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UNITED STATES NUCLEAR REGULATORY COMMISSION'S

ADVISORY COMMITTEE ON NUCLEAR WASTE

July 17, 2006

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON NUCLEAR WASTE

172ND MEETING

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MONDAY,

JULY 17, 2006

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ROCKVILLE, MARYLAND

The meeting convened at the Nuclear Regulatory Commission, Two White Flint North, Room T-2B3, 11545 Rockville Pike, at 8:30 a.m., Michael T. Ryan, Chair, presiding.

COMMITTEE MEMBERS PRESENT:

MICHAEL T. RYAN Chairman

ALLEN G. CROFF Vice-Chair

JOHN T. LARKINS Executive Director

JAMES H. CLARKE Member

WILLIAM J. HINZEMember

RUTH F. WEINER Member

ACNW STAFF PRESENT:

ANTONIO DIAS

LATIF S. HAMDAN

MICHAEL P. LEE

DEREK WIDMAYER

NRC STAFF PRESENT:

DON COOL	NMSS
VINCE HOLAHAN	RES
ABY MOHSENI	NMSS
JACK STROSMIDER	NMSS

ALSO PRESENT:

FRANK PERRY	LANL

I N D E X

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P R O C E E D I N G S

8:33 A.M.

CHAIRMAN RYAN: I'm going to ask everyone to come to order, please.

This is the first day of the 172nd meeting of the Advisory Committee on Nuclear Waste.

During today's meeting, the Committee will consider the following: U.S. Department of Energy briefing on exploratory drilling of aeromagnetic anomalies in the Yucca Mountain region; NRC Staff review of revised International Commission on Radiological Protection recommendations; an exchange of information between NMSS management and ACNW Members. We will also discuss drafts of ACNW letters and reports.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act.

Neil Coleman is the Designated Federal Official for today's session.

We have received no written comments or requests for time to make oral statements from members of the public regarding today's session. Should anyone wish to address the Committee, please make your wishes known to one of the Committee's staff.

It is requested that speakers use one of the microphones, identify themselves, and speak with sufficient clarity and volume so that they can be readily heard. And it's also requested that if you have cell phones or pagers, that you kindly turn them off.

I'll also ask that visitors to the Committee and to the meeting sign in on the respective sheets for NRC Staff and for outside visitors on the pole behind me.

Without further ado, I'll turn over this first session to Professor Clarke, who is going to lead us in the update of drilling of aeromagnetic anomalies at Yucca Mountain.

MEMBER HINZE: Yes, Mr. Croff. Excuse me.

(Laughter.)

Thank you, Dr. Ryan.

CHAIRMAN RYAN: Is that right? It's early.

MEMBER HINZE: It's early and it's Monday morning.

Again, thank you, Dr. Ryan. It's my privilege to welcome to the Committee Dr. Frank Perry of the Los Alamos National Laboratory. Dr. Perry has been in charge of some of the consequence work

associated with igneous activity at Yucca Mountain and has been particularly concerned recently with the drilling on the magnetic anomalies that were identified in the recent high resolution, high sensitivity aeromagnetic survey.

This aeromagnetic survey is one of the bases for the probabilistic volcanic hazard analysis update and with that, I will turn it over to Frank and ask him if he will please give us something on the status and interpretation of the drilling and the aeromagnetic survey.

MR. PERRY: Am I mic'd? I'm not sure if I'm supposed to have one.

All right, okay. First, I'd like to thank you for inviting me. It's been, I can't remember, 10 or 12 years, probably the early '90s since we were back here in any capacity talking to the Panel.

It's a good start. I dropped my laser. So I'm Frank Perry. I'm the overall PI for the aeromagnetic drilling program. I wanted to say right off the bat if there's any questions that exceeds my technical capability to answer in terms of the geophysics which involves the aeromag, Allen Cogbill of Los Alamos is the geophysicist on the project. I'm a geologist, volcanologist. So if there are any

questions I can't answer in that realm, please get them to me by email or whatever mechanism and we'll make sure that you get an answer.

Also, I want to mention that the USGS, Robert Fleck and NLO is providing the potassium argon and argon/argon data. We have completed the first round of dating the salts that we've encountered in the drill holes. And also, I want to mention that Rick Kelley has done a lot of GIS that you'll see here today.

So what I'm going to talk about is really an integration and we think both are equally important, both the aeromagnetic survey and the drilling. And these are integrated very beautifully in our minds and kind of exceeded our expectations.

So here you have a representation of the survey and the drilling. And we think that between these two techniques we now have a really good understanding of what's going on in the basins around Yucca Mountain in terms of buried volcanic rocks.

I think the mouse is not the way to go. Okay, so these -- as Bill Hinze mentioned, these results are the primary data, kind of the driver that's supported an update to the 1996 probabilistic volcanic hazard analysis which is going on now. This

is called PVHA-U. In fact, this afternoon I'm flying to Oakland and the first elicitation interviews start this week. And they'll go this week, next week and then a week in August. That will be the first round through the Panel Members.

This information, of course, provides data on the location and age of buried basalts, lengths of vent alignments which is important in probability models. And somewhat unexpected, unanticipated data for us was it's providing information on dike azimuths and lengths which is not something we planned for, but it's welcome data.

There's other data available since the last PVHA in 1996, including geologic mapping, tectonic models, crustal strain measurements, teleseismic data. These also support the update to the PVHA. So it's not just this data I'm showing you. It's a wide variety of geologic and geophysical data that's become available since 1996.

Okay, this is an overview of Yucca Mountain and the basalts around it, the basins and the problem that we're trying to solve. So this is actually looking to the south. This is Death Valley back here. This is the Yucca Mountain crest, Crater Flat, Jackass Flats. So you have a number of basalts

of different ages around the mountain, starting the oldest, Miocene basalts over here in Jackass Flat, also in Southern Crater Flat.

We know there are buried miocene basalts in Western Crater Flat from a drill hole BH2 drilled in the mid-'90s about here or the mid-'80s, sorry. Also, Pliocene basalts erupted between -- well, in this area they're only 3.7 to 3.8 million years old. These are eroded remnants down in here.

Also from a 1991 wildcat well over in this area, there's a buried basalt about 100 meters down that correlates in age to this basalt. So that's one magnetic anomaly that had been known for a long time that, in fact, is buried basalt.

Then you have the catenary basalts, the million year basalts aligned right here, these four cones. And then the youngest volcano, lathrop well at the south end of Yucca Mountain at 80,000 years old.

So we know, we have the surface volcanics. We know there's some unknown number of buried volcanics and depending on the age and location of those, the question is to what extent does what information on the location and age of these buried volcanos impact new probability estimates.

Background. In 1997, the PEHA,

probability estimate depended heavily on the distribution of known post-Miocene volcanism. So these are 3.7 million year old. These are post-5 million year old basalts and you can see there to the southwest, south and west of the repository. This heavily influenced spatial models.

At that time, in 1996, it was known that there was a number of anomalies recognized that were thought to represent basalt. This is the one I mentioned that had been drilled by '91 and dated at 3.8 million years. But there's a number of other ones that were thought with various degrees of confidence to represent basalt, but we didn't know the age.

Since 1990 -- so basically, this is the situation in 1996. The PVHA at that time, this is their spatial event frequency that they determined based on the distribution of these buried basalts and the surface basalts, so it reflects the probability contours of the frequency of an event occurring.

So the highest frequency is, of course, to this area to the southwest and basically, it's all -- it encompasses both these buried and surface basalts. So as you go to the east, there's lesser probability. There actually is a value of 10^{-10} that covers the whole rest of the field, so it doesn't stop at 10^{-9}

here.

