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Revision 0

Hanford Site Composite Analysis Technical Approach Description: Hanford Site Disposition Baseline

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

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

P.O. Box 1600
Richland, Washington 99352

Approved for Public Release;
Further Dissemination Unlimited

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Hanford Site Composite Analysis Technical Approach Description: Hanford Site Disposition Baseline

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September 2016

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TERMS

ABAR	aggregated barrier
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CHPRC	CH2M Hill Plateau Remediation Company
CSNA	confirmatory sampling, no action
D4	decontamination, deactivation, decommissioning, and demolition.
D&D	decontamination (or deactivation) and decommissioning
DOE	U.S. Department of Energy
ESD	Explanation of Significant Difference
ET barrier	evapotranspiration barrier
FIMS	Facilities Information Management System
GIS	geographic information system
IBAR	individual barrier
IC	institutional control
IDMS	Integrated Document Management System
MESC	maintain existing soil cover
MNA	monitored natural attenuation
MSA	Mission Support Alliance
O&M	operations and maintenance
OU	operable unit
PNNL	Pacific Northwest National Laboratory
PUREX	Plutonium Uranium Extraction (Plant)
RCRA	*Resource Conservation and Recovery Act*
REDOX	Reduction-Oxidation (S-Plant)
ROD	Record of Decision
RTD	remove, treat, dispose
TBD	to be determined
TC&WM EIS	*Tank Closure and Waste Management Environmental Impact Statement*
TPA	Tri-Party Agreement (Hanford Federal Facility Agreement and Consent Order)
UPR	unplanned release
WCH	Washington Closure Hanford
WIDS	Waste Information Data System

1.0 INTRODUCTION

The permeability of ground surfaces within the U.S. Department of Energy's (DOE) Hanford Site strongly influences boundary conditions when simulating the movement of groundwater using the Subsurface Transport Over Multiple Phases model. To conduct site-wide modeling of cumulative impacts to groundwater from past, current, and future waste management activities, a site-wide assessment of the permeability of surface conditions is needed. The surface condition of the vast majority of the Hanford Site has been and continues to be native soils vegetated with dryland grasses and shrubs. In contrast, the surface condition of many of the waste sites and facilities within the Hanford Site has varied over time. Conceptually, at a given waste site over many decades, surface permeability would have been low in its native soil condition, then increased during waste management activities as a result of soil disturbance (digging cribs and trenches, conducting weed management, using gravel or soil as cover material, etc.). After waste site remediation, surface permeability could decrease to less than native soil conditions as a result of compacting soil or installing barriers but would eventually approximate pre-disturbance conditions in future centuries. Similarly, for facilities, the permeability after a building was constructed would be near zero, increase during demolition, decrease after remediation, and eventually approximate native soil conditions. The purpose of this report is to identify the surface condition of waste sites and facilities within the Hanford Site boundaries from the date of initial disturbance to the expected final condition, or "disposition" of the site. The resulting data set will be used in future modeling.

Past efforts to estimate surface conditions have been static, one-time assessments. The Pacific Northwest National Laboratory (PNNL) conducted a disposition based on conditions in 2003, in preparation for a site-wide composite analysis of radionuclides (*Inventory Data Package for Hanford Assessments*, PNNL-15829). The Science Applications International Corporation conducted a disposition based on conditions in 2006 as part of the *Tank Closure and Waste Management Environmental Impact Statement* (DOE/EIS-0391), hereinafter referred to as the TC&WM EIS, for sites contaminated with hazardous constituents or radionuclides, including sites outside of the Hanford Site boundaries. Because the status of waste sites is continually changing, the current baseline disposition has been developed to be maintainable. The database format also allows the data to be more easily incorporated into Geographic Information System (GIS) and modeling analyses. Future updates to the disposition will be able to take advantage of existing databases and annual processes used to track waste site and facility status. However, a complete and thorough disposition remains a time-intensive process even when utilizing existing tracking mechanisms due to the level of specificity required to disposition individual sites and facilities.

2.0 DATABASE DEVELOPMENT METHODOLOGY

The general approach to obtaining information for the database was to develop a comprehensive list of waste sites and facilities, then to search for information relating to the past, current, and future disposition of each site. This disposition focuses on determining changes in surface conditions of waste sites and facilities resulting from changes in operations. Specifically, for waste sites, the years in which a site began accepting wastes, no longer accepted wastes, was remediated, and the type of remediation. For facilities, the year the structure was built, the year the structure was demolished or otherwise dispositioned, and the type of disposition. This disposition does not address changes in the surface conditions of roads, gravel pits, and other types of infrastructure which are not listed in WIDS, the Mission Support Alliance (MSA) Site Structures List, or the DOE Dashboards.

An Excel® spreadsheet was first created to provide a structure to organize the data when searching for data from diverse types of information sources.[1] Once the data were organized, a database was developed to allow improved interfaces with modeling and GIS tools.

2.1 SPREADSHEET DEVELOPMENT

The organization of the spreadsheet reflects the development process. Worksheets within the spreadsheet summarize data from each of the major sources of information used to develop the list of waste sites and facilities, and the information sources used to determine the disposition of the sites and facilities. One worksheet then summarizes key attributes from the other worksheets.

2.1.1 Disposition

To organize the data and facilitate future updates, multiple sources of information were compiled into different worksheets within a single Excel file, 'SitewideDisposition_27Sept16.xlsx.' A master list, based on the list of sites and facilities, uses vlookup functions to fill in the values for each site's attributes from the various worksheets. The **MasterLis**t worksheet contains 4,873 sites and facilities.

2.1.1.1 Information Sources

The reference list in this document lists each specific document or source of information used in the disposition to create the list of sites and/or determine changes or proposed changes in the operational or cleanup status of the waste sites or facilities. The following lists the major sources of information used.

1. **Waste Information Data System (WIDS)**

A list of 4,024 WIDS sites was obtained from the WIDS administrator in March 2015 (Shearer, 2015). The administrator provided an Access database, 'WIDSOut.accdb,' and an Excel spreadsheet, 'WasteSite.xlsx'. The spreadsheet included start dates, end dates, and a few narrative fields describing the waste site history and conditions. The spreadsheet was copied in its entirety to the **WIDS_Data** worksheet. Because dispositions were not needed for WIDS sites which are not waste management units or did not receive hazardous or radioactive materials, as indicated by the WIDS classification or reclassification categories of not accepted, proposed not accepted, or rejected (HNF-21189, *Waste Information Data System (WIDS) User Guide*, Rev. 1), nor were dispositions needed for waste sites which had been consolidated into other waste sites, the data from **WIDS_Data** were filtered to remove these types of wastes sites, then copied into **WIDS_Data_Filtered**. This reduced the list of waste sites to 3,039 sites, of which 520 were sub-sites. Waste sites were not screened out based on the type of hazardous constituent, type of disposal unit or structure, volume of waste, or potential to impact groundwater because the current disposition is intended to represent all contaminated waste sites and facilities, not just those for which inventories need to be developed. Two columns were added to convert dates from a day-month-year format to years.

The 'WIDSOut' database included the additional useful attributes of excavation date and institutional controls in the Closure Groups report. The Closure Groups report was copied into the **WIDS_closure** worksheet. Two columns were added to the **WIDS_Closure** worksheet to convert dates from a day-month-year format to years.

Relevant information on the type of disposition, disposition year, and maximum depth of excavation was also manually extracted from WIDS annual reports (DOE/RL-88-30, *Hanford Site Waste Management Units Report*, Rev. 24 and Rev. 25), WIDS site summary reports in IDMS, or narrative fields in the WIDS spreadsheet, primarily by searching for narratives which included the term 'excavation.' These data were manually entered into the **OtherReferences** worksheet.

[1] Excel is a registered trademark of Microsoft Corporation in the United States and in other countries.

2. U.S. Department of Energy's Performance Metric Database

DOE's Performance Metric Database, part of the Project Data Management System, tracks the past, present, and future status of waste sites and industrial, nuclear, and radioactive facilities site-wide (DOE, 2014). Two on-line dashboards provide access to the data -- the Waste Sites Dashboard and Facilities Dashboard. Each dashboard includes the status of the sites or facilities (Complete or To Go), the Hanford operational area, and fiscal year in which the status changed or is planned to change. Information on remedy selection for a limited number of waste sites and facilities is listed on the Regulatory Decision Document Report portion of the website, in the "Waste Sites Detail Report" and "Facilities Detail Report." The dashboard reports are not published documents but rather tables of information generated on the webpage. A link to DOE's Project Data Management System is provided under the list of 'Helpful Resources' on the 'Prime Contract & Project Integration' webpage of CH2M Hill Plateau Remediation Company (CHPRC).

The status of a waste site or facility is changed in these dashboards when a form is signed indicating the remediation work is complete (DOE, 2014). Specifically:

> "For corporate performance reporting, a waste site is considered complete when the Waste Site Reclassification Form (WSRF) is signed by the authoritative regulatory agency representative. Acceptance by the regulatory agency indicates that remediation work has been completed in accordance with the requirements of the regulatory work plans that include load out of contaminated material to the Environmental Restoration Disposal Facility (ERDF)" (DOE, 2014, p. 59).
>
> "For corporate performance reporting, a facility is considered complete when the Facility Status Change Form (FSCF) is signed…" "A signed FSCF indicates that cleanup work has been completed in accordance with the requirements of the regulatory work plans that include load out of material to the Environmental Restoration Disposal Facility (ERDF)" (DOE, 2014, p. 65).

Lists of waste sites and facilities were obtained in late 2015 from the dashboards (DOE, 2015). Relevant attributes from the waste sites and facilities lists were excerpted, merged into one list, and copied into the **DOEDashboardStatusSitesFacilit** worksheet. Lists on the 'Regulatory Decision Document Report' portion of the website identifying remedies for waste sites and facilities were copied into the **DOE_WasteSiteDetails** and **DOE_FacilitiesDetails** worksheets.

The 'Waste Site OU Comparison Discrepany Report' from the Dashboard website lists 582 waste sites, identifying the OU assigned to each waste site in RODs versus in WIDS. This list was copied into the **DOE_OU_Assignments** worksheet for general reference.

3. Hanford Site Structures List

The 'Hanford Site Structures List,' rev. 31, current as of 10/26/2015, was obtained from MSA's internal-Hanford webpage (Mission Support Alliance, 2015). The Hanford Site Structures List is a primary source for listing cleanup objects and the basis for updating attachment J.13 'Hanford Site Structures List' of contracts for each of the Prime Contractors working on the Hanford Site. Relevant attributes extracted from the spreadsheet include structure identification number, title, Hanford operational area, current lifecycle status, disposition date, demolition date, and year built. The list was copied in its entirety into the **MSA_SiteStructures** worksheet.

The worksheet **MSA_SiteStructuresFiltered** removed unneeded columns from the MSA spreadsheet and deleted mobile offices. Waste sites listed in a section of the spreadsheet labeled 'Proposed Additional Structures, Structures in Caretaker that are Waste Sites' were also removed because they were duplicative of sites listed in WIDS. The geographic area data preceded by an apostrophe were re-formatted using the 'Clean' function to remove the hidden apostrophe preceding the numerical values. Dates were converted from day-month-year format to years.

The data from **MSA_SiteStructuresFiltered and DOE_DashboardStatusSitesFacilit** were combined into the **MSA_and_Dashboard_Facilities** worksheet. Duplicates were removed. One column was added to indicate if the structure had been demolished. The MSA Site Structure List contained three potentially useful attributes -- Same As Waste Site, Includes Waste Site, and Included in Waste Site. However, for some waste sites, in the latter two categories, more than one waste site was listed, which rendered the cell unusable for vlookup functions. Therefore, two additional columns were created in the MSA_and_DashboardFacilities worksheet to select only the first waste site when more than one was listed in a given cell. The first waste site was selected using the search and replace function, searching for all ",*" and replacing the commas with blanks.

4. Regulatory Decision Documents

Information on the type of remedy from Proposed Plans, Action Memos, and Records of Decisions (RODs) and their associated amendments and Explanations of Significant Differences (ESDs) was manually entered into three worksheets – RODs, ActionMemos, and ProposedPlans. The list of current RODs, ESDs, and Action Memos in Appendix A of *2016 Hanford Lifecycle Scope, Schedule and Cost Report* (DOE/RL-2015-10), hereinafter referred to as the 2016 Lifecycle Report, was reviewed for non-ground water operable units to determine the relevant documents (Table 2-1). Thirty-four documents described a decision which would influence surface conditions. Remedies were identified for 1,285 sites in RODs and associated ESDs and amendments, 1014 sites in Action Memos and 837 sites in Proposed Plans.

Because the "Record of Decision: Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington" (78 FR 240) did not list the tanks to which the TC&WM EIS applied, the remedies of grouting and surface barrier in the TC&WM EIS were applied to all waste sites in the tank farms with a WIDS type of single-shell tank and double-shell tank on the **MasterList**. The resulting list of tanks was copied and added to the RODs worksheet.

5. River Corridor Cleanup Verification GIS Data

A geographic information system (GIS) shapefile from Washington Closure Hanford documenting the cleanup verification package boundaries for waste sites within the River Corridor provided excavation depths for many waste sites (Washington Closure Hanford, 2010). After removing duplicate entries for a given waste site, select attributes from 'WCH-RC-CleanupVerificationPackageBoundaries_ 2010Dec10.dbf' were copied into the **ExcavationsWCH** worksheet. A column was added to shorten the description of the institutional controls, using a series of filters and manually entering the text.

6. Hanford Ten Year Site Plans

Hanford Ten Year Site Plan Fiscal Period 2013-2022 (DOE/RL-2012-29), contains a facilities disposition plan in Appendix E. The disposition plan includes the Facilities Information Management System (FIMS) Decontamination & Decommissioning (D&D) Status Code and estimated disposition year. *Hanford Ten Year Site Plan Fiscal Period 2016-2025* (DOE/RL-2015-42), also contains a facilities disposition in Attachment E1. However, not all facilities in DOE/RL-2012-29 were included in DOE/RL-2015-42, so key attributes from both lists were combined into one list and copied into the **10yrPlan** worksheet of the 'SitewideDisposition_27Sept16.xlsx' spreadsheet. While DOE/RL-2012-29 reported the status of facilities using words (demolished, operating, etc.), DOE/RL-2015-42 reported the status using codes. The meaning of the codes was found in Appendix A, 'FIMS Data Element Dictionary' of the *U.S. Department of Energy Facilities Information Management System User's Guide* (DOE, 2016c). A vlookup function in the **10yrPlan** worksheet assigns the appropriate descriptor to each facility.

Table 2-1. List of RODs, Amendments, and ESDs Evaluated for the Disposition

Scope	Document Number or Reference	Year	Amendments	ESD
	RODs			
Decommissioning 8 reactors	58 FR 178	1993		
1100 Area, Horn Rapids Landfill	EPA/ROD/R10-93/063	1993		EPA 2010a
ERDF	EPA/ROD/R10-95/100	1995	EPA/AMD/R10-97/101 EPA/AMD/R10-99/038 EPA/AMD/R10-02/030 EPA 2007a EPA 2009a	EPA/ESD/R10-96/145 EPA 2015
100-BC-1, 100-DR-1, 100-HR-1	EPA/ROD/R10-95/126	1995	EPA/AMD/R10-97/044	
300-FF-1, -5	EPA/ROD/R10-96/143	1996		EPA/ESD/R10-00-524
100-IU-1, -3, -4, -5	EPA/ROD/R10-96/151	1996		
Remaining 100 Area sites	EPA/ROD/R10-99/039	1999		EPA/ESD/R10-00/045 EPA 2004a EPA 2009b
100-KR-2	EPA/ROD/R10-99/059	1999	EPA 2005a	
100-NR-1, -2	EPA/ROD/R10-99/112	1999	EPA 2010b	EPA/ESD/R10-03/605 EPA 2011a EPA 2013
100 Area Burial Grounds	EPA/ROD/R10-00/121	2000		EPA 2007b
300-FF-2, -5 (-1 for amendment)	EPA/ROD/R10-01/119	2001	EPA and DOE 2013	EPA 2004b EPA 2009c
100-NR-1	EPA/ROD/R10-00/120	2000		2003
221-U Canyon	EPA 2005b	2005		
200-CW-5, PW-1, PW-3, PW-6	EPA 2011b	2011		
300-FF-2, -5	EPA and DOE 2013	2013		15-AMRP-0259
Tank Farms, FFTF	78 FR 240	2013		
100-FR-1, FR-2, FR-3, IU-2, IU-6	EPA 2014	2014		
	Action Memos			
316-5 Process Trenches	CCN-9103432	1991		
183-H Solar Evaporation Basin (100-H-33)	CCN-040739	1996		
100-F and 105-DR Reactor Buildings and Ancillary Facilities	CCN-059689	1998		
232-Z	CCN-0093881	2004		
218-W-4C Burial Grounds	DOE, EPA, and Ecology, 2004	2004		
300 Area Facilities	DOE and EPA, 2005	2005		
300 Area Facilities	DOE and EPA, 2006a	2006		

Table 2-1. List of RODs, Amendments, and ESDs Evaluated for the Disposition

Scope	Document Number or Reference	Year	Amendments	ESD
300 Area Facilities	DOE and EPA, 2006b	2006		
105-KE and 105-KW Reactor Facilities and Ancillary Facilities	DOE and EPA, 2007	2007		
BC Controlled Area	DOE/RL-2008-21	2008		
200-MG-2	DOE/RL-2009-37	2009		
IDW Purgewater Management	DOE/RL-2009-39	2009		
200-MG-1	DOE/RL-2009-48	2009		
212-N, -P, and –R Facilities	DOE/RL-2008-80	2009		
Railcars	DOE/RL-2008-80-ADD1	2010		
200-MG-1	DOE/RL-2009-86	2010		
Hanford Site	DOE/RL-2010-22	2010		
200 East Tier 2 Buildings/Structures	DOE/RL-2010-102	2011		
Proposed Plans				
200-CW-1, 200-CW-1, 200 North	DOE/RL-2003-06 Draft A	2003		
U Canyon	DOE/RL-2001-29	2004		
200-TW-1, 200-TW-2, 200-PW-5	DOE/RL-2004-10 Draft A Reissue	2004		
200-UW-1	DOE/RL-2003-24 Reissue	2005		
BC Cribs and Trenches	DOE/RL-2004-69 Draft	2005		
200-LW-1, 200-LW-2	DOE/RL-2006-60 Decisional draft	2006		
200-CS-1	DOE/RL-2005-64	2008		
200-CW-5, 200-PW-1, 200-PW-3, 200-PW-6	DOE/RL-2009-117	2011		
100-KR-1, 100-KR-2, 100-KR-4	DOE/RL-2011-82 Draft A*	2011		
100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3	DOE/RL-2011-111 Draft A	2012		
100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, 100-IU-6	DOE/RL-2012-41	2014		
100-NR-1, 100-NR-2	DOE/RL-2012-68 Draft A	2013		

Notes:
* DOE/RL-2011-82, *Proposed Plan for Remediation of 100-KR-1, 100-KR-2, and 100-KR-4 Operable Units*, Draft A was evaluated but did not contain sufficient detail to assign dispositions to specific waste sites.
Table does not include RODs for groundwater operable units.
Grey font indicates the decision did not include actions which would directly influence surface condition at a specific waste site.

