

River & Plateau Committee Draft Advice

Topic: 100-B/C

Authors: Dale Engstrom, Jan Catrell, Shelley Cimon, Dan Serres, Helen Wheatley, Gerry Pollet, Liz Mattson

Originating Committee: RAP

Version #1: Color: X pink yellow green orange purple blue goldenrod

The production of plutonium and other nuclear materials at the B and C reactors near the Columbia River left behind large volumes of waste, including radionuclides and hexavalent chromium. The B reactor is now part of the Manhattan Project National Historic Park, while the shoreline is one of the more accessible areas of Hanford Reach National Monument. Contaminated groundwater enters the Columbia River along the shoreline.

The Hanford Advisory Board (HAB, Board) recognizes that substantial interim decision work has been done at 100-B/C to remove large concentrations of hexavalent chromium particularly through the two “big digs” (completed in 2014) that took place near C-Reactor. The removal of that mass of chromium reduced the need for long-term groundwater treatment in the 100-B/C area. It was a good start.

The results from the 100-B/C Remedial Investigation demonstrated that the 100-B/C clean-up work is not yet done. There are highly contaminated soils near the Columbia River shoreline for which Institutional Controls are proposed for up to a hundred years or more. Additional remediation is required to fulfill the Tri-Party Agencies’ (TPA) commitment to “stop chromium from getting to the Columbia River.” Allowing a plume of groundwater with elevated chromium values to continue to enter the Columbia River for a period of 60 years would defy the TPA commitments. Right now, the chromium contaminated water enters the river over a shoreline length of approximately 1800 meters. DOE’s Proposed Plan estimates that it will take 187 years for contamination near the B-Reactor spent fuel basin to naturally attenuate to levels that would not require Institutional Controls. However, if the shallower sources were removed to the 15-foot limit, Institutional Control (IC) requirements would fall to 39 years. The Hanford site has multiple precedents for successful removal of spent fuel basins and surrounding contaminated soil.

The HAB has provided past advice (HAB advice 278, Bullet 2, and HAB Advice 290, bullet 2) asserting that institutional controls for cleanup projects for a duration exceeding 100 years is unreasonable. The removal of soil contamination has been tested and shown to be implementable, where long-term ICs are neither proven nor shown to be sustainable for the periods of time proposed.

For example, there are two deeper contaminated soil sites, 116-B-11 and 116-C-1 that are close to the river. Site 116-B-11, which is contaminated with Strontium-90 and Cesium-137, will require ICs until the year 2247. Leaving such contaminated material behind does not conform to the HAB vision of “how clean is clean enough”.

Washington Model Toxics Control Act (MTCA) regulation establishes an aquatic water standard that requires corrective action when chromium levels of groundwater entering surface waters exceed 10 µg/L in order to protect fish and other aquatic organisms. The Chromium levels in groundwater currently exceed MTCA standards. The HAB supports the proposed idea of using the 100-K Pump-and-Treat facility to treat contaminated water extracted from the 100-B/C system as a reasonable addition to the alternatives that will be selected for the Proposed Plan.

	<u>Water Standard</u>	µg/L	Reference
	MCLG ¹ (EPA)	100 (Cr) ²	40 CFR-141.51; CWA, sect. 303(c)
	MTCA ³	48 (Cr) ⁴	WAC 173-340-900, Table

¹ Maximum Contaminant Level Goal

² Total Chromium

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	Cleanup Level for Groundwater		720-1
	WAC Surface Water Standard	10 (Cr VI)	WAC 173-201A-240, Table 240
<u>Year</u>	<u>Maximum Cr Value – Aquifer Tube</u>	<u>Maximum Cr Value – Well</u>	
2016	58 µg/L (C6230)	55 µg/L (199-B3-47)	
2017	39 µg/L (06-M)	50 µg/L (199-B3-47)	

Water standards and latest hexavalent chromium values.

In addition to reducing the amount of chromium in groundwater in a shorter period of time, the 100-B/C pump-and-treat system would be capable of preventing contaminated water from reaching the river through flow control, by pushing or drawing the chromium contaminated water away from the shore until cleanup of the groundwater is accomplished. In RAP committee briefings, EPA stated that the alternatives that included pump and treat would cost approximately \$100 million more (including both capital cost and operations and maintenance), and some of this cost was in updates to the 100-K facility since the pump and treat will need to operate for 40 years. The Proposed Plan estimates total pump and treat capital costs for upgrades at \$31 million including installation and refurbishment (tables 10-5, 10-6, and 10-7).

