DVZ Technologies Public Information Exchange

June 7, 2011
Location: Shilo Inn, Richland, WA

Opening Session – Flip Chart Notes

Comments

- Excavation technologies are good to approximately 40 ft. and make a big footprint. Develop some cost curves to get general understanding of cost/benefit.
- Excavation can be cheap and quick.
- Lots of deep vadose zone problems are black and white at 60 to 120 ft, but not at 250 ft.
- Good technology screening process important. Need to categorize and couple technologies right.
- Integration with tank farms.
- Screening criteria should include Environment, Safety, and Health (ES&H) and the economic impacts of technologies.
- Pay attention to reality of deploying technologies (excavation brings up lots of sediment).
- Operable Unit schedule does not address characterization and treatability testing. Would need to include multiple iterations.
- Perched zone pumping should be pursued now.
- Any perforations in a well require cost and thought for decommissioning, etc.
- Maybe technologies could help with integration issues.

Questions

- Re-raise question of definition of Deep Vadose, where is top?
- Can you determine risk reduction is worth cost?
- There is a possibility that we may do harm (e.g., dust suppression water). We will impact groundwater. How do we pick technologies given this?
- Lots of new holes associated with these technologies and need to ensure that don't harm the Cold Creek unit.
- Are there some short term vadose zone successes to make Hanford investment –worthy?
- Need to understand/get over the site-wide risk assessment. Context. Will help with the cost-benefit equation.

Opening Session – Sticky Notes

Comments

- Tank Farm "surface barrier tests" used to be called RCRA corrective action "interim measures." The interim measures weren't really designed as "tests". In other words, monitoring and barrier design may be inadequate to use/apply at cribs and trenches. In the RI/FS Reports, these concerns would need to be carried forward as data gaps.
- The presentation indicated "surface barrier tests" were under way at Tank Farms. However, the same type of barriers does not appear to be included on 1 table handed out.
- The description of the technologies should estimate the "life" of the technology. For example, is the technology intended to last 5 years or 100?
- Be sure to assess synergy provided between multiple technologies. i.e., geophysics has the ability to monitor the individual injection types as well as certain chemical reactions. (Electrical geophysics methods)

- Be aware of secondary chemical reactions of injected materials.
- Need much more data to show that the four types of barrier (plus the asphalt types) are effective at limiting water infiltration
- Please do not operate in a vacuum, get input from all contractors.
- Scheduling research to fit in a time line of a few years – not reality based concept.
- Disconnect in schedule for the 200-DV-1 Operable Unit and Single Shell Tank (SST) closures.
- The Perched Water Removal should be an immediate interim measure and should be taken off the technology list.
- Technologies that focus on removal of contaminants should be given priority – Remove, Treat, and Dispose (RTD) should be the default policy.
- Would be helpful to screen these technologies based on how they address heterogeneity in subsurface – which ones work well in sand; or cobble; or all types of material.
- Would be helpful to screen technologies by how much water needs to be added while deploying system. – dust abatement during excavation or water in slurry system.

Questions
- How to quantify your cleanup? Is sampling groundwater to late to test efficiency of vapor technology? Vadose monitoring technologies?
- Effective depth of surface barriers?
- Fate of INEL-led Vadose Zone Road Map and applicability?

Breakout Session – Removal Technologies

Comments
- Revisiting historical sites? (Thought couldn't dig deeper than 15').
- All excavation techniques above groundwater.
- BC – nonrad / N Area Sr90.
- Not talking about worker protection, just speaking now about digging notes.
- On the In Situ side, good technology that directs drilling.
- Deep mixed wells – working on site where using this to stabilize contaminants. (Actually overlapping augers)
- Most technologies go to 50 – 60 ft, then bench and go deeper.
- Deep excavation used to get to contaminants.

Questions
- Can remotely operated machinery be used? (Tribes Deep Vadose Zone Info on this)
- How good is auger on consolidated material? Practical depth?
- Expense of auger? Can use for characterization? Can use with another process? Can dry fine soils become airborne? Could you recycle "used" soil (wash)?
- Sheet piling – Can go 250'? How far out does bench have to be? Technology doesn't work as well in heavy cobbles.
- Could use diaphragm walls as containment? Do you have to worry about slurry loss? At Hanford would have to be far from rad so not generate rad slurry. How well will it work in gravel?
- Diaphragm – Do you have to use benches? Or can you drill straight down?
- Straight wall technology – Have you over used them as slant walls?
- What's the standard slope ratio?
- How far would you have to "step out" wall for rad?

- How do you get soil out of caissons? Monitoring programs in place when digging in potential rad areas? Maximum diameter? Maximum depth?
- Jet grout – Why limit to 50'?
- Auger drilling – diameter? Bit material?
- Soil nail walls same as you see on highways?
- Can caissons be rectangular?
- Water content of slurry?
- What technologies do oil industries use? (to direct drilling)
- With excavation, you're closer to groundwater. What are the new implications?
- Has anyone provided definition of **deep** vadose zone?