So the other thing that happened since the PVHA, there's a number of ground surveys by the Center and also the 1999 USGS regional aeromagnetic survey that was sort of a medium resolution survey. That identified a number of other anomalies, quite a few 15 or 18 or so which created concern in the project and with the NRC about how well do we really have these things characterized in terms of how many are basalts and what's the age distribution.

One thing we noted when this data became available that these pretty much fill in the same area that encompasses the area of surface volcanics and these earlier known buried basalts or anomalies inferred to be buried basalts. So I thought when we first saw this data is it really wouldn't change the probability estimates too much if these were taken into account because they occur in the same area. But the big unknown was we really didn't know the age. If these happened to be catenary-buried basalts it would have a different impact.

The exception -- so the big exception to these things falling into this area is the 1999 aeromagnetic survey showed an area in Jackass Flats that was fairly complex in terms of magnetic

anomalies. So it brought up the question that there could be buried basalts to the east of Yucca Mountain and Jackass Flats.

These fall outside of the highest density for volcanic event frequency and if there truly were buried basalts post-5 million, we knew - -we know that there's Miocene basalts, for instance, at Little Skull Mountain, but if there were younger, buried basalts in the basin, that would have the potential to dramatically or to some extent change these probability contours in terms of where the event frequency is and likely shift them off to the east.

And it's not too hard to imagine that that would increase the probability of an event if everything shifted east at the repository site.

So that's kind of the background of what, as we went into this new survey, this is what we were looking at, the known anomalies at the time and the problem that we wanted to improve understanding of.

This, I've already said in the first two bullets really, but the main thing to stress is the last bullet. Of course, the drilling program addresses spatial and temporal models, but again, the surprise, which I'll talk about some more is it also gets the characteristics, particularly the azimuth, we

believe, of feeder dikes, which is an important problem.

Let me go back one.

(Pause.)

It's hard for me to see from where I am. I guess it's hard for you to see there too. I guess it's pretty much buried, covers the existing volcanos. But for instance, if you have a volcano, a new volcano that forms somewhere to the southwest of Yucca Mountain, and the dike, the azimuth of the feeder dike is oriented to the northeast which was pretty much the case in the 1996 PVHA because that follows the regional stress field and also follows the line of cones, a dike like that is more likely to intersect a repository when it forms an area down here than a dike that's north-south or some other direction. So any data that bears on the azimuth of a dike is important to probability models. I think we have data that gives a different picture than what we had before.

Okay, this is the design of the survey. The idea was to do a very high resolution survey to optimize detection of any features within the survey area including hopefully dikes if they were close enough to the surface and in the right host rock. But the boundaries of the survey were designed to

encompass the main populations and alignments of new anomalies.

So for instance, this group of anomalies in Northern Crater Flat which is pretty close to the repository; alignments down here which have implications for vent alignment length and potentially line with the one million year volcanos in Crater Flat; another alignment down in this area; and of course, this important area over in Jackass Flats to see if we could detect anything to the east of Yucca Mountain.

This is a summary of the survey. In a lot of talks I don't like showing this because it's just this huge amount of data and at this scale it's not really showing you the things we're interested in. So sometimes there's really not a lot to say about it, but you see the major, these linear anomalies that form the major or represent the major faults in the Yucca Mountain block. This is the solitary of canyon fault.

The basalts show up well. These are the million year volcanics. They have this strange, short wavelength model pattern which people have noted. If you go to the 3.7, the surface expression is in here, but you can see this model pattern extend over to

areas like this and if the salts are buried shallowly in that, you can still pick up this pattern, so it's diagnostic in terms of looking for very shallowly buried basalts.

This is actually a lead-in to -- okay, it's a very high resolution survey and it's got continuous coverage. So it's very different than a ground survey. There you've got high resolution, but you've got very discontinuous patches, so it's very hard to put anything into context. Or you have more regional surveys at lower resolution and you just can't see detail. And this has been really helpful to us, this combination, to in terms of interpreting faulted tuff versus basalt, relationship between faulting and volcanic features.

And I'll admit, the reason I really bring this up is there's a couple of cases that I'll bring up where some anomalies from the '99 survey have been modeled as basalt. Before we drilled them, we predicted they would be tuff. And it's not that we were better scientists than the people that thought they were basalts and were modeling them that way, it's that we had the advantage of a much better survey.

So it's a lot easier to see the context

these are in to compare it to other faulted areas that were similar and to draw the conclusion that it probably represented tuff and then in most cases the drilling confirmed that.

So we did have a formal criteria for selecting drill sites. One was the location. As we felt it impacted probability estimates, for instance, the distance from the repository or the impact on the vent lengths, we wanted to sample each major cluster or alignment of anomalies. We wanted to sample a potential range of ages to get an idea what is the full range of ages that are buried and do we get anything in the catenary, that type of thing.

And these differences were based, pre-drilling, were based on looking at differences in estimated burial depth or magnetic polarity. So if you have two anomalies adjacent to each other with different magnetic polarities, they've got to be different ages. So those are the type of things we wanted to explore.

And then a balance of high confidence versus low confidence anomalies which really comes down to is it basalt or tuff? Tuff is magnetic too, so any time you see an anomaly the question is, is it a basalt that matters or a tuff that doesn't matter?

Here's an example of the selection criteria. These are some modeling profiles taken from a publication, USGS Open File Report from O'Leary 2002. This is based on the 1999 survey. So here, for instance, there are two anomalies close to each other, a shallower one and a deeper one with two different polarities. So obviously, they must represent different ages. So these are two things we wanted to drill. We were really trying to get the whole -- sample the entire age distribution.

Now before we drill we predicted that this would not be basalt. It would be tuff, based on some fault relationships. And that turned out to be the case and I'll show you that in the next few slides. This is south of lathrop wells cone. Another area south of Seas Pass, there's an alignment of anomalies which potentially could be an alignment of volcanic vents. The main reason we drilled anomaly O is because it was the most shallowly modeled, the depths of the anomaly was the most shallowly modeled. It was about 50 meters.

So using depths of burial approximately for age, this potentially was the youngest anomaly in the area.

A summary of the drilling program, we

completed seven drill holes. Two are in Crater Flat, one in northern Crater Flat. They're all shown by the white circles; one in southern Crater Flat, at anomaly A which is of great interest because it's a positive anomaly and all the other volcanics in Crater Flat of different ages are reversely magnetized.

Of these seven holes, we've penetrated basalt in four of the holes at depths ranging from 80 to 150 meters. We specifically targeted tuff in three cases or what we thought was tuff. Two of these had been modeled as basalt to test alternative interpretations of what the anomalies represent. Again, the goal is to improve our understanding of both the age and location of basalts in this area.

This is a summary of -- before I kind of walk through each anomaly that we drilled, this is a summary of the age-dating results which we got -- which were completed about a month ago. We don't think these are going to change. Some of these are potassium argon. Some are argon argon and they will fill in the potassium argon results with argon argon, but we're confident that these results really aren't going to change.

Just going from sort of counter-clockwise, the oldest that we dated was in northern Crater Flat

and we think age is 11.1. This is an argon argon age on biotite. We had predicted from cartography that this would be about 11 million years old. I'll go through that in just a minute.

In southern crater flat an age that doesn't correspond to anything else we know in this particular region, a small basaltic body at anomaly A comes out at about 10.1 million. These are both argon argon. And these will be the final dates. These are on, actually on high potassium sanidine within differentiated veins within this mafic body.