7. *Central Plateau Remediation Optimization Study*

The *Central Plateau Remediation Optimization Study* (DOE/RL-2012-33) recommends a remediation sequencing strategy for waste sites and facilities on the Central Plateau. Appendix A of the study lists specific waste sites and an assumed optimization remedy. The study scope does not include operating facilities, tank farms, retrievably stored waste in burial grounds, stored wastes (German logs, cesium/strontium capsules, spent fuel, vitrified tank waste), low-level burial grounds, the Integrated Disposal Facility, and US Ecology. Remedies listed are not decisions but a preferred sequence of activities based on constraints and assumptions as of March 2012. In the study, if a remedy was not found in the documents reviewed, a decision logic was applied to assign an assumed remedy. The decision logic (Table 2-2) included consideration of the end point to be achieved after completion of remediation.

An Excel version of Appendix A was found in IDMS, ‘Copy of 100K Sites 01062011 CP Optimization Waste Sites.xlsx’ and copied in its entirety to the **CP_Optimization_Study** worksheet. Duplicate site codes were removed because the vlookup function used in the **MasterList** worksheet would return only the first value found. In the optimization study spreadsheet, some site codes were listed more than once because the same site code was assigned to different implementation areas. Duplicate site code listings were deleted using the following approach: (1) retain the row with the most descriptive remedy (e.g., "RTD" vs. "No RL-40 action", (2) retain the most comprehensive or aggressive remedy (e.g., "RTD plus void fill" vs. "void fill", or "RTD" vs. "no action"), and (3) combine very different remedies into one row (e.g., "RTD" for one row and "void fill" for another row became "RTD or void fill" in one row). Some remedies were originally described as one remedy "plus" another remedy (e.g., "Demolish plus Barrier"); these were retained as originally worded.

8. Waste Site Planning Assumptions

The attachment to *Waste Site Planning Assumptions, Project Management Baseline for FY2013 to 2018* (RA-00406) specifies the remedy for many sites on the Central Plateau. An Excel spreadsheet 'RA-00406_Rev_0_ATTACHMENT' located in IDMS provided the same information in a spreadsheet format. The information on waste sites (excluding pipelines) and remedies was copied and pasted from 'RA-00406_Rev_0_ATTACHMENT' to the **WasteSitePlanningFY13-18** worksheet.

9. Tank Closure and Waste Management Environmental Impact Statement

The *Technology Transfer Document for the Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington* (DOE, 2013) and associated spreadsheets included waste sites and facilities data for the start year, end year, future disposition, and type of barrier. Data for these attributes were extracted from spreadsheets provided in Appendix J, ‘Electronic Media’ of the technology transfer document. The data from the following spreadsheets were combined into a single spreadsheet:

> 100BC REV 6 06-27-11 (Final), 100DR REV 6 06-27-11 (Final), 100F REV 6 06-27-11 (Final), 100H REV 6 06-27-11 (Final), 100K REV 6 06-27-11 (Final), 100-Misc REV 6 06-27-11 (Final), 100N REV 6 06-27-11 (Final), 300 Area REV 6 06-27-11 (Final), 400 Area REV 6 06-27-11 (Final), B Area REV 6 06-27-11 (Final), B-Pond REV 6 06-27-11 (Final), Gable Mtn North REV 6 06-27-11 (Final), NRDWL REV 6 06-27-11 (Final), Permitted Facilities REV 6 06-27-11
>
> (Final), PUREX REV 6 06-27-11 (Final), Richland REV 6 06-27-11 (Final), S Area REV 6 06-27-11 (Final), T Plant REV 6 06-27-11 (Final), U Area REV 6 06-27-11 (Final), and Z Area REV 6 06-27-11 (Final).

The combined spreadsheet was copied into the **TCWM_EIS** worksheet and the following columns were added: FutureEndStateAbbr (to remove extraneous text), BarrierTypeAbbr (to remove extraneous text), CompletionDateAbbr (to remove page numbers following the dates), and Spreadsheet (to identify which spreadsheet the row came from).

Table 2-2. End Point Conditions and Remedy Selection Logic

Element	Inner Area	Outer Area
Land Use	• Industrial Exclusive land use for management of residual waste and containment of residual contamination	• Majority of the Outer Area (~55 mi^2) maintained for Conservation and Mining • ~10 mi^2 available for Industrial uses compatible with waste management activities conducted in Inner Area
Point of Compliance for protection of direct contact human receptors, ecological receptors, and groundwater	• Assumed to be10 ft bgs • Deeper if necessary to protect groundwater	• Assumed to be15 ft bgs • Deeper if necessary to protect groundwater
Excess contaminated structures	• Above-grade portion demolished to slab-on-grade. • Remaining portion removed to up to 10 ft bgs if necessary to protect human health and the environment. The remaining portion of some structures will remain under a barrier.	• Above-grade portion removed to slab on grade. • Below-grade portion removed to up to 15 ft bgs if necessary to protect human health and the environment.
Excess uncontaminated structures	• Above grade portion removed to slab-on-grade. • Below-grade portion will remain in place.	• Above grade portion removed to slab-on-grade. • Below-grade portion will remain in place.
Structures required for post-cleanup operations	• Remain in place.	• Remain in place.
Pipelines used for most contaminated waste streams	• Less than 10 ft bgs – removed unless under an engineered barrier used for another structure or waste site; pipeline or encasement under barrier will be void filled if void area is greater than 12 in. diameter. • More than 10 ft bgs – remain in place; pipeline or encasement will be void filled if void area is greater than 12 in. diameter.	• Less than 15 ft bgs – removed. • More than 15 ft bgs – remain in place; pipeline or encasement will be void filled if void area is greater than 12 in. diameter.
Pipelines used for raw or potable water; SALDS or TEDF waste streams	• Remain in place; pipeline will be void filled if void area is greater than 12in. diameter. • SALDS and TEDF lines will be flushed if necessary and remain in place.	• Remain in place; pipeline will be void filled if void area is greater than 12in. diameter. • SALDS and TEDF lines will be flushed if necessary and remain in place.
Soil waste sites	• Remediated as needed to break pathway to human or ecological receptors using RTD, MESC unless under an engineered barrier • Remediated as needed to protect groundwater using RTD, engineered barrier, or deep vadose zone treatment	• Remediated as needed to break pathway to human or ecological receptors using RTD, MESC • Remediated as needed to protect groundwater using RTD, engineered barrier, or deep vadose zone treatment
Uncontaminated debris piles	• To be addressed during final area closure period if determined to be necessary by DOE.	• To be addressed during final area closure period if determined to be necessary by DOE.

Table 2-2. End Point Conditions and Remedy Selection Logic

Element	Inner Area	Outer Area
Utilities (power lines; water supplies, rail lines, etc.)	• Isolated or re-routed as necessary to remove conflicts with remediation. • To be addressed during final area closure period if determined to be necessary by DOE.	• Isolated or re-routed as necessary to remove conflicts with remediation. • To be addressed during final area closure period if determined to be necessary by DOE.
Institutional Controls	• Applied to Inner Area as defined by final remedy decisions to protect human health and the environment	• Applied to the Outer Area and individual sites as defined by final remedy decisions to protect human health and the environment

bgs below ground surface
MESC maintain/enhance existing soil cover
RTD remove/treat/dispose
SALDS State-Approved Land Disposal Site
TEDF Treated Effluent Disposal Facility

Source: DOE/RL-2012-33, *Central Plateau Remediation Optimization Study*, Rev. 0

10. *Inventory Data Package for Hanford Assessments*

Tables containing types of remedies, types of barriers, institutional controls, and end dates were copied from Appendix A, 'Remedial Actions and Completion Dates' of *Inventory Data Package for Hanford Assessments* (PNNL-15829). The tables were combined into a single table in the **PNNL_Disposition** worksheet. Because the listed remedy sometimes included the type of barrier, and the remedies sometimes used abbreviations inconsistent with more current documents, the remedies and barriers were duplicated and split into two new columns -- RemedyAbbr and Barrier.

11. **2016 Lifecycle Report**

Appendix B of the 2016 Lifecycle Report includes a list of future cleanup actions and plausible alternatives for several sites and operable units. For each of the cleanup actions considered, the worksheet listed the most aggressive alternative and, if more than one alternative was listed, the least aggressive alternative. The report did not specify which alternatives were considered most or least aggressive, so best professional judgment was applied. To assign specific waste sites or facility identification numbers from **MasterLis**t to the broad cleanup actions described Table B-2 of the Lifecycle Report, three existing categorization systems were generally used: (1) OU assignments in the **MasterLis**t worksheet (for those cleanup actions which applied to an entire OU), (2) for Central Plateau sites, SQUID (subsequent units for individual development) assignments from the *Central Plateau Optimization Study* (DOE/RL-2012-33) and (3) for structures, closure zones from the **MSA_SiteStructures** worksheet. In addition to these three general approaches, one waste site assignment relied on the responsible contractor category in the Hanford Site Structures list and two cleanup actions were site-specific.

12. Other References

In addition to the above references, many assorted documents were reviewed to find information on dispositions. The type of completed disposition, year, and maximum depth of excavation was obtained from the WIDS annual report (DOE/RL-88-30, Rev. 24 and Rev. 25) and columns containing descriptive text in **WIDS_Data**. Completed or planned future types of dispositions were also obtained from diverse references, including the following: waste-site-specific cleanup reports (cleanup verification packages, remaining site verification packages, response action reports, letters, meeting notes, etc.), waste-site-specific closure reports, a GIS shapefile showing the spatial extent of planned barriers, descriptions of the preferred alternatives in the TC&WM EIS, planning reports (such as remedial design/remedial action work plans, remedial investigations/feasibility studies, engineering evaluation/cost alternatives, a RCRA

permit application, change notices [documenting building demolition], WIDS summary reports (site-specific reports included in IDMS WIDS folders for each waste site), PFM-00039 *Integrated Technical Data-Mart Alternative Analysis*, and HNF-6612, *Hanford Site Sewer System Master Plan*, Rev. 4).

The GIS shapefiles 'env_haz_remediation_abar.dbf' which delineates the extent of aggregated barriers (barriers covering more than one waste site), and 'env_haz_remediation_ibar.dbf', which delineates the extent of individual barriers (barriers specific to a site or facility), were used to identify waste sites and facilities planned to be covered with barriers. The metadata for the shapefiles describe the information sources used to delineate the boundaries as including the CHPRC Performance Measurement Baseline Rev2a, the Richland Operations Office baseline, or that were proposed for closure of the tank farms in Fluor's 2004 *Central Plateau Closure Plan* (DOE, 2016 a and b). Using the same shapefile, the following remedies identified in the TC&WM EIS were applied to non-tank waste sites and facilities in the tank farms depending on their location relative to a barrier: Grout for below-grade tanks and ancillary equipment located under the surface barriers, removal of above-grade ancillary equipment, and removal or remediation of above-grade ancillary equipment and waste receiver facilities outside the barriers (DOE/EIS-0391, p. 2-34). Where waste sites (such as pipelines) were not entirely covered by the barrier in the shapefile, if the majority of a waste site was visually estimated to be under the barrier, it was added to the list as having a remedy of barrier. If the proportions of a below-ground structure lying under and outside of a barrier were roughly comparable, both grout and RTD were listed as remedies.

13. Hanford Federal Facility Agreement and Consent Order

The Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement [TPA]) specifies milestones and target dates for specific sites and operable units in Appendix D of Attachment 2 'Action Plan' (Ecology *et al*., 1989). The remedies and milestone dates from the August 2016 update to Appendix D were summarized in the **TPA** worksheet. Because some recently completed milestones had been removed from the 2016 update, dates for the completed relevant milestones were obtained from the 2016 Lifecycle report. The *River Protection Project System Plan*, Rev. 7 (ORP-11242) was reviewed to look for disposition deadlines specific to the tank farms but no dates for final disposition of the tank farms were found more specific than already stated in the TPA.

Milestone dates from the TPA Work Plan were used if the milestone specified a disposition (Table 2-3). The milestone dates often applied to entire operable units or designated areas. To apply the milestones to all sites on the **MasterList**, the following series of conditional statements was used:

```
=IF(I2="Deleted From NPL", "N/A",IF(F2="Double-shell Tank",2052,IF(F2="Reactor",2070,
IFERROR(VLOOKUP(A2,TPA!$P$3:$Q$198,2,FALSE),IFERROR(VLOOKUP(D2,TPA!$P$3:$Q$198,
2,FALSE),IFERROR(VLOOKUP(E2,TPA!$P$3:$Q$198,2,FALSE),IF(AND(E2="300",G2<>"active",X2
<>"O&M"),2018,2042)))))))
```

The formula returns the following:

- N/A if the site has a reclassification status of "Deleted from NPL"
- 2052 if the WIDS type is "Double-shell Tank"
- 2070 if the site has WIDS type of "Reactor"
- Years listed in a lookup table in the **TPA** worksheet for specifically-listed waste sites
- Years listed in a lookup table in the **TPA** worksheet for specifically-listed OUs
- Years listed in a lookup table in the **TPA** worksheet for specifically-listed designated areas
- 2018 for waste sites not captured by the above conditional statements with a designated area of 300, which do not have status of active in WIDS and do not have a status of O&M in the MSA site structure list
- 2042 for all other sites.

Table 2-3. Select Milestones from the Tri-Party Agreement, Attachment 2, Action Plan

Milestone Number	Milestone	Deadline	How Applied in the Disposition
M-016-00	Complete remedial actions for all non-tank farm and non-canyon operable units	2042	Apply this date to any site not covered by other milestones by listing this date in the formula in the **MasterList** for the TPA disposition date column as the default date for any site not included in the other conditional statements.
M-016-00A	Complete all response actions for the 100 Areas units (except groundwater actions and 100K)	2017	Add the following designated areas and OUWMAs to the lookup table in the **TPA** worksheet and apply the date to all sites within them: designated areas of 100B, 100C, 100D, 100F, 100H, and 100N, and OUWMAs of 100-BC-1,100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-IU-1, 100-IU-2, 100-IU-3, 100-IU-4, 100-IU-5, 100-IU-6, 100-NR-1, and 100-OL-1.
M-016-00B	Complete all interim 300 area remedial actions except sites associated with retained 300 Area facilities and utility corridors	2018	Apply this date to all sites not specifically listed in the **TPA** lookup table, with a designated area of 300, a WIDS site status other than active, and a MSA lifecycle status other than O&M by including in the MasterList formula the conditional statement “IF(AND(E2="300",G2<>"active",X2<>"O&M"),2018,”.
M-016-00C	Complete all response actions for the 100 K Area.	2024	Add 100-KR-1 and 100-KR2 to the lookup table in the **TPA** worksheet and apply the date to all sites listed with those OUWMAs.
M-016-69	Complete all interim 300 area remedial actions to include confirmatory sampling of all candidate sites listed in the 300-FF-2 ROD (except for 618-10 and 618-11 burial grounds).	2015*	Add 300-FF-2 to the lookup table in the **TPA** worksheet below waste site listings. This applies the date to sites with an OUWMA of 300-FF-2, except for those sites already specifically listed in the lookup table (618-10, 618-11, and 324 building (300-25) and its related structures).
M-016-149	Complete 100-IU-2/6 interim response actions for the following waste sites…	2016*	Add the waste sites specifically listed in the milestone to the lookup table in the **TPA** worksheet, then apply the date to each site.
M-016-159	Complete 100-D and 100-H interim response actions for the following waste sites….	2015*	
M-016-161	Complete 100-D and 100-H interim response actions for the following waste sites …	2016*	
M-016-164	Complete 100-N interim response actions for the following waste sites …	2017	
M-016-200B	Complete U Plant barrier construction	2027	Add 221-U and its subsites (221-U:1, 221-U:2, and 221-U:3) to the lookup table in the **TPA** worksheet, then apply the date to each site.
M-037-10	Complete unit-specific closure requirements for 7 Treatment Storage or Disposal Facilities	2020	Add the waste sites specifically listed in the milestone to the lookup table in the **TPA** worksheet, then apply the date to each site.
M-037-11	Complete unit-specific closure requirements for 2 Treatment Storage or Disposal Facilities	2024	
M-42-00A	Complete closure of all Double Shell Tank Farms	TBD; ≤2052	Using the formula in the **MasterList** for the **TPA** disposition date column, apply 2052 to all sites with a WIDS type of “Double-shell Tank.” This is not a complete application of the milestone, as the tank farms include ancillary equipment not

Table 2-3. Select Milestones from the Tri-Party Agreement, Attachment 2, Action Plan

Milestone Number	Milestone	Deadline	How Applied in the Disposition
			listed with a WIDS type of "Double-shell Tank". However, because there is no OU or similar WIDS categorization of all components within the double-shell tank farms, it was not possible to apply this year to all ancillary equipment.
M-045-00	Complete closure of all Single Shell Tank Farms	2043	Add the following OUWMAs to the lookup table in the **TPA** worksheet and apply the date to all sites within the OUMWAs: WMA A/AX, WMA B/BX/BY, WMA C, WMA S/SX, WMA T, WMA TX/TY, and WMA U.
M-045-83	Complete closure of Waste Management Area C	2019	Add WMA C to to the lookup table in the **TPA** worksheet and apply the date to all sites within the OUMWA.
M-085-00	Complete response actions for canyon facilities/associated past practices waste sites, other Tier 1 Central Plateau facilities not covered by existing milestones and Tier 2 CP facilities. Includes B Plant, PUREX, & REDOX. Doesn't include U Plant or T Plant canyons.	TBD	Add the following OUWMAs to the lookup table in the **TPA** worksheet and apply 2070 to all sites within the OUMWAs: 200-CB-1 OU (B Plant), 200-CP-1 OU (PUREX), 200-CR-1 OU (REDOX), and T Plant Complex (200-W-20, not including T-Plant Canyon [221T] which was specifically added to the lookup table with "N/A" as the date because no other TPA milestone appeared to apply). The year 2070 was based on rounding up the year 2068, when final reactor disposition is projected to be completed (2016 Lifecycle Report, p. C-48).
M-093-00	Complete final disposition of all 100 Area Surplus Production Reactor Bdgs	TBD	Apply 2070 to all sites with a WIDS type of "Reactor", which captures the cocooned reactors and some of the waste sites immediately next to the cocooned reactor left in place until reactor removal. The year 2070 was based on rounding up the year 2068, when final reactor disposition is projected to be completed (2016 Lifecycle Report, p. C-48).
M-094-00	Complete disposition of all 300 Area surplus facilities including 324 Bldg & related structures	2018	Add 300-19, 300-25, 300-296, 300-263, and 300-265 to the lookup table in the **TPA** worksheet, then apply the date to each site.
M-094-10	Complete disposition of all 300 Area surplus facilities excluding 324 Bldg & related structures	2015	Unable to apply to globally because "surplus" is not a category included in the MSA lifecycle column for FIMS D&D status. Some of the surplus facilities, however, would have been captured by M-016-69. Because the primary purpose of the TPA milestones is to provide disposition dates for waste sites not yet remediated, and this milestone has already passed, no additional effort was made to identify all surplus facilities.

Notes:
*From *2016 Hanford Lifecycle Scope, Schedule and Cost Report* (DOE/RL-2015-10).
Other deadlines are from the Tri-Party Agreement, Attachment 2 Action Plan, Appendix D, 'Work Schedule Milestones and Target Dates including Designation of Lead Regulatory Agency, Current as of August 1, 2016' (Ecology *et al*., 1989).

2.1.1.2 Master List

To create a master list of sites, in the **MasterList** worksheet, the list of WIDS sites and key attributes in **WIDS_Data_Filtered** was combined with the merged list of facilities and key attributes from **MSA_and_DashboardFacilities**. When PNNL and Science Applications International Corporation conducted their analyses, WIDS tracked waste sites and facilities. However, in 2011, WIDS stopped tracking the status of facilities (WIDS advisory group, 2013), necessitating the use of lists specific to facilities. Duplicates and mobile offices were removed from the combined list.