Breakout Session – Ex Situ Treatment and Disposal Technologies

Comments

- In Situ uranium recovery would work well at Hanford (Tribal Deep Vadose Zone Info)
- Molecular cage extraction – check it out (gold mining)
- If cure is worse than disease, not worth it.
- Chemicals now using to extract immobilize and "kill" uranium pretty safe now (Tribal rep).
- In situ uranium recovery techniques have been well refined and could be used at Hanford to reduce contaminants into groundwater and later extracted or immobilized.
- Soil flushing – contaminants followed path and recharging should continue them along path.
- Concern with technetium-99 being a problem with solidification/stabilization due to leaching.
- No viable disposition option for technetium-99.
- Favor extraction vs. immobilization and place in vaults for possible future use (technetium 99, etc.).
- Iodine-129 has a "bad rap"; perhaps public discussions about risk.
- Soil vapor extraction (SVE), electro kinetic immobilization, and other in-situ technologies could be considered for ex-situ implementation.
- In Situ – biggest issue is that more geotechnical investigations to know how will work in soil. Need a list of what we need to know about soil to include certain technologies and make it part of sampling & analysis plan.
- Compare effectiveness to size of problem (assess technologies according to time limitations, etc.).
- Vadose zone not deadlocked … won't be drilling through basalt.
- Never heard perched water and "ephemeral" used together … not sure what Hanford water is.
- Heard water rushing through 300 Area so fast, hard to recover uranium.
- Basis for technology screening is important. Input needed to support the basis.
- Look at characterization technologies or others that help you find waste.

Questions

- Where is hexavalent chrome taken after removed from ground?
- Any perched water in 200 West?
- What is deep vadose zone?
    - Site specific … at least 50' – 60'
    - DV-1 from surface to groundwater
    - Limits to excavation and limits to how close we can get to Tank Farms
    - Have to stop a(t) Tank Farm boundary (fence line)
    - Where is integration of removing contaminants knowing more contaminants are going to move through area? (Tank Farms)
    - Started using "deep" to differentiate from river corridor shallow contaminants.

- DV-1 milestones – collaborative effort among regulators, DOE, contractor? Need further milestones that are not in current OUs?

Breakout Session – Containment Technologies

Comments

- Consider slant drilling for jet grouting. Is being considered elsewhere (Dib).
- Confirmation of performance in the subsurface is important. Could actually do damage by deploying injection technologies if we can't determine their impacts.
- We still don't know the effective depth of a surface barrier. Current estimates do not include field data.
- Jet grouting may have holes and then concentrate water and speed travel time to groundwater.
- Mid 70's PNNL work on warming up aquifer important input for wax injection (slide 9).
- Wax barriers won't last forever, but might help you do a removal action before it degrades.
- Need explicit steps for binning to get input on early screening.

Questions

- Will down select include weighting factors for operation and maintenance (O&M) cost? Need to consider both short and long term applicability.
- What are the technologies.for heating soil (slide 9 Molten Wax)?
- Slide 9, Molten wax: Can wax be used to push contamination to where it can be collected?

Breakout Session – In situ Technologies

Comments

- All directional methods use drilling mud so some liquid is injected into the vadose zone.
- Depth limitations on mixing technologies is approximately 60 ft. (slide 20)
- Consider reactive barriers w/zero valent metals.
- Monitored natural attenuation (MNA) at Hanford has a 60 year history of application. Seriously looking at this history in conjunction with other technologies could really help. (slide 48)
- Principle of "do no harm" means that we should take an approach to avoid harming caliche layer.
- Testing success in the field needs to be considered. Ability to apply success metrics as important as remediation technologies themselves.
- Knowing where the contamination is will help with making technology decisions (e.g., some technologies useful at 60 ft., but not at 250 ft).
- Lots of technologies will be difficult to screen because they are so site or contaminant specific.
- Lots of reagents used in production processes during 40's, 50's, and 60's that should be looked into for vadose zone application.
- Integration of Tank Farm sub-surface work with this work is important.
- Consider steam injection/reforming for carbon tetrachloride.
- Foams, polymers, etc. should be looked into at research arms of oil companies
- Should ensure that data needed to support these technologies is being collected. Doing this well at U-8.
- Use commerce business daily to identify technologies.
- Combinations of gases and reoxidation still on lab level and not yet ready for deployment. (Slide 37)
- Certain geophysical technologies (e.g., SGE, IP) could help monitor the ammonia treatment. (Slide 39)
- Be cautious with two effects (e.g., colloids) for ammonia treatment. (slide 39)
- Additional limitation is methanogenesis causing methane buildup. (Slide 46)
- Monitored natural attenuation (MNA) needs to include communication that it includes dealing with source.

Questions

- Slide 37: Looking at methods to limit or slow reoxidation? Yes, doing this in the lab (Mike).
- Slide 38: Would ammonia treatment potentially be applicable in 300 Area? Yes, potential exists if lab testing is successful (Mike).
- Slide 42: How well might phosphate sequestration work on transuranics?
- What is acceptable/unacceptable in the groundwater? What performance are we really looking for? This impacts screening criteria and evaluation.