Anomaly O turned out to be tuff. I'll talk about. Anomaly I - -this is modeled as basalt. Also anomaly I modeled as basalt. It turned out to be tuff.

The youngest basalt that we encountered and dated is here at anomaly G. This is the northernmost of three aligned anomalies. It comes out with a mean of about 3.8, two dates of 3.7 and 4. This corresponds in age to the 3.75 million year old basalts up in southeastern Crater Flat. And also buried basalt from these two drill holes that we call anomaly B that has a date of 3.85. So it looks like a cluster of events at three locations, here, here and up here.

Then in Jackass Flat, the only hole that we didn't actually hit bedrock, either basalt or tuff, we finished in alluvium, but I'll go through the argument as far as we think this represents tuff. And the last one of basalt, we hit it about 80 meters that's 9.4 million years old. We predicted that this correlated with the basalt hid down here in the Nye County hole at 23P that had been dated at 9.5 million years old. So this was as we expected.

Feel free to ask any questions when any come to mind.

So I'll just kind of walk through the --

MEMBER HINZE: Since you've got that one up, let me ask you the question. You've talked about this first round of age dating. What is going to be the second round and when will you have that and why are you performing that second one?

MR. PERRY: Well, there's two other -- there's three dating tasks we're doing. One is the basalts we drilled and that's largely done, except we will go back. You can see some of these -- this, for instance, is potassium argon and a little bit more on a higher uncertainty. We'll go back and try to do argon argon on this one. This one down here, and basically leave these two alone because we have argon

argon on both of these. And we're confident in those.

Because of correlation, we think this right on, but we'd like to just get the air down and have consistent argon argon data on all of them. So for here, it's really just cleaning up a couple of samples to make sure we have consistent data.

There's two other --

MEMBER HINZE: Excuse me, but you are also doing some further age dating on the exposed volcanic --

MR. PERRY: Right, that's what I was going to mention. Two other things we're doing is we've resampled pretty much all Jackass Flat and no other places, because we wanted -- some of these dates are very poorly known on the Miocene basalts because they were last dated in the mid-80s by potassium argon.

So we felt we needed to get some modern dates for correlation purposes and this was really started before the drilling. And since things have fallen out so well that's a little less important, but we anticipated to correlate with surface volcanics, things that had been faulted and are both exposed at the surface and subsurface. You need dates for correlation. So we have about four sites in Jackass Flats where we're waiting on argon argon dates.

And then the third is to redate these catenary one million year old basalts. There's been a constant uncertainty ever since the '96 PVHA about how many volcanic episodes those actually represent. Are they four separate episodes? Did they all erupt at once or very close in time?

So they were last dated about 10 years ago by argon argon. We're trying to see if 10 years later with better equipment and hopefully a little better precision is there any way to separate -- can we see any separation ages between these four centers. And all these dates will be done by probably the end of September. So that will wrap up the entire dating exercise.

Okay, now I'll try to quickly walk through these separate anomalies. Anomaly Q in northern Crater Flat, this is Black Cone and Northern Cone. Encountered basalt at 140 meters. Turned out to be four lava flows. They underlie this very stratographically characteristic Paleozoic dolomite and quartzite which represents slide blocks off of Bear Mountain. That same sequence is seen in gauge 2 which had been dated 11.3 million years. So we knew that this was basically the same basalt sequence as VH2, so we pretty much knew it was an 11 million year

old basalt. That's been confirmed by the argon argon date.

We extrapolate -- one thing we -- as we tried to pick populations, if we characterize one anomaly in a population and all the other anomalies around it have the same characteristics, we extrapolate those results to say the other anomalies represent the same thing. So in this case, you can see Q is a negative anomaly. Has very similar characteristics to 4 and R and also T which we know is the 11 million year old basalt.

So we don't feel too -- like we're making too large a leap to say that R and 4 represent the same basalt at 11 million years old. So this way we can start accounting for as many anomalies as we can. And we try not to make too large a leap, but we don't think we are.

Back up. One thing you'll notice on this is a strong north-south lineation of these -- well, these linear anomalies. A couple that project from Black Cone. Some are at Makani. These are noticed already from a ground survey that the Center did back in the late '90s.

Now we see this at Black Cone, so it's very tempting to say that these are faults associated

with the volcanos. And so there's this very striking north-south grain between Black Cone and Northern Cone.

One thing we noticed from analog studies of a number of eroded centers in the region, trying to get vent characteristics, looking at the plumbing style and the characteristics of the plumbing is that every dike we observe in the region occupies or is intruded a normal fault plane. So this is at Paiute Ridge on the northeast part of the test site. This is a dike, basaltic dike coming up intruding tuff and it stops actually right here. This particular dike segment doesn't reach the surface, but it's intruding a normal fault plane and the fault, you can see, is right through here. There's another major fault over here. But this is what we see in every site we look at that these dikes are intruding faults.

So if that's true, going back to Black Cone and Makani, if we see what we interpret as a fault here at Black Cone, we make the further interpretation that the feeder dike that fed Black Cone, you know may have intruded one of these faults which tells us about the dike azimuth. That means this dike was oriented north-south. We see the same thing in Makani Cone. In Makani, we have direct -- so

what we've done is taken this, interpreted it over here, basically on a DEM, so this is just all the faults we see here in the subsurface and these shallow alluvium we put over here.

So we see a couple of dikes through Makani Cone, these that lead out from the north end of Black Cone. At Makani we see the fissure which is north-south on the eastern side of the volcano and so we can see a direct correspondence there between the fissure zone and the underlying fault from the aeromag.

We also -- we know -- we also have exposed dikes at 3.7 centers down here in southeastern Crater Flat and these dikes parallel exactly this trend of these set of faults in this area.

So this gives us -- we take this as information about dike azimuth in this region, that the dikes associated with these catenary cones are north-south and that's -- that differs from the previous model that the connecting -- that dikes connected these cones and they're northeast oriented. So I mention the northeast dikes versus north-south or northwest trending dikes. So we think this is an important outcome that really uses the aeromag data quite a bit.

Okay, anomaly A, we're now moving just

further south in Crater Flat. This is just south of Little Cone. It was very interesting because it's the only positive anomaly in Crater Flat. It turns out to be a basanite which is basically a low silica basalt. It's about 42 percent silica. It's a composition that we haven't seen previously in the Yucca Mountain region. I don't think there's terrible significance to that, but it's a curiosity.

It's large enough, cooled slowly enough that it contains different shaded veins of what we call "mafic pegmatite". We have a whole rock composition now of that material that's about 48 percent, SIO2. So it's still basaltic, but much more evolved than the 42 percent mafic host rock.

What's interesting about A is there's no apparent flow features associated with where there are with all the other basalts we've hit. And it's 60 meters thick, so this thickness which is thicker than any basalt body we know of, I believe, in the region, along with a very limited extent, it's only a couple of kilometers across, suggests to us that it might be an intrusion, an intrusive sill and we see sills of this same size order at Paiute Ridge where we see two or three sills up in the northeastern test site. So if it is a sill, it's not the first sill we've known

of in the Yucca Mountain region.

Now we're backing out a little bit. This is A and now we're looking at this alignment. This is the alignment that was modeled as basaltic vents. We drilled the shallowest one, O. Turned out to be tuff. Actually, Bullfrog Tuff at the base. It does have the right magnetic characteristics to produce these anomalies.

Again, by extrapolation, we -- since all these anomalies look like they share the same magnetic characteristics, we infer that all of these, in fact, represent faulted bullfrog member. And one thing we see, if you look at -- you see faults in here where this tuff is broken up. You see like a bleak meetings of faults. You see that same pattern repeated up in the Yucca Mountain block along with northwest trending faults which you see in the block. So just by comparison of the pattern of faulting before we drilled this, we had a feeling this was tuff. That turned out to be the case, so --

MEMBER HINZE: While you have that up there, can I ask you a question?

