
- They contain no hazardous constituent above the WAC 173-340 Method B, soil cleanup standards based on process knowledge and available data.

7.2 SATURATED DRILL CUTTINGS

All drill cuttings from below the highest recorded water table, or any saturated perched water zones, shall be contained in drums. Waste characterization sampling and analysis will be performed in conjunction with the sampling and analysis activities as described in the associated project SAP (DOE/RL-2007-18, Appendix A). The COCs identified in this DQO will be added

to the SAPs analytical requirements as required. The final disposition of the accumulated wastes will be in accordance with applicable requirements as determined from waste characterization.

7.3 DECONTAMINATION FLUIDS AND PURGEWATER

Decontamination fluids and purgewater (e.g., well development water) do not require sampling because historical groundwater data from surrounding wells will be used to support disposal at the Purgewater Storage and Treatment Facility or to the Effluent Treatment Facility. Additional sampling to support the Effluent Treatment Facility waste acceptance requirements may be required.

7.4 MISCELLANEOUS SOLID WASTE

The MSW (e.g., wipes, gloves and other PPE and) from vadose zone drilling should be separated from the other waste resulting from saturated zone drilling and sampling. The MSW from vadose zone activities may be monitored in the field for release based on the provisions of HNF-13536, Section 4.1.1, "Standard Radiological Release Survey for Material and Equipment." If elevated readings are detected, the MSW shall be designated using the vadose zone cuttings, soil contaminant profile or analytical and characterization data. The MSW generated from work in the saturated zone will be designated using the saturated zone drill cuttings analytical and characterization data. The field survey results for any MSW with elevated readings will be used to scale the concentrations of COCs with analytical results assigned to the well site.

8.0 REFERENCES

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