

# **Safety Basis Step-Out Criteria for the 324 Facility**

## **(Formerly WCH-378)**

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

Contractor for the U.S. Department of Energy  
under Contract 89303320DEM000030



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# Safety Basis Step-Out Criteria for the 324 Facility

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## 1.0 Scope and Purpose

This document serves as an update to the previously established, and partially executed plan, WCH-378, *Phased Shutdown Criteria for the 324 Facility Ventilation System*, Rev. 1. Work on this plan had ceased with the implementation of CHPRC-03197, *Remote Soil Excavation Addendum to the 324 Building Basis for Interim Operation*, Rev. 0 (now updated to CPCC-00016). Credit was taken for the substantive risk reduction achieved by the planned activities completed, before work was paused, in the approved fiscal year (FY) 2017 update to the safety basis. Activities would have resumed at the conclusion of the soil removal as described in that addendum. As the removal of the contaminated soil beneath B-Cell is no longer a prerequisite to building radiological stabilization, work toward stabilization is now resuming.

CPCC-00014, *Addendum to the 324 Building Basis for Interim Operation for Stabilization*, provides the safety basis for completing radiological stabilization of the 324 Facility and for the safe shutdown of the facility and systems. As stabilization and shutdown activities progress, the addendum allows for step-out of various operational controls based on criteria in Table 6-1, “Design Feature Step-Out Criteria;” Table 6-2, “ITS System Step-Out Criteria;” and Table 7-1, “Administrative Controls Step-Out Criteria,” of CPCC-00014. This document reiterates the Step-Out Criteria from the addendum and identifies methods for verifying meeting of the Step-Out Criteria.

CPCC-00016, *Remote Soil Excavation Addendum to the 324 Building Basis for Interim Operation*, retains controls to address the hazards from the previously planned contaminated soil removal activities. Some of these controls are the same as those with approved step-out criteria in CPCC-00014. As a result, fully stepping out of these controls will not be permitted until a future update to the safety basis is approved and CPCC-00016 is cancelled. However, none of the stabilization activities, as described below in Table 1, “Previously Completed Step-Out Activities” and Table 2, “Remaining Step-Out Activities,” conflict with the credited functions of these controls. Thus, work toward stabilization will proceed under the safety basis as currently approved. The Unreviewed Safety Question (USQ) process will be used to verify compliance with the safety basis for all activities undertaken.

The credited systems are found in Section 2.7, “Safety Systems,” of CPCC-00016 and are listed below:

- “The 324 Building roof and exterior walls surrounding the areas of the building ventilated by the Zone II system remain safety class, although the leak path factor (LPF) is no longer credited.
- The Stack EP-324-01-S, fan housing, and ducts connecting the building to the stack remain safety class.
- The Zone I and Zone II last stage HEPA filters remain safety significant.
- The REC and Shielded Material Facility (SMF) hot cells, walls and ceilings remain general service important to safety (ITS).
- Fire detection system (ITS).

- Exhaust fan speed restriction (ITS).
- Supply/exhaust fan interlocks (ITS).
- REC hot cell windows, doors, penetrations (ITS).
- REC pressure differential alarms (ITS).
- REC continuous air monitors (CAMs) (ITS).”

## 2.0 Phased Step-Out Criteria and Verification Methods

Step-Out Criteria in Tables 6-1, 6-2, and 7-1, of CPCC-00014 repeat the same criteria for step-out of a number of controls. In the tables below, Step-Out Criteria are listed and the related safety basis information is provided in the adjacent column. Table 1 shows the Step-Out Criteria that have been previously completed and Table 2 provides the remaining Step-Out Activities. The established numbering convention from WCH-378 for all activities has been maintained for consistency.

**Table 1. Previously Completed Step-Out Activities**

No.	Step-Out Criteria	Related Information	Verification Method
1	REC Source Term Removal <ul style="list-style-type: none"> <li>• Remove hot cell decontamination debris from hot cell complex</li> </ul>	This criterion requires the removal of decontamination debris and equipment to the extent that the REC remaining dispersible radiological material can be demonstrated to be reduced to less than that assumed in Section 5.1.1 “Review of Risk Reduction,” in CPCC-00014.	Hot cell dose profiling and associated supporting calculation documenting REC inventory within the criteria in Section 5.1.1.  Previously completed and verified as stated in the approved safety basis.