The drilling seems to be on the inflection point of the magnetic anomaly. Was there any investigation of the sediments that were drilled to

determine whether there were any remnants of basaltic rocks in the sediments that might indicate a nearby basaltic body?

MR. PERRY: We would have noted anything like that and I think without exception there was really not -- except for very rare -- there's really no basalt in the overlying sediment. Does that -- anything about bolders?

MEMBER HINZE: Yes, class that you would expect some kind of materials to be picked up in the sediments immediately overlying or adjacent. And I was just wondering since this was drilled on the inflection of the anomaly, whether this might -- whether there might be any evidence of a nearby basalt in the sediments that were drilled?

MR. PERRY: Not here at all. I mean there were -- I can't remember exactly, but there were a few other cases in the drill hole where we would see some basalt fragments, but not at this drill hole.

MEMBER HINZE: Thank you.

MR. PERRY: So now we're stepping to the east. This is lathrop wells. There's a set of anomalies to the south of there. Anomaly G we drilled because it's the northern most of this alignment. We believe that whatever this represented was -- would be

the same as F and H because of the magnetic similarity, we see and because they're aligned.

G turned out to be 3.8 million years old, as I mentioned. So this is actually the youngest drilled basalt that we've encountered. So it corresponds in age to the 3.7 million year old basalts up in southeastern Crater Flat and also anomaly B which is off to the east a little bit.

It's unique in that it has -- the next slide will show, it has 10 percent hornblende. Hornblende has only been seen as very rare phase in a few of the catenary basalts. And here's a core photo. So all the black, dark gray crystals are hornblende. So it's pretty rich. It's about 10 percent. These aren't rare. In the other cases, you could literally collect a pick-up load full of rock to find one hornblende crystal and I personally have seen it in a few places, so it's kind of neat to see.

This assemblage, interestingly enough, Nicholas and Rutherford took some samples from Little Cone and lathrop wells and did some experiments a couple of years ago and reproduced at high water pressure and low temperature, about 950 degrees, somewhere in that area, they produced this assemblage. It's only olivine and hornblende. And these sort of

rusty crystals, they're hard for me to see right now. They represent about 3 percent olivine. So there's no plagioclase or pyridoxine in the phenocryst crystal assemblage.

So what they reproduced experimentally seems to be right on with what is in this rock. To us, that indicates rapid ascent from depth at conditions of high P_{H20} and without a chance to really reequillibrate and lose these hornblende crystals.

So it may be in the history of all these rocks hornblende is a common phase of depth, but it's rarely preserved because we see remnants of it in a few caternative basalts and this is the only basalt we see abundantly.

Okay, moving, going closer to lathrop wells, anomaly I had been modeled as basalt. This is the one that was deeper and different magnetization from G. So potentially a different age. Once we got the higher resolution survey, we noted the detail in the anomaly that there's a linear anomaly associated with it to the northwest and also one here. These seem to mimic the outcrop patterns in the tuff of the faults. So we interpret this as a faulted tuff block and that's, in fact, what it turned out to be. We hit tuff at 163 meters.

The other interesting thing though is that this fault that we incur here traces right up into lathrop wells and it's always been curious to anyone who's worked at lathrop wells, why the cone is oriented to the northwest and it's elongate. So if you do the same fault interpretation from this data and put it over here on the DEM, this is the faults we see in the subsurface, so here's the fault that extends from anomaly I. There's other faults that are northwest, north-northwest oriented, north of lathrop wells. So it's tempting to think that the fissure somehow goes through the cone.

As they've quarried the cone over the last few years, they've exposed right down in this part of the quarry, a very highly welded body that they can't bulldoze and it's the hardest body within the cone. So we toyed with that for a while and finally said well, what if that represents part of the fissure because it's so welded? So if you just take that point, connect it to the center of the crater which will then represent two lines on a fissure, you get an orientation that's exactly this and we think that's pretty consistent. It's north seven west and basically consistent with the lathrop wells fissure being oriented that way and being controlled by north-

northwest trending faults.

This is very similar to the example of Black Cone and Northern Cone.

Okay, we're down to the last two anomalies. JF-5 is here. We're now in Jackass Flat. Busted Butte is, you can just see the edge of it over here. This is Fortymile Wash coming down here. All the drill holes along Fortymile Wash.

JF-5, we predicted was a faulted, downfaulted buried miocene basalt because there's an outcrop of miocene basalt right here. It's pretty evident in the aeromag that there's a north trending fault up through this area. So the simplest explanation was that this is just a downfaulted piece of this outcrop and so we drilled it here. It's 9.4 million years old. We're redating this, but it has an existing potassium argon date from the mid-'80s of 9.6 million years old. So we're confident in that interpretation.

At 23P, basalt was hit at 400 meters and that's been dated at 9.5 million two or three years ago by the USGS. So we think this whole positive anomaly that runs north-south through Jackass Flat represents one large basaltic body, a lava flow. And it's been progressively down-faulted. We can see

these faults that are sort of northwest trending, through here. It's progressively downfaulting into deeper parts of the basin.

JF-6 is the Bill Hinze anomaly.

(Laughter.)

And Bill suggested in one of our earlier meetings that we drill this because it's one of the few --

MEMBER HINZE: Thanks a lot.

(Laughter.)

MR. PERRY: We're happy we did. It's one of the few reversed anomalies that has any kind of real form in Jackass Flat.

So we drilled it. This ended at alluvium at 196 meters. We kept going down and down. Eventually ran into some pretty severe drilling problems with water loss and decided at that point to call it. What we think is going on, if you look at this associated anomaly here which we interpret as a fault, the mine mountain fault comes through here which merges into the gravity fault, we believe.

We think these anomalies are an expression of the same type of fault pattern we see in other places, so that this anomaly really represents faulted tuffed depth. And in a lot of these, as the signal is

dampened, with depth, they start to look circular in that type of thing.

Nearby drill holes, J-12, there's one not shown here, JF-3, have penetrated tuff or tuff colluvium at less than 150 meters. So around this anomaly there is tuff and we just don't think we could get deep enough to actually hit it. So we interpret this as due to tuff, probably a fault that runs to the northeast and a fault here to the northwest. And the other factor is if we had hit basalt, if somehow there is basalt at 200 meters, that's deep enough where it almost has to be miocene, based on our experience with the depths we're hitting these other basalts.

As we work through this in a couple of workshops with the expert panel, they suggested other potential anomalies in Jackass Flat that could represent basalt. So this is Fortymile Wash, this feature here. This is Busted Butte, with all the faults through it. Anomaly X, if I go back a slide, is here on this feature that we infer is mainly due to faulting of tuff. It's modeled at a depth of 300 meters, so it's a deep source. There's a drill hole just to the west of it, about one kilometer. It encountered tuff at 240 to 365 meters.

So again, we interpret because it lies

along this feature, that it is faulted tuff and even if -- there is air in the source depth estimates, but given even a lot of air on that it's deep enough that even if it were basalt, it's got to be one of these 9 million or 10 million year old basalts.

Z and Y, real quickly, if we go over here, back to the fault interpretations, the yellow circle is actually the center of the anomaly. This one, we think, represents the end of a fault. It's an extension of a bedrock fault that you can see in the bedrock and basically represents the tip. Y is centered, actually partly on bedrock. You can see the bedrock feature here. So we've looked at several other anomalies in Jackass Flat that we didn't drill and interpret all those as being due to tuff.

