

Columbia Riverkeeper
724 Oak Street
Hood River, OR 97031
P.O. Box 912
Bingen, WA 98605
Phone: (541) 387-3030
www.columbiariverkeeper.org

July 22, 2010

Paula Call
U.S. Department of Energy
Richland Operations Office
P.O. Box 550, A7-75
Richland, WA 99352
100NRPP@rl.gov

Via Email and U.S. Mail

RE: Public Comments on the Proposed Plan for Amendment of 100-NR-1/NR-2 Interim Action Record of Decision

Dear Ms. Call,

On behalf of Columbia Riverkeeper, please accept the following public comments on the proposed amendment of the 100-NR-1/NR-2 Interim Record of Decision, which proposes actions to address strontium-90 contamination near the Columbia River. Thank you in advance for considering and responding to these public comments.

I. COLUMBIA RIVERKEEPER'S COMMITMENT TO PROMPT, EFFECTIVE CLEANUP AT HANFORD

Columbia Riverkeeper is a 501(c)(3) nonprofit organization with thousands of members in Washington and Oregon. Our mission is to protect and restore the Columbia River, from its headwaters to the Pacific Ocean. Since 1989, Columbia Riverkeeper has played an active role in monitoring and improving cleanup activities at the Hanford Nuclear Reservation (Hanford). A legacy of World War II and the Cold War, the Hanford site continues to leach radioactive pollution into the Columbia River. Hanford's legacy is not a local issue. Nuclear contamination from Hanford threatens the Pacific Northwest's people, a world-renowned salmon fishery, and countless other cultural and natural resources.

Columbia Riverkeeper's staff and members are dedicated to a long-term solution for Hanford cleanup. Simply put, Hanford is one of the world's most contaminated sites. Despite this status, the public and Columbia Riverkeeper's members continue to catch

and consume fish from the Columbia River and recreate near and downstream of Hanford.

Each summer Columbia Riverkeeper leads a series of kayak trips on the Hanford Reach of the Columbia River. During these trips, Columbia Riverkeeper's staff and members tour areas of the Hanford Reach that are currently being polluted by excessive levels of radioactive strontium – all areas that would be affected by the proposed cleanup actions. The Hanford Reach is particularly unique because it is the last free-flowing stretch of the Columbia River. For example, during a trip on July 17, 2010, Riverkeeper's staff and members observed over a dozen salmon &/or steelhead while kayaking past the Hanford site. On these educational tours, our members learn about the Endangered Species Act-listed salmon and steelhead that spawn, rear, and migrate in the Hanford Reach.

For the above stated reasons, Columbia Riverkeeper is submitting the following comments on the proposed Record of Decision (ROD) amendments to address of radioactive strontium pollution in the 100 Area.



A Columbia Riverkeeper member and Riverkeeper's Director view the Hanford site from kayaks during a summer Hanford Reach kayaking trip.

II. PROPOSED U.S. DEPARTMENT OF ENERGY ACTION AND THREATS POSED BY STRONTIUM

A. The U.S. Department of Energy's Proposal.

Strontium-90 contained in Hanford's soil and groundwater poses serious threats to the Columbia River and the people, aquatic life, and wildlife that depend on the River for sustenance. As part of the U.S. Department of Energy's (USDOE) ongoing cleanup duties at the Hanford site, USDOE is proposing to amend the blueprint for Hanford cleanup—the Tri-Party Agreement (TPA)—to address contaminated soil and groundwater in the northern area of the Hanford site along the Columbia River. In recent years, USDOE operated a pump-and-treat system to remove strontium-90 from groundwater near the Columbia River. However, USDOE concluded that the pump-and-treat system did not effectively remove strontium-90 from groundwater.

Following experimental tests at Hanford, USDOE is now proposing to reduce strontium-90 entering the Columbia River by injecting a combination of minerals into the ground. Specifically, apatite minerals capture and hold radioactive and metal contaminants. If USDOE proceeds with its preferred action alternative (*i.e.*, Apatite Permeable Reactive Barrier), the plan calls for pumping apatite minerals into the soil

column near the Columbia River’s shoreline when the River levels are highest. This allows the apatite minerals to react with strontium-90 when the groundwater levels are also highest.

