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Dept of Ecology

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March 7, 2014

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Re: 100 N Proposed Plan, Draft A

Dear Messrs. McCormick, Smith, Faulk and Ms. Hedges,

Background

The 100-N area is the last of the 100 Area, River Corridor, Remedial Investigation/Feasibility Study (RI/FS) and Proposed Plans for submittal¹. The 100-N area consists of two Decision Units, NR-1, which is the source unit, and NR-2, the groundwater unit. There are 234 facilities, of which 76% have been demolished, and there are 175 waste sites and four Resource Conservation and Recovery Act treatment, storage and disposal sites. Around 108 kilotons of contaminated soil have been removed.

The 100-N reactor was the last of the production reactors. The N-area reactor was different in that it was a double loop design with a contained inner circulation that heat exchanged with cooling water from the river. Effluent from the inner cycle was discharged to trenches, which left deposits of strontium-90 and other contaminants which now act as sources for groundwater plumes. Levels of strontium in groundwater, the primary contaminant of concern at 100-NR-2, are as much as 1,000 times the regulatory standard. The highest strontium-90 concentration trench soils were removed to

¹ Background information comes from 100-N Proposed Plan

Envirolssues

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meet direct contact goals for protection of human health and the environment. An initial groundwater remediation attempt, employing a pump-and-treat system, was effective at providing a hydraulic barrier to keep strontium-90 out of the river, but was not effective at strontium removal and was costly. After more research and consultation with experts, the Tri-Party Agreement agencies conducted a test using a permeable reactive barrier (PRB) employing apatite to capture the strontium. The PRB proves to be quite effective at reducing dissolved strontium levels. When funds are available, the PRB will be lengthened to the entire length of the strontium plume.

While the Board is heartened by the success of the apatite PRB, there remain a number of related concerns about the state of the 100-N operable units. While the PRB is effectively pulling strontium from the groundwater that passes through, there remains a highly contaminated plume between the PRB and the liquid waste disposal trenches. There is also some amount of strontium that resides in the gravels between the PRB and the Columbia River. There is a large nitrate plume that comingles with the strontium plume, which will be difficult to remediate using in-situ technology because that may clog some of the pore space in the PRB. Large spills of petroleum products have also created smaller plumes that demand remedial attention.

The Proposed Plan for remediation of the 100-NR-1 and 100-NR-2 Operable Units (DOE/RL-2012-68, Draft A) presents a number of alternatives that are being considered for the final remedy. Alternative 1 proposes no remedial action. Alternative 2 proposes the use of removal-treatment-and disposal of contaminated soils at waste sites; an apatite PRB for near-shore capture of strontium-90; a technical impracticability waiver for the strontium-90 upland of the PRB; bioventing for diesel residues (TPH-D) in the vadose zone; and monitored natural attenuation (MNA) for TPH-D in groundwater, with groundwater monitoring and institutional controls to prevent exposure until cleanup levels are achieved. Alternative 3 is the same as Alternative 2, except that biosparging is added to treat TPH-D in the groundwater. Alternative 4 contains all of the remediation steps as Alternative 3, but adds in-situ biological treatment of the nitrate plume. Alternative 5 adds apatite treatment of the upland strontium plume.

The Board notes that of the alternatives, as they are described in Draft A of the Proposed Plan, the preferred Alternative 3 appears to best meet the objective of protective cleanup and reasonable cost. However, the Board also notes that the U.S. Department of Energy (DOE) has not evaluated all possible alternatives. Other alternatives could reduce the levels of strontium getting to groundwater at the source, by removing the contaminated material along the Columbia River.

The Board supports the Washington State Department of Ecology's Feasibility Study comment (No.5) that phytotechnology (both phytoextraction and rhizofiltration) should be retained and evaluated to treat strontium-90 in order to form a full analysis of potential implementation. Ecology states that they expect to make a recommendation only after they have seen this evaluation. Ecology predicts that this move alone would shorten the remediation time (for contaminants in groundwater flowing into the Columbia River) from a proposed 115 years to 50-75 years. The Proposed Plan provides a schedule that indicates that DOE will continue work at 100-N for at least that long.

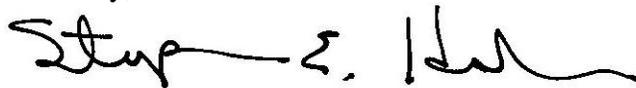
The Board asks DOE to avoid asking for a technical impracticability waiver at 100-N. Employing a technical impracticability waiver for strontium-90 and opting not to remediate the nitrate plume

dictates that greater than 100-year institutional controls will have to be maintained, groundwater levels monitored, adequate federal budgets allocated and public safety assured for a very long time. The Board has concerns that strontium-90 contamination is being left in place in the vadose zone and soil column. The Board is concerned about the ability of the PRB to function consistently during its 100-year plus life. The Board is also concerned about other unevaluated environmental factors that could cause strontium to be re-released to the Columbia River.

Advice¹:

- The Board advises DOE to evaluate an alternative with targeted remove, treat and dispose to reduce the strontium source at the more highly contaminated liquid disposal sites (basically three hot spots).
- The Board advises DOE to evaluate an alternative that employs mini-PRBs just downstream of the most highly contaminated strontium sources, to double the effectiveness of the apatite sequestration technique.
- The Board advises DOE to retain and evaluate phytoremediation (Coyote Willows) to reduce the amount of strontium contained in the 100-N foreshore in the Feasibility Study.
- The Board advises DOE to evaluate remediation of the nitrate plume in the alternatives evaluation, employing a number of ex-situ methods.
- The Board advises that additional vadose zone apatite injections be installed above the groundwater apatite barrier.
- The Board advises DOE to evaluate an alternative design of the apatite barrier so that it intercepts the entire depth of river-bound groundwater.
- The area surrounding 100-N is designated as a traditional cultural property and is very culturally sensitive. The Board advises that every effort be made to protect that trust, and to fully comply with the laws regarding cultural resources.

Sincerely,



Steve Hudson, Chair
Hanford Advisory Board

This advice represents Board consensus for this specific topic. It should not be taken out of context to extrapolate Board agreement on other subject matters.

cc: Jeff Frey, Deputy Designated Federal Official, U.S. Department of Energy Richland
Operations Office
David Borak, U.S. Department of Energy, Headquarters
The Oregon and Washington Delegations