This is the merging of the project data set and the 1999 data set, particularly to the south. We've looked at those to consider other anomalies that lie outside of our survey area. Of particular interest were these two anomalies down here, C and D; one, because they represent very clearly defined anomalies that probably do represent basalt. Two, there's a drill hole from a water well from the 1960s that encountered basalt at the bottom of the hole, went through nine meters of basalt and then stopped.

There's no data on that basalt in terms of age or any magnetic properties.

So one way we're trying to estimate age is of things we haven't drilled is to look at what we've learned so far and then apply that. So within -- these boundaries represent the western and eastern edge of the Amargosa Trough which is a graven-like structure that goes through here.

So if we look at drill holes that we have data where the bottom of the basalt flow is so we can estimate and we know the age, we know the depth. We can then estimate burial rates. These four holes that fall within the Amargosa Trough, 23-P; two holes at 3.8 million anomaly B; and the new hole at the 3.8 million anomaly G. Those four holes give a calculated burial rate from .039 to .043 millimeters per year which is varies by 10 percent.

So across this region right here, there's not that much variation in burial rate. So the idea is to then take that rate down here where we know the depth of at least part of the basalt and estimate an age.

This is a blow up of that area. So this is the hole where basalt was encountered at 178 meters. We don't know the depth of the base, but we

can make assumptions about a minimum and a maximum flow base thickness and apply those burial rates from the previous slide.

If we use the range that encompasses those calculated values, that gives an age range of these two anomalies between 4.2 and 5.8 million years. We're still trying to work out where this basalt belongs because it's not clearly on either anomaly. We don't know magnetic properties, so we don't know if it's reversed or normal and that would help constrain the age because within this range of 4.2 to 5.8, there's about four polarity reversals in the magnetic record.

Just for interest, there's one other anomaly over here that we really hadn't recognized until the last year at drill hole MSHC. They encountered basalt at 149 meters and it was dated by the survey in the late 1990s at 9.6 million.

Okay, this is essentially the last slide. This is a summary, a synthesis basically of everything we've learned from both the aeromag and the drilling. So what you're seeing, these large green patterns and pink patterns represent buried basalt constrained in location and age by the drilling and aeromag program. So we hit four basalts. In the new drill holes, these

represent four different basalt units erupted between 11 and 3.8. The youngest is at 3.8 down here, which correlates in age with this basalt body here and also the surface and buried basalts in southeastern Crater Flat.

So there was this episode at around that time that produced several locations of eruption at about 3.8 million years ago.

There's extensive buried basalts in both Crater Flat and Jackass. We knew that partly from age 2 in the mid-'80s that hit 30 years of basalt, about 330 meters down. We've now hit that in queue and we've correlated that to an outcrop down here. So a lot of 11 million year old basalt in western Crater Flat. In Jackass, we have a very extensive 9.5 million year old basalt that's been now encountered in three drill holes and we have good age correlation at those holes and also petrologic correlation.

The important thing in terms of hazards is there's a fair amount of number of drill holes now in Jackass Flat, including all these along the western margin, along Fortymile Wash. None of these have hit basalt, including the hole we drilled where we ended in alluvium right there. But where we have hit basalt is this 9.5 million year old unit. So there's no

evidence from the aeromag or from any drilling that there's anything in Jackass Flat younger than 9.5 million years old.

So in terms of hazard studies, that's an important feature because almost anyone that looks at probability models looks at heavily waste the last five million years, the catenary and the pliocene. So those don't exist over here as far as we know. They exist to the southwest and west of Yucca Mountain.

So that's probably the most important single outcome of this whole drilling and aeromag program. And then this last bullet, you know something we didn't anticipate is that we see a lot of these cases, lathrop wells, the 3.7 which fits a pattern we didn't know was bigger than that and Black Cone and Makani where it looks like the feeder dikes are oriented more north-south than to the northeast.

As far as remaining work, we need to do final age determinations, as I've mentioned, and geochemistry from both subsurface and surface basalts. We need to take the information we've learned and model depth thickness and volume of undrilled anomalies. We are doing that now and once we have that information, we can estimate, do better estimates of age of the undrilled anomalies.

And finally, well, for our use but of course the PVHA will use this in their probability estimates. But then we need to integrate all these new results with the existing knowledge of the volcanic framework of the Yucca Mountain region. And that type of information is being presented to the Panel as they go through their elucidations and estimates.

MEMBER HINZE: Thank you very much, Frank. We have a few moments and let's open it up to some questions. Allen?

VICE-CHAIRMAN CROFF: At the outset, you mentioned the whole function of this data-gathering exercise was to relate back to models, I guess. And I'm a little bit unclear what kind of models you're talking about. Are you talking about conceptual models or mathematical models?

MR. PERRY: Both. When the conceptual models are for where does volcanism occur? Would an expert just look at where it has occurred? You know, in that case their conceptual model would be that they would expect renewed volcanism somewhere in a region like this.

Other data that can change the conceptual model would be if they knew from strain data or some

gravity signatures or tomography, that something was going on in say Jackass Flat that would lead them to think there's a potential for volcanism there. Their conceptual model would reflect that.

It would allow for volcanism in an area other than where it has already occurred. The mathematical models, given that say you have a model that predicts, or your conceptual model is that it's going to occur somewhere in this region. There's various mathematical models which are spatial density models. Like there's a bivariant Gaussian model which basically fits the volcanos and then there's a probability fall off with distance away from the centroid in the density function.

There's some models just have zones, where you have uniform rates within that zone. There are kernel models which cluster the separate events and then the density falls off, the probability density as you move away from those clusters. So those, except for the source zones, the kernel models and the bivariant Gaussian models, they never go to zero as you move away from an area you think volcanism is going to occur.

The highest density, or the highest probability of new formation, for instance, would be

in this area but it would tail off to a non-zero value as you move away from that area. So they are both conceptual and mathematical models.

VICE-CHAIRMAN CROFF: Okay, and a second question. With everything you have seen in this new campaign, which direction will that tend to drag the probabilities, up or down?

MR. PERRY: Well, I wondered if someone would ask that. I thought maybe I should just leave that to the Panel because it really is the job of the Panel. You know, if you look at certain data, you would predict one way or another. But they are looking at a very large range of data. Not just this, but gravity, tomography, structural data. And blending that all together, I don't want to stand here and say that. I would -- it's their job to come up with a probability estimate and I think it is wise for me to just wait for their outcome.

VICE-CHAIRMAN CROFF: Okay, thanks. Dr. Ryan?

CHAIRMAN RYAN: That took care of my question.

MEMBER HINZE: Okay, Ruth?

MEMBER WEINER: You just raised a question -- by the way, I want to thank you for a very

interesting presentation.

Are there inconsistencies that you see right now between the data that you have here and other data that has been collected by other means?

MR. PERRY: I don't believe so. I think this actually meshes sort of beautifully into a framework that has been evolving over the last few years. It's very rather satisfying in that way.

MEMBER HINZE: Dr. Clarke?

MEMBER CLARKE: Thanks, Frank. I think we all are probably going to ask you that question that Allen asked, so I won't do it again.

And Bill, it is good to hear that you have yet another anomaly. That's good news.

(Laughter.)

MEMBER HINZE: I won't ask about the others.

VICE-CHAIRMAN CROFF: The caldera from the volcano that formed Yucca Mountain is to the northeast, is there?

MR. PERRY: The edge of that is actually right up in here. That's the caldera wall.

