Oregon
Kate Brown, Governor

OREGON DEPARTMENT OF ENERGY

550 Capitol St. NE
Salem, OR 97301
Phone: 503-378-4040
Toll Free: 1-800-221-8035
FAX: 503-373-7806
www.oregon.gov/energy

April 2, 2019

William F Hamel, Assistant Manager
Richland Operations Office
US Department of Energy
PO Box 550, MSIN: H5-20
Richland, WA 99352

Dear Mr. Hamel,

The Oregon Department of Energy would like to offer comments on *The Technology Evaluation and Treatability Studies Assessment for the Hanford Central Plateau Deep Vadose Zone* (DOE/RL-2017-58 Draft A). As you are aware, Oregon holds protection of the Columbia River paramount, and we believe that all efforts should be taken to prevent further degradation of this vital resource. Consistent with the requirements of RCRA and CERCLA, Oregon's default preference for final deep vadose zone technology applications is remediation, not containment[1]. Effective remediation will shorten the U.S. Department of Energy's long-term obligations at Hanford.

It appears to us that the review of technologies is progressing, and the next steps proposed by DOE are reasonable and fairly well defined (Table 5.1). The recommendations for additional study will provide much of the information required to make appropriate remedial decisions in the future, provided they are completed in a timely manner. We offer the following additional considerations to assist your next step decisions.

- The remedial tool kit being developed for the deep vadose zone needs to be broad and evaluations of applicability should be complete. Given the wide array of subsurface geochemistry in the Central Plateau, we recommend that DOE continue their planned lab-scale studies and bench studies with samples from Hanford sites to find optimal chemistries for each method, then move forward with field-scale tests when a site exhibits those chemical profiles.

- Additional studies are needed for in-situ gas injection. While ammonia was the most promising gas to immobilize contaminants, other treatments were also effective (PNNL-18879 - NaOH mist, CO_2, HCL mist, Fe(III) mist). These other treatment methods should continue to be evaluated in lab studies. Recent bench-scale studies using site soils revealed that the technology is sensitive to geochemical parameters. Ammonia should be tested in the lab on

[1] "Under the Superfund Amendments and Reauthorization Act of 1986, the U.S. Environmental Protection Agency is required to select remedial actions involving treatment that "permanently and significantly reduces the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants" [Comprehensive Environmental Response, Compensation, and Liability Act, Section 121(b)]."

soils from other Hanford waste sites with varying chemistry, to determine which sites may be targets for field-scale studies.

- A final remedy should not be selected until the impacts are substantially characterized and the degree and extent is known. During site characterization, we suggest DOE conduct a variety of chemical analyses to find the best fit technologies in the tool kit. This should eliminate much of the guesswork and provide a better chance of success.

- Final Record of Decision implementation prior to near-surface source removal is counterproductive. Remedy deployment should wait until overlying sites have been remediated or can be definitively demonstrated to no longer contribute to an exceedance of applicable groundwater standards. Such a demonstration would require adequate characterization of the source area(s) and integration of related Operable Units.

- We consider technology which will not remove risk to groundwater (either through removal or complete immobilization of contaminants) to be a containment technology.

  If containment technologies are selected which do not have a life expectancy sufficient to prevent groundwater contamination above applicable standards over the lifespan of the contaminant, then future Feasibility Study analyses must include long-term pump-and-treat costs. Cost estimates should also include monitoring, repair, and replacement of the containment system.

  Any containment strategy must be periodically reassessed until either the contaminant mass no longer poses a risk to compliance or an effective remediation strategy has been implemented.

- Soil wicking (a remedial strategy) should not be rejected (Table 5.1) without further study in deference to desiccation (a containment strategy). Injected air may not be able to penetrate fine grained soils where wicking could be effective.

  Desiccation without vapor extraction should not be considered (section 3.1.1.2) as a default option. Intuitively, removing the hydrated air before it cools and moisture re-condenses will increase the effectiveness and duration of the desiccation zone.

- We recommend that additional evaluation (subject to 100-K pilot results) be conducted to assess the practicality of soil flushing. The injection of pump-and-treat effluent into former infiltration features (e.g. cribs) may mobilize contaminant mass from the vadose zone, allowing capture and treatment in groundwater – provided that groundwater monitoring and plume capture features are in place.

  The flow path of the injectant may follow a similar transport pathway through the vadose zone as wastewaters disposed during operation. If this is the case, the resulting contaminant footprint is more predictable, able to be monitored, and therefore recoverable. Using pump-and-treat effluent would also provide an additional benefit, as it will limit the need for additional injection wells. This strategy would require more focused monitoring in “sentry

wells" to ensure that the injectant flow path is properly identified and the remobilized contaminants are captured.

- DOE should institute a Challenge Grant, available to universities, small businesses, laboratories, and research centers, to explore innovative and cutting edge technologies. The current literature and technology review has identified a number of potentially viable solutions. A relatively minor expenditure from DOE can support the development of new remedial strategies and the next generation of scientists and engineers, who will carry the mission to completion.

- It has been stated many times, and by many different entities, including Oregon, but it bears repeating that a surface barrier should only be considered as a strategy of last resort.

We understand the desire and pressure to move forward with decisions on vadose zone activities. However, the deep vadose zone provides a particularly rare chance for deliberate, persistent progress. Groundwater plume controls are in place; steps are being taken to evaluate and remedy shallow surface sources; and the Washington Department of Ecology has provided additional time to complete the work already begun. In the interim, DOE has the opportunity to make sure the selected remedy fits the applicable conditions, complete site investigations, and to be ready to act when the time is right.

If you have questions about these comments, please contact Tom Sicilia of my staff at 503-378-5584.

Sincerely,

Ken Niles
Assistant Director for Nuclear Safety

Cc: John Price, Washington Department of Ecology
Dave Einan, U.S. Environmental Protection Agency
Oregon Hanford Cleanup Board
Susan Leckband, Hanford Advisory Board
Matt Johnson, Confederated Tribes of the Umatilla Indian Reservation
Laurene Contreras, Yakama Indian Nation
Jack Bell, Nez Perce Tribe