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HNF-20632
Revision 3

End Point Criteria for the K Basins Interim Remedial Action

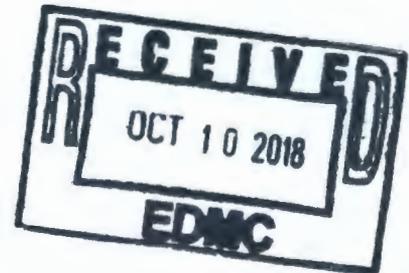
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CH2MHILL
Plateau Remediation Company

P.O. Box 1600
Richland, Washington 99352



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Approval Page

Title: *End Point Criteria for the K Basins Interim Remedial Action*

Approval R. A. Quintero
U.S. Department of Energy, Richland Operations Office

RA Quintero 1/6/11
Signature Date

R. A. Lobos
U.S. Environmental Protection Agency

[Signature] 1-6-2011
Signature Date

Contents

1	Introduction	6
1.1	Purpose and Scope.....	6
1.2	Background	6
2	End State and End Point Criteria.....	9
2.1	Fuel.....	9
2.1.1	Criteria	9
2.2	Sludge.....	10
2.2.1	Criteria (Sludge Removal)	10
2.2.2	Criteria (Sludge Treatment)	10
2.3	Debris	11
2.3.1	Criteria (Above Water Debris).....	11
2.3.2	Criteria (Below Water Debris).....	11
2.4	Water	12
2.4.1	Criteria	12
2.5	Deactivation	12
2.5.1	Criteria	12
3	Records.....	12
4	Approval and Implementation.....	13
5	References	13

Figure

Figure 1. K Basins Plan View.....	7
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Terms

ALARA	as low as reasonably achievable
ARAR	applicable or relevant and appropriate requirement
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
CFR	<i>Code of Federal Regulations</i>
CVDF	Cold Vacuum Drying Facility
DOE	United States Department of Energy
DQO	data quality objective
EIS	environmental impact statement
EPA	United States Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
ETF	Effluent Treatment Facility
FFS	focused feasibility study
GTCC	Greater Than Class C (wastes)
IWTS	Integrated Water Treatment System
KOP	Knock-Out Pot
LDR	land disposal restrictions
MCO	multi-canister overpack
nCi	nano-Curies
NEPA	<i>National Environmental Policy Act</i>
PCB	polychlorinated biphenyl
SAP	sampling and analysis plan
SNF	spent nuclear fuel
SPR	single pass reactor
Tc99	technetium-99
TPA	Tri-Party Agreement (<i>Hanford Federal Facility Agreement and Consent Order</i>)
TRU	transuranic
TSCA	<i>Toxic Substances Control Act</i>
WAC	<i>Washington Administrative Code</i>

WACr Waste Acceptance Criteria
WIPP Waste Isolation Pilot Plant

Definitions

Canistered Fuel Fuel stored in fuel canisters, but also stored in baskets (single pass reactor [SPR] fuel), Single Element Fuel Containers, Remnant Return Canisters and sample containers. (Derived from HNF-19247.)

Debris Debris is defined as anything (e.g., equipment and material) that is over 0.25 in. in largest dimension, is not a permanent structure within the basin*, is not used for current or planned operations or maintenance activity, and is not fuel or sludge. *Debris* includes such items as empty fuel canisters, old equipment, hand tools, and miscellaneous irradiated and non-irradiated items.

 * "Within the basins" means in the basin water or under the grating of either the basin or one of the adjacent pits.

End Point Criteria Defined conditions that must exist before deactivation and the overall K Basin CERCLA interim remedial action can be considered complete (DOE-RL, 2001)

Found Fuel Found fuel refers to any fuel that is not "canistered fuel" and is "found" in K Basins during debris retrieval or sludge retrieval.

Fuel *Fuel* is defined as all *spent nuclear fuel* that is greater than .25 inches in diameter (derived from WHC-SD-SNF-SP-005). For purposes of differentiating *fuel* from *sludge* and *debris*, any material that will pass through a screen with 0.25-inch openings is defined as sludge (HNF-SD-TI-015, Volume 2, Sludge, Section 3.0). This definition applies to all K Basins remediation activities.