MEMBER CLARKE: I was just curious about one just very basic question, but I can see how you could use the information to come up with relative

ages of basalt, the actual quantification. You mentioned the depositional rate. Is there isotopic analysis or anything else that's done to confirm that? How do you come up with an actual age?

MR. PERRY: Using argon argon isotopes. I mean, you have to have the sample. So if we don't have a sample, then undrilled then we can only do things like burial rates or those types of inferential things. But if we have the sample, we use isotopic techniques, argon argon to do the analysis.

MEMBER CLARKE: Thank you.

MEMBER HINZE: Well, a few questions, Frank. You haven't mentioned the magnetic properties of basalts that you have drilled. DO you have any results on those, either the remanent or the induced?

MR. PERRY: The remnants being measured by Wayne Champion in concert with the work that Bob Fleck is doing at Menlo, using the same samples that we're dating. So that's going to be used by Allen Cogbill to help, you know, more precisely model depth. Because we'll have actual magnetic properties on a range of basalts. And we'll see what the variability is and use that information as best we can to model other anomalies that we haven't drilled.

MEMBER HINZE: So you don't have the

magnetic properties of the basenite on anomaly A?

MR. PERRY: I believe we have it, but I don't -- it's not in my head.

MEMBER HINZE: Is that basenite a possibility that that was residual in the crust, resided in the crust for a period of time and then was extruded up to the surface as a sill? Is that a -- what is the significance of that?

MR. PERRY: It's in alluvium. I mean we went to 150 meters of alluvium basin fill.

MEMBER HINZE: But it's quite differentiated.

MR. PERRY: Parts of it are, about 1 percent -- 99 percent of it is this very mafid basensite. One percent is differentiated veins of more silicic material.

What happened at depth below that is a part of history we just don't know. We actually -- we had to stop for safety reasons. As soon as we hit the bottom of that body, the water was completely lost and the ground actually started caving, so we had to immediately suspend. But we were hoping to go through that anomaly and a couple of things, one, test whether we would then go through the older 11.3 and we really wanted to just go down further and see what all was

below that body and we couldn't. We had to stop right at the contact.

MEMBER HINZE: You mentioned the significance of the feeder dikes and the use of the magnetics for the azimuth.

What about the length? The length of these dikes are very important and it's something you've mentioned. How are you getting at the length of the dikes?

MR. PERRY: A couple of ways. One is a bit of an inference. If you're someone that likes to model where this alignment of cones is connected by a dike, then you have a very long dike. It's 11 kilometers. If instead each is fed by a separate say north trending dike, they're -- one, they're not required to be as long. They can be much shorter. The other thing is we don't -- we've run tests of what would be detectable in the alluvium. Allen has completed this recently and provided it to the Panel.

If there is a dike within the alluvium, say in the upper 250 meters between cones and not underneath the flows, you should be able to detect that. The dike we couldn't detect is Solitairo Canyon which is in tuff and the widest we've seen it is about 50 centimeters.

So we don't think it's typical of a feeder dike which you'd expect to be more like three or four meters or at least two meters. So this very thin dike that we couldn't detect was up here.

We would expect to be able to detect dikes in the alluvium as deep as 250 meters. The conclusion from that is that these are -- and they fit the style of volcanism in the volume -- is that very short feeder dikes in the shallow surface fed these volcanos, these small volume catenary. And the cone apron covers the fissure. So you can't detect it any more. Each case it's covered by the flow. So it may have been less than a kilometer long. And that fits modern analogs like Paricutin and some other volcanos. The feeders are not that long.

MEMBER HINZE: Are you suggesting by virtue of an analog with lathrop wells that the localization of the volcanos along the dike is associated with a cross fault?

MR. PERRY: With a crystal fault?

MEMBER HINZE: With a cross fault.

MR. PERRY: Oh, a cross fault. It's true at lathrop wells, but I wouldn't want to generalize beyond that. We really think that this feeder dike was controlled by these northwest turning faults, but

there's obviously another fault there and I -- as far as we go, I guess, is we first didn't know which one it was following, they were open to either one. But then thought about other evidence. But it is -- I don't see that at the other cones like Black Cone or Red Cone, where it's at a place where faults cross. But it's definitely the case at lathrop wells.

So it may be a factor in the overall reason why lathrop wells is there. It looks like the feeder wanted to follow the northwest turning fault.

MEMBER HINZE: Could you go to Figure 10 and let me ask you my question. What's the origin of the east-west striping that we see at the northern end, the red to yellow and the breakup at the Paintbrush Canyon and then at the Windy Wash fault?

MR. PERRY: So that's the first feature you're talking about?

MEMBER HINZE: Right. There are a couple of others that -- the one at the southern end of the right and then another one at the Yucca -- at the Y of Yucca Mountain. Do you have any -- obviously, if this has tectonic significance it may have significance in terms of the location of volcanic features.

MR. PERRY: I don't have the answer. The latest I've heard about that was the talk Mark Tining

gave and he mentioned these features in terms of reams, but I barely have thought about this question and for instance, down here, I don't know why because of the pathologies. I need to go back and look at the geology. But I don't think there's a big change in the pathology why suddenly you get these large deposits that kind of disappear. So I don't know the answer is the bottom line.

MEMBER HINZE: Are there questions among the staff?

Latif?

MR. HAMDAN: Two questions. Thank you. The reason why they do not do any service in the roads is because you cannot drill there to verify. Is there another reason?

MR. PERRY: There's no basis. One was money. We had to stop somewhere. The other is there's no major basins, so we're really interested in these alluvial-filled basins and you get up into the caldera complex at the north where there's really no basins that could easily bury anything.

MR. HAMDAN: Okay. The other question is now that you have the detail, can you go back to the anomalies and make any distinct wish at all between a basalt anomaly and a tuff or something like that?

MR. PERRY: Yes, we think we can. That's what we were doing, for instance, here; where anomalies had been very small anomalies here and right there. There are several anomalies in here. We can make interpretations from what we've learned, from what we drilled and fault patterns that we see in the bedrock extending those out into the alluvium. We can make what we think are legitimate interpretations about whether they're tuff or basalt. In this case, we would say tuff.

In other cases, we still think there's basalt down there. The ones to the south, C and D, we're sure are basalt. There's a couple of others that may well be basalt and there we'll try our best to determine depth and get an age estimate from burial depth or other input.

MR. HAMDAN: Thank you.

CHAIRMAN RYAN: It's just a quick question on the error analysis. I notice on the one in the upper left, that the error is about an order of magnitude higher than the one just below it and why is that true?

MR. PERRY: This was --

CHAIRMAN RYAN: Different technique?

MR. PERRY: First of all, you didn't ask

this, but this has a higher error because it's potassium argon. This is argon argon down on a biotite which is fairly high potassium, so the error is smaller and there's other reasons with argon argon it's smaller.

This was done on a very high potassium feldspar, so you had an extremely high signal.

CHAIRMAN RYAN: So it's technique-driven is the reason.

MR. PERRY: Yes.

CHAIRMAN RYAN: And the second part of the question is does the error only represent technique error?

MR. PERRY: Yes.

CHAIRMAN RYAN: It's analytical error.

MR. PERRY: It's measurement analytical error, technique, nothing else.

CHAIRMAN RYAN: So I guess at least in my third question I say that all three of the ones on top are the same and the one on the bottom is different, is that about right?

That would make a difference between 9.4 and 10.8.

MR. PERRY: For hazard bios it wouldn't matter. To me it matters. I think they are

different.

CHAIRMAN RYAN: That's what I'm trying to understand.

