Topic Area 5 Q&A

Q: In disposal research, there are 3 topics of interest. One of them was improving geological characterization through field test. Is there any more information on this particular topic? Are these field tests associated with current experiments.
A: There has been generic research done for a while. That looks at the geologies around the country because there are so many formations. The next step is to do site characterization studies which is unique to sites. From a generic standpoint, we are looking to see how you can do field tests to extract, say permeability in different places, understanding flow through fracture in a field, and how you can measure or interpret using new techniques. Giving an opportunity to help next stage of evaluations that may have to be done once a site is identified. We need to look at different aspects of field testing. We already have work going on in URLs (underground research laboratory) with international communities and they usually look at internal to drifts half a mile underground (URLs). But there is a gray area looking at the top to the bottom between the URLs and finding out if there are any features or processes that need to be addressed. It is site specific but we need to keep the processes generic so they can be used at different sites. You need to be able to go to a site and take those general processes to see how you measure, test, or interpret.

Q: These would be potentially in different geologies, and you would be interested potentially in near-surface processes. For example, you would be interested in near surface processes that may affect boundary conditions to the repository?
A: Near-surface tends to be soil type of things. Part of it, is you are doing the biosphere modeling. You need to know how the flora and foliage is able to transmit radionuclides to the surface. But we are still working at the substantial raw component which in further deeper down within the subsurface where the main isolation will take place. We are looking for new techniques getting the same data conventionally or new ideas on getting information needed.

Q: In the description of one of the topic areas there is mention of nano and molecular scale models should be bridged with micro and macro scale models. Could you comment more on which kind of nano or molecular scale properties you care about and if there is any reference article that is of interest or particularly important or any kind of comment that could be relative for waste management?
A: There are many studies reported from the waste management conferences. For example, looking at bentonite and water filtering through the different layers, you look at the geology (marco) and the nano scale and then doing some molecular dynamics type of studies. How do you take that information from the molecular studies and graduate (scale up) to the next scale and then move it to the third scale and the fourth scale getting to the outer range. Why we need this because, when we model the effects of processes, we are modeling system analysis and in that you must graduate these models from the molecular scale to the macro scale. When you do the modeling at a smaller scale (local/micro) do you lose some of the intrinsic features that need to be carried to the higher-level scale (macro). It is a challenge. There are two challenges 1.) the physics behind it 2.) whether you have

adequate computer capabilities to model those specific regimes. Because if you get smaller in one dimension and bigger in this thing you will get mismatches and it will take a lot of time to converge and each realization gets complicated. We also look at surrogate modeling which is part of scaling. We are looking at ideas that you can move from one scale to another as transparently as possible. There are no absolutes, but you want to retain the features of what you studied.

Q: Would radioisotope adsorptions to the engineer barrier be a priority focus for this topic area?
A: There are quite a few studies going on right now within the bentonite area, plutonium and uranium sorption. Recommend looking at what has been done so far. Do a literature search to see what has been already done in this area. We also sometimes use I-129 in our modeling as a tracer. If you are looking at a tracer of some material is also there. But make sure you scan the literature and ensure you don't propose things that have already been done. We have been doing some of this research for over 15 20 years. Just a caution. You want your proposal to improve the engineer barrier in a substantial way or provide some insight that improves the modeling performance assessment.

Q: Will near field radiations be a subject?
A: Not quite. If the radiation is changing some of the geochemistry in the area that might be of influence but the radiation by itself is underground and sequestered away. There is no human safety stuff. We handle it and close the repository. It would be a concern if it was changing the water chemistry. It is doubtful that it is a strong component.

Q: Safety during operation is not of interest, is that correct?
A: During operation, it is a separate issue. It's a surface technology and other things that we do but we primarily are looking at long term isolation of waste and not the safety issues related to handling of waste and stuff like that. Those are still done in commercial space already and unless there is a new reason to do something it will be when a new design is put out and we look at it for the handling facilities. But not for this program, the disposal part of it.

Q: Follow-up question to dual purpose canister research. Is that topic better for this topic area or would it be better for the storage and transportation area of Topic Area 6?
A: It has a couple of facets that are important to it for disposal 1.) is the criticality issues we are dealing with and 2.) long term part of it is filling for disposal. These DPCs are already licensed for storage and transportation. That's why it is called dual purpose. The only part of the storage and transportation aspect would be how long it can keep it safe over and beyond the licensing period. The assumption is that we will still be meeting part 71 every time and relicense it as we go on in the facility. Regarding the disposal part, we are considering different pouring into the canister to make it rigid so that they don't separate out or introduce poison in the canisters. We are looking at different things, 1.) how the heat output because the container has a lot more fuel and it exudes a lot more heat energy. The heat output within the repository has to be considered and 2.) the weight. For instance, in

salt it may have a settling effect and what happens at high temperatures on salt. As in crystal and others how do you handle not handling per say and getting it to a place to monitor. We are trying to reduce the possibility of criticality in these things. That has been the focus of some of the work that has been done in the past.