DOE's Preferred Alternative (Alternative Two) does little to remove the remaining mass of contaminants identified in the Remedial Investigation/Feasibility Study in a timely manner. Alternative Two relies primarily on Institutional Controls and Monitored Natural Attenuation to keep people and aquatic organisms from harm. The Preferred Alternative leaves long-lived radiological contamination deeper than 15 feet in the ground that has the potential to harm human health and the environment for thousands of years. For example, in the Proposed Plan, 100-B-14:1, located in the river-shore uplands area, will require 12,110 years of ICs for Carbon-14 remediation. If DOE excavates 9 of the 23 waste sites like this site identified in the draft Proposed Plan, a majority of the mass of contamination will be removed, eliminating the need for ICs.

The Board would like to see a separation of the consideration of soil remediation options within the Proposed Plan from the alternatives proposed for groundwater remediation as two separate selection processes. Of the 6 alternatives in the 100-B/C Proposed Plan, each is a combination of a groundwater and a soil remediation component. The combinations offered do not provide an instance that pairs the HAB's preferred strategies of Pump and Treat for groundwater with Remove, Treat, and Dispose (RTD) for soil contamination. The HAB finds that the best proposed alternative combines portions of Alternative Three and Alternative Five.

Proposed Cleanup Plans are supposed to be based on preventing risks due to the highest exposure reasonably expected to occur (known as "reasonable maximum exposure scenarios"). However, the B-C Area Proposed Plan fails to consider the likelihood of intensive public demand to use areas along the Columbia River adjoining (or included in) the Hanford Reach National Monument and the new national historic park, or of tribal uses of lands and resources along the River pursuant to Treaty and National Historic Preservation Act rights. The Plan fails to realistically consider the likely failure of institutional controls to prevent long-term access to these sites, particularly since such institutional controls have repeatedly failed within a few years at other high-profile Superfund sites.

³ Model Toxics Control Act

⁴ Total Chromium

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The Board advises the TPA Agencies to consider the following when finalizing the RI/FS and developing the Proposed Plan:

- Institutional Control periods lasting more than 100 years are not reasonable. (HAB advice 278, Bullet 2, and HAB Advice 290, bullet 2). The HAB advises that all Proposed Plan Alternatives proposed and chosen should establish completion dates within decades but never more than a 100-year time frame. For sites immediately adjacent to the river, institutional control periods should be much shorter.
- The use of Institutional Controls for over 100 years should not be considered highly “implementable.” Similar institutional controls have repeatedly failed within a few years at other high-profile Superfund sites. Remedies which remove contamination have been successfully used across the Hanford Site and are more implementable.
- The HAB supports a reduction of the remaining mass of contamination identified in the RI/FS process to bring 100-B/C into a safe state within a reasonable time scale. In order to sufficiently reduce contamination at 100-BC Area, DOE needs to conduct additional cleanup at waste sites where the RI/FS process has identified considerable contamination, but where the Preferred Alternative proposes to leave quantities of contamination in place, with some of these in the deep soils (greater than 15 feet bgs).
- Contaminated pipelines identified in the 100-B/C RI/FS and Proposed Plan should be removed.
- Consider groundwater remediation separately from soil remediation in the presentation of alternatives in this and future proposed plans. The Agencies and the public should be able to separately support one option for soil and another for ground water, rather than having to choose from combined alternatives. Combining remediation methods to be used confounds the selection process.
- Create or select an alternative that includes the implementation of a 100-B/C Pump-and-Treat system. The HAB agrees with the concept of using a repurposed and renovated 100-K treatment facility as this appears to be a reasonable and cost-effective solution to remove chromium from the 100-B/C groundwater and to decrease the flow of hexavalent chromium-bearing groundwater flow into the Columbia River currently at levels above cleanup MTCA standards.
- Reject the Preferred Alternative offered and instead opt for a new alternative, with pump-and-treat added to address contaminated groundwater. The revised alternative is recommended to include added RTD sites that will reduce the time of Institutional Controls to a monitoring period of less than 100-years.
- Reject Alternative Two on the grounds that Alternatives Three and Five each present a better overall balance of criteria in the Comparative Analysis. Alternative Two, DOE’s Preferred Alternative, does not protect humans against the risks of foreseeable failure of very long-term institutional controls at sites along the river or within a national park. Alternative Two would not protect the river environment or groundwater. The Board reiterates Advice 268 that stated: “The

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Board advises the TPA Agencies to choose alternatives that meet the goal of unrestricted use along the river corridor.”

- Hold public meetings around the region on the Proposed Plan and Alternatives.
- Use of Tribal exposure scenarios for the reasonable maximum risk evaluation.
- Conduct a survey of the 100-B/C area for traditional cultural properties (TCPS), as required by federal law, prior to issuing a revised plan or making decisions.

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