

Background information

The 100-N area is the last of the 100 Area, River Corridor, RI/FS and Proposed Plans for submittal. 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 RCRA TSD sites. Of these waste sites, 18 have been cleaned up and 78 have been scheduled for start in June 2010. Around 108 kilotons of contaminated soil have been removed.

The 100-N reactor, WNP-1 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 cribs, which left deposits of strontium and other contaminants which 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. An initial remediation attempt, employing a pump-and-treat system, was not effective and was costly. After more research and consultation with experts, the Tri-Parties conducted a test using a permeable reactive barrier (PRB) with apatite to exchange with the strontium. The PRB proves to be quite effective at reducing dissolved strontium levels, and the PRB is being 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 on the upstream side of the PRB. There is also an anomalous amount of strontium that resides in the foreshore gravels between the PRB and the Columbia River. There is a large nitrate plume that comingles with the strontium plume, which would be difficult to remediate using in-situ technology because that might clog some of the pore space in the PRB. Large spills of petroleum products have also created smaller plumes that demand remedial attention.

Potential concepts for advice:

- ✓ 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.
- ✓ Not all alternatives have been evaluated in this Proposed Plan, the most obvious omission being an alternative with targeted R-T-D to reduce the strontium source at the more highly contaminated liquid disposal sites (basically three hot spots), and thereby reduce the levels of strontium getting to groundwater at the source, and unlike the PRB, removes the contaminated material from the site. Another unevaluated alternative might employ mini-PRBs just downstream of the most highly contaminated strontium sources, to double the effectiveness of the apatite sequestration technique.
- ✓ Support Ecology's insistence on using phyto-remediation (coyote willows) to reduce the amount of strontium contained in the 100-N foreshore. Ecology predicts that this move alone would shorten

Issue framework for potential 100-N advice (lead Issue Manager: Engstrom)

the remediation time from a proposed 115 years to 50-75 years. The Proposed Plan provides a schedule that provides that DOE will continue work at 100-N for at least that long.

- ✓ The Proposed Plan did not include remediation of the nitrate plume, while considering only the in-situ methods. The Board advises that other nitrate remediation technologies exist, which include a number of ex-situ forms.
- ✓ Employing a Technical Impracticability waiver and opting not to remediate the nitrate plume dictates that greater than 100-year Institutional Controls will have to be maintained, groundwater levels monitored, budgets allocated and public safety assured for a very long time. The Board advises the Tri-Parties that it has concerns that strontium-90 contamination is being left in place in the vadose zone and soil column. The Board is concerned whether the PRB will continue to function as well far into its 100-year plus life, and there may be environmental factors that could cause the strontium to be re-released to the Columbia River that haven't yet been evaluated.
- ✓ The design of the apatite barrier, and particularly with the fact that the barrier design does not intercept the entire flux of contaminated groundwater. The Board supports the addition of the vadose zone apatite injections.
- ✓ The area surrounding 100-N is culturally sensitive, and every effort must be taken to protect that trust.