**Table 1. Previously Completed Step-Out Activities**

No.	Step-Out Criteria	Related Information	Verification Method
6	SMF Grout Encapsulation <ul style="list-style-type: none"> <li>• South Cell floor up to just below window level</li> <li>• South Cell exhaust filters</li> </ul>	South Cell is grout filled to just below window level encapsulating source term ensuring fire entrainment of contamination will not occur.	Inspection (via camera/windows/mirrors) shows flow paths have been established permitting flow of grout to all floor areas and exhaust filters in the South Cell. Inspection of visible spaces (via camera/windows/mirrors) shows grout height reaches to just below window level. Non-visible areas beneath the work trays in Compartments 1-4 will be verified through use of site tubes or goose necks.  Previously completed and verified as stated in the approved safety basis.
8	SMF Final Stabilization <ul style="list-style-type: none"> <li>• Cell interior surfaces</li> </ul>	Visible surfaces of the hot cell interior are stabilized (i.e., fogged, painted, foamed, or grouted) to control contamination spread as necessary to transition from crediting Zone I ventilation to crediting the Radiation Protection Program.	Inspection (via camera/mirrors) inserted through split plugs and access port shows all visible cell interior surfaces are coated. Where visual inspection may not be reasonable (e.g., Pipe Trench) alternate means of verification may be necessary. Metering of stabilization media (e.g., fixative, fog, or grout) will be recorded to duplicate the application as shown effective in mockup testing.  Previously completed and verified as stated in the approved safety basis.
11	Source Term Removal <ul style="list-style-type: none"> <li>• Remove hot cell decontamination debris from the building</li> </ul>	REC cell decontamination debris removed in Step-Out Criteria 1, "Source Term Removal," above has been removed from the building.	Shipping manifests and/or storage yard records document removal of all decontamination debris generated by "Source Term Removal" activity.  Previously completed and verified as stated in the approved safety basis.

REC=Radiochemical Engineering Cells

SMF=Shielded Material Facility

**Table 2. Remaining Step-Out Activities**

No.	Step-Out Criteria	Related Information	Verification Method
2	REC Grout Encapsulating <ul style="list-style-type: none"> <li>• B Cell floor</li> </ul>	Grout pour coats the surface of B Cell, including the trench and sump, ensuring fire entrainment of floor contamination will not occur.	Inspection (via camera/windows/mirrors) of B Cell floor area shows floor area, including the trench and sump, has been coated with grout. As recorded in work package status log or equivalent documentation.
3	REC Grout Encapsulation <ul style="list-style-type: none"> <li>• B Cell in-cell filters</li> </ul>	B Cell in-cell filters are encased in grout monolith ensuring fire entrainment of B Cell in-cell filter contamination will not occur. Monolith may be part of a cell monolith or secondary container monolith.	Inspection (via camera/windows/mirrors) of grout monolith shows encapsulation and inventory of monolith includes B Cell in-cell filters. As recorded in work package status log or equivalent documentation.
4	REC Grout Encapsulation <ul style="list-style-type: none"> <li>• Grout containers</li> </ul>	Grout containers filled ensuring fire entrainment of container contamination will not occur.	Inspection (via camera/windows/mirrors) of grout containers shows fill of container with grout. As recorded in work package status log or equivalent documentation.
5	REC Grout Encapsulation <ul style="list-style-type: none"> <li>• Highly contaminated equipment</li> </ul> (Note: Some contaminated equipment may not require grouting. Low contamination defined as equipment contamination less than B Cell wall contamination levels)	Highly contaminated equipment is encased in grout monolith ensuring fire entrainment of contamination will not occur. Monolith may be part of a cell monolith or secondary container.	Inspection (via camera/windows/mirrors) of monolith shows encapsulation of highly contaminated equipment and dose profiling for any unincorporated equipment demonstrates contamination levels are below B Cell wall contamination levels. As recorded in work package status log or equivalent documentation.
7	REC Final Stabilization <ul style="list-style-type: none"> <li>• Cell ductwork to A frames</li> </ul>	REC duct work to A frames is stabilized (i.e., fogged, painted, foamed, or grouted) to control contamination spread as necessary to transition from crediting Zone I ventilation to crediting the Radiation Protection Program.	Visual inspection of the ventilation duct work is not reasonable and therefore alternate means of verification are necessary. Metering of stabilization media (e.g., fixative, fog, and grout) will be recorded to duplicate the application as shown effective in mockup testing. As recorded in work package status log or equivalent documentation.