Fuel Assembly *Fuel assembly* consists of concentric inner and outer fuel elements of N Reactor fuel. Whole or partial elements containing an intact circular section for a portion of the element or segment length longer than 3 inches may be stacked into an MCO fuel basket in the form of assemblies.

Fuel Fragment Fuel fragment is an informal term used to describe pieces of fuel of any size, implying that it is fuel, which is not a whole *fuel element* or *fuel assembly*. These would likely be classified as *fuel scrap* based on size.

Fuel Scrap *Fuel Scrap* is defined as any *fuel* that is not "loadable" in an MCO fuel basket (derived from K Basins SAR, Section 2.5.5.1.5). Fuel scrap is loadable in an MCO scrap basket. See *fuel assembly* definition.

Coarse scrap is *fuel scrap* greater than 1 inch in any dimension.

Fine Scrap is *fuel scrap* that is greater than 0.25 inch but less than 1 inch in all dimensions. By definition, *fuel* that is less than 0.25 inch is *sludge*.

KOP Material

KOP material is that material which was collected in the Primary Cleaning Machine strainers, KOPs, and strainers downstream of the KOPs during the washing of the different fuel types described above.

KOP Product Material

KOP product material, aka. KOP contents, is the product stream of "KOP material" which has undergone separations to remove low density material to yield a material that is more representative of the density of N Reactor fuel than other sludge streams and which is less than 0.25 inch (0.64cm) and greater than 600 microns which will subsequently be managed similar to SNF per the ROD selected remedy for SNF as described in a RDR/RAWP.

Sludge

Sludge is any material in the K Basins water that will pass through a screen with 0.25 in. (.64 cm) openings. Sludge on the floor and in the pits is a mix of fuel corrosion products (including metallic uranium, and fission and activation products), small fuel fragments, iron and aluminum oxide, concrete grit, sand, dirt, operational debris, and biological debris.

Spent Nuclear Fuel

10 CFR 960.2 and 40 CFR 191.02 defines *spent nuclear fuel* as "fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing."

1 Introduction

1.1 Purpose and Scope

The purpose of this document is to define the conditions that must exist to consider the K Basins interim remedial action as defined in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Record of Decision (ROD) and its amendments (EPA, 1999b; EPA, 2005) complete in the form of end point criteria. For the K Basins interim remedial action, end point criteria also provide the framework to develop data quality objectives (DQOs) and sampling and analysis plans (SAPs) for the remedial action, and to develop indirect or direct measurement techniques or processes to demonstrate how the criteria are satisfied. These SAPs will form a part of the project closure documentation which will demonstrate how waste acceptance criteria at applicable waste storage and disposal facilities are met (DOE-RL, 2001) (Section 5.2).

End point criteria for the deactivation phase of the K Basins were not included in the *Remedial Design Report/Remedial Action Work Plan (RDR/RAWP) for the K Basins Interim Remedial Action* (DOE-RL, 2001) (Section 5.1.1) and their development was deferred until further details were available. Also, since the RDR/RAWP (DOE-RL, 2001) was approved, a CERCLA ROD amendment (EPA, 2005) was issued that amended the scope of the CERCLA interim remedial action to include sludge treatment for off Hanford Site disposal, and delivered to a national repository for disposal.

Details of deactivation have progressed significantly to support the development of end point criteria described herein. For completeness, this document reiterates the remedial action scope for fuel, sludge, debris, and water removal, as identified in the *ROD for the K Basins Interim Remedial Action* (EPA, 1999b), including the changes to the remedies for sludge and some debris defined in the *ROD Amendment for the K Basins Interim Remedial Action* (EPA, 2005), and provides end point criteria to define the conditions that must exist to consider those phases of the interim remedial action complete as well as remedial action objectives.

This document does not discuss end point criteria for management of spent nuclear fuel (SNF) or the KOP product material after removal from the K Basins, or the physical removal of the basin structures. These activities are outside the scope of the K Basins interim remedial action.

