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Localized Corrosion of Alloy 22 in Yucca Mt. Environments

p21
line 2 “Hot test waste packages can reach over 200°C” - How high can any of the packages get actually? (on p35 it says current models are “only applicable at 240°C) (p48, line 11, says 140°??)

line 20 They “don’t expect” much rock dust - why not? What could cause more rock dust as more casks are moved into the tunnels? Movement causes dust? What enforces the tunnels - I remember the term “shotcrete” and talk of some metal screening or something to prevent rockfalls - as things dry out and rock crumble - will dust accumulate more? What can happen often does! A lot now depends on the drip shield, put as a woman who still cleans house, I know dust won’t be prevented by the drip shield – it’s designed for drip protection, not dust. Dust is in the circulating air and what will ventilation bring in as time passes in the future? How can we analyze what to predict? Will our air become less pure in the future with all the construction and travel of trains & trucks to Yucca Mt and all the activity there? One filter problem in ventilation could cause a real problem couldn’t it? How is air double checked to be clean in ventilating the drifts? I never like the idea of relying on a mechanical system to keep the casks cool. That has always worried me. Has a team looked at all the “what ifs” here? Some brainstorming on dust and ventilation is needed. What are the “unknown unknowns”?

p38
p38
line 3 (Can this really be Sally Devlin’s microbes have arrived?) I read her comments in previous transcripts and thought it kind of odd, but here it is. I realize the microbes have been traced “probably” to the saran wrap used to wrap the seepage samples. But, there is also mention of a “packer” to eliminate head space in the tube. Has this substance been analyzed? What was the tube made of? The whole process of this test appalls me! Saran wrap! Who plans these things? It reminds me of the situation when they used flammable plastic tubing and duct tape at a nuclear plant to vent the accumulated of hydrogen from dry casks (the same type that had an explosion of hydrogen at our local Pt. Beach plant when a welder’s spark ignited it). This other plant used this ridiculous plan to prevent hydrogen accumulation - of course, the tubing caught fire twice before they got wise. Unbelievable to me! But it was done. (Saran wrap! Duct tape! Let’s get scientific - even I would know better than that.)

p40-1 (line 7 and 8) quote “We actually ended up with a fairly, purely by chance, we ended up with – well, not exactly by chance - but we ended up with”- What? This kind of talk is done all too frequently. “We believe”, “we assume”- etc. We need more valid testing taking time to do things right the 1st time in testing the real thing. That is just why things went so wrong in our dry cask use here in Wisconsin. Nobody tested things carefully, because they were in such a hurry to load the casks. Is this the situation with Yucca Mt. now?

p43 Very good -- Mr Morganstein asks about the assumption about the bacteria using an organic pathway instead of a metabolic pathway. Why wasn't this looked at in the 1st place? (As well as the “wetting assumption of the metal surface from the dust - what keeps the water in the dust?) The stainless steel supports do need to be considered. Just as in our Pt. Beach cask, we found that every material in there could react (as the painted surface did to create flammable hydrogen nobody expected) - new materials can be formed.

p45
line13+14 “Particles larger than 30 microns are deposited in the turnout limb” I assume this is a reference to some sort of dust filter? Has this been tested and how will it be checked in actual use before the repository is closed? What happens if the ventilation system goes off for some reason (national disaster - war) or if a filter is faulty? What is the plan in such cases?

p54 line 15 - data to 110°C only - why not higher? Has this “uncertainty” (line 21) been tested now?

p59
line 2 “depends to some degree on whether the alloy 22 is mill annealed or thermally aged” this may be very important. The materials for our casks in Wis made a big difference and the QA where they were formed and even the initial supplies. There were problems all over the place once we looked for the sources. (The devil is in the details!)

p72-81
line 8,9,10 This whole discussion of the change in thinking from a slowly evolving repository to one of “very rapid” changes is quite new and the “wet/dry/wet/dry pattern, the barometric pressures changes, etc. reminds me of concerns with casks themselves. On p 80 (line 22) there is an unknown about “the air permeability of the seals over time”. I was always referencing the wet/dry wet/dry state of the spent fuel over time of its life - in the reactor, in the pool, wet in loading the cask, dry in storage, wet in unloading, dry in transport, wet in possible unloading again and dry in keeping of disposal and wet at end again - I always asked for experiments and actually what happens to the pellets, the zircaloy, all the materials in there over time. There are blisters and pinhole leaks in the waste - what else? What condition will the actual waste be in at the beginning of the disposal in fact? Does anybody really know or will they? Will we have reactions inside the containers with all that's going on outside the containers in the repository. Are they just taking it for granted that it doesn't matter or what? Why?