MR. PERRY: To a geologist, I'm sure they're different because we're dating these and actually have preliminary numbers I don't have. This is a very different composition of basalt sequence that's high, tilted up on Skull Mountain, Little Skull. And these are coming out 10.5 million years. These down in the basin, post-tilting which you predict are younger. These are coming out repeatedly at three sides, 9.5 million. So I think that's a real million year difference. A million years is a long time.

CHAIRMAN RYAN: Sure. I appreciate that.

MR. PERRY: Even if it's 9.5 to 10.5, it's still -- so we think those are very real.

CHAIRMAN RYAN: It's the other physical data and geology and so forth that helps you make that --

MR. PERRY: It always is.

CHAIRMAN RYAN: I just wanted to understand that a little bit. Thanks.

MEMBER HINZE: If there are no further questions, Frank, thank you very much for an excellent

presentation. We do appreciate it and we learned a lot. Thanks.

MR. PERRY: Thanks. I enjoyed being here.

CHAIRMAN RYAN: Appreciate it. Let's see, next on our agenda, I believe we have Drs. Cool and Holahan to talk to us about the most recent update for the draft guidance from ICRP and their views of it.

I'm sorry, I was looking at 9:45. Let's take our 10-minute break, cut it by five minutes and we'll start promptly at 5 minutes of 10, please. thank you.

(Whereupon, the proceedings in the foregoing matter went off the record at 9:44 a.m. and went back on the record at 9:52 a.m.)

CHAIRMAN RYAN: Our next presentation is by Drs. Holahan and Cool, who are going to provide us with an update on their preliminary observations on the most recent ICRP 2006 revision to the 2005 draft recommendations. Close enough.

So, gentlemen, please take it away.

MR. COOL: That sounds about confusing enough to --

(Laughter.)

-- be the appropriate introduction. I'm Don Cool, Senior Advisor for Radiation Safety and

International Liaison at NMSS. With me is Vince Holahan, who is the Senior Advisor for Radiation Health Effects in the Office of Research.

We have been working as a tag team, and that's probably how we will work this morning, busy trying to keep each other out of trouble or in trouble or correcting each other, depending on the act circumstance and the moment.

What we wanted to give you today is a quick review both of the draft recommendations that have been published by ICRP for public comment, and then the staff's initial views and observations on those. So trying not to spend too much time, but I'll give you a little bit of history on where we have been, an outline, and then our reviews and conclusions.

For history, as you are probably aware, maybe painfully aware by the number of letters that you have written, the ICRP has been working on their recommendations for radiation protection for quite a number of years now. I think that if we actually total it up from the time that Roger Clarke first started to float some of his papers in the late '90s we would be up to seven or eight years in the development cycle at this point. That might sound

like a familiar number for those who are familiar with how long it takes to revise Part 20.

The draft recommendations formally were first put out for public comment in the summer of 2004. At that point it was called RP-05, Radiation Protection 05, because ICRP thought that they were going to be publishing the recommendations in 2005. That didn't exactly happen. They got a huge number of comments as a result of their solicitation for public comment, a lot of issues and ideas brought forth to them, as well as several workshops and various things.

The NRC staff did provide comments on those. We reviewed those with you at that time. The following spring and summer -- this would be 2005, last year -- ICRP put out a series of foundation documents -- there were actually five or six of those, which form some of the basis for the recommendations and some of the more detailed material which wouldn't actually be in the recommendations.

One of the comments that we had had in 2004 when we reviewed the draft was that this was all very nice, but there were a lot of details that were referenced which were not available. That's what those foundation documents provided. The staff provided comments on each of those foundation

documents last year.

ICRP has now put out for the second time a draft of the recommendations themselves. It was published in -- on January 7th of 2006.

Let's go to the next slide, please.

The draft date, if you look at the top of the document, is actually June 5th. It was actually noticed on the Federal -- on their website on June 7th. That's why you have this slight difference perhaps in dates between things that you might cite.

Comments are due to ICRP on the 15th of September, so they've only given a three-month time period this time as opposed to the six months previously. Anyone is invited to comment. Comments will be put on the ICRP website, and they are all available for review and reading at your convenience.

The website in fact contains all of the comments that have been submitted to ICRP all through this process. So you can go all the way back and see the comments that were put on for the first draft of the recommendations as well as all of the comments that were given to ICRP on each of the foundation documents.

The last couple of bullets on this slide here give you a quick outline of the things we are yet

to do as we go through this process. We have been working with the Nuclear Energy Agency, Committee on Radiation Protection and Public Health, which Vince Holahan represents us on, in Paris, for a workshop that will be held here the 28th and 29th of August.

In addition to that, the following couple of days, so the 30th and perhaps even the 31st, working with NEA we will have an ad hoc expert group, so that all of the people who really love to get in the details and have lots and lots of little individual comments, those can all be captured for NEA CRPPH and the expert group that will be developing comments to ICRP from NEA.

We will be working with that group. That group actually meets in Paris the week after our workshop, so we will be able to take all of our information to Paris to support that comment development process. And in parallel with that, we will be working with ISCORS, the Interagency Steering Committee on Radiation Standards, to develop some federal consensus comments, higher-level comments, that we and EPA and DOE and others can all agree upon.

Let's go ahead and go to the next slide.

To give you a very quick overview of the draft recommendations as available this time, not to

go through all of the details, but the usual sorts of things on biological and dosimetry quantities, system of protection, medical exposure, natural sources, exemption exclusion. There is a chapter on protection of the environment and a chapter on implementation. We'll get back to those, because you'll see that we have some comments on some of those as we go through it.

Next slide.

The aims of the revision, according to ICRP, to take account of the new biological and physical information and trends, set radiation protection standards, to improve and streamline the presentation of the recommendations. That's one way of saying something else that -- they've said they wanted to try and improve the consistency, they wanted to try and consolidate the recommendations that have been generated since 1990 when the previous set of recommendations were put out. They wanted to try and simplify the recommendations.

And the ICRP wants to try and maintain as much stability in the recommendations as is consistent with the scientific information. One of the messages that they heard loud and clear, not just from us but from many people, particularly in the European Union

and others, is don't go rattling the whole boat. We've just now managed to implement the previous set of recommendations. It wasn't entirely clear why it is that they felt that there needed to be a revision.

Let's go on to the next.

Some of the key features. Maintains the three fundamental principles of the system of protection, justification, optimization, and dose limitation. You may recall that the previous draft had not said very much about justification. That was something else that was commented on by many, many people requesting that that be put back in and given the same importance that it had been before.

This draft maintains the individual dose limits for all the regulated sources, and it retains the numeric value of the dose limits as they were in CRP Publication 60. That's for both occupational exposure and for public exposure.

Next slide.

It also attempts to provide a unifying conceptual approach for constraining doses. This is perhaps the area, if you were to ask ICRP where all of the simplification and consolidation is represented within this draft, this would be it. You can actually find the word "constraint" and the definition of

"constraint" in their previous set of recommendations.

At that time, everybody said, "Oh, what's a constraint?" And the last 15 plus years have been in debates in various forums, nationally and internationally, about what's a constraint, what does it mean, how do you use it, and a variety of those sorts of terms.

This document attempts to pull that together, and it attempts to establish a uniform approach to radiation protection, no matter what the exposure situation, whether it's a normal exposure, everything that we would typically think of and regulate, aka practices in the old vernacular. This is where you're adding exposure, because you're going out and doing something. That's everything from a powerplant to the radiographers taking shots of pipes to medicine to all of the other things that would be done.