**Table 2. Remaining Step-Out Activities**

No.	Step-Out Criteria	Related Information	Verification Method
8	REC Cells/Airlock /Pipe Trench Final Stabilization <ul style="list-style-type: none"> <li>• Interior surfaces</li> </ul>	Visible surfaces of the hot cell interior are stabilized (i.e., fogged, painted, foamed, or grouted) to control contamination spread as necessary to transition from crediting Zone I ventilation to crediting the Radiation Protection Program.	Inspection (via camera/mirrors) inserted through split plugs and access port shows all visible cell interior surfaces are coated. Where visual inspection may not be reasonable (e.g., Pipe Trench) alternate means of verification may be necessary. Metering of stabilization media (e.g., fixative, fog, or grout) will be recorded to duplicate the application as shown effective in mockup testing. As recorded in work package status log or equivalent documentation.
9	Grout Encapsulation <ul style="list-style-type: none"> <li>• Tank interiors</li> </ul>	Tanks and pots are grout filled to eliminate void space and stabilize tank interior surfaces.	Visual inspection of the tank interiors is not reasonable and therefore alternate means of verification are necessary. Grout quantities will be recorded and monitored against calculated volumes coupled with remote observation of grout insertion locations for overflow when tank interior is filled. As recorded in work package status log or equivalent documentation.
10	Grout Encapsulation <ul style="list-style-type: none"> <li>• Vaults</li> </ul>	Vault interior will be filled to the extent that tanks and pots are encapsulated by grout. This encapsulation mitigates potential releases from a cover block or floor failure.	Inspection (via camera/mirrors) inserted through access port shows vault tanks and pots submerged in grout. Document grout quantities in work package status log. As recorded in work package status log or equivalent documentation. (Note: fill to top of tank vault is not required to complete the encapsulation)
12	Building <ul style="list-style-type: none"> <li>• Complete stabilization of Zone I ventilation</li> </ul>	Items 1-8 above are complete.	Verify documentation for Step-Out Criteria of Items 1-8 are complete.
13	Building <ul style="list-style-type: none"> <li>• Complete stabilization of Zone I ventilation</li> </ul>	Transient and fixed combustibles in the 324 Building have been reduced to the extent practicable to prepare for shutdown of the fire protection systems.	FPE memo/letter documenting combustible loading has been minimized.
14	Building <ul style="list-style-type: none"> <li>• Obtain Hanford Fire Marshal Permit for Fire Protection system deactivation</li> </ul>	Hanford Fire Marshal approval for deactivation of fire protection systems	Fire Marshal Permit

**Table 2. Remaining Step-Out Activities**

No.	Step-Out Criteria	Related Information	Verification Method
15	Building <ul style="list-style-type: none"> <li>Supply fan shutdown</li> </ul>	Supply fans are no longer needed.	Supply fans have been electrically isolated and permanently removed from service. As recorded in work package status log or equivalent documentation.

FPE = Fire Protection Engineer

REC = Radiochemical Engineering Cells

SMF = Shielded Material Facility

### 3.0 General Information

Stabilization is the means and methods by which radiological source materials are immobilized. Stabilization is performed in a series of events that include activities such as fogging, painting, spraying fixatives, foaming, and/or grouting. Grout will include a range of grout materials from low-density; low-strength to high-density; and high-strength formulations based on disposition plans, weight considerations, shielding, transportation, and other criteria.

The Shielded Materials Facility (SMF) stabilization activities have been completed. Credit was taken in the approved FY17 update to the safety basis for the corresponding risk reduction. This included the removal of radioactive materials from the South Cell floor, to the extent practical. The South Cell has been grouted and the remaining material on the floor has been grouted to a depth sufficient to provide stabilization and shielding. Grout was added to a level near the bottom of the cell windows and the cell and sub-compartments were re-profiled. Additional grout will be added if required to meet transportation and/or disposal requirements. The South Cell exhaust filters were incorporated into the grout. Fixatives were applied to remaining cell interior surfaces for contamination control.

The Radiochemical Engineering Cells (REC) have been prepared for grouting/stabilization by completion of B-Cell decontamination and removal of the decontamination debris. Credit for the accomplished risk reduction was also taken in the approved FY17 update to the safety basis. The pipe trench will be stabilized via open plug ports connecting to the B-Cell. The REC high dose rate in-cell filters and equipment will be placed in A-Cell for inclusion in a grouted monolith. Lower dose filters and equipment will be stabilized in place with fixatives. B-Cell floor will be grouted. A-Cell will be grouted to cover the grout containers and miscellaneous debris with Zone I exhaust maintained by openings in the crane door, providing an exhaust conduit to the airlock. Fixatives will be applied to REC hot cell interiors and exhaust ductwork up to and including the A frame filters.

### 4.0 Conclusions

The proposed verification methods for the stabilization activities address the Step-Out Criteria in general. To meet the intent, additional information may be required in addition to that

specifically identified in the table. It is appropriate to augment or adjust verification documentation above to demonstrate fully meeting the Step-Out Criteria identified in CPCC-00014 in response to changes to the addendum, or as a result of new information acquired through detailed work planning. Additionally, stepping out of these controls will require a further update to the safety basis removing their dependency from CPCC-00016 or cancelling this addendum entirely.

## **5.0 References**

- CPCC-00010, 2023, *324 Building Basis for Interim Operation*, Rev. 2, Central Plateau Cleanup Company, Richland, Washington.
- CPCC-00014, 2023, *Addendum to the 324 Building Basis for Interim Operation for Stabilization*, Rev. 1, Central Plateau Cleanup Company, Richland, Washington.
- CPCC-00016, 2023, *Remote Soil Excavation Addendum to the 324 Building Basis for Interim Operation*, Rev. 2, Central Plateau Cleanup Company, Richland, Washington.
- CPCC-PRO-NS-8317, 2022, *Safety Basis Implementation and Maintenance*, Rev. 1-0, Central Plateau Cleanup Company, Richland, Washington.
- WCH-378, 2010, *Phased Shutdown Criteria for the 324 Facility Ventilation System*, Rev. 1, Washington Closure Hanford, Richland, Washington.