1.2 Background

The KE and KW Basins were constructed in the early 1950s. Each basin is 125 ft long by 67 ft wide and is divided into three, approximately equally sized bays, with several pits located to the east and west of the main basin and a discharge chute located between the 105 K Reactor Building and the basin. The dividing walls between bays are cantilevered from the floor and do not tie into the outer walls.

Each basin is 21 ft deep, and the water depth is maintained at approximately 16 ft. The basin floors were covered with a rack system that held fuel canisters. Most of the racks have been removed. These racks were constructed of angle iron and pipe. The tops of the racks were 19 in. above the basin floor. The racks contained a matrix of 12 in. by 20 in. openings that held the fuel canisters in a vertical position.

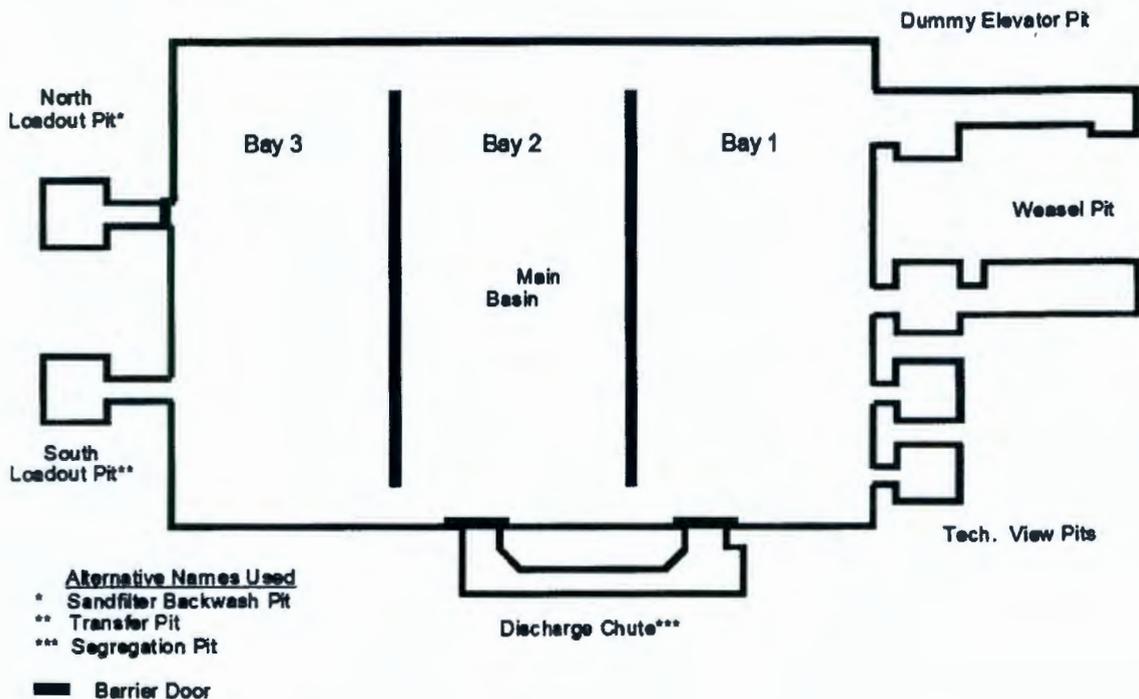


Figure 1. K Basins Plan View

Six pits and an inactive fuel discharge chute are located around the perimeter of each basin. Barrier doors at the discharge chutes isolate them from the main basin areas. The KE and KW discharge chute have been cleaned, dewatered and isolated from the KE and KW Reactor using a specially formulated grout.

The KE and KW Reactors operated from 1955 until 1970 and 1971, respectively. Most of the SNF in the K Basins was removed at the time of the shutdown. The K Basins were reused to store SNF from the N Reactor beginning in 1975 for K East and 1981 for K West until 2004 when removal of canistered fuel was completed. A significant fraction of the fuel stored in the KE Basin during this period degraded because of cladding breaches caused during reactor discharge and corrosion from long-term underwater storage in open-top canisters. Over time, corrosion products from the degrading fuel rods, storage rack rust, concrete from pool walls, and environmental particulates accumulated as sludge in fuel canisters, on the floor, and in the pits of the KE Basin.