Before selecting a preferred alternative, USDOE considered five remedial action alternatives. These alternatives include:

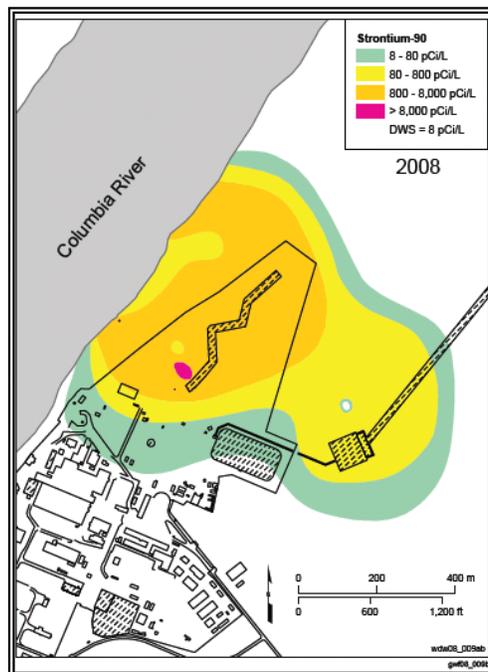
- No Action Alternative
- Alternative 1—Institutional Controls and Monitored Natural Attenuation
- Alternative 2—Resume Operation of Existing Pump and Treat System
- Alternative 3—Impermeable Barrier, and
- Alternative 4—Apatite Permeable Reactive Barrier.

“Under Alternative 4 (the preferred alternative), the apatite permeable reactive barrier would be extended from its current length of 300 ft to approximately 2,500 ft to span the width of the area where strontium-90 concentrations in groundwater exceed the EPA drinking water standard. In addition, the agencies are proposing to remove the existing pump-and-treat system’s facility and conveyance piping.”¹

B. Threats Posed by Strontium-90.

Strontium is a radioactive waste product that causes bone cancer and immune system suppression. Because of its chemical structure, strontium-90 is a “bone-seeker”: it becomes lodged near blood-forming bone marrow. At Hanford, large plumes of strontium-90 are moving through the groundwater towards the Columbia River. Historically, the USDOE discharged strontium-90 from the 100 Area’s N reactor into an unlined trench near the Columbia River.

Recent measurements in the groundwater beneath the 100-N area show that strontium-90 levels are over 1000% greater than the drinking water standard (over 8000 picocuries/liter (pCi/L) versus 8 pCi/L).¹ Notably, strontium-90 concentrates in fish bone tissues. As the graphic demonstrates, the presence of strontium-90 at Hanford poses significant threats to the Columbia River.



Source: USDOE Hanford Environmental Report, 2008.

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¹Washington Department of Ecology Website, <http://www.ecy.wa.gov/programs/nwp/apatite.htm>.

III. COMMENTS ON PROPOSED REMEDIES FOR STRONTIUM GROUNDWATER CONTAMINATION

Columbia Riverkeeper supports installation of an extended apatite barrier to protect the Columbia River from strontium-90. As noted above, Sr-90 poses a significant risk to the water quality of the Columbia and the people, fish, and wildlife that use the area. However, we have a few questions and concerns regarding the preferred alternative (Alternative 4) and USDOE's compliance with environmental laws.

A. Decommissioning of the Pump-and-Treat Facility.

USDOE proposes to remove the existing pump-and-treat system. This proposal is based on USDOE's conclusion that pump-and-treat system was ineffective in removing significant quantities of strontium. However, USDOE failed to consider and explain whether continuing the use of the pump-and-treat system, in combination with the apatite barrier, could help to lower Sr-90 levels more quickly. For example, a pump-and-treat system could be used to capture water that has passed through the apatite permeable reactive barrier (PRB) but still carries residual Sr-90.

The maps provided in USDOE's public notice make it somewhat difficult to ascertain whether elements of the system could be used to augment the PRB. However, as shown in Figure 6 of the proposed plan for the apatite barrier, it appears that the apatite barrier would be located on the Columbia River side of existing pump-and-treat infrastructure.ⁱⁱ The current pump-and-treat system, then, appears to be upgradient of the proposed barrier. However, it might be possible to use parts of this system or even add to it, in order to more aggressively remove and treat Sr-90. If the pump-and-treat cannot be used in combination with the apatite PRB, USDOE and Ecology should reflect that reality in their analysis.

Question 1: What is USDOE and Ecology's rationale for entirely dismantling the pump-and-treat system?

Question 2: Would it be possible to use elements of a pump-and-treat (either the existing one or an additional one) that could augment the cleanup proposed for Sr-90?

Question 3: Has USDOE considered some combination of the PRB and a pump-and-treat system?

Question 3.a.: If so, please explain why this alternative was not included in the public notice.

Question 3.b.: If not, please explain USDOE's rationale for excluding this potential alternative.

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B. Depth of Proposed Apatite Barrier.