Then, to compile disposition data from the other various sources of information, columns were added to the combined table, primarily using vlookup functions. The various sources of information used to determine dispositions were created in different years for different purposes. It is not surprising there were many differences between the sources of information as to the value for a given attribute. Decision rules were developed to provide a single value for each attribute in the Disposition worksheet. Table 2-4 describes each column in the **MasterList** worksheet, including priorities used in the decision rules.

2.1.2 Assign Cover Types

After dispositions were identified, cover types were assigned to each category of disposition based on the expected typical type of cover associated with a particular status (Table 2-5).

Table 2-4. MasterList Worksheet Column Headers

MasterList Column Header	Source of Information	Description
ID	Copied from **WIDS_Data_Filtered** and **MSA_and_DashboardFacilities**	Waste Site or Facility identification number
Names		Waste site or facility name
WIDS_Site_Subsite	Copied from **WIDS_Data_Filtered**	Identifies if a site is a subsite
WIDS_OU		Operable unit
DesignatedArea	Copied from **WIDS_Data_Filtered** and **MSA_and_DashboardFacilities**	Geographic area
WIDS_Type	Copied from **WIDS_Data_Filtered**	Type of waste site
WIDS_SiteStatus		Waste site status in WIDS
WIDS_Classification		Waste site classification in WIDS
WIDS_Reclassification		Waste site re-classification in WIDS
WIDS_ReclassificationDate		Re-classification date
WIDS_StartYear		Year site began accepting wastes
EIS time first start year	Vlookup of ‘TimeStart1stYearOnly’ in **TCWM_EIS**	Year site began accepting wastes
MSA_YearBuilt	Copied from **MSA_SiteStructuresFiltered**	Year facility was built
StartYear	Internal reference to values in **MasterList**	Returns one year based on descending priorities: WIDS, MSA, and TC&WM EIS
WIDS_EndYear	Copied from **WIDS_Data_Filtered**	Year site stopped accepting waste
EIS time first stop year	Vlookup of ‘TimeStop1stYearOnly’ in **TCWM_EIS**	Year site no longer accepted wastes
EndYear	Internal reference to values in **MasterLis**t	Maximum of WIDS or EIS end year
DashboardCleanupStatus	Vlookup of ‘Status’ in **DOE_DashboardStatusSitesFacilit**	Status of sites and facilities: Complete or To Go
DashboardCleanupYearCompletedActions	Vlookup of 'FY_completed_actions' in **DOE_DashboardStatusSitesFacilit**	Fiscal year remedy was completed
DashboardWasteSiteOrFacilitiesRemedy	Vlookup of RemedyMod' in **DOE_WasteSiteDetails** or "Remedy_Shortened' **in DOE_FacilitiesDetails**	Selected remedy in regulatory decision documents
ActualDisposition_WIDS_Narrative_Or_ WIDS_Report	Vlookup of 'ActualDisposition_WIDS_Narrative_Or_WIDS_Report' in **OtherReferences**	Completed remedy as described in the WIDS annual report, WIDS Site Narrative in IDMS, or the narrative columns in the WIDS spreadsheet
Disposition (latest) year from narrative	Vlookup of 'Disposition (latest) year from narrative' in **OtherReferences**	Year of completed remedy as described in the WIDS annual report, WIDS Site Narrative in IDMS, or the narrative columns in the WIDS spreadsheet

Table 2-4. MasterList Worksheet Column Headers

MasterList Column Header	Source of Information	Description
Disposition_From_Other_Reference	Vlookup of 'Actual_Disposition_From_Other_Reference' in **OtherReferences**	Completed remedy as described in a variety of other sources of information
CurrentLifecycle	Copied from **MSA_and_DashboardFacilities**	Status of facilities
YearDispositioned		Year the facility was dispositioned
Demolished?		Year the facility was demolished
YearDemolished		Indicates if facility was demolished
SameAsWasteSite		Facility is the same as the listed waste site
IncludesWasteSite		Facility includes the listed waste site
IncludedInWasteSite		Facility is included within the listed waste site
Disposition of "same as", "includes" or "included in" waste site	Vlookup of 'Disposition' for waste site listed 'SameAsWasteSite', 'IncludesWasteSite' and 'IncludedInWasteSite'	Remedy or proposed remedy of waste sites listed in the three previous columns (same as, includes, and included in…waste site)
Text Disposition of "same as", "includes" or "included in" waste site	Copy and paste as text 'Vlookup of 'Disposition' for waste site listed 'SameAsWasteSite', 'IncludesWasteSite' and 'IncludedInWasteSite"	Removes circular reference between 'Disposition roll-up' and 'Disposition' for waste site listed 'SameAsWasteSite', 'IncludesWasteSite' and 'IncludedInWasteSite'
10-yr Plan FIMS D&D Status Code	Vlookup of 'Status' in **10yrPlan**	Facility status
10-yr Plan FIMS Excess Year	Vlookup of 'ExcessYear' in **10yrPlan**	Year facility was excessed
Remedy from Final RODs	Vlookup of 'Final Remedy' in **RODs**	Type of planned remedy
Signature Date of Final RODs	Vlookup of 'Year Final ROD was Signed' in **RODs**	Date ROD was signed
Disposition roll-up	Internal reference to values in **MasterList**	Returns one disposition from the descending priority: DOE Dashboard, WIDS, MSA Site Structure List, Ten Year Plan (FIMS D&D status), same as waste site, final RODs, other references.
WIDS_Excavation_Start_Year	Vlookup of 'ExcavationStartYear' column in **WIDS_closure**	Year excavation began
WIDS_Excavation_End_Year	Vlookup of 'ExcavationEndYear' column in **WIDS_closure**	Year excavation ended
Max_excavation_depth_(m_bgs)_from_narrative	Vlookup of 'Max_excavation_depth_(m_bgs)_from_narrative' in **OtherReferences**	Maximum depth of excavation (meters)
Max_excavation_depth_from_other_ref_(m_bgs)	Vlookup of 'Max_excavation_depth_from_other_ref_(m_bgs)' in **OtherReferences**	Maximum depth of excavation (meters)
ExcavationDepthWCH (m)	Vlookup of 'EXCAV_DEPT (M)' in **ExcavationsWCH** worksheet	Excavation depth (meters)

Table 2-4. MasterList Worksheet Column Headers

MasterList Column Header	Source of Information	Description
Max Excavation Depth (m)	Internal reference to values in **MasterList**	Returns only one depth from descending priority: WCH GIS layer, WIDS, and other references.
ICs_WCH	Vlookup of 'IC_Abbr' in **ExcavationsWCH**	Type of institutional control
WIDS_ICs	Vlookup of 'InstitutionalControls' column in **WIDS_closure**	Type of institutional control
PNNL ICs	Vlookup of 'IC' in **PNNL_Disposition**	Institutional control noted as part of remedy
IC Roll-up	Internal reference to values in **MasterList**	Concatenates 3 columns of institutional controls
Interim Remedy from RODs	Vlookup of 'Interim Remedy' in **RODs**	Type of planned remedy
Remedy from Proposed Plans	Vlookup of 'Remedy' in **ProposedPlans**	Type of planned remedy
Remedy from Action Memos	Vlookup of 'Remedy' in **ActionMemos**	Type of planned remedy
Future Disposition CP Optimization Study	Vlookup of 'Assumed Optimization Remedy' in **CP_Optimization_Study**	Type of assumed remedy
Disposition Waste Site Planning Assumptions FY13-18	Vlookup of 'Disposition' in **WasteSitePlanningFY13-18**	Type of planned remedy
EIS future end state	Vlookup of 'FutureEndState+Barrier' in **TCWM_EIS**	Proposed remedy
PNNL Remedy abbr	Vlookup of 'RemedyAbbr' in **PNNL_Disposition**	Remedy or proposed remedy
Future Disposition From Other Reference	Vlookup of 'Future_Disposition_From_Other_Reference' in **OtherReference**s	Proposed or assumed remedy
Future Disposition Roll-up	Internal reference to values in **MasterList**	Returns one future disposition based on the descending priorities: interim RODs, action memos, proposed plans, Central Plateau optimization study, waste site planning assumptions for FY13-18, EIS, PNNL, other references.
Lifecycle Future Disposition Most Aggressive Alt	Vlookup of 'Most aggressive alt' in **Lifecycle**	Possible future remedy for waste sites without regulatory decision documents
Lifecycle Future Disposition Least Aggressive Alt	Vlookup of 'Least aggressive alt' in **Lifecycle**	
Future Disposition Date from TPA	A combination of internal references to values in **MasterList** and vlookup of column P 'TPA Dates Applied' and column Q 'Year' in **TPA**	A series of "if" statements assigns TPA milestone dates to waste sites based on the listing in **TPA**. Returns “N/A” for waste sites removed from the National Priorities List.
Date_Disposition_OtherReferences	Vlookup of ‘Actual_Disposition_Date’ in **OtherReferences**	Year of remedy
Date_Interim_RODs	Vlookup of ‘Year Interim’ in **RODs**	Year ROD was signed
Date_ActionMemo	Vlookup of ‘Year Published or Signed’ in **ActionMemos**	Year action memo was signed or published

Table 2-5. Cover Types and Surface Conditions

Disposition	Cover Type	Surface Condition	Rationale
<blanks>	Gravel/industrial/non-vegetated/weeds	Cheatgrass	If no known disposition, assume gravel/industrial
ABAR	Barrier	Barrier/ MinRchrg	PNNL-14702 Table 4.16 provides recharge rates for 5 types of barriers, 4 of which are assigned the same recharge rate (the exception is the geosynthetic cap at US Ecology). It is assumed the various types of barriers listed in this table all would be assigned the same recharge rates over time -- intact barrier, transitioning to post-design life young shrub-steppe and shrub-steppe.
ABAR, ET Cap			
ABAR, Hanford			
ABAR, Hanford Barrier			
ABAR, Mod RCRA C Low Permeability			
ABAR, Mod RCRA C w/ asphalt			
Addressed by remedy from adjacent site	n/a	n/a	Insufficient information in description to determine surface condition
Administratively closed out	Gravel/industrial/non-vegetated/weeds	Cheatgrass	No remedial action, so assume gravel/industrial
Barrier	Barrier	Barrier/ MinRchrg	PNNL-14702 Table 4.16 provides recharge rates for 5 types of barriers, 4 of which are assigned the same recharge rate (the exception is the geosynthetic cap at US Ecology). It is assumed the various types of barriers listed in this table all would be assigned the same recharge rates over time -- intact barrier, transitioning to post-design life young shrub-steppe and shrub-steppe.
Barrier plus GW monitoring			
Barrier plus RTD			
Barrier plus treatment			
Barrier, ET			
Barrier, ET Cap			
Barrier, ET Mono			
barrier, Hanford Barrier			
barrier, Modified Subtitle C RCRA barrier			
Clean close	n/a	n/a	Insufficient information in description to determine surface condition
Closed Out			
Cocoon	Bldg	Barrier/ MinRchrg	PNNL-14702 assigns the same recharge rate to areas covered by asphalt, concrete, or building (p. 4-27)
Cocoon for 75 years, then demolish, transport pieces to 200 West for disposal, and fill voids			
Cocoon, RTD			
CS/MESC/MNA/IC	Gravel/industrial/non-vegetated/weeds	Cheatgrass	No remedial action, so assume gravel/industrial
CSNA			

Table 2-5. Cover Types and Surface Conditions

Disposition	Cover Type	Surface Condition	Rationale
CSNA or RTD	Disturbed	Bare	Given two very different possible dispositions, selected disposition with higher permeability
D&D	Bldg	Barrier/ MinRchrg	In decontamination and decommissioning (D&D), the structure remains. PNNL-14702 assigns the same recharge rate to areas covered by asphalt, concrete, or building (p. 4-27)
D&D in Progress			
D&D, ET Cap			
D4	Gravel/industrial/non-vegetated/weeds	Cheatgrass	Assumed bldg was demolished with only shallow (<3 ft) disturbance
D4 (complete removal)	Disturbed	Bare	Deep (> 3ft) disturbance probably involved
D4 (demolish in place)			
D4 (demolish in place; backfill)			
D4 (removed aboveground tanks)	Gravel/industrial/non-vegetated/weeds	Cheatgrass	Assumed little or no surface disturbance
D4 (sanitary holding tanks removed)	Disturbed	Bare	Deep (> 3ft) disturbance probably involved
D4 (structure backfilled)	Bldg	Barrier/ MinRchrg	Assumed deep (> 3ft) disturbance involved
D4 above-grade structure	Gravel/industrial/non-vegetated/weeds	Cheatgrass	Assumed only shallow (<3 ft) disturbance
D4 to 3 ft bgs			Only shallow (<3 ft) disturbance
D4 to grade			Assumed only shallow (<3 ft) disturbance
D4 to slab-on-grade	Bldg	Barrier/ MinRchrg	PNNL-14702 assigns the same recharge rate to areas covered by asphalt, concrete, or building (p. 4-27)
D4 with RTD if needed	Disturbed	Bare	Deep (> 3ft) disturbance probably involved
D4, bury in place			
D4, grout	Bldg	Barrier/ MinRchrg	Assumed grout is comparable to a building
D4, ISS			In ISS, the structure remains.
D4. RTD if needed.	Disturbed	Bare	Assumed deep (> 3ft) disturbance involved
D4S	Gravel/industrial/non-vegetated/weeds	Cheatgrass	D4 with little or no surface disturbance
Deactivation	Bldg	Barrier/ MinRchrg	Structure remains
Decommission			Structure remains
Decommission (septic tank left in place)			Remaining underground tank would act as barrier
Decontamination			Structure remains
Decontamination, CSNA			

Table 2-5. Cover Types and Surface Conditions

Disposition	Cover Type	Surface Condition	Rationale
Deleted from NPL	Artificial regeneration	Developing	Sites fully remediated
Demolish	Gravel/industrial/non-vegetated/weeds	Cheatgrass	Assumed only shallow (<3 ft) disturbance
Demolish plus Barrier	Barrier	Barrier/ MinRchrg	PNNL-14702 Table 4.16 provides recharge rates for 5 types of barriers, 4 of which are assigned the same recharge rate (the exception is the geosynthetic cap at US Ecology). It is assumed the various types of barriers listed in this table all would be assigned the same recharge rates over time -- intact barrier, transitioning to post-design life young shrub-steppe and shrub-steppe.
Demolish plus RTD	Disturbed	Bare	Deep (> 3ft) disturbance probably involved
Demolish plus void fill	Bldg	Barrier/ MinRchrg	Assumed void fill was equivalent to a barrier
Demolish, transport reactor block to 200 West for disposal	Disturbed	Bare	Deep (> 3ft) disturbance probably involved
Demolished	Gravel/industrial/non-vegetated/weeds	Cheatgrass	Assumed only shallow (<3 ft) disturbance
Demolition to slab-on-grade	Bldg	Barrier/ MinRchrg	PNNL-14702 assigns the same recharge rate to areas covered by asphalt, concrete, or building (p. 4-27)
DV Treatment plus barrier	Barrier	Barrier/ MinRchrg	PNNL-14702 Table 4.16 provides recharge rates for 5 types of barriers, 4 of which are assigned the same recharge rate (the exception is the geosynthetic cap at US Ecology). It is assumed the various types of barriers listed in this table all would be assigned the same recharge rates over time -- intact barrier, transitioning to post-design life young shrub-steppe and shrub-steppe.
DV Treatment plus RTD	Disturbed	Bare	Deep (> 3ft) disturbance probably involved
Entombment	Bldg	Barrier/ MinRchrg	PNNL-14702 assigns the same recharge rate to areas covered by asphalt, concrete, or building (p. 4-27)
ET Barrier	Barrier	Barrier/ MinRchrg	PNNL-14702 Table 4.16 provides recharge rates for 5 types of barriers, 4 of which are assigned the same recharge rate (the exception is the geosynthetic cap at US Ecology). It is assumed the various types of barriers listed in this table all would be assigned the same recharge rates over time -- intact barrier, transitioning to post-design life young shrub-steppe and shrub-steppe.
ET Barrier, MNA			
ET barrier, MNA			
ET Cap			
ET Mono			

Table 2-5. Cover Types and Surface Conditions

Disposition	Cover Type	Surface Condition	Rationale
Ex situ bioremediation	Disturbed	Bare	Assumes excavation was needed to remove mat'l being bioremediated
Excavate			Deep (> 3ft) disturbance probably involved
Excavated			Deep (> 3ft) disturbance probably involved
Final Closed Out	n/a	n/a	Insufficient information in description to determine surface condition
Final No Action	Gravel/industrial/non-vegetated/weeds	Cheatgrass	No remedial action, so assume gravel/industrial
Grout	Bldg	Barrier/ MinRchrg	Assumed grout is comparable to a building
Grout, barrier	Bldg	Barrier/ MinRchrg	PNNL-14702 Table 4.16 provides recharge rates for 5 types of barriers, 4 of which are assigned the same recharge rate (the exception is the geosynthetic cap at US Ecology). It is assumed the various types of barriers listed in this table all would be assigned the same recharge rates over time -- intact barrier, transitioning to post-design life young shrub-steppe and shrub-steppe.
Hanford Barrier			
Hanford or ET barrier			
Hazard mitigation for public access	n/a	n/a	Insufficient information in description to determine surface condition
Historic structure	Bldg	Barrier/ MinRchrg	PNNL-14702 assigns the same recharge rate to areas covered by asphalt, concrete, or building (p. 4-27)
IBAR	Barrier	Barrier/ MinRchrg	PNNL-14702 Table 4.16 provides recharge rates for 5 types of barriers, 4 of which are assigned the same recharge rate (the exception is the geosynthetic cap at US Ecology). It is assumed the various types of barriers listed in this table all would be assigned the same recharge rates over time -- intact barrier, transitioning to post-design life young shrub-steppe and shrub-steppe.
IBAR, ET Cap			
IBAR, ET Mono			
IBAR, Hanford			
IBAR, Hanford Barrier			
IBAR, Mod RCRA C LP			
IBAR, Mod RCRA C w/asphalt			
IBAR, Mod RCRA C WA			
IBAR, Mod RCRA-C LP			
IC	Artificial regeneration	Developing	Institutional Control (IC) usually implies we are avoiding future changes (such as irrigation); so treat this as no different than remediated
IC: Prohibit application of irrigation water except to establish veg.	Artificial regeneration	Developing	IC specifically mentions revegetation
In situ vitrification	Bldg	Barrier/ MinRchrg	Essentially no recharge, comparable to bldg

Table 2-5. Cover Types and Surface Conditions

Disposition	Cover Type	Surface Condition	Rationale
Interim Closed Out	n/a	n/a	Insufficient information in description to determine surface condition
Interim No Action	Gravel/industrial/non-vegetated/weeds	Cheatgrass	No remedial action, so assume gravel/industrial
ISS	Bldg	Barrier/ MinRchrg	PNNL-14702 assigns the same recharge rate to areas covered by asphalt, concrete, or building (p. 4-27)
ISS, possibly display a portion			
MESC	Gravel/industrial/non-vegetated/weeds	Cheatgrass	Maintain existing soil cover, so assume gravel/industrial
MESC, MNA			
MESC/MEESC/MNA			MEESC = maintain/enhance existing soil cover, so assume gravel/industrial.
MESC/MNA/IC			Maintain existing soil cover, so assume gravel/industrial
MNA, IC			Assume existing condition is gravel/industrial
Museum	Bldg	Barrier/ MinRchrg	PNNL-14702 assigns the same recharge rate to areas covered by asphalt, concrete, or building (p. 4-27)
Negotiated and public sale	n/a	n/a	Insufficient information in description to determine surface condition
No action	Gravel/industrial/non-vegetated/weeds	Cheatgrass	No remedial action, so assume gravel/industrial
No further action	n/a	n/a	Insufficient information in description to determine surface condition
No other alt			
no other alternative			
No RL-40 Action			
None			
only 1 alternative			
Operating	Bldg	Barrier/ MinRchrg	PNNL-14702 assigns the same recharge rate to areas covered by asphalt, concrete, or building (p. 4-27)
Operational standby			
partial RTD with unspecified barrier	Barrier	Barrier/ MinRchrg	PNNL-14702 Table 4.16 provides recharge rates for 5 types of barriers, 4 of which are assigned the same recharge rate (the exception is the geosynthetic cap at US Ecology). It is assumed the various types of barriers listed in this table all would be assigned the same recharge rates over time -- intact barrier, transitioning to post-design life young shrub-steppe and shrub-steppe.