Emergency situations, anything that causes you to have to react to immediately respond to a situation -- fairly explanatory. And existing situations, which is everything else, as in that which has already existed. Now, within that category might be both really naturally-existing situations, everything from the Monazite Sands to Caralla, and

some of the other places where you have fairly large naturally-existing situations, to perhaps situations that were caused by the activities that man at some point in the past -- something might have been done or might not have been done about them, and they now exist and you have to decide whether or not you want to do something with them, because you have determined for whatever reason that they now pose some issue for you.

In addition to that, there are a number of updates on the understanding of the biology of physics, updates to the radiation, and tissue weighting factors, all within this document.

Let's go ahead. Next slide.

We, and the NRC staff, throughout all of the offices have been developing our comments over the last several weeks. What we're going to try and give you today is a preliminary view of those comments. They are actually in office concurrence at this moment.

So as you well know, that means that these are still subject to tweaking, changing, and otherwise. They are intended to be to the Commission by the end of July. The Commission will have an opportunity to look at it, so there may be some

additional adjustments, some things added, some of the tenor or tone perhaps adjusted as they may wish to add to it. So these are our preliminary views at this point.

Once we have completed the interaction with the Commission, we will post the comments to the ICRP website before the end of the comment period, and we will use these comments -- the general and the specific comments -- to work with ISCORS and with NEA.

Let's go ahead to the next slide.

So to transition, unless there are some questions that you would like to ask now, we'll go ahead to our preliminary observations. First, what is the need for change? The current draft does not obviously consolidate or simplify the recommendations. For example, it states that all of the previous numeric values that have been published since ICRP Publication 60 should now all be considered as constraints.

Well, unfortunately, from my way of thinking at least, that doesn't particularly consolidate it, other than to say they are all "effeche," nor does it necessarily simplify it in the sense that we've sort of lumped them into bands, but nothing has changed in the way that they were

originally justified, the way that they were used at the various times, or otherwise. So they all still exist. They just all get lumped into a name.

Much of the material within this draft report, which elaborates and expands on the previous recommendations, is in fact a description of the current state of the system of radiation protection as being implemented by many well-run programs.

Now, what is new is that this is the first time ICRP has written a lot of this down, because a lot of this has worked as best practices, worked in the industry, has worked in response to various regulations, so much of what is written you will not find in a previous ICRP publication, at least not fairly nicely laid out.

But it doesn't, in fact, provide a whole lot of new information or new direction or new material which you would obviously wish to want to necessarily pick up in the radiation protection program. On the other hand, it is very nice to know that the system that we have, the way that it is functioning, the protection that it is affording, is in fact what is and continues to be recommended in terms of a sound radiation protection program and activities.

Thus, one of the staff's conclusions is that there is no compelling public health and safety argument for changes to the recommendations or to the national regulations which might implement those regulations. To put it in NRC speak for a moment, if you were to ask me on the backfit rule, was this a change that was necessary for health and safety, adequate protection, the answer would be no.

On the other hand, there are a number of things, as the committee has observed before and which we will be observing here, which are good updates to scientific information, so that we can be more accurate and consistent, we can be up to date, and there are some things which, as a result of this continuing consolidation and explanation, which might in fact be useful to get, for example, alignment of the U.S. programs and international programs, so that we don't spend time constantly arguing back and forth about whether or not we did or didn't do something, because unfortunately many people do not necessarily look at the outcome as in, for example, measured by the doses, but rather in part would wish to evaluate a program and its adequacy on the basis of whether certain elements obviously and distinctly appear within the system.

Let's go ahead to the next one.

Let's do some weighting factors. There are changes to the tissue weighting factors and the nominal risk coefficients for cancer and hereditary disease. These may, in fact, be a bit premature. Now, well, you say, why is that? Because you, the committee, have pointed out on at least one or two occasions that this would be one of the things that the staff would probably want to do, and you recommended that we would pick these up.

In fact, what you have is an interesting factoid perhaps of taking a snapshot in any moment of time. The dosimetry for Hiroshima and Nagasaki has now been updated, DS-02. The analysis of all of the various cancers and cancer incidences and all of the things that relate to that, which are used to construct these factors that are published today, are still on the old DS-86. They have not yet been all rerun and published and peer reviewed on the basis of DS-02. So we're in that interim period.

This document cites a number of things, noting that they are in press or in preparation. Now, when you have the authors on the Maine Commission and on the committees that are doing the work, they do in fact have knowledge of what is being worked on. So it

is, in fact, likely that much of what is here is reflective of things which are coming along the line, but they are not, in fact, out there and available for the public scrutiny and information.

So part of the issue that we have is a situation in which if we were to turn around and try to do this for a Federal Register notice or something like that to change our standards, we would have -- we would not actually have the underlying scientific information, simply this rollup which cites a document which is in preparation.

We, now getting to be a bit self-serving and looking at it from the standpoint of the next steps that we would need to do to start to translate this in the regulations, would much prefer that that material was completed and published in a peer reviewed journal and there were actually citations available before we needed to move forward with this, and we would actually recommend to ICRP that some of that be done before these recommendations came out and were in final.

I would also note that, just as a little side bar for you, many of the pieces that we would wish to use, for example in Appendix B to Part 20, the annual limits of intake derived air concentrations and

some of those sorts of things, have not yet been run by ICRP Committee 2.

Those are not expected to be available for publication for about another two years, so we are in a window where it's tantalizingly close, but we aren't actually at the position where the staff would really be able to move forward aggressively to do some implementing activities.

Let's go ahead to the next slide.

Dose constraints -- perhaps one of the biggest deals from the ICRP standpoint, certainly one of the things that has generated more discussion than anything else. This document is an attempt to clarify the meaning, the use of the dose constraint, and it is certainly an improvement over that which existed previously. The ideas are, in fact, coming together, but there is some further clarification that is needed.

As we went through the document, there are places that read very nicely for us, and then there are places which certainly could still seem to be read as if a constraint was a numeric value that you gauge compliance against. We don't believe that this is, in fact, what the ICRP would wish to have. A number of our specific comments get into that level of detail.

The constraint, at least as we understand it at this point, and where the majority of the document would lead you to, properly implemented in a radiation protection program, and a licensee's optimization, contributes to assuring that each individual is adequately protected. So in a system of protection, such as the one we have, you have dose limits, the legally binding values upon which we send them over to our Office of Enforcement and we bop them over the head if they exceed them.

Those define a fundamental level of protection. One of the things that we've had a little bit of a disagreement with is the ICRP document says that the constraint provides the fundamental level of protection. What we actually believe is a more correct formulation is that the constraint used in the radiation protection program and specifically within their optimization, help to ensure that each individual achieves a fundamental level of protection and is in compliance, that individual, with the dose limits.

Now, that's a slightly different phrase, but then it becomes a more logical construct of limits. The establishment of a constraint, a boundary, which you're going to use to run your

radiation protection program and optimize it. A constraint would always be something less than, occasionally equal to, a dose limit.

It's something that you would want to have in order for your program to run well and to make sure that you didn't exceed the limit, to make sure that what you did in optimizing, as low as reasonably achievable, didn't inadvertently cause someone to be over, as in the perfect optimum might be send one guy in and he gets a whole bunch of dose and he gets the job done, because he can do it very quickly and he knows what he's doing. But that's bad for the -- that particular individual. So that wouldn't be an acceptable optimization.

I would note that this is exactly the way -- this system is exactly the way that most of the large programs in the United States, certainly all of the reactor programs, the large material programs, work. If you go and ask them, they have a radiation protection program. They're required by Part 20 to do that. They work as well as reasonably achievable optimization. They're required by Part 20 to do that.

They do that by establishing boundaries for themselves and optimizing. Except