The apatite PRB proposed in Alternative 4 extends to a depth of 30 feet, which may not be adequate to maximally bind strontium-90 and keep it from moving in the groundwater. For example, other pollutants at Hanford have behaved in unexpected ways despite active cleanup efforts. For instance, chromium was discovered upwelling into the Columbia River at much higher levels than expected. Although Sr-90 and chromium behave very differently (chromium is more mobile), we urge DOE to explain why the current depth will be the most protective approach.

Question 4: Is DOE confident that Sr-90 will remain at depths less than 30 feet?

The proposed plan indicated that test injections were effective at a depth of 30 feet. The wells were constructed to inject high concentrations of apatite-forming minerals into both the Hanford and Ringold formations. See Proposed Plan for Amendment of 100-NR-1/NR-2 Interim Action Record of Decision, page 21, Figure 7. If strontium-90 is known to be present in the Ringold formation, which goes deeper than 30 feet, USDOE should explain why extending the apatite barrier to a greater depth would not be more protective.

The proposed plan indicates that USDOE and the Washington Department of Ecology (Ecology) will work to refine their injection well design. Columbia Riverkeeper requests that the agencies provide more detail about how and where additional apatite might occur – including the potential for increasing the depth of the apatite injections.

Question 5: What is the rationale for USDOE and Ecology not extending the apatite below 30 feet?

Question 6: If Sr-90 levels remain elevated after USDOE implements the apatite barrier, will USDOE consider extending the apatite barrier to a greater depth?

C. Strategies for Addressing Pollution Outside the Apatite Barrier.

The proposed plan acknowledges that there will be strontium-90 contamination outside the proposed PRB. As noted above, it might be possible to address these areas through a pump-and-treat system, particularly during times of the year when water levels are lower and the hydrologic gradient is draining groundwater into the Columbia River. Additionally, Columbia Riverkeeper remains concerned that there is potential for strontium-90 to move through and/or around the PRB.

While the PRB will help to ameliorate the problem, the groundwater close to the Columbia River will remain elevated in strontium-90. It appears that the apatite barrier will be located close to the Columbia River, and Ecology and USDOE should explain what options are available for treatment for Sr-90 that is not bound up by the apatite

injections. Without addressing these areas, Sr-90 will continue to pose a threat to the Columbia River, human health, and the environment. Additionally, the proposed alternative does not clearly indicate how cleanup actions for other chemical and radioactive contaminants will be impacted by the apatite barrier.

Question 7: What is the strategy for addressing pollution outside the proposed apatite barrier?

Question 8: How much of the current strontium-90 plume would be outside the proposed extended PRB?

Question 9: Is a pump-and-treat approach feasible for addressing the area that is outside of (*i.e.*, on the Columbia River side of) the apatite PRB?

D. Long-Term Efficacy of the Apatite Barrier.

The proposed plan for extending the apatite barrier indicates that USDOE and Ecology anticipate the minerals injected during the apatite process to be effective in binding radioactive strontium over a long period of time. Columbia Riverkeeper is concerned that, under preferred Alternative 4, the timeframe required to achieve the 8 pCi/L standard throughout the aquifer is 300 years.ⁱⁱⁱ During this time, strontium-90 levels are expected to remain elevated in the 100-N Area. The proposed plan does not describe whether the apatite barrier may decline in its effectiveness over this long period of time. USDOE and Ecology have indicated that they will be monitoring the effectiveness of the proposed apatite PRB, and Columbia Riverkeeper supports this ongoing monitoring effort.^{iv} However, Columbia Riverkeeper requests that Ecology and USDOE provide a clear description about their expectations for the long-term ability of the initial barrier to be effective.

Question 10: Is the rate at which the PRB is capable of binding strontium-90 expected to decrease over the life of the barrier?

Question 11: Are USDOE and Ecology going to propose specific monitoring and trigger points where additional apatite injections would occur in order to make sure that the barrier has the ability to bind strontium-90 effectively over the long-term?

E. Failure to Consult Under Section 7 of the Endangered Species Act.

As Columbia Riverkeeper has noted in many previous comments, USDOE is required to consult with the federal expert agencies when a federal action at Hanford may affect federally-listed endangered or threatened species. *See* Columbia Riverkeeper Comment on USDOE Mercury Storage at Hanford (Aug. 2009); Columbia Riverkeeper Comment to USDOE on Tri-Party Agreement Proposed Changes and Consent Decree (Dec. 2009); Columbia Riverkeeper Comment on USDOE Tank Closure Waste Management Environmental Impact Statement (May 2010). Pursuant to Section 7 of the

Endangered Species Act (ESA), USDOE must consult with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) to determine how the proposed action may affect any threatened or endangered species in the Hanford Reach of the Columbia River.

i. Endangered and Threatened Salmon and Steelhead in the Hanford Reach.