A small thing like a drift seal permeability may not seem important right now, but may become very important if things happen in a drift they didn't expect to happen over time. How can you

shut off one drift from affecting all the others in an emergency situation? We need to always take in the whole picture of what can happen to the whole intertwined system as time goes by.

p105
line 13+14 “wind-blown dusts, which will be brought into the repository during the ventilation period” - This has always been a big concern of mine. How can they predict over time what these dusts will actually be made of? The world (wars, natural disasters like a volcano erupting, global warming, what else? I remember dust from Mt. St. Helen’s on Lake Michigan here in Wisconsin! Look at what could be in these dusts - brainstorm into the future on this.

p111
line 4 I’d certainly have to question any test using only 5 samples. (From what locations?) this small a sample group can’t possibly be valid to represent the whole repository. They could represent only a small fraction of what will really be in there now and in the future. Is this test valid at all? It seems they are using it for some very important conclusions.

line 2
p112 “Neither model predicts what is observed experimentally” This goes to prove once again how invalid assumptions put into a model can lead to invalid conclusions and those conclusions are put into more models as facts which make more conclusions invalid. But, I don’t agree that this 5 sample experiment represents reality either. We have to make decisions on some basis after all, but seems to me things are not being done carefully with the sampling, time, and though, they deserve for such an important project that can affect the future of this country. Let’s not forget that a small invalid assumption can lead to big future problems as it did with the painted coatings on our casks at Pt. Beach in Wisconsin.

line 6 “so it’s a fairly simple explanation for the discrepancy.” In all the documents I’ve read on nuclear waste over all these years I always look for the words “believe”, “assume”, “easy”, “simple” etc. These I highlight as I read on. I have a quote on my refrigerator that is from H.L. Menken - “for every problem there is one solution that is simple, neat, and wrong!” Dad always said if you are going to do something take the time to do it right the first time - he kept his tools in place and in shape and knew how to use them. Sometimes I fear that fieldwork and experiments for the repository are too simple and don’t think beyond the immediate result.

p117-120 There is some very astute questioning here about the details of the experiment. What really is the actual mineral assemblage? Is the test valid? Seems to me that any time you change the form of the dust, you have to be very careful to include anything that forms in the change - what was degassed, soluble in the water, etc. This reminds me of a test I read about used to verify our cask used at Pt. Beach. The testing equipment had to be stuck into the surface which then affected the test results. I don’t have the study any more, but I remember that there was an unexplained pressure build up that was “assumed to be something with the test equipment,” which was probably an important clue to the creation of the hydrogen pressure that nobody expected when the painted coating caused that flammable gas creation. I always felt that test was sloppy and could have saved a lot

of people a lot of time, concern and money if done correctly. That pressure build up was important.

p127 Now this is good - a concern about iron and iron oxhydroxides - rock bolts, inverts, floor, drip shield, etc. - what dust do the man made things -- everything put in there create, as well as what the ventilation brings in. I don't know the transport system presently used in the model – but what is there? Rails? What else? Wiring – lights – transporters –what? I remember when WEPCO showed us slides of the new transporter being created to move the casks around at Pt. Beach - just a schematic thing of 2 poles on wheels! At that hearing we knew this was going to be a new creation. I was allowed to watch its use in a dry run with an empty cask taken to the concrete storage pad in the fields near the plant. As it lumbered along the road I certainly wrote down a lot of questions for NRC about the equipment used to stabilize the cask etc. etc. As the transporter came to turn into the gate to the pad there seemed to be a lot of confusion and halting movements, I could see them throwing sand on the turn. They were apparently having trouble turning the thing. It was resolved in later uses. These are the kinds of things that reality brings to the total system. So, how are the casks to be brought into the drifts - what equipment comes in and out? What is all there in actual use that can create dust and what can that dust do over time and in high heat? Does any body know?

p137 “after ventilation, the drip shield is in place, any dust that is generated on the walls of the repository would be deposited on the drip shield, not on the waste package.” Do you consider his statement valid? If so why? I really would like to see what the current design of the drip shield is now. I find it hard to believe it is going to keep any dust circulation from getting to alloy 22. Wouldn't just the interreactions within the closed tunnel cause some dust movement under the drip shield? Oxidation of rock bolts for example, evaporation, rock falls or more “rock flour” creation - what all happens in that repository after closure that could cause dust movement from above the drip shield to the cask surface - or what dust can come up from the floor in vibrations from the nearby air flights and military tests in future manmade creations? How can we know what they will be doing there in the future? (How does weather, volcanoes eruptions, earthquakes, sonic booms, whatever man or nature can do in the future?) You know in every depiction of anything closed in the ground over many years, you open it and theres lots of dust.

p138
line 11-25 Will the drip shield do what they expect it to do? What will it be made of? Will a real one be tested over time in a drift before they are installed? I certainly hope so! I see more and more dependent on that drip shield. It is gaining importance and not clearly even designed yet. (Same old problems!)

p140
line 2
line 5 So - are nitrates present or not? Do you know? Is it still dangling out there? I hope not. Is there really going to be a cyclic corrosion environment? That needs clarification now.

p147-149 This part of the workshop really made me decide to take a walk and do some thinking. You know when I was very involved with the certification by NRC of the first generic cask, the NRC was in the phase of creating the certification procedure. A lot of changes

had to be made. And I worry here that in your discussion NRC compliance has gained the status of the all powerful guidance tool for everything again. In gearing everything toward NRC certification qualifications in the vendors of cask designs, anything else goes out the window - "it doesn't matter" if NRC doesn't require it. Don't spend the time and money on it they seemed to think - leave unknowns alone - they just cause trouble. Well, I strongly disagree. They do cause a lot of trouble. We saw that at Pt. Beach. If you, as an oversight board, or DOE, EPRI - all of you see a question that NRC doesn't necessitate answering - maybe NRC isn't aware of something you are seeing that they aren't asking about. Heaven knows, NRC people are only human - they make mistakes too. And I thank the board for having this workshop and for not allowing something to be eliminated from the documents because it isn't fully understood and may not matter. Because often these things cause you to "dig deep" and really find the things you didn't realize at first that became things of major importance in the end.