Table 2-5. Cover Types and Surface Conditions

Disposition	Cover Type	Surface Condition	Rationale
Pipeline capping	Disturbed	Bare	Deep (> 3ft) disturbance probably involved
RCRA closure	n/a	n/a	Insufficient information in description to determine surface condition
Remove	Disturbed	Bare	Deep (> 3ft) disturbance probably involved. Assumed "removal" refers to complete removal of structure, including subsurface portions.
Remove basin contents	Bldg	Barrier/ MinRchrg	Implies the basin remains; assume the basin is concrete.
Remove sludge, backfill underground tank			PNNL-14702 assigns the same recharge rate to areas covered by asphalt, concrete, or building (p. 4-27)
remove sludge,backfill underground tank			Remaining underground tank would act as barrier
Removed, closed out	n/a	n/a	Insufficient information in description to determine surface condition
RTD	Disturbed	Bare	Deep (> 3ft) disturbance probably involved
RTD or void fill			Given two very different dispositions, selected disposition with higher permeability
RTD plus GW monitoring			Deep (> 3ft) disturbance probably involved
RTD plus void fill	Barrier	Barrier/ MinRchrg	Assumed "void fill" meant grouting a subsurface structure
RTD to 3 ft bgs	Gravel/industrial/non-vegetated/weeds	Cheatgrass	Shallow (< 3 ft) disturbance
RTD to 3 ft bgs, partial barrier	Barrier	Barrier/ MinRchrg	PNNL-14702 Table 4.16 provides recharge rates for 5 types of barriers, 4 of which are assigned the same recharge rate (the exception is the geosynthetic cap at US Ecology). It is assumed the various types of barriers listed in this table all would be assigned the same recharge rates over time -- intact barrier, transitioning to post-design life young shrub-steppe and shrub-steppe.
RTD to 4.6 m. IC: Prohibit application of irrigation water except to establish veg.	Artificial regeneration	Developing	IC specifically mentions revegetation
RTD, ABAR	Barrier	Barrier/ MinRchrg	PNNL-14702 Table 4.16 provides recharge rates for 5 types of barriers, 4 of which are assigned the same recharge rate (the exception is the geosynthetic cap at US Ecology). It is assumed the various types of barriers listed in this table all would be assigned the same recharge rates over time -- intact barrier, transitioning to post-design life young shrub-steppe and shrub-steppe.
RTD, Barrier			
RTD, Barrier, ET Cap			
RTD, ET barrier, IC			
RTD, ET Cap			
RTD, ET Mono			

Table 2-5. Cover Types and Surface Conditions

Disposition	Cover Type	Surface Condition	Rationale
RTD, grout	Barrier	Barrier/ MinRchrg	Assumed grout is comparable to a building
RTD, Hanford Barrier	Barrier	Barrier/ MinRchrg	PNNL-14702 Table 4.16 provides recharge rates for 5 types of barriers, 4 of which are assigned the same recharge rate (the exception is the geosynthetic cap at US Ecology). It is assumed the various types of barriers listed in this table all would be assigned the same recharge rates over time -- intact barrier, transitioning to post-design life young shrub-steppe and shrub-steppe.
RTD, Mod RCRA C LP			
RTD, Mod RCRA C w/asphalt			
RTD, Mod RCRA C WA			
RTD, on-site ex-situ bioremediation	Disturbed	Bare	Deep (> 3ft) disturbance probably involved
RTD, or Void Fill Plus Barrier	Barrier	Barrier/ MinRchrg	PNNL-14702 Table 4.16 provides recharge rates for 5 types of barriers, 4 of which are assigned the same recharge rate (the exception is the geosynthetic cap at US Ecology). It is assumed the various types of barriers listed in this table all would be assigned the same recharge rates over time -- intact barrier, transitioning to post-design life young shrub-steppe and shrub-steppe.
RTD, vapor barrier	Barrier	Barrier/ MinRchrg	PNNL-14702 Table 4.16 provides recharge rates for 5 types of barriers, 4 of which are assigned the same recharge rate (the exception is the geosynthetic cap at US Ecology). It is assumed the various types of barriers listed in this table all would be assigned the same recharge rates over time -- intact barrier, transitioning to post-design life young shrub-steppe and shrub-steppe.
Shutdown Pending	Bldg	Barrier/ MinRchrg	PNNL-14702 assigns the same recharge rate to areas covered by asphalt, concrete, or building (p. 4-27)
Shutdown pending D&D			
Shutdown pending disposal			
Shutdown pending Transfer			
Simplified soil cap	Gravel/industrial/non-vegetated/weeds	Cheatgrass	Assumes minimal disturbance
Soil Cap, MNA, IC			
Soil cover			
Start date (structure)	Bldg	Barrier/ MinRchrg	Assumes start date is when the building was constructed
Start date (waste site)	Gravel/industrial/non-vegetated/weeds	Cheatgrass	Assumes the waste site was covered with gravel or similar non-native materials when it began receiving wastes.
TBD	n/a	n/a	Insufficient information in description to determine surface condition
TBD in 200-IS-1 process			

Table 2-5. Cover Types and Surface Conditions

Disposition	Cover Type	Surface Condition	Rationale
Void Fill	Barrier	Barrier/ MinRchrg	Assumed "void fill" meant grouting a subsurface structure
Void Fill or RTD			
Void Fill Plus Barrier	Barrier	Barrier/ MinRchrg	PNNL-14702 Table 4.16 provides recharge rates for 5 types of barriers, 4 of which are assigned the same recharge rate (the exception is the geosynthetic cap at US Ecology). It is assumed the various types of barriers listed in this table all would be assigned the same recharge rates over time -- intact barrier, transitioning to post-design life young shrub-steppe and shrub-steppe.
Void Fill/MESC	Barrier	Barrier/ MinRchrg	Assumed "void fill" meant grouting a subsurface structure

Notes:

ABAR	Aggregated barrier. Barrier over an area covering more than one waste site.
CS	Confirmatory sampling
CSNA	Confirmatory sampling, no action
D&D	Decontamination (or deactivation) and decommissioning
D4	Decontamination, deactivation, decommissioning, and demolition. May include removal of shallow soils
ET	Evapotranspiration
ET Cap	ET capillary barrier
ET Mono	Monolithic evapotranspiration barrier
GW	Groundwater
IBAR	Individual site barrier
IC	Institutional control
ISS	Interim safe storage (cocoon)
MEESC	Maintain and/or enhance existing soil cover
MESC	Maintain existing soil cover
MNA	Monitored natural attenuation
Mod RCRA C WA	Modified RCRA C barrier with asphalt
Mod RCRA-C LP	Modified RCRA C barrier with low permeability
RCRA C	Meets RCRA Subtitle C (hazardous waste) requirements
RTD	Remove, treat, dispose
TBD	To be determined

2.2 DATABASE DEVELOPMENT

To provide a common interface of the sites' dispositions throughout the life of the Hanford Site, the **MasterList** worksheet was used as the starting point for an MS-Access database application. The database, named 'HSDB.accdb' for "Hanford Sitewide Disposition dataBase," contains tables, queries, forms and reports necessary to allow users to retrieve, in a consistent and repeatable format, disposition and surface condition information for Hanford sites, as needed for modeling work.

To make the information on the comprehensive **MasterList** available to users in an easily understood way, an MS-Excel query was written to create a **DispositionList** worksheet (and table in the database) that contains a single record per site for each disposition listed in the **MasterList**. The "Sources" in the **MasterList** worksheet that were used to create individual disposition records in the **DispositionList** worksheet are listed in the table below.

Table 2-6. Sources of Disposition Information Used for the MasterList Worksheet

Source of Disposition or Remedy	Remedy Type	Priority
Year Built	Actual	
WIDS Start Year	Actual	
EIS Start Year	Actual	
Excavation End Date	Actual	
WIDS Narrative Disposition	Actual	
Demolished	Actual	
10-Yr Plan FIMS D&D	Actual	
Included in another Site	Actual	
RODs Final Remedy	Actual	
Action Memos Remedy	Actual	
Other References	Actual	
RODs Interim Remedy	Actual	
Proposed Plans Remedy	Future	1
Dashboard Remedy	Future	2
Future CP Optimization Study	Future	3
Waste Site Planning Assumptions	Future	4
EIS Future End State	Future	5
PNNL Remedy	Future	6
Other References' Disposition	Future	7
TPA Future Disposition Date	Future	8
Lifecycle Future Most Aggressive Alt	Alt Analysis	
Lifecycle Future Least Aggressive Alt	Alt Analysis	

All records from Sources listed as "Actual" or "Alternative Analysis" in the table above, are included in the **DispositionList** table. Since "Future" remedy types are best estimates from various sources, only the highest priority remedy is entered into the **DispositionList** table. The "Future" sources were prioritized based on two factors: 1) how formalized or detailed the decision making process was for each source, and 2) which source had the most recent disposition information.

The **DispositionList** table contains seven fields for each record:

1) ‘ID’ (Site name or ID),

2) ‘Disposition’ (the disposition indicated by the source),

3) ‘Year’ (year associated with the disposition),

4) ‘Source’ (the column in the **MasterList** providing the information for this entry),

5) ‘Excavation Depth’ (depth in meters if the disposition indicated an excavation,

6) ‘Remedy Type’ (Actual, Future, or Alternative Analysis)

7) ‘Notes’ (additional information about the site).

So, the **DispositionList** could contain up to 15 entries for every site if dispositions (or remedies) were listed for each of the sources and only the highest priority remedy selected from *future* remedy types.

From here, surface conditions for each disposition were determined using the **CoverTypeAssignments** worksheet since it contains cover types and surface conditions for all possible dispositions listed on the **MasterList** worksheet.

A **SurfaceConditionList** worksheet (and table in the database) was generated from the **DispositionList** using the *Disposition* as a lookup into the **CoverTypeAssignments** worksheet. **SurfaceConditionList** contains the same fields as **DispositionList** plus:

8) **Cover Type** (Barrier, Bldg, Disturbed, etc.)

9) **Surface Condition** (Bare, Barrier/MinRchrg, Cheatgrass, or Developing)

Dispositions with cover types and surface conditions of “n/a,” were excluded from the final **SurfaceConditionList** since there was insufficient information in the sources’ descriptions to determine the surface condition.

These three worksheets, plus other supporting worksheets from the MS-Excel workbook, were imported into the database as tables. A form was created to display the **SurfaceConditionList** contents and allow users to select sites to report dispositions and surface conditions for. The selected sites are displayed on the computer screen, and written to a comma delimited (.csv) file that can be read by a text editor and scripts used by the modelers.

2.2.1 Database Input

A form displaying the **SurfaceConditionList** table is displayed when the database is opened (Figure 2-1). The user can navigate through the list of Site IDs and select a Surface Condition Record to display. Navigation through the table can be made via keyboard or mouse.

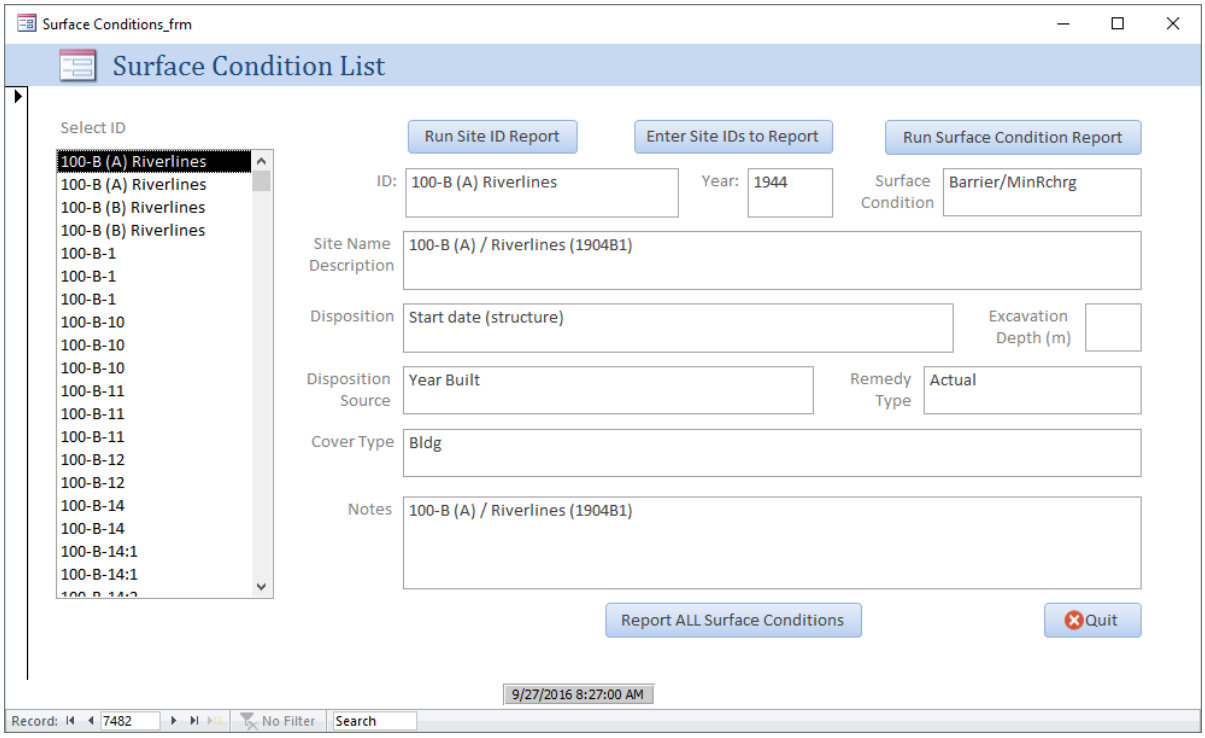


Figure 2-1. Screen Shot of Database Opening Screen

The user is not provided direct access to the tables but can generate reports and output using command buttons available on the primary form. The command button labeled "Enter Site IDs to Report" allows the user to enter multiple IDs in a text box, each on its own row. Saving the Site IDs by selecting the "Save Site IDs" command button saves the list to an internal table and closes the input window (Figure 2-2).

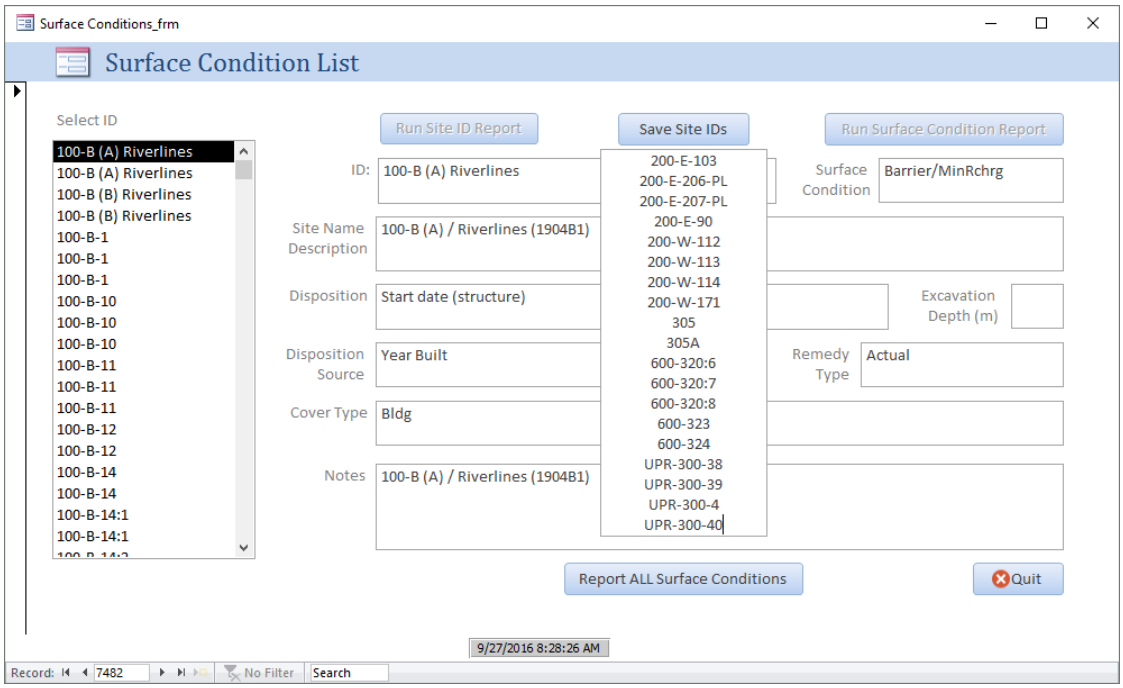
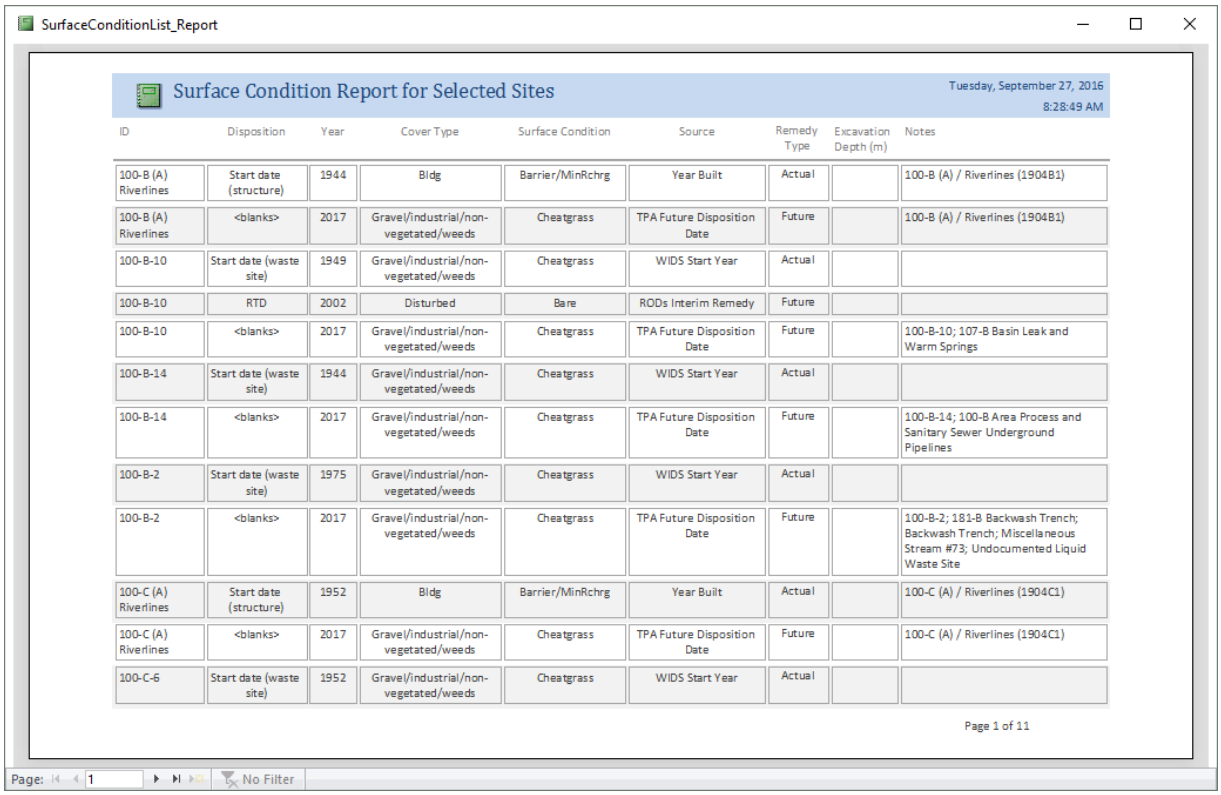


Figure 2-2. Screen Shot of 'Save Site IDs' Example

2.2.2 Database Output

The "Run Surface Condition Report" command button uses the previously saved Site ID list to generate a report containing all disposition data for the IDs in the list (Figure 2-3).