Among the forty-three species of fish present in the Hanford Reach are several endangered species, including the Upper Columbia River spring-run Chinook salmon and steelhead ESUs. For thousands of years, the Columbia River supported the most abundant salmon runs on Earth.^v Beginning in the late 1990s, the National Marine Fisheries Services listed thirteen stocks of migratory salmonids as threatened or endangered under the Endangered Species Act. These fish spend part of their life-cycle in the Columbia River and its tributaries and part of their life in the Pacific Ocean, eventually returning to the Columbia and its tributaries to reproduce and die.

The Hanford Reach is well documented as the only remaining significant spawning ground for the fall run Chinook salmon on the mainstem of the Columbia River.^{vi} According to the U.S. Fish and Wildlife Service, "[t]he [Hanford] Reach contains islands, riffles, gravel bars, oxbow ponds, and backwater sloughs that support some of the most productive spawning areas in the Northwest, including the largest remaining stock of wild fall Chinook salmon in the Columbia River."^{vii} The fall Chinook salmon that spawn and rear throughout the Hanford Reach support in-river commercial and tribal fisheries, commercial fisheries in the North Pacific Ocean, and sport fisheries.^{viii}

In addition to fall run Chinook salmon, the Hanford Reach also supports over forty other species of fish, including sturgeon, steelhead, and bull trout. The prevalence of endangered and threatened fish in the Hanford Reach raises serious questions about the current and future impacts of Hanford's pollution legacy and USDOE's decisions that impact how much pollution will enter the Columbia for generations. Importantly, strontium-90 is documented entering salmon spawning grounds along the Hanford Reach.^{ix}

ii. USDOE Must Consult Under ESA § 7.

Section 7 of the Endangered Species Act (ESA), the heart of the ESA's requirements for federal actions, imposes strict substantive and procedural duties on federal agencies to ensure that their activities do not cause jeopardy to listed species or adverse modification to their critical habitat. 16 U.S.C. § 1536(a)(2).

The ESA mandates consultations to ensure that an agency action "is not likely to jeopardize the continued existence of any" listed species or adversely modify critical habitat. 16 U.S.C. § 1536(a)(2). Regulations require such consultations whenever an action "may affect" a listed species. *See* 50 C.F.R. § 402.14. Where an action is "likely to adversely effect" a listed species, the agency must conduct formal consultation with

the National Marine Fisheries Service (NMFS) and/or the U.S. Fish and Wildlife Service (USFWS) (collectively “the Services”). The end product of formal consultation is a biological opinion in which the Services determine whether the action will cause jeopardy to the species or adversely modify designated critical habitat. 16 U.S.C. § 1536(b).

In their joint consultation regulations, NMFS and the FWS established a preliminary review that can be used to sidestep formal consultation in limited situations. For all actions that “may affect” a listed species, the action agency must determine whether the action is “likely to adversely affect” or “not likely to adversely affect” the listed species. 50 C.F.R. § 402.14(a)–(b). An action that is “likely to adversely affect” a listed species or its critical habitat must undergo formal consultation that culminates with the services’ issuance of a biological opinion that complies with the ESA and regulatory requirements. *Id.* §§ 402.02, 402.14(a).

Under the joint regulations, a “not likely to adversely affect” determination can lead instead to an informal consultation, which consists of all discussions and communications between the agencies and ends with the Services’ written concurrence in that determination. *Id.* § 402.13. If the expert agency does not concur, the action is deemed “likely to adversely affect” and the agencies must conduct a formal consultation. *Id.* §§ 402.02, 402.14(a). Use of informal consultation is optional in those instances where it is available.

An agency may avoid “consultation only when it has determined the proposed action is unlikely to adversely affect the protected species or habitat and the [expert agency] concurs with that determination.” *Tinoqui-Chalola Council of Kitanemuk v. U.S. Dept. of Energy*, 232 F.3d 1300, 1306 (9th Cir. 2000) (citing 50 C.F.R. § 402.14(b)).

Question 12: Has USDOE initiated Section 7 consultation with NMFS and/or the USFWS regarding the proposed strontium-90 action?

Question 13: If USDOE has not initiated Section 7 consultation, does USDOE intend to initiate Section 7 consultation? Please explain

Question 14: If USDOE has not and does not intend to initiate Section 7 consultation, please explain the agency’s rationale for not consulting with the Services under the ESA.