The sludge on the floor and pits of the KW Basin was deposited from fuel and sludge handling operations.

The SNF and sludge released soluble fission products into the basin water and past leaks from the basins have contaminated the underlying soil and groundwater. During the late 1970s increased basin water leakage was noted and subsequent actions were taken in the 1980s and 1990s to mitigate the leaks.

The purpose of the K Basin CERCLA interim remedial action is to mitigate the potential to release hazardous substances from the K Basins. The scope of the remedial action is as follows:

- Remove SNF, sludge, debris, and water from the basins;
- Transfer SNF to the 100-K Area Cold Vacuum Drying facility;

- Remove sludge from K Basins, treat and package the sludge for disposal off the Hanford Site, store it at the Hanford Site for an interim period pending shipment; and ship to a national repository for disposal.
- Treat non-transuranic (TRU) sludge to meet Environmental Restoration Disposal Facility (ERDF) waste acceptance criteria and dispose at ERDF;
- Treat basin water as required and transfer it to the Effluent Treatment Facility;
- Treat debris and transfer to disposal or storage facilities in the 200 Area; and
- Deactivate the basins.

Under the 1999 remedial design, a period of surveillance and maintenance was anticipated after deactivation of the K Basins prior to removal under a separate CERCLA action, the *100 Area Remaining Sites Interim Action ROD*. Tri-Party Agreement (TPA) Change No. M-34-04-01 removed this period of interim surveillance and maintenance and accelerated the removal of the KE Basin and in a related action established a date for initiating soil remediation at the KE Basin established by TPA Change No. M-16-04-04, i.e., Milestone M-16-57.

In 2009, TPA Change package M-34-08-03 deleted the M-034 milestone series and moved the work scope to the M-016 milestone series to promote integration with the 100 K Area closure activities. TPA Change package M-16-08-09 was developed and includes a milestone (M-016-140) for submittal of remedial design/remedial action work plans (RD/RAWPs) for the 100K Area with new proposed milestones. These RD/RAWPs are to include the following scope of the K Basin interim remedial action:

- Complete removal of all sludges
- Complete removal of KOP contents
- Complete treatment and packaging of first container of TRU sludge waste centrifugable for disposal at Waste Isolation Pilot Plant (WIPP)
- Complete treatment and packaging of sludge for disposal at WIPP.

Strategies to accelerate the K Basins removal include grouting of some debris and contaminated residual materials for subsequent removal when the basins are demolished. Since the basins already were scheduled for removal under the *ROD for the 100 Area Remaining Sites Interim Action*, eliminating the surveillance and maintenance period and removing some debris along with the basin structure was shown to have life cycle cost savings as well as ALARA benefits.

Remedy changes addressing sludge and debris were embodied in the *ROD Amendment for the K Basins Interim Remedial Action* (EPA, 2005). The scope of the changes to the remedies includes:

- Treatment and packaging of sludge for disposal off the Hanford Site; store it at the Hanford Site for an interim period prior to treatment and packaging; store it at the Hanford Site for an interim period after treatment and packaging pending shipment and ship to a national repository for disposal. The off-Hanford Site location(s) for disposal of the sludge, as one composite waste stream or several, in addition to an explanation of how and where the sludge will be treated, will be identified during the remedial design phase of the project and described in the RDR/RAWP; and
- Grouting of some debris for removal during basin demolition.

The K Basins will be removed under the *100 Area Remaining Sites Interim Action ROD*. Details of basin removal will be contained in a separate RDR/RAWP aligned to that ROD.

2 End State and End Point Criteria

The end state for the K Basins interim remedial action is identified in the *ROD for the K Basins Interim Remedial Action* (EPA, 1999b), as amended (EPA, 2005) and includes the following:

- Remove SNF from the K Basins;
- Remove sludge from the K Basins, treat and package the sludge for disposal off the Hanford Site, store it at the Hanford Site for an interim period pending shipment; and ship to a national repository for disposal. The off-Hanford Site location(s) for disposal of the sludge, as one composite waste stream or several, in addition to an explanation of how and where the sludge will be treated, will be identified during the remedial design phase of the project and described in the RDR/RAWP
- Treat and remove water from the K Basins;
- Remove debris from the K Basins or encapsulate for removal during basin demolition;
- Deactivate the basins.