SurfaceConditionList_Report

Surface Condition Report for Selected Sites

Tuesday, September 27, 2016
8:28:49 AM

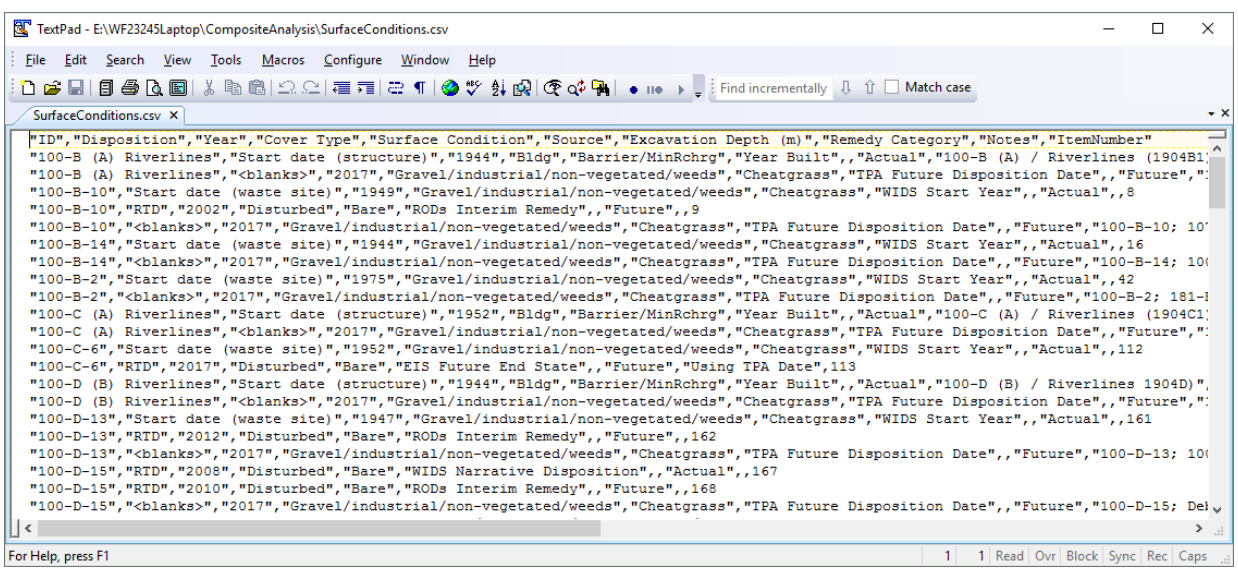
ID	Disposition	Year	Cover Type	Surface Condition	Source	Remedy Type	Excavation Depth (m)	Notes
100-B (A) Riverlines	Start date (structure)	1944	Bldg	Barrier/MinRchrg	Year Built	Actual		100-B (A) / Riverlines (1904B1)
100-B (A) Riverlines	<blanks>	2017	Gravel/industrial/non-vegetated/weeds	Cheatgrass	TPA Future Disposition Date	Future		100-B (A) / Riverlines (1904B1)
100-B-10	Start date (waste site)	1949	Gravel/industrial/non-vegetated/weeds	Cheatgrass	WIDS Start Year	Actual		
100-B-10	RTD	2002	Disturbed	Bare	RODs Interim Remedy	Future		
100-B-10	<blanks>	2017	Gravel/industrial/non-vegetated/weeds	Cheatgrass	TPA Future Disposition Date	Future		100-B-10; 107-B Basin Leak and Warm Springs
100-B-14	Start date (waste site)	1944	Gravel/industrial/non-vegetated/weeds	Cheatgrass	WIDS Start Year	Actual		
100-B-14	<blanks>	2017	Gravel/industrial/non-vegetated/weeds	Cheatgrass	TPA Future Disposition Date	Future		100-B-14; 100-B Area Process and Sanitary Sewer Underground Pipelines
100-B-2	Start date (waste site)	1975	Gravel/industrial/non-vegetated/weeds	Cheatgrass	WIDS Start Year	Actual		
100-B-2	<blanks>	2017	Gravel/industrial/non-vegetated/weeds	Cheatgrass	TPA Future Disposition Date	Future		100-B-2; 181-B Backwash Trench; Backwash Trench; Miscellaneous Stream #73; Undocumented Liquid Waste Site
100-C (A) Riverlines	Start date (structure)	1952	Bldg	Barrier/MinRchrg	Year Built	Actual		100-C (A) / Riverlines (1904C1)
100-C (A) Riverlines	<blanks>	2017	Gravel/industrial/non-vegetated/weeds	Cheatgrass	TPA Future Disposition Date	Future		100-C (A) / Riverlines (1904C1)
100-C-6	Start date (waste site)	1952	Gravel/industrial/non-vegetated/weeds	Cheatgrass	WIDS Start Year	Actual		

Page 1 of 11

Page: 1 No Filter

Figure 2-3. Screen Shot of Results of 'Run Surface Condition Report'

The data are also saved to a comma-delimited file named "SurfaceConditions.csv" located in the working directory (Figure 2-4).



TextPad - E:\WF23245Laptop\CompositeAnalysis\SurfaceConditions.csv

File Edit Search View Tools Macros Configure Window Help

Find incrementally Match case

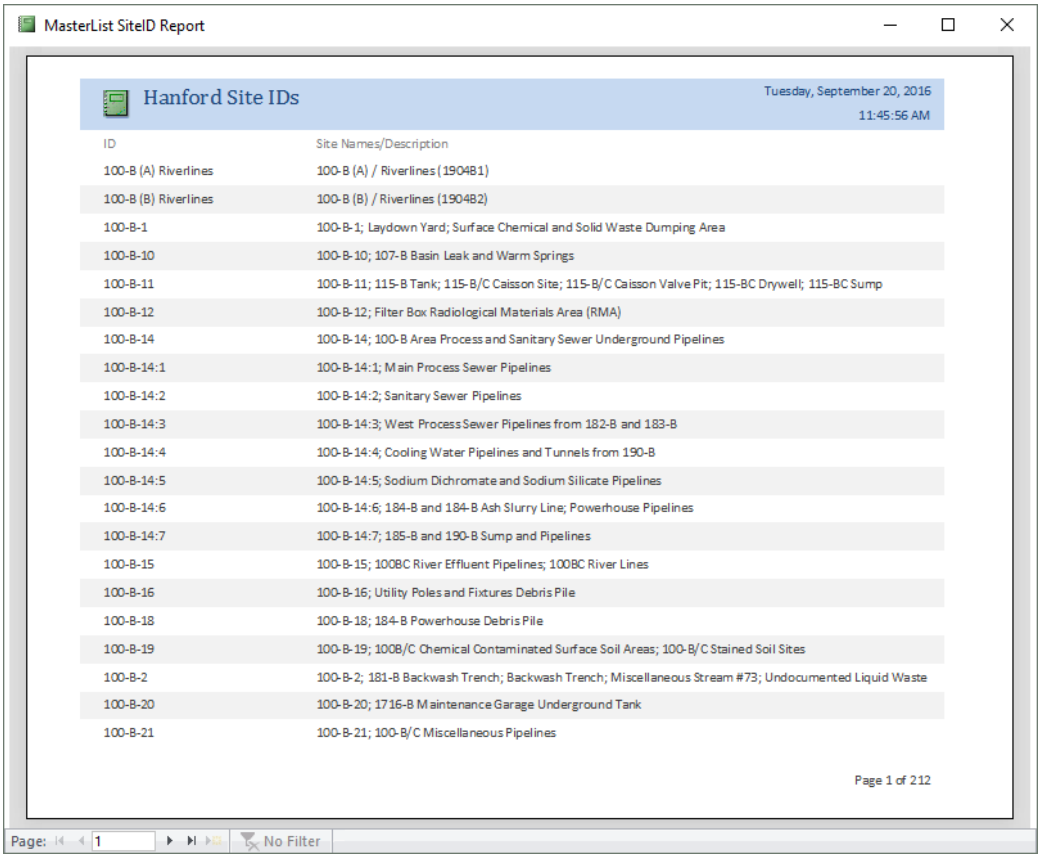
SurfaceConditions.csv

```
"ID","Disposition","Year","Cover Type","Surface Condition","Source","Excavation Depth (m)","Remedy Category","Notes","ItemNumber"
"100-B (A) Riverlines","Start date (structure)","1944","Bldg","Barrier/MinRchrg","Year Built",,"Actual","100-B (A) / Riverlines (1904B1
"100-B (A) Riverlines","<blanks>","2017","Gravel/industrial/non-vegetated/weeds","Cheatgrass","TPA Future Disposition Date",,"Future",
"100-B-10","Start date (waste site)","1949","Gravel/industrial/non-vegetated/weeds","Cheatgrass","WIDS Start Year",,"Actual",,8
"100-B-10","RTD","2002","Disturbed","Bare","RODs Interim Remedy",,"Future",,9
"100-B-10","<blanks>","2017","Gravel/industrial/non-vegetated/weeds","Cheatgrass","TPA Future Disposition Date",,"Future","100-B-10; 10
"100-B-14","Start date (waste site)","1944","Gravel/industrial/non-vegetated/weeds","Cheatgrass","WIDS Start Year",,"Actual",,16
"100-B-14","<blanks>","2017","Gravel/industrial/non-vegetated/weeds","Cheatgrass","TPA Future Disposition Date",,"Future","100-B-14; 10
"100-B-2","Start date (waste site)","1975","Gravel/industrial/non-vegetated/weeds","Cheatgrass","WIDS Start Year",,"Actual",,42
"100-B-2","<blanks>","2017","Gravel/industrial/non-vegetated/weeds","Cheatgrass","TPA Future Disposition Date",,"Future","100-B-2; 181-
"100-C (A) Riverlines","Start date (structure)","1952","Bldg","Barrier/MinRchrg","Year Built",,"Actual","100-C (A) / Riverlines (1904C1
"100-C (A) Riverlines","<blanks>","2017","Gravel/industrial/non-vegetated/weeds","Cheatgrass","TPA Future Disposition Date",,"Future",
"100-C-6","Start date (waste site)","1952","Gravel/industrial/non-vegetated/weeds","Cheatgrass","WIDS Start Year",,"Actual",,112
"100-C-6","RTD","2017","Disturbed","Bare","EIS Future End State",,"Future","Using TPA Date",113
"100-D (B) Riverlines","Start date (structure)","1944","Bldg","Barrier/MinRchrg","Year Built",,"Actual","100-D (B) / Riverlines 1904D)",
"100-D (B) Riverlines","<blanks>","2017","Gravel/industrial/non-vegetated/weeds","Cheatgrass","TPA Future Disposition Date",,"Future",
"100-D-13","Start date (waste site)","1947","Gravel/industrial/non-vegetated/weeds","Cheatgrass","WIDS Start Year",,"Actual",,161
"100-D-13","RTD","2012","Disturbed","Bare","RODs Interim Remedy",,"Future",,162
"100-D-13","<blanks>","2017","Gravel/industrial/non-vegetated/weeds","Cheatgrass","TPA Future Disposition Date",,"Future","100-D-13; 10
"100-D-15","RTD","2008","Disturbed","Bare","WIDS Narrative Disposition",,"Actual",,167
"100-D-15","RTD","2010","Disturbed","Bare","RODs Interim Remedy",,"Future",,168
"100-D-15","<blanks>","2017","Gravel/industrial/non-vegetated/weeds","Cheatgrass","TPA Future Disposition Date",,"Future","100-D-15; De
```

For Help, press F1 1 1 Read Ovr Block Sync Rec Caps

Figure 2-4. Screen Shot of Comma-Delimited File

The “Run Site ID Report” command button generates a report of all Site IDs and associated Site Names (Figure 2-5).



MasterList SiteID Report

Hanford Site IDs

Tuesday, September 20, 2016
11:45:56 AM

ID	Site Names/Description
100-B (A) Riverlines	100-B (A) / Riverlines (1904B1)
100-B (B) Riverlines	100-B (B) / Riverlines (1904B2)
100-B-1	100-B-1; Laydown Yard; Surface Chemical and Solid Waste Dumping Area
100-B-10	100-B-10; 107-B Basin Leak and Warm Springs
100-B-11	100-B-11; 115-B Tank; 115-B/C Caisson Site; 115-B/C Caisson Valve Pit; 115-BC Drywell; 115-BC Sump
100-B-12	100-B-12; Filter Box Radiological Materials Area (RMA)
100-B-14	100-B-14; 100-B Area Process and Sanitary Sewer Underground Pipelines
100-B-14:1	100-B-14:1; Main Process Sewer Pipelines
100-B-14:2	100-B-14:2; Sanitary Sewer Pipelines
100-B-14:3	100-B-14:3; West Process Sewer Pipelines from 182-B and 183-B
100-B-14:4	100-B-14:4; Cooling Water Pipelines and Tunnels from 190-B
100-B-14:5	100-B-14:5; Sodium Dichromate and Sodium Silicate Pipelines
100-B-14:6	100-B-14:6; 184-B and 184-B Ash Slurry Line; Powerhouse Pipelines
100-B-14:7	100-B-14:7; 185-B and 190-B Sump and Pipelines
100-B-15	100-B-15; 100BC River Effluent Pipelines; 100BC River Lines
100-B-16	100-B-16; Utility Poles and Fixtures Debris Pile
100-B-18	100-B-18; 184-B Powerhouse Debris Pile
100-B-19	100-B-19; 100B/C Chemical Contaminated Surface Soil Areas; 100-B/C Stained Soil Sites
100-B-2	100-B-2; 181-B Backwash Trench; Backwash Trench; Miscellaneous Stream #73; Undocumented Liquid Waste
100-B-20	100-B-20; 1716-B Maintenance Garage Underground Tank
100-B-21	100-B-21; 100-B/C Miscellaneous Pipelines

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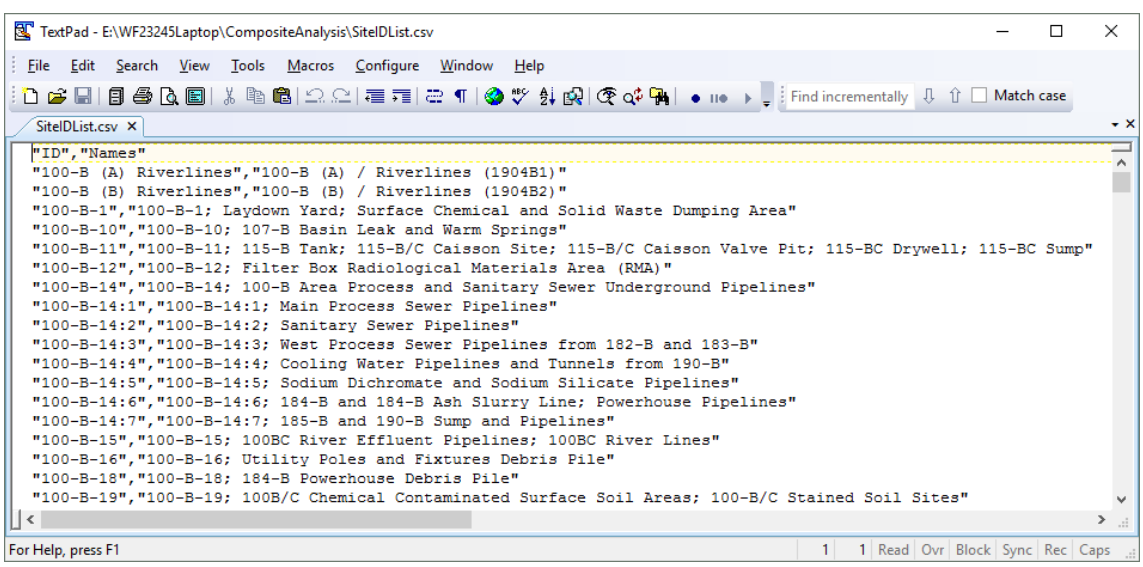
Page: 1 No Filter

Figure 2-5. Screen Shot of ‘Run Site ID Report’ Example

The Site ID data are also saved to a comma-delimited file named “SiteIDList.csv” located in the working directory (Figure 2-6).



TextPad - E:\WF23245Laptop\CompositeAnalysis\SiteIDList.csv

File Edit Search View Tools Macros Configure Window Help

Find incrementally Match case

SiteIDList.csv

```
"ID","Names"
"100-B (A) Riverlines","100-B (A) / Riverlines (1904B1)"
"100-B (B) Riverlines","100-B (B) / Riverlines (1904B2)"
"100-B-1","100-B-1; Laydown Yard; Surface Chemical and Solid Waste Dumping Area"
"100-B-10","100-B-10; 107-B Basin Leak and Warm Springs"
"100-B-11","100-B-11; 115-B Tank; 115-B/C Caisson Site; 115-B/C Caisson Valve Pit; 115-BC Drywell; 115-BC Sump"
"100-B-12","100-B-12; Filter Box Radiological Materials Area (RMA)"
"100-B-14","100-B-14; 100-B Area Process and Sanitary Sewer Underground Pipelines"
"100-B-14:1","100-B-14:1; Main Process Sewer Pipelines"
"100-B-14:2","100-B-14:2; Sanitary Sewer Pipelines"
"100-B-14:3","100-B-14:3; West Process Sewer Pipelines from 182-B and 183-B"
"100-B-14:4","100-B-14:4; Cooling Water Pipelines and Tunnels from 190-B"
"100-B-14:5","100-B-14:5; Sodium Dichromate and Sodium Silicate Pipelines"
"100-B-14:6","100-B-14:6; 184-B and 184-B Ash Slurry Line; Powerhouse Pipelines"
"100-B-14:7","100-B-14:7; 185-B and 190-B Sump and Pipelines"
"100-B-15","100-B-15; 100BC River Effluent Pipelines; 100BC River Lines"
"100-B-16","100-B-16; Utility Poles and Fixtures Debris Pile"
"100-B-18","100-B-18; 184-B Powerhouse Debris Pile"
"100-B-19","100-B-19; 100B/C Chemical Contaminated Surface Soil Areas; 100-B/C Stained Soil Sites"
```

For Help, press F1 1 1 Read Ovr Block Sync Rec Caps

Figure 2-6. Screen Shot of Site ID Comma-delimited File

2.2.3 Data Interpretation

To make sure the user has the best understanding of the dispositions for the sites being modeled, no interpretations are done by the database application. It simply reports the dispositions and associated surface conditions for the dates discovered during the creation of this product. However, the user will be able to use their own assumptions concerning a site's disposition and surface condition.

As mentioned previously, the only screening performed by this application is to reduce the number of "future" remedies (and their corresponding surface conditions) to a single result per site using the prioritization order established above. If a user wants to apply a different prioritization or screening algorithm, all dispositions (surface conditions) for selected sites will be written to the output file: SurfaceConditionsALL.csv, if the command button labeled **Report ALL Surface Conditions** located at the bottom of the form is selected. The user can then apply different screening rules on the complete disposition set to get different results.

Also, multiple sources often report similar dispositions on the same dates so the user is advised to review the output for the best understanding of how the output can be used in other work. For example, both "WIDS Start Year" and "EIS Start Year" report the date "1949," and the surface condition "Cheatgrass" for site ID 100-B-10. Redundant dispositions are possible due to the nature of the data.

3.0 QUALITY ASSURANCE AND QUALITY CONTROL

The following quality assurance processes and quality control checks were applied to this project.

3.1 QUALITY ASSURANCE

Processes incorporated into this project to ensure the quality of the final products included the following:

- Clearly identifying the objectives and scope of the project (e.g., intended use of the database),
- Securing sufficient funds to complete the task,
- Balancing and integrating diverse workloads to provide this project with sufficient staffing to allow its completion in a timely manner,
- Selecting qualified individuals to perform the tasks, providing Hanford-specific training to the individuals performing the tasks,
- Providing management direction and support of the technical specialists performing the tasks,
- Clearly identifying roles and responsibilities of individuals involved in the project before beginning the work,
- Developing a plan to conduct the work,
- Following the plan (adapting as needed in response to unanticipated conditions),
- Documenting the method and its results in this Technical Approach Document,
- Storing the spreadsheet, database, and listed references in INTERA's Environmental Model Management Archive, the contents of which are transferred at least monthly to CHPRC's Environmental Data Management group for inclusion in CHPRC managed disk space, and
- Using only CHPRC-approved software for the work conducted.

3.2 QUALITY CONTROL

To check the accuracy, completeness, and reliability of the completed spreadsheet and database, the follow reviews were performed:

- Reviewed each worksheet in the spreadsheet to look for error returns to any formula.
    - None were found.

- Filtered the **MasterList** for all sites with excavation depths in the rollup column (AQ) and reviewed the type of disposition for each waste site. Six waste sites had a WIDS disposition of no action. The 2015 WIDS annual report was checked for each of the six waste sites.
    - At one of the sites, the site had been determined to require no action based on confirmatory sampling; the excavation depth entered into the **MasterList** referred to the depth of the test pit excavated in order to conduct sampling. The depth datum for that site was removed from the worksheet.
    - At the other five sites, the WIDS report described that the site had been determined to require no action based on confirmatory sampling; however, the report also described previous remedial actions. The WIDS disposition was changed from 'no action' to the remedial action described.
- Filtered the **MasterList** for WIDS actual disposition of no action, comparing it against other actual dispositions. The Dashboard remedy listed RTD for 10 of the sites. No mention of RTD-type activities was described in the WIDS annual report for seven sites (200-N-3, 216-N-2 (did mention test pits for sampling), 216-N-3, 600-285-PL, 600-51, 600-65, and UPR-200-N-1. For site UPR-200-N-2, removal of surface debris was mentioned but the remaining details related to a decision of confirmatory sampling/no action. No change was made to data entered for these eight sites. For sites 600-286-PL and 600-297-PL, the WIDS report states "Although the Confirmatory Sampling/No Action remediation alternative was selected for pipelines in 2009 for 600-286-PL and 600-287-PL, these two clay pipelines were removed in 2010." So these two dispositions were changed to RTD in the WIDS disposition column.
- RODs. Randomly selected three RODs to check the assigned remedies.
    - EPA/ROD/R10-00/120. The remedy listed in the ROD worksheet was RTD, which is consistent with remediation described in the ROD. The correct sites were listed: 116-N-1, 116-N-3, and UPR-100-N-31.
    - The ROD worksheet listed varying remedies for 123 sites for the 200-FF-1, -2, and -5 OU ROD (EPA and DOE, 2013). To check the listing, the sites were sorted by remedy, then compared to Table 1, '130 Waste Sites included in this ROD' in the ROD. One typographic error was found (a missing comma between two sites resulted in both sites being listed in one row). The two sites were separated into two rows. Seven waste sites with enhanced attenuation as a remedy had not been included in the worksheet and were added to the worksheet.
    - The interim ROD for the 100 Area Remaining Sites (EPA/ROD/R10-99/039) was checked by comparing Tables A-1 '100 Area Remaining Sites for Remove/Treat/Dispose' and A-2 'Candidate 100 Area Remaining Sites for Plug-in of Remove/Treat/Dispose' against the filtered list in the ROD worksheet. Two out of the 161 sites listed in Table A-2 had been missed and were added to the worksheet. For unknown reasons, none of the waste sites in Table A-1 had been entered and were added to the worksheet.
- Proposed Plan. Without looking at the file directory, selected the first and fifth proposed plan on the file directory.
    - 221-U. The remedy was partially demolish, fill void spaces with grout, and dispose in place hazardous substances and resulting demolition debris inside and next to structure under engineered barrier. The plan lists three waste sites -- 221-U, 271-U, and 276-U. Only 221-U:3 was listed in worksheet, which was changed to 221-U, and 271-U, 276U, 221U, and 271U were added. The remedy in the worksheet was changed from D4 to D4, grout, barrier.

    - BC Cribs and Trenches. Described 23 waste sites with a remedy of ET barrier and 6 waste sites with a remedy of excavation (RTD). The waste sites and remedy in the worksheet were correct.
- Action Memos. Without looking at the file directory, selected the third and eleventh action memo.
    - 100-BC-1 Non-time critical removal action. Sites: 116-B-4, 116-B-5, and 116-C-1. Remedy: Excavate, store waste on-site. The correct sites were listed in the worksheet, with a disposition of RTD.
    - 232-Z. Only one waste site, 232-Z, was listed with a remedy of building decontamination, stabilization, dismantling, and leaving the building slab. The correct waste site was listed in the worksheet, with a disposition of D4 to slab on grade.
- Other References.
    - CWC was listed with decontamination as a remedy but the reference cited an interim plan; a more recent closure plan does not specify decontamination as a remedy; removed the older reference; added a row for CWC to cite the more recent plan, and added other waste sites within CWC complex specifically listed in closure plan.

Because of the errors and omissions found in the limited number of QC checks, a more thorough check was conducted of the consistency of the data in the spreadsheet with the information sources. For selected waste sites, an independent reviewer compared the selected remedy described in the cited regulatory decision document to the disposition listed for the waste sites in the appropriate worksheet. The waste sites reviewed were all waste sites with a disposition list in action memos (1,362 rows of data), RODs (798 rows of data), or proposed plans (792 rows of data), plus 300 randomly selected waste sites with a disposition based on other types of documentation, for a total of 3,252 checked entries. The independent reviewer was not familiar with the Hanford Site and many of the initial discrepancies noted by the reviewer were due to this unfamiliarity and the variety of waste site naming conventions used in the various documents. The independent review did find three typographical errors in waste site numbers, one error in excavation depth, and two waste sites with remedies which would be more accurately classified with a different remedy than listed in the worksheet. These errors were corrected in the final spreadsheet and database. The low error rate (less than 0.2 percent) and the extensive amount of independent checking performed provides confidence the disposition data accurately reflects the information in the source documents.

4.0 REFERENCES

15-AMRP-0259, 2015, *Explanation of Significant Differences for the Hanford Site 300 Area Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1*, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0079935H

58 FR 178, "Record of Decision: Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington," *Federal Register*, Vol. 58, No. 178, p. 48509, September 16, 1993. Available at: http://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/EIS-0119-ROD-1993.pdf

78 FR 240, "Record of Decision for the Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington," Federal Register, Vol. 79, No. 240, pp. 75913-75919, December 13, 2013. Available at: http://www.hanford.gov/files.cfm/TCWM_ROD_FR_pub_12_13_13.pdf.

002263, 1989, "2101-M Pond Meeting" (meeting notes), July 7.

1305309, 2013, "PNNL Exit/Closeout of 622S – Field Lysimeter Test Facility (FLTF) and Update to the Hanford Site Structures List" (memorandum to R.E. Snyder from M.S. McCormick, U.S. Department of Energy--Richland Operations Office), U.S. Department of Energy, Richland Operations Office, Richland, WA, December 17.

1400146A, 2014, "622S Lysimeter Statement of Work Transmittal – Replacement of CO#190" (Correspondence Distribution Coversheet to D.S. Merry, CH2M Hill Plateau Remediation Company, from C.M. Jacobsen, U.S. Department of Energy--Richland Operations Office), with attached e-mail to D.S. Merry, CH2M Hill Plateau Remediation Company, from C.M. Jacobsen, U.S. Department of Energy--Richland Operations Office, January 9.

Barnes, Brett M., 2014, "400-7 Septic Tank Closure" (internal e-mail to C.R. Webb), CH2M Hill Plateau Remediation Company, March 25.

BHI-00025, 1994, *Project Management Plan for the 200-BP-1 Modified RCRA Barrier (Project W-403)*, Rev. 00, Bechtel Hanford, Inc., Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D196063860

BHI-01164, 1998, *300 Area Process Trenches Verification Package*, Rev. 0, Bechtel Hanford, Inc., Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D198200905

BHI-01298, 1999, *300-FF-1 Operable Unit North Process Pond/Scraping Disposal Area Verification Package*, Rev. 0, Bechtel Hanford, Inc., Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0078649H

CCN-0093881, 2004, "Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Non-Time Critical Removal Action Memorandum for Removal of the 232-Z Contaminated Waste Recovery Process Facility from the Plutonium Finishing Plant" (letter to M.A. Wilson, Washington State Department of Ecology from K.A. Klein), U.S. Department of Energy, Richland Operations Office, Richland, Washington, November 5.

CCN-022696, 1995, "Voluntary Action at the 'Cut-up' Oil Dump Site" (external letter to J.K. Erickson, USDOE, from G.R. Eidam, Bechtel Hanford, Inc.), October 26, with attached letter "Voluntary

Cleanup of the 300-FF-2 'Cut-up' Oil Dump Site at the Hanford Site" to C. Clarke, EPA, from J.L. Murphy, [undated].

CCN-038546, 1996, "Action Memorandum, N Area Waste Expedited Response Action Cleanup Plan" (letter to R.F. Smith, U.S. Environmental Protection Agency and M.A. Wilson, Washington State Department of Ecology from L.L. Piper), U.S. Department of Energy, Richland Operations Office, Richland, Washington, November 7.

CCN-040739, 1996, "Action Memorandum, 183-H Solar Evaporation Basin Waste Expedited Response Action Cleanup Plan" (letter to R.F. Smith, U.S. Environmental Protection Agency and M.A. Wilson, Washington State Department of Ecology from L.L. Piper), U.S. Department of Energy, Richland Operations Office, Richland, Washington, November 26. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1205170975

CCN-059689, 1998, "Action Memorandum: USDOE Hanford 100 Area National Priorities List (NPL); 105-F and 105-DR Reactor Buildings and Ancillary Facilities; Hanford Site; Benton County, Washington," Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Richland Operations Office, Richland, Washington, July 14.

CCN-174858, 2014, "Post-Demolition Summary Report for the 151-D-A4 Electrical Substation Switchyard" (internal memorandum to M.E. Allen from M.E. Allen), Washington Closure Hanford, February 14.

CCN-175434, 2014, "Post-Demolition Summary Report for the 151-B-A2 Electrical Substation Switchyard" (internal memorandum to M.E. Allen from M.E. Allen), Washington Closure Hanford, March 31.

CCN-175461, 2014, "Post-Demolition Summary Report for the 181-N River Pump House Cable Float Barrier Anchor Blocks" (internal memorandum to L.M. Douglas from M.E. Allen), Washington Closure Hanford, April 3.

CCN-176390, 2014, "Post-Demolition Summary Report for the 183-B Water Treatment Plant Clearwells and Pump House" (internal memorandum to L.M. Douglas from M.E. Allen), Washington Closure Hanford, June 25.

CCN-9100749, 1991, "618-9 Burial Ground Expedited Response Action, Phase I Project Plan" (letter to P.T. Day, U.S. Environmental Protection Agency, and T.L. Nord, Washington State Department of Ecology from S.H. Wisness), U.S. Department of Energy, Richland, Washington, February 13.

CCN-9103432, 1991, "Action Memorandum Approval: 316-5 Process Trenches, U.S. Department of Energy (DOE) Hanford Site, Richland, Washington" (letter to W. Bixby, U.S. Department of Energy, Richland Operations Office from C.E. Findley and R. Stanley, Washington State Department of Ecology and U.S. Environmental Protection Agency, Seattle, Washington, July 15. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D196069898

CCN-9305567, 1993, "Action Memorandum: Expedited Response Action Proposal; Riverland Site, USDOE Hanford Site, Richland, WA" (letter to L.E. Little, U.S. Department of Energy, from R.F. Smith and R. Stanley, U.S. Environmental Protection Agency and Washington State Department of Ecology), U.S. Environmental Protection Agency, Seattle, Washington, June 23.

CCN-9307470, 1993, "Action Memorandum Approval: Sodium Dichromate Barrel Landfill, USDOE Hanford Site, Richland, WA" (letter to L.E. Little, U.S. Department of Energy, from R. Stanley and R.F. Smith, Washington State Department of Ecology and U.S. Environmental Protection Agency),

Washington State Department of Ecology, Kennewick, Washington, March 8. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D196106756

Change Notice for Hanford Facility, 2010, Building No. 1605NE, Area 100N, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2010, Building No. 2736ZE, Area 200W, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2010, Building No. 2736ZF, Area 200W, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2010, Building No. 2736ZG, Area 200W, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2010, Building No. 2736ZH, Area 200W, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2010, Building No. 2736ZI, Area 200W, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2010, Building No. 2736ZM, Area 200W, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2010, Building No. 2736ZN, Area 200W, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2010, Building No. 2736ZO, Area 200W, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2010, Building No. 2736ZP, Area 200W, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2010, Building No. 2736ZQ, Area 200W, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2010, Building No. 2736ZR, Area 200W, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2010, Building No. 2736ZS, Area 200W, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2010, Building No. 2736ZT, Area 200W, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2010, Building No. 2736ZU, Area 200W, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2011, Building No. 1605KE, Area 100K, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2011, Building No. 1605KW, Area 100K, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2012, Building No. 296Z005, Area 200W, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2012, Building No. 296Z006, Area 200W, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2012, Building No. 296Z007, Area 200W, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2012, Building No. HS0007, Area 100N, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2012, Building No. HS0008, Area 100N, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2015, Building No. 241SY275, Area 200W, Hanford Form Number A-6002-836.2 (Rev 1).

Change Notice for Hanford Facility, 2015, Building No. 2316W, Area 200W, Hanford Form Number A-6002-836.2 (Rev 1).

CHPRC, 2010, "Waste Information Data System General Summary Report," Site Code: 2718-S, CH2M Hill Plateau Remediation Company, Richland, Washington, December 29.

CHPRC, 2011a, "Waste Information Data System General Summary Report," Site Code: 241-BYR-09A, CH2M Hill Plateau Remediation Company, Richland, Washington, February 14.

CHPRC, 2011b, "Waste Information Data System General Summary Report," Site Code: 132-B-2, CH2M Hill Plateau Remediation Company, Richland, Washington, May 26.

CHPRC, 2012a, "Waste Information Data System General Summary Report," Site Code: 300-6, CH2M Hill Plateau Remediation Company, Richland, Washington, February 6.

CHPRC, 2012b, "Waste Information Data System General Summary Report," Site Code: 316-2, CH2M Hill Plateau Remediation Company, Richland, Washington, February 24.

CHPRC, 2013, "Waste Information Data System General Summary Report," Site Code: 118-DR-2:2, CH2M Hill Plateau Remediation Company, Richland, Washington, October 31.

CHPRC, 2014, "Waste Information Data System General Summary Report," Site Code: 600-326, CH2M Hill Plateau Remediation Company, Richland, Washington, July 16.

CHPRC-1204952, 2012, "Contract Number DE-AC06-08 RL14788 – Performance Measure Completion Request for Contracting Officer Acceptance per PRC Clause B.8(C) -- RL-0011, Fourth Quarter Fiscal Year 2012" (external letter to J.C. Connerly, U.S. Department of Energy, Richland Operations Office, from J.C. Fulton), CH2M Hill Plateau Remediation Company, with "Attachment 4, CHPRC-1204952, Contract Number DE-AC06-08RL14788, Performance Objective RL-0011-02 1.10.1, PFP Closure Project – Ancillary Facilities Disposition" CH2M Hill Plateau Remediation Company, Richland, Washington.

CHPRC-1505522, 2015, "Contract Number DE-AC06-08RL14788 – Response to Agreed Order and Stipulated Penalty Docket Number DE 10156 Exhibit A Section 1.12.1 Concerning the Submittal of a Class 3 Permit Modification Request to Incorporate the Solid Waste Operations Complex Unit Groups into the Hanford Dangerous Waste Permit" (external letter to J.J. Short, USDOE, from J.A.

Ciucci), CH2M Hill Plateau Remediation Company, Richland, Washington, December 15, including Attachment 2, "CHPRC-1505522, Contract Number DE-AC06-08RL14788, Hanford Facility Dangerous Waste Part B Permit Application; Low-Level Burial Grounds Trenches 31-34-94, T Plant Complex, and Central Waste Complex-Waste Receiving and Processing Facility DOE/RL-2015-74, Revision 0, S.R. Horn," Attachment 3, "CHPRC-1505522, Contract Number DE-AC06-08RL14788, T Plant Complex Part B, DOE/RL-2015-74 Revision 0, S.R. Horn," and Attachment 4, CHPRC-1505522, Contract Number DE-AC06-08RL14788, CWC-WRAP Part B, DOE/RL-2015-74, Revision 0, S.R. Horn."

CHPRC-2011-05, 2011, *Monthly Performance Report – May 2011*, Rev.0, CH2M Hill Plateau Remediation Company, Richland, Washington.

CHPRC-2011-09, 2011, *Monthly Performance Report -- September 2011*, Rev.0, CH2M Hill Plateau Remediation Company, Richland, Washington.

CH2M Hill Plateau Remediation Company, 2012, "Task Detail Estimate Report, WBS: 040.02.29.03.04, O-Zone CSNA (Waste Sites)," including "Task: 040.02.29.03.04.28, 600-28 Confirmatory Sampling," CH2M Hill Plateau Remediation Company, Richland, Washington.

CVP-2006-00005, 2006, *Cleanup Verification Package for the 618-3 Burial Ground*, Rev. 0, Washington Closure Hanford, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA03634106

CVP-2010-00001, 2010, *Cleanup Verification Package for the 618-1 Burial Ground and Subsites 333 East Side Heat Treat Salt Storage Area (618-1:1), Limestone Neutralization Pit (618-1:2), and Consolidated Waste Sites 333 Laydown Hazardous Waste Storage Area (333 LHWSA), Acid Neutralization Tank Leak East of the 333 Building (UPR-300-13), Acid Leak at the 334 Tank Farm (UPR-300-14), and Collocated Waste Sites 333 Building Stormwater Runoff (300-110), 303-M Building Storage Area (303-M SA), 303-M Uranium Oxide Facility (303-M UOF), 333 Building East Site Hazardous Waste Storage Area (333 ESHWSA)*, Rev. 0, Washington Closure Hanford, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/pdf.cfm?accession=0084309

CVP-2010-00002, 2010, *Cleanup Verification Package for the 118-H-2, H-1 Loop Burial Ground Trenches and Sorting Cells*, Rev. 0, Washington Closure Hanford, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1012280971

CVP-2011-00001, 2011, *Cleanup Verification Package for the 118-H-1:1, 100-H Burial Ground Trenches and Sorting Cells*, Rev. 0, Washington Closure Hanford, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093728

CVP-2015-00011, 2015, *Cleanup Verification Package for the 300 RLWS:1, 300 RLWS:2, 300 RRLWS:1, and 300-214:1 Subsites*, Washington Closure Hanford, Richland, Washington, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0079925H

DOE, 2013, *Technology Transfer Document for the Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington*, Appendix J, "Electronic Media,"' U.S. Department of Energy.

DOE, 2014, "RL Integrated Baseline Management" (U.S. Department of Energy, Richland Operations Office procedure), U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE, 2015, Performance Metric Database (an on-line database, part of the U.S. Department of Energy Richland Operations Office's Project Data Management System), accessed on December 29, 2015. Available on Hanford's internal web at: http://doesp.rl.gov/amms/PDMS/SitePages/Home.aspx

DOE, 2016a, Metadata for GIS shapefile, 'env_haz_remediation_abar,' U.S. Department of Energy, Richland Operations Office, Richland, Washington, updated January 15.

DOE, 2016b, Metadata for GIS shapefile, 'env_haz_remediation_ibar,' U.S. Department of Energy, Richland Operations Office, Richland, Washington, updated January 15.

DOE, 2016c, *U.S. Department of Energy Facilities Information Management System User's Guide*, updated January 7, 2016. Available at https://fimsweb.doe.gov/fimsinfo/documentation.htm

DOE and Ecology, 2000, "Action Memorandum: USDOE Hanford 100 Area National Priorities List (NPL); 105-D and 105-H Reactor Facilities and Ancillary Facilities; Hanford Site, Benton County, WA", U.S. Department of Energy, Richland Operations Office and Washington State Department of Ecology, Richland, Washington, December 8. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D8566579

DOE and EPA, 1997, "Action Memorandum: Removal Action at the 233-S Plutonium Concentration Facility, USDOE Hanford Site, Benton County, WA" U.S. Department of Energy, Richland Operations Office and U.S. Environmental Protection Agency, Richland, Washington, March 24. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D197166461

DOE and EPA, 2000, "Action Memorandum: USDOE, Hanford 300 Area National Priorities List (NPL), 331-A Virology Laboratory Building, Hanford Site, Benton County, WA" U.S. Department of Energy, Richland Operations Office and U.S. Environmental Protection Agency, Richland, Washington, February 15. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D8232563

DOE and EPA, 2001, "Action Memorandum: USDOE, Hanford 100 Area National Priorities List, 105-B Reactor Facility, Hanford Site, Benton County, WA" U.S. Department of Energy, Richland Operations Office and U.S. Environmental Protection Agency, Richland, Washington, December 27. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D8979346

DOE and EPA, 2005, "Action Memorandum #1 for the 300 Area Facilities," U.S. Department of Energy, Richland Operations Office and U.S. Environmental Protection Agency, Richland, Washington, January 20. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D7135495

DOE and EPA, 2006a, "Action Memorandum #2 for the 300 Area Facilities," U.S. Department of Energy, Richland Operations Office and U.S. Environmental Protection Agency, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA02553852

DOE and EPA, 2006b, "Action Memorandum #3 for the 300 Area Facilities, DOE/RL-2005-87" Letter Number 07-AMRC-0046, U.S. Department of Energy, Richland Operations Office and U.S. Environmental Protection Agency, Richland, Washington, November 30. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA04027779

DOE and EPA, 2007, "Action Memorandum for the Non-Time-Critical Removal Action for the 105-KE and 105-KW Reactor Facilities and Ancillary Facilities," U.S. Environmental Protection Agency, 100-K Area Cleanup Project Manager and U.S. Department of Energy, Richland Operations Office, Richland, Washington, January 4. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA04316914

DOE, EPA, and Ecology, 1998, "Action Memorandum: USDOE Hanford 100 Area National Priorities List, 100-N Area Ancillary Facilities; Hanford Site, Benton County, WA" U.S. Department of Energy, Richland Operations Office; U.S. Environmental Protection Agency; and Washington State

Department of Ecology, Richland, Washington, December 17. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D199017702

DOE, EPA, and Ecology, 2004, "Action Memorandum: U.S. Department of Energy, 200 Area, Burial Ground 218-W-4C Waste Retrieval, Hanford Site, Benton County, Washington," U.S. Department of Energy, Richland Operations Office; U.S. Environmental Protection Agency; and Washington State Department of Ecology, Richland, Washington, April 19. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D6853085

DOE/EIS-0391, 2012, *Final Environmental Impact Statement Tank Closure and Waste Management for the Hanford Site, Richland, Washington*, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www.hanford.gov/page.cfm/FinalTCWMEIS

DOE/RL-88-30, Rev. 24, 2015, *Hanford Site Waste Management Units Reports*, U.S. Department of Energy, Richland, Washington. Available at:
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0082011H
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0082010H
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0082009H
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0082008H

DOE/RL-88-30, Rev. 25, 2016, *Hanford Site Waste Management Units Reports*, U.S. Department of Energy, Richland, Washington. Available at:
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0078250H
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0078019H
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0078018H
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0078017H

DOE/RL-89-28, 1994, *216-B-3 Expansion Ponds Closure Plan*, Rev. 2, U.S. Department of Energy, Richland, Washington. Available at:
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D196055407

DOE/RL-91-27, 2006, *Hanford Facility Permit Application, 222-S Dangerous and Mixed Waste Treatment, Storage, and Disposal Unit*, Rev. 2, Reissue, U.S. Department of Energy, Richland, Washington. Available at:
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA03540335.

DOE/RL-91-38, 1992, *Engineering Evaluation of the 618-9 Burial Ground Expedited Response Action*, U.S. Department of Energy, Richland, Washington. Available at:
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D196093733

DOE/RL-92-53, 1992, *218-E-8 Borrow Pit Demolition Site Closure Plan*, Rev. 1, U.S. Department of Energy, Richland, Washington. Available at:
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D196042761

DOE/RL-94-61, 1998, *100 Area Source Operable Unit Focused Feasibility Study*, Appendix N, "Remedy Selection Process for Remaining Source Operable Unit Waste Sites," Rev. 0, U.S. Department of Energy, Richland, Washington. Available at:
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D198209199.

DOE/RL-95-57, 1995, *Data Evaluation Report, Simulated High-Level Waste Slurry Treatment and Storage Unit*, U.S. Department of Energy, Richland, Washington. Available at:
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D196008160

DOE/RL-96-17, 2009, *Remedial Design Report/Remedial Action Work Plan for the 100 Area*, Rev. 6, U.S. Department of Energy, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0095436

DOE/RL-96-82, 2004, *Hanford Facility Dangerous Waste Closure Plan*, 241-Z Treatment and Storage Tanks, Rev. 1, U.S. Department of Energy, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D4493219

DOE/RL-2000-70, 2000, *Closure Plan for Active Low-Level Burial Grounds*, Rev. 0, U.S. Department of Energy, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D8532666.

DOE/RL-2001-29, 2004, *Proposed Plan for Remediation of the 221-U Facility (Canyon Disposition Initiative)*, Rev. 0, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D6697046

DOE/RL-2003-06, Draft A, *Proposed Plan for the 200-CW-1 Gabel Mountain Pond/B Pond and Ditches Waste Group Operable Unit, the 200-CW-3 200 North Area Cooling Water Waste Group Operable Unit and the 200 North Area Waste Sites*, U.S. Department of Energy, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D1362530

DOE/RL-2003-24, 2005, *Proposed Plan for the 200-UW-1 Operable Unit, Hanford Site, Richland, Washington*, Rev. 0, Reissue, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA007725

DOE/RL-2004-10, 2004, *Proposed Plan for the 200-TW-1 Scavenged Waste Group, 200-TW-2 Tank Waste Group, and 200-PW-5 Fission-Product Rich Waste Group Operable Units, Hanford Site, Richland, Washington*, Draft A, Reissue, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D4506687

DOE/RL-2004-36, 2004, *Action Memorandum for the Non-Time Critical Removal Action for the 224-B Plutonium Concentration Facility*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D6731933

DOE/RL-2004-67, *Action Memorandum for the Non-Time-Critical Removal Action for the U Plant Ancillary Facilities*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D7030987

DOE/RL-2004-69, 2005, *Proposed Plan for the BC Cribs and Trenches Area Waste Sites, Hanford Site, Richland, Washington*, Draft A, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA169911

DOE/RL-2005-20, *233-S Plutonium Concentration Facility Removal Action Closeout Report*, Rev. 0, U.S. Department of Energy, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA451399.

DOE/RL-2005-54, 2006, *Central Plateau Facility Binning Report*, Draft A, U.S. Department of Energy, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA03009540

DOE/RL-2005-64, 2008, *Proposed Plan for the 200-CS-1 Chemical Sewers Group Operable Unit, Hanford Site, Richland, Washington*, Rev. 0, U.S. Department of Energy, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0087001

DOE/RL-2005-86, 2006, *Engineering Evaluation/Cost Analysis for the 105-KE and 105-KW Reactor Facilities and Ancillary Facilities*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA02850332

DOE/RL-2005-89, 2015, *207-A South Retention Basin Closure Plan*, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0080919H

DOE/RL-2006-11, 2008, *Hanford Facility Dangerous Waste Closure/Postclosure Plan for the 216-B-63 Trench*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0087004

DOE/RL-2006-12, 2008, *Hanford Facility Dangerous Waste Closure/Postclosure Plan for the 216-S-10 Pond and Ditch*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0087003

DOE/RL-2006-60, 2006, *Proposed Plan for the 200-LW-1 and 200-LW-2 Chemical Laboratory Waste Group Operable Units, Hanford Site, Richland, Washington*, Decisional Draft, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

DOE/RL-2008-21, 2008, *Action Memorandum for the Non-Time-Critical Removal Action for the Northern Part of the BC Controlled Area (UPR-200-E-83)*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0806050037

DOE/RL-2008-44, 2009, *Engineering Evaluation/Cost Analysis for the 200-MG-1 Operable Unit Waste Sites*, Rev. 0, Appendix B 'Waste Site Attributes,' U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0096350

DOE/RL-2008-45, 2009, *Engineering Evaluation/Cost Analysis for the 200-MG-2 Operable Unit Waste Sites*, Rev. 0, Appendix B 'Waste Site Attributes,' U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0906020197.

DOE/RL-2008-51, 2009, *241-CX Tank System Closure Plan*, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0095783

DOE/RL-2008-78, 2009, *200 West Area 200-ZP-1 Pump-and-Treat Remedial Design/Remedial Action Work Plan*, Rev. 0, Reissue, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084101.

DOE/RL-2008-80, 2009, *Action Memorandum for Non-Time-Critical Removal Action for the 212-N, -P and -R Facilities*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0095783

DOE/RL-2008-80-ADD1, 2010, *Action Memorandum for Non-Time-Critical Removal Action for the 212-N, -P and -R Facilities, Addendum 1: Disposition of Railcars*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084143

DOE/RL-2009-10, 2013, *Hanford Site Cleanup Completion Framework*, Rev. 1, U.S. Department of Energy, Richland Operations Office and Office of River Protection, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1008190506

DOE/RL-2009-39, 2009, *Investigation-Derived Waste Purgewater Management Action Memorandum*, Rev. 0, U.S. Department of Energy, Richland Operations Office and Office of River Protection, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0096133

DOE/RL-2009-37, 2009, *Action Memorandum for Non-Time-Critical Removal Action for 200-MG-2 Operable Unit*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0095206

DOE/RL-2009-48, 2009, *Action Memorandum for Non-Time-Critical Removal Action for 11 Waste Sites in the 200-MG-1 Operable Unit*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0096131

DOE/RL-2009-81, 2009, *Central Plateau Cleanup Completion Strategy*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1002180676

DOE/RL-2009-86, 2010, *Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084449

DOE/RL-2009-117, 2011, *Proposed Plan for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units*, Rev. 0, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093832

DOE/RL-2009-129, 2009, [untitled], Internal Draft, engineering evaluation/cost analysis for the Plutonium Uranium Extraction (PUREX) and Hot Semi-Works ancillary facilities and structures. [No title page.]

DOE/RL-2010-22, 2010, *Action Memorandum for General Hanford Site Decommissioning Activities*, Rev. 0, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084575

DOE/RL-2010-97, 2011, *Remedial Investigation/Feasibility Study for the 100-KR-1, 100-KR-2, and 100-KR-4 Operable Units*, Draft A, U.S. Department of Energy, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/pdf.cfm?accession=0093615

DOE/RL-2010-102, 2011, *Action Memorandum for Decontamination, Deactivation, Decommissioning, and Demolition (D4) Activities for 200 East Tier 2 Buildings/Structures*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0083998

DOE/RL-2010-109, 2011, *Response Action Report for the 200-MG-1 Operable Unit Waste Site 600-38*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1107010453

DOE/RL-2010-114, 2011, *200-IS-1 Operable Unit Pipeline System Waste Sites RFI/CMS/RI/FS Work Plan*, Draft A, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093547

DOE/RL-2011-28, 2011, *Response Action Report for the 200-MG-1 Operable Unit Waste Site 600-226*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1106271473

DOE/RL-2011-82, 2011, *Proposed Plan for Remediation of 100-KR-1, 100-KR-2, and 100-KR-4 Operable Units*, Draft A, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093614

DOE/RL-2011-111, 2012, *Proposed Plan for Remediation of the 100-DR-1,100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units*, Draft A, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0090582

DOE/RL-2012-29, 2012, *Hanford Ten Year Site Plan Fiscal Period 2013-2022*, Rev. 0, U.S. Department of Energy, Richland Operations Office and Office of River Protection, Richland, Washington.

DOE/RL-2012-33, 2012, *Central Plateau Remediation Optimization Study*, Rev. 0, U.S. Department of Energy, Richland Operations Office and Office of River Protection, Richland, Washington.

DOE/RL-2012-41, 2014, *Proposed Plan for Remediation of the 100-FR-1,100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units*, Rev. 0, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0085353

DOE/RL-2012-68, 2013, *Proposed Plan for Remediation of the 100-NR-1 and 100-NR-2 Operable Units*, Draft A, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0088369

DOE/RL-2014-11, 2014, *2015 Lifecycle Scope, Schedule and Cost Report*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0082292H

DOE/RL-2015-10, 2015, *2016 Lifecycle Scope, Schedule and Cost Report*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0078688H

DOE/RL-2015-42, 2015, *Hanford Ten Year Site Plan Fiscal Period 2016-2025*, U.S. Department of Energy, Richland Operations Office and Office of River Protection, Richland, Washington.

DOE/RL-2015-74, *Hanford Facility Dangerous Waste Part B Permit Application: Low-Level Burial Grounds Trenches 31-34-94, T Plant Complex, and Central Waste Complex-Waste Receiving and Processing Facility Operating Unit Groups*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at:
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0078648H
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0078647H

http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0078646H
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0078645H
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0078644H

Ecology and DOE, 1997, "Action Memorandum, USDOE Hanford 100 Area NPL, 100-IU-3 Operable Unit (Wahluke Slope), Hanford Site, Adams, Grant, and Franklin Counties, WA" (signed by M. Wilson and L. Piper), Washington State Department of Ecology and the U.S. Department of Energy, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D197231782

Ecology and DOE, 2005, "Action Memorandum; USDOE, 100 Area, 105-N Reactor Facility and 109-N Heat Exchanger Building, Hanford Site, Benton County, WA" (signed by M. Wilson and L. Erickson), Washington State Department of Ecology and the U.S. Department of Energy, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D7590430

Ecology and EPA, 1994, "Action Memorandum: North Slope (Wahluke Slope) Expedited Response Action Cleanup Plan, USDOE Hanford Site, Richland, WA" (letter to R. Izatt, U.S. Department of Energy, Richland Operations Office from D. Butler, Washington State Department of Ecology and R.F. Smith, U.S. Environmental Protection Agency), Washington State Department of Ecology, Kennewick, Washington, March 17. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D196063462

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order Action Plan*, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington. [Appendix D, 'Work Schedule Milestones and Target Dates including Designation of Lead Regulatory Agency, current as of August 1, 2016.'] Available at: http://www.hanford.gov/?page=82

Ecology, EPA, and DOE, 2015, Waste Information Data System database 'WIDSOut.accdb' and Excel spreadsheet 'WasteSite.xlsx', obtained via e-mail from the WIDS administrator, Jeffrey Shearer, March 26, 2015.

EPA, 1997, "Action Memorandum: 100-B/C Area Ancillary Facilities and the 108-F Building Removal Action, USDOE Hanford Site, Richland, Washington" (letter to J.M. Bruggeman, U.S. Department of Energy, Richland Operations Office from D. Faulk), U.S. Environmental Protection Agency, Region 10 Hanford Project Office, Richland, Washington, January 29. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D197045200

EPA, 2004a, *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D4855290

EPA, 2004b, *Explanation of Significant Differences for the 300-FF-2 Operable Unit Record of Decision*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D5048583

EPA, 2005a, *Interim Remedial Action Record of Decision Amendment, Declaration, U.S. Department of Energy, 100 K Area K Basins, Hanford Site - 100 Area, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA450992

EPA, 2005b, *Record of Decision 221-U Facility (Canyon Disposition Initiative), Hanford Site, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA01060264

EPA, 2007a, *U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site - 200 Area, Benton County, Washington, Amended Record of Decision, Decision Summary and Responsiveness Summary*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0086538

EPA, 2007b, *Explanation of Significant Difference for the Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-2, 100-HR-2, and 100-KR-2 Operable Units (100 Area Burial Grounds)*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA06144408

EPA, 2009a, *Declaration: U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site - 200 Area, Benton County, Washington*, (Record of Decision [ROD] Amendment and Explanation of Significant Differences [ESD]), U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0908030975

EPA, 2009b, *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0908240150

EPA, 2009c, *Explanation of Significant Differences for the 300-FF-2 Operable Unit Interim Action Record of Decision, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0096132

EPA, 2010a, *U.S. Department of Energy, 100-NR-1 and NR-2 Operable Units, Hanford Site - 100 Area, Benton County, Washington, Amended Record of Decision, Decision Summary and Responsiveness Summary*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084198

EPA 2010b, *Explanation of Significant Differences for the Record of Decision for the USDOE Hanford 1100 Area Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1010051005

EPA, 2011a, *Explanation of Significant Differences for the 100-NR-1 and 100-NR-2 Operable Units Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093940

EPA, 2011b, *Record of Decision, Hanford 200 Area, Superfund Site 200-CW-5 and 200-PW-1, 200-PW-3 and 200-PW-6 Operable Units Hanford Site, Benton County, Washington*, U.S. Environmental

Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093644

EPA, 2013, *Explanation of Significant Difference for the 100-NR-1 and 100-NR-2 Operable Units Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0087916

EPA, 2014, *Record of Decision Hanford 100 Area Superfund Site 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units*, U.S. Environmental Protection Agency and U.S. Department of Energy, Seattle, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0083120H

EPA, 2015, *Explanation of Significant Differences for the U.S. Department of Energy Environmental Restoration Disposal Facility Hanford Site - 200 Area Benton County, Washington, EPA ID: WA1890090078*, U.S. Environmental Protection Agency, Washington, D.C. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0079657H

EPA and DOE, 2013, *Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1 Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency and U.S. Department of Energy, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0087180

EPA/AMD/R10-97/044, 1997, *Amendment to the Interim Action Record of Decision for the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D197225332

EPA/AMD/R10-97/101, 1997, *U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site – 200 Area, Benton County, Washington, Amended Record of Decision, Decision Summary and Responsiveness Summary*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

EPA/AMD/R10-99/038, 1999, *U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site – 200 Area, Benton County, Washington, Amended Record of Decision, Decision Summary and Responsiveness Summary*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

EPA/AMD/R10-02/030, 2002, *U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site – 200 Area, Benton County, Washington, Amended Record of Decision, Decision Summary and Responsiveness Summary*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D9066891

EPA/ESD/R10-00/045, 2000, *Explanation of Significant Difference for the 100 Area Remaining Sites ROD, USDOE Hanford 100 Area, 100-IU-6 Operable Unit, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D8350914

EPA/ESD/R10-00/524, 2000, *Explanation of Significant Difference for the 300-FF-5 Record of Decision*, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D8350921

EPA/ESD/R10-03/605, 2003, *Explanation of Significant Difference for the 100-NR-1 Operable Unit Treatment, Storage, and Disposal Interim Action Record of Decision and 100-NR-1/100-NR-2 Operable Unit Interim Action Record of Decision*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D2020929

EPA/ESD/R10-96/145, 1996, *USDOE Environmental Restoration Disposal Facility, Hanford Site, Benton County, Washington, Explanation of Significant Difference (ESD)*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D196114910

EPA/ROD/R10-00/120, 2000, *Interim Remedial Action Record of Decision Declaration, U.S. Department of Energy 100 Area, 100-NR-1 Operable Unit, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D8224996

EPA/ROD/R10-00/121, 2000, *Declaration of the Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-2, 100-HR-2, 100-KR-2 Operable Units, Hanford Site (100 Area Burial Grounds), Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D8453142

EPA/ROD/R10-01/119, 2001, *Declaration of the Interim Record of Decision for the 300-FF-2 Operable Unit*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D8686316

EPA/ROD/R10-93/063, 1993, *Record of Decision: USDOE Hanford 1100-Area*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D3408196

EPA/ROD/R10-95/100, 1995, *Declaration of the Record of Decision for the Environmental Restoration Disposal Facility*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

EPA/ROD/R10-95/126, 1995, *Declaration of the Record of Decision for the 100-BC-1, 100-DR-1 and 100-HR-1 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D195066674

EPA/ROD/R10-96/143, 1996, *Declaration of the Record of Decision for the 300-FF-1 and 300-FF-5 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D196245781

EPA/ROD/R10-96/151, 1996, *Declaration of the Record of Decision for the 100-IU-1, 100-IU-3, 100-IU-4, and100-IU-5 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D196033367

EPA/ROD/R10-99/039, 1999, *Interim Remedial Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D199153689

EPA/ROD/R10-99/059, 1999, *Declaration of the Record of Decision for the 100-KR-2 Operable Unit, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D199158532

EPA/ROD/R10-99/112, 1999, *Interim Remedial Action Record of Decision for the 100-NR-1 and 100-NR-2 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D9177845

HNF-6612, 2014, *Hanford Site Sewer System Master Plan*, Rev. 4, Mission Support Alliance, Richland, Washington.

HNF-21189, 2013, *Waste Information Data System (WIDS) User Guide*, Rev. 1, CH2M Hill Plateau Remediation Company, Richland, Washington.

HNF-21190, 2006, *Waste Information Data System (WIDS) Data Dictionary*, Rev. 0, Fluor Hanford, Richland, Washington.

HT-2007-022, 2001, "Historic Property Inventory Form," for Site Name Historic: 'PP&L Hanford Electrical Substation-Switching Station' [site 6640], State of Washington, Department of Community Development, Office of Archaeology and Historic Preservation, Olympia, Washington.

Mission Support Alliance, 2010, Hanford Facility Number Request, Allard Pump House [site 6642], Hanford Form Number A-6002-836 (Rev 2).

Mission Support Alliance, 2010, Hanford Facility Number Request, Bruggemann's Warehouse [site 6643], Hanford Form NumberA-6002-836 (Rev 2).

Mission Support Alliance, 2010, Hanford Facility Number Request, Hanford Town High School [site 6639], Hanford Form Number A-6002-836 (Rev 2).

Mission Support Alliance, 2010, "Hanford Facility Number Request," White Bluffs Bank [site 6641], Hanford Form Number A-6002-836 (Rev 2).

Mission Support Alliance, 2015, 'Hanford Site Structure List Rev. 31.xlsx', Excel spreadsheet, downloaded from Mission Support Alliance Hanford's internal webpage, People, Land & Buildings page, Facility Management page, Site Structure and Waste Sites Lists page. Accessed January 8, 2016.

ORP-11242, 2014, *River Protection Project System Plan*, Rev. 7, U.S. Department of Energy, Office of River Protection, Richland, Washington.

PFM-00039, 2011, *Hanford Mission Support Contract Integrated Technical Data-Mart Alternatives Analysis*, Appendix 22 "In Caretaker Not in MapMax", Rev. 0, Mission Support Alliance.

PNNL-15829, 2006, *Inventory Data Package for Hanford Assessments*, Rev.0, Pacific Northwest National Laboratory, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0911300004

RA-00136, 2010, *Rationale to Recommend Change of Status to 100-K-61, 100-K-62, 100-K-66, 100-K-67, 118-KW-1, 118-KW-2, 130-KE-2, 130-KW-2, 132-KE-1 and 132-KW-1 Waste Sites*, Rev. 0, CH2M Hill Plateau Remediation Company.

RA-00406, 2011, *Waste Site Planning Assumptions: Project Management Baseline for FY2013 to 2018*, Rev. 1, CH2M Hill Plateau Remediation Company, Richland, Washington.

Schofield, Wayne D., 2012, "400 Area (Fluor Hanford Era) Asbestos Site" (internal e-mail to C.R. Webb), CH2M Hill Plateau Remediation Company, November 15. [regarding site 400-42]

Shearer, Jeffrey P., 2015, "RE: Data Extract from WIDS" (e-mail to Marie Cobb, INTERA, Richland, Washington), March 26.

Thoren, Scott D., 1993, "3000-12 LUST site" (external memorandum to A.L. Rodriguez, U.S. Department of Energy, Richland Operations Office), Washington Hanford Closure, July 16.

WA7890008967, 2007, *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste, Class 1 Modification*, Part III, Operating Units (Liquid Effluent Retention Facility (LERF) & 200 Area Effluent Treatment Facility (ETF), Addendum H, Closure Plan; 325 Hazardous Waste Treatment Units, Addendum H, Closure Plan; and 400 Area Waste Management Unit, Addendum H, Closure Plan), Washington State Department of Ecology, Richland, Washington.

Washington Closure Hanford, 2010, GIS shapefile 'WCH_RC_CleanupVerificationPackageBoundaries_2010Dec10,' delineating the excavation limits after contaminated soil had been removed from waste sites along the River Corridor, including stockpiles and staging pile footprints.

WCH-410, 2010, *100 Area D4 Project Building Completion Report – December 2008 to December 2009*, Rev. 0, Washington Closure Hanford, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0090078

WCH-523, 2012, *100 Area/400 Area D4 Project Building Completion Report – January 1, 2011 to December 31, 2011*, Rev. 0, Washington Closure Hanford, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1301310380

WHC-SD-W049H-FDC-001, 1992, *Functional Design Criteria for the 200 Area Treated Effluent Disposal Facility Project W-049H*, Rev 1, Westinghouse Hanford Company, Richland, Washington.

WIDS Advisory Group, 2013, "WAG Meeting Minutes," December 11, CH2M Hill Plateau Remediation Company, Richland, Washington. [Located on-line on CHPRC's Environmental Data Integration webpage, Waste Information Data System section, under WIDS Advisory Group.]

WIDS Summary Sheets for waste sites 2718S, 116B, 241-BYR-09A, 118-DR-2:2, and 600-326. [Located in IDMS under WIDS folders for each site.]

WSRF-2003-054, 2004, Waste Site Reclassification Form, Operable Unit 300-FF-2, Waste Site Code 600-278, U.S. Environmental Protection Agency and U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1508060804

WSRF-2006-039, 2006, Waste Site Reclassification Form, Operable Unit 100-FR-1, Waste Site Code 116-F-16, with attachment, "Remaining Sites Verification Package for the 116-F-16, PNL Outfall and the 100-F-43, PNL Outfall Spillway," U.S. Environmental Protection Agency and U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA03768158

WSRF-2007-035, 2012, Waste Site Reclassification Form, Operable Unit 100-FR-1, Waste Site Code 100-D-26:4, with attachment, "Remaining Sites Verification Package for the 100-F-26:4, South Process Pipelines," U.S. Environmental Protection Agency and U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093348

WSRF-2008-028, 2008, Waste Site Reclassification Form, Operable Unit 100-FR-2, Waste Site Code 120-F-1, with attachment, "Remaining Sites Verification Package for the 120-F-1 Glass Dump Waste Site," U.S. Environmental Protection Agency and U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0808180171

WSRF-2009-049, 2015, Waste Site Reclassification Form, Operable Unit 100-DR-1, Waste Site Code 100-D-30, with attachment, "Remaining Sites Verification Package for the 100-D-30, Sodium Dichromate Soil Contamination Waste Site and the 100-D-104, Unplanned Release Near 185-D Sodium Dichromate Storage Tank and Acid Neutralization French Drain Waste Site," Washington State Department of Ecology and U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0080913H

WSRF-2010-051, 2010, Waste Site Reclassification Form, Operable Unit 100-DR-1, Waste Site Code 116-DR-5, with attachment, "Remaining Sites Verification Package for the 116-DR-5, 1904-DR Outfall Structure," Washington State Department of Ecology and U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084072

WSRF-2010-058, 2010, Waste Site Reclassification Form, Operable Unit 300-FF-2, Waste Site Codes 300-33, 300-256, 300-41 with attachment, "Remaining Sites Verification Package for the 300-33, 306W Metal Fabrication Development Building Releases; the 300-256, 306E Fabrication and Testing Laboratory Releases; and the 300-41, 306E Neutralization Tank, Underground Lime Tank and Valve Pit," U.S. Environmental Protection Agency and U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084140

WSRF-2010-071, 2011, Waste Site Reclassification Form, Operable Unit 100-DR-1, Waste Site Code 118-D-6:4, with attachment, "Remaining Sites Verification Package for the 118-D-6:4, Northern Decontamination Pad and 105-D Fuel Storage Basin Side Slope Soils," Washington State Department of Ecology and U.S. Department of Energy, Richland Operations Office, Richland,

Washington. Available at:
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1202020265

WSRF-2011-005, 2011, Waste Site Reclassification Form, Operable Unit 100-DR-1, Waste Site Code 100-D-7, with attachment, "Remaining Sites Verification Package for the 100-D-7 Undocumented Solid Waste Site," Washington State Department of Ecology and U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at:
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093594

WSRF-2011-088, 2012, Waste Site Reclassification Form, Operable Unit 100-FR-1, Waste Site Code 100-F-26:7, with attachment, "Remaining Sites Verification Package for the 100-F-26:7, Sodium Dichromate and Sodium Silicate Pipelines," U.S. Environmental Protection Agency and U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at:
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093349

WSRF-2012-010, 2012, Waste Site Reclassification Form, Operable Unit 100-FR-1, Waste Site Code 100-F-57:1, with attachment, "Remaining Sites Verification Package for the 100-F-57:1, Eastern 190-F Process Water Pump House Debris and Overburden Stockpile," U.S. Environmental Protection Agency and U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093022

WSRF-2012-084, 2013, Waste Site Reclassification Form, Operable Unit 100-NR-1, Waste Site Codes 100-N-60, 1314-N Drywell, with attachment, "Remaining Sites Verification Package for the 100-N-60, 1314-N Drywell; UPR-100-N-13, 1314-N Drywell Overflow, 1314-N Loading Station, UN-100-N-13, and UPR-100-N-26, Backflow of Radioactive Waste in 1314-N Facility, UN-100-N-26 Waste Sites", U.S. Department of Energy, Richland Operations Office and Washington State Department of Ecology, Richland, Washington. Available at:
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0088991

WSRF-2012-112, 2013, Waste Site Reclassification Form, Operable Unit 100-NR-1, Waste Site Codes UPR-100-N-1, 100-N 1304-N Dump Tank; Emergency Dump Tan Inlet Valve Box Leak; UN-100-N-1, with attachment, "Remaining Sites Verification Package for the 100-N-57, UPR-100-N-1, UPR-100-N-2, UPR-100-N-29, UPR-100-N-30, and UPR-100-N-32 Waste Sites," U.S. Department of Energy, Richland Operations Office and Washington State Department of Ecology, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0088993

WSRF-2013-031, 2014, Waste Site Reclassification Form, Operable Unit 100-BC-2, Waste Site Code 100-C-7:1, with attachment, "Remaining Sites Verification Package for the 100-C-7:1, 183-C Water Treatment Facility Head House Foundation and Stained Soils Subsite," U.S. Department of Energy, Richland Operations Office and Washington State Department of Ecology, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0085871

WSRF-2013-032, 2013, Waste Site Reclassification Form, Operable Unit 100-NR-1, Waste Site Code 120-N-7, with attachment, "Remaining Sites Verification Package for the 120-N-7, 108-N Acid Unloading Facility French Drain," U.S. Department of Energy, Richland Operations Office and Washington State Department of Ecology, Richland, Washington. Available at:
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1307230959

WSRF 2013-036, 2013, Waste Site Reclassification Form, Operable Unit 100-NR-1, Waste Site ID UPR-100-N-4, with attachment, "Remaining Sites Verification Package for the UPR-100-N-4, UPR-100-N-8, and UPR-100-N-31 Unplanned Release Waste Sites," U.S. Department of Energy, Richland Operations Office and Washington State Department of Ecology, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/pdf.cfm?accession=1309180460

WSRF 2013-076, 2013, Waste Site Reclassification Form, Operable Unit 100-NR-1, Waste Site Codes 118-N-1 and 1303-N Spacer Silos, with attachment, "Remaining Sites Verification Package for the 118-N-1 and 1303-N Spacer Silos Waste Site," U.S. Department of Energy, Richland Operations Office and Washington State Department of Ecology, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1309180464

WSRF 2013-077, 2013, Waste Site Reclassification Form, Operable Unit 100-DR-2, Waste Site Code 100-D-62, with attachment, "Remaining Sites Verification Package for the 100-D-62, 183-DR Head House Septic Tank; 100-D-77, 183-DR Water Treatment Facility; and 100-D83:1, 183-DR Acid Addition Pipeline Waste Sites," U.S. Department of Energy, Richland Operations Office, and Washington State Department of Ecology, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0087256

WSRF 2013-078, 2013, Waste Site Reclassification Form, Operable Unit 100-DR-2, Waste Site Code 100-D-83:1, with attachment, "Remaining Sites Verification Package for the 100-D-62, 183-DR Head House Septic Tank; 100-D-77, 183-DR Water Treatment Facility; and 100-D83:1, 183-DR Acid Addition Pipeline Waste Sites," U.S. Department of Energy, Richland Operations Office, and Washington State Department of Ecology, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0087256

WSRF 2013-079, 2013, Waste Site Reclassification Form, Operable Unit 100-DR-2, Waste Site Code 100-D-62, with attachment, "Remaining Sites Verification Package for the 100-D-62, 183-DR Head House Septic Tank; 100-D-77, 183-DR Water Treatment Facility; and 100-D83:1, 183-DR Acid Addition Pipeline Waste Sites," U.S. Department of Energy, Richland Operations Office, and Washington State Department of Ecology, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0087256

WSRF-2014-096, 2014, Waste Site Reclassification Form, Operable Unit 100-DR-1, Waste Site Code 100-D-84:2, with attachment, "Remaining Sites Verification Package for the 100-D-84:2, Sanitary Sewer Pipelines – Areas 3 and 4 Subsite," U U.S. Department of Energy, Richland Operations Office, and Washington State Department of Ecology, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0082387H

WSRF-2014-102, 2014, Waste Site Reclassification Form, Operable Unit 100-DR-1, Waste Site Code 100-D-96:2, with attachment, "Remaining Sites Verification Package for the 100-D-96:2, 100-D/DR Additional French Drains Group 2 Subsite," U.S. Department of Energy, Richland Operations Office, and Washington State Department of Ecology, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0081602H

WSRF-2014-104, 2015, Waste Site Reclassification Form, Operable Unit 100-DR-2, Waste Site Code 100-D-106, with attachment, "Remaining Sites Verification Package for the 100-D-106; 1607-D1 Influent Pipelines Waste Site," Washington State Department of Ecology and U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1502171813

WSRF-2014-111, 2015, Waste Site Reclassification Form, Operable Unit 100-HR-1, Waste Site Code 100-H-49:1, with attachment, "Remaining Sites Verification Package for the 100-H-49:1, 184-H Boiler House and 1717-H Hot Shop French Drains Subsite," U.S. Department of Energy, Richland Operations Office, and Washington State Department of Ecology, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0081455H

WSRF-2014-119, 2015, Waste Site Reclassification Form, Operable Unit 100-DR-1, Waste Site Code 100-D-104, with attachment, "Remaining Sites Verification Package for 100-D-30, Sodium

Dichromate Soil Contamination Waste Site and the 100-D-104, Unplanned Release Near 185-D Sodium Dichromate Storage Tank and Acid Neutralization French Drain Waste Site," Washington State Department of Ecology and U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0080913H

WSRF-2015-003, 2015, Waste Site Reclassification Form, Operable Unit 100-DR-1, Waste Site Code 100-D-72, with attachment, "Remaining Sites Verification Package for 100-D-72, 183-D Acid Facility; 100-D-31:11, 182-D and 183-D Sewer Pipelines; 100-D-31:12, 183-D West Process Pipelines Waste Sites," Washington State Department of Ecology and U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1506301060

WSRF-2015-015, 2015, Waste Site Reclassification Form, Operable Unit 100-BC-2, Waste Site Code 100-B-35:1, with attachment, "Remaining Sites Verification Package for the 100-B-35:1, 151-B Primary Substation Subsite," U.S. Department of Energy, Richland Operations Office, and Washington State Department of Ecology, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0080907H

WSRF-2015-016, 2015, Waste Site Reclassification Form, Operable Unit 100-DR-1, Waste Site Code 100-D-86:3, with attachment, "Remaining Sites Verification Package for the 100-D-86:3, 105-DR Fan Room Sewer Pipelines Waste Site," U.S. Department of Energy, Richland Operations Office, and Washington State Department of Ecology, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0080787H

WSRF-2015-020, 2015, Waste Site Reclassification Form, Operable Unit 100-DR-1, Waste Site Code 100-D-85:2, with attachment, "Remaining Sites Verification Package for the 100-D-85:2, Additional 105-DR Reactor Effluent Pipelines Subsite," U.S. Department of Energy, Richland Operations Office, and Washington State Department of Ecology, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0080909H

WSRF-2015-023, 2015, Waste Site Reclassification Form, Operable Unit 100-DR-1, Waste Site Code 100-D-75:1, with attachment, "Remaining Sites Verification Package for the 100-D-75:1, 151-D Primary Electrical Substation Subsite," U.S. Department of Energy, Richland Operations Office, and Washington State Department of Ecology, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0080784H

WSRF-2015-025, 2015, Waste Site Reclassification Form, Operable Unit 100-HR-1, Waste Site Code 100-H-51:2, with attachment, "Remaining Sites Verification Package for the 100-H-51:2; 117-H Seal Pit Crib Feedline Subsite," U.S. Department of Energy, Richland Operations Office, and Washington State Department of Ecology, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0080456H

WSRF-2015-031, 2015, Waste Site Reclassification Form, Operable Unit 300-FF-21, Waste Site Code 300 RLWS:1, U.S. Environmental Protection Agency and U.S. Department of Energy, Richland Operations Office, Richland, Washington.

WSRF-2015-032, 2015, Waste Site Reclassification Form, Operable Unit 300-FF-21, Waste Site Code 300 RLWS:2, U.S. Environmental Protection Agency and U.S. Department of Energy, Richland Operations Office, Richland, Washington.

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