F. USDOE’s Duties Under the National Environmental Policy Act.

The National Environmental Policy Act (NEPA) is “our basic national charter for protection of the environment.” 40 C.F.R. § 1500.1(a). By design, NEPA “is a procedural statute that requires the Federal agencies to assess the environmental consequences of their actions before those actions are undertaken.” *Klamath-Siskyou Wildlands Ctr. v. Bureau of Land Mgmt.*, 387 F.3d 989, 993 (9th Cir. 2004). It “contains ‘action forcing’ provisions to make sure that federal agencies act according to the letter and spirit of the Act.” 40 C.F.R. § 1500.1.

NEPA requires federal agencies “to prepare a detailed EIS [Environmental Impact Statement] for all ‘major Federal actions significantly affecting the quality of the human environment.’ ” *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1211-12 (9th Cir. 1998) (citing 42 U.S.C. § 4332(2)(C)). An Environmental Impact Statement “ensures that the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts; it also guarantees that the relevant information will be made available to the larger [public] audience that may also play a role in both the decisionmaking process and implementation of that decision.” *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989).

In particular, NEPA ensures that federal agencies make informed decisions about the potential environmental impact of an action before it is too late. *Klamath-Siskiyou Wildlands Ctr. v. Bureau of Land Mgmt.*, 387 F.3d at 993. NEPA’s implementing rules expressly provide that, “[u]ntil an agency issues a record of decision . . . no action concerning the proposal shall be taken which would: (1) Have an adverse environmental impact; or (2) Limit the choice of reasonable alternatives.” 40 C.F.R. § 1506.1(a); see also 40 C.F.R. 1500.1(c) (one of act’s fundamental purposes is to “help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment.”). NEPA, therefore, promotes informed and transparent government decisionmaking.

To determine whether an EIS is required, agencies may prepare an environmental assessment (“EA”). 40 C.F.R. § 1508.9. “The purpose of an EA is to provide the agency with sufficient evidence and analysis for determining whether to prepare an EIS or to issue a FONSI.” *Metcalf v. Daley*, 214 F.3d 1135, 1143 (9th Cir. 2000) (citing 40 C.F.R. § 1508.9).

Question 15: Has USDOE prepared an EA, EIS, or determined that a categorical exclusion applies to the proposed strontium action? Please explain

Question 16: If USDOE has not prepared any NEPA review for the proposed strontium action, does USDOE intend to prepare a NEPA review at some point in the future? Please explain.

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III. CONCLUSION

Thank you in advance for considering Columbia Riverkeeper's comments on the proposed plan for addressing strontium pollution near the Columbia River. If USDOE has any questions or would like to discuss these public comments, please contact Columbia Riverkeeper at crk@gorge.net to arrange a meeting.

Sincerely,

/s/ Dan Serres
Dan Serres
Columbia Riverkeeper
Conservation Director

/s/ Lauren Goldberg
Lauren Goldberg
Columbia Riverkeeper
Staff Attorney

cc:

Dennis Faulk, U.S. Environmental Protection Agency
Jane Hedges, Washington Department of Ecology
Ken Niles, Oregon Department of Energy

ⁱ U.S. Department of Energy. *Hanford Site Environmental Report for Calendar Year 2008* at 220.

ⁱⁱ Figure 6 of the Proposed Plan for Amendment of 100-NR-1/NR-2 Interim Action ROD shows that wells 199-N-75, 199-N-103A, 199-N-105A, and 199-N-106A were used for extraction in the pump-and-treat system.

ⁱⁱⁱ *Id.* at 20.

^{iv} *Id.* at 19.

^v National Resource Council, *Managing the Columbia River: Instream Flows, Water Withdrawals, and Salmon Survival* (2004).

^{vi} "The Hanford Reach of the Columbia River provides the only major spawning habitat for the upriver bright race of fall Chinook salmon in the mainstem Columbia River." USDOE-PNNL, PNL-7289; USDOE OSTI ID: 7051730. "Today, however, the 51-mile Hanford Reach is the only significant spawning habitat that remains for the upriver bright race of fall Chinook salmon in the main stem Columbia River." USDOE-PNNL at: <http://science-ed.pnl.gov/pals/resource/cards/Chinooksalmon.stm> (2009).

^{vii} U.S. Fish and Wildlife Service Website, <http://www.fws.gov/hanfordreach/salmon.html>.

^{viii} *Id.*

^{viii} *Id.*

^{ix} See e.g. *Groundwater Contaminants at Hanford*, Washington Dept. of Ecology <http://www.ecy.wa.gov/programs/nwp/gwhanfordcont.htm>; *Hanford Site Groundwater Monitoring for Fiscal Year 2008*, Department of Energy, DOE/RL-2008-66; *Hanford Integrated Groundwater and Vadose Zone Management Plan*, Department of Energy, DOE/RL-2007-20, Pg. 3.