To achieve the K Basin interim remedial action end state, end points for fuel, sludge, water and debris removal, and basin deactivation must be achieved consistent with remedial action objectives specified in the ROD. To define the conditions that must exist to consider the K Basins interim remedial action complete, end point criteria were needed for fuel, sludge, water, and debris removal, as well as for the sludge treatment and packaging, and deactivation. These end point criteria are discussed below. Details of the Applicable or Relevant and Appropriate Requirements (ARARs) and criteria, advisories, or guidance to-be-considered (TBC) used in developing the end point criteria are discussed in the ROD (EPA, 1999b) and ROD amendment (EPA, 2005).

2.1 Fuel

The *ROD for the K Basins Interim Remedial Action* (Section 11.1) indicates that fuel will be removed from the K Basins and transferred to the cold vacuum drying facility (CVDF). The end point criterion for the removal of canistered fuel from the K Basins has been met by satisfying TPA Milestone M-34-18B. Found fuel is anticipated to be discovered during debris handling and sludge vacuuming activities. Found fuel must be removed from the basins for basin demolition waste to be disposed of at the ERDF. Fuel is prohibited for disposal at ERDF under the ERDF Waste Acceptance Criteria (WACr) (WCH-191, 000X-DC-W0001).

2.1.1 Criteria

The conditions that must exist to consider that the K Basins interim remedial action is complete with respect to removal of spent nuclear fuel are:

1. A visual inspection of the floor has been performed using individuals familiar with fuel scrap visual characteristics and has been documented using standard, commercially available imaging methods (e.g., video, photographic, or similar), or written logs;
2. Objects that appear to be found fuel have either been removed from the basin or evaluated by a secondary process, such as radiation measurement, and determined to not be found fuel;

3. Fuel canisters, sludge strainers, or other fuel collection devices, which have the potential to contain fuel, have either been evaluated to ensure they contain no found fuel or have been removed from the basin; and
4. Found fuel has been removed from the basins to a suitable location.

2.2 Sludge

The sludge remedy described in the *ROD for the K Basins Interim Remedial Action* (Section 11.2) as amended (EPA, 2005) identifies that sludge will be removed from the basins, treated, packaged for off Hanford Site disposal, and stored for an interim period at Hanford prior to shipment off Hanford to a national repository for disposal. The ROD identifies the majority of sludge as a TRU, polychlorinated biphenyl (PCB) remedial waste and further indicates that:

"If it is determined during remedial design that a portion of the sludge could be treated to meet the ERDF waste acceptance criteria, and it is practicable and cost effective, then that treatment will be done as part of this interim remedial action. The treatment for ERDF disposal may take place at either the K Basins or the ERDF."

The ROD amendment explains the off-Hanford Site location(s) for disposal of the sludge, as one composite waste stream or several, in addition to an explanation of how and where the sludge will be treated, will be identified during the remedial design phase of the project and described in the RDR/RAWP.

The sludge removal remedy remains unchanged. Sludge will be removed from the basins. Residues that remain after sludge end point criteria are met will be accounted for in the waste matrices offered for disposal to meet the ERDF WACr or other appropriate Hanford Site WACr. Sludge end point criteria have been developed as identified below.

2.2.1 Criteria (Sludge Removal)

The conditions that must exist to consider that the K Basin interim remedial action is complete with respect to removal of sludge are:

1. Sludge has been removed from the floor and pits of the basin to the maximum extent practicable in accord with a qualified process approved by DOE-RL and EPA for management as low-level or TRU waste;
2. Sludge has been removed to the extent that residues on the floor on or in debris, and within other matrices has been estimated and documented to demonstrate that the basin demolition waste streams satisfy the ERDF WACr.
3. KOP material has undergone separation in accordance with an approved RDR/RAWP to yield and remove a KOP product material for management as SNF and other sludge for management as low-level or TRU waste, consistent with the Record of Decision.

2.2.2 Criteria (Sludge Treatment)

The conditions that must exist to consider the K Basin interim remedial action is complete with respect to treatment of sludge which will be managed as waste are:

1. Sludge has been treated and packaged into a waste form for disposal off the Hanford Site; placed in storage at Hanford for an interim period pending shipment; and
2. Shipped to a national repository for disposal.

2.3 Debris

Debris will be removed from the K Basins, treated as appropriate, and disposed at the ERDF as approved by EPA. If the debris cannot be treated to meet ERDF waste acceptance criteria, it will be transferred to a 200 waste management facility approved by EPA.

Above water debris will be removed from the K Basins and will be disposed of as described in the *ROD for the K Basins Interim Remedial Action* (Section 11.4). Underwater debris at the K Basins will be segregated based on its disposal pathway; removed and disposed directly to a 200 Area storage or disposal facility; or debris to remain in the basin in a grouted or ungrouted form and will be removed during basin demolition and be disposed at ERDF.

2.3.1 Criteria (Above Water Debris)

The condition that must exist to consider that the K Basins interim remedial action is complete with respect to above water debris removal is above water debris that will not be disposed at ERDF with the rest of the basin demolition rubble has been removed from the building, treated as appropriate, staged and transferred to disposal or storage facilities in the 200 Area.

2.3.2 Criteria (Below Water Debris)

The conditions that must exist to consider that the K Basins interim remedial action is complete with respect to below water debris removal are:

1. A visual examination will be performed to identify those types of debris that have to be removed and disposed separately, e.g. materials prohibited from being disposed at ERDF. These materials will be removed, treated as appropriate, and transferred to disposal or storage facilities in the 200 Area. Debris that would designate as a dangerous waste and cannot be treated by macroencapsulation, washing, etc., which would allow this type of debris to be treated in situ and grouted, will be removed, treated as appropriate, and transferred to disposal or storage facilities in the 200 Area;
2. Debris that will remain in the basin for removal during basin demolition has undergone a process to remove sludge to the maximum extent practicable and to the extent necessary that sludge residues on or in the debris do not result in a waste form that exceeds the ERDF WACr, as determined according to an approved SAP;
3. Debris that could contain sludge in its internal volume:
 - a. has been sectioned to expose its internal volume such that sludge removal can be conducted to the maximum extent practicable, or
 - b. has undergone internal flushing to remove the sludge inventory to the maximum extent practicable, or
 - c. since the basin will not transition to a period of surveillance and maintenance prior to demolition, but will transition directly to demolition, debris will be left in those cases where it is impractical to remove it providing that it has been accounted for such that the sludge residues on the floor, on or in debris, and within other matrices grouted in the basin (e.g. debris containers) does not result in the basin or debris containers in the basin to exceed the ERDF WACr as determined according to an approved SAP and final ERDF-compliant calculation,
 - d. a small population of debris items that with potential to contain sludge hold up will be provided to EPA with the hold up estimated and be included in the final ERDF compliant calculation demonstrating a negligible contribution to the overall sludge residual;

4. Debris that will be grouted below water for removal during basin demolition has been oriented or sectioned such that free liquids (basin water) in void spaces are displaced by grout;
5. Debris that will be left below water for removal during basin demolition has been inventoried, characterized, and its location mapped;
6. Below water debris made of aluminum and considered for below water grouting will be evaluated for the potential to generate unacceptable levels of hydrogen and will be prepared appropriately for being encapsulated in grout or removed and transferred to disposal or storage facilities in the 200 Area; and
7. High dose items may be left behind in the basin in containers, void spaces filled with grout, as an ALARA measure to protect future demolition workers and the public from dose and contamination during removal of these items during basin demolition.

2.4 Water

The *ROD for the K Basins Interim Remedial Action* (Section 11.3) indicates that water will be removed from the K Basins for treatment at the Effluent Treatment Facility (ETF).

2.4.1 Criteria

The conditions that must exist to consider that the K Basins interim remedial action is complete with respect to water removal are:

1. Water has been removed from the basin to the extent that only residual amounts of water that cannot be readily pumped remain¹; and
2. Water removed from the basin has been transferred to the ETF for disposal as described in the *RDR/RAWP for the K Basins Interim Remedial Action*.

2.5 Deactivation

2.5.1 Criteria

The conditions that must exist to consider that the K Basins interim remedial action is complete with respect to basin deactivation are:

1. The end point criteria for fuel removal, sludge removal, debris removal, and water removal have been met; and
2. Building interior surfaces are decontaminated or shielded to dose rates that meet ARARs and ALARA requirements, and where necessary fixatives have been applied to control airborne contamination;
3. Support systems such as electrical, heating, ventilation, air conditioning, water supply, and monitoring that are not required for future environmental compliance or personnel safety purposes will be de-energized.

3 Records

Records documenting that end point criteria have been met will be included in the project closure report in accordance with the *RDR/RAWP for the K Basins Interim Remedial Action*, Section 5.2, Project Closure Documentation.

¹ Absorbents or similar may be used as appropriate to achieve final removal of free liquids.

4 Approval and Implementation

The K Basin end state and end point criteria identified in this document were developed to satisfy requirements in the *RDR/RAWP for the K Basins Interim Remedial Action*. The end point criteria described herein define the conditions that must exist before the K Basins interim remedial action can be considered complete. End point criteria for the KE and KW Basins will be achieved independently. These end point criteria are subject to review and approval by EPA per Section 5.1.1 of the *RDR/RAWP for the K Basins Interim Remedial Action*.

Details of the remedial design and remedial action work plan changes for each basin will be included in supplements or revisions to the *RDR/RAWP for the K Basins Interim Remedial Action*. Supplements or revisions to Section 4.2, Planning and Documentation of the RAWP, or a corresponding section, will identify SAPs and other processes to be used to meet the end point criteria and the approval authority needed for each. SAPs developed for CERCLA remedial actions at the Hanford Site, such as those referenced in Section 4.2 of the RAWP, are subject to EPA approval.

5 References

- 0000X-DC-W0001, 2009, Rev. 12, *Supplemental Waste Acceptance Criteria for Bulk Shipments to the Environmental Restoration Disposal Facility*, Washington Closure Hanford, Richland, Washington.
- DOE-RL, 1996, DOE/RL-96-17, Rev. 4, *Remedial Design Report and Remedial Action Work Plan for the 100 Area*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE-RL, 2001, DOE/RL-99-89, Rev. 1, *Remedial Design Report and Remedial Action Work Plan for the K Basins Interim Remedial Action*, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE-RL, 2004, DOE/RL-98-66, Rev. 0 *Addendum, Addendum to the Focused Feasibility Study for the K Basins Interim Remedial Action*
- EPA, 1999a, EPA/ROD/R10-99/039, *Interim Action Record Of Decision: 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*, U.S. Environmental Protection Agency, Richland, Washington.
- EPA, 1999b, EPA/ROD/R10-99/059, *Record of Decision for the K Basins Interim Remedial Action*, U.S. Environmental Protection Agency, Richland, Washington.
- EPA, 2005, *ROD Amendment for the K Basins Interim Remedial Action*, U.S. Environmental Protection Agency, Richland, Washington.
- Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington, as amended. Available at <http://www.hanford.gov/?page=91&parent=0>.
- TPA Change No. M-34-04-01, "Acceleration of K Basins Sludge Treatment and Disposal, Basin Remediation, and Delay in Sludge Retrieval," August 2004.

- TPA Change No. M-34-08-03, "Modification of the M-34-00 K Basin Closure Major and Interim Milestones to Align with the Impacts From the Delay To The Disposition of Sludge," August 2009.
- TPA Change No. M-16-04-04, "Establish Tri-Party Agreement Interim Milestones Under the M-016 Series Milestones to Support K Basin Remediation Acceleration," August 2004.
- TPA Change No. M-16-08-09, "Modification of the Hanford Facility Agreement and Consent Order (Agreement) 100 K Area M-016 Major and Interim Milestones," August 2009.

WCH-191, 2009, Rev. 4, *Environmental Restoration Disposal Facility Waste Acceptance Criteria*, Washington Closure Hanford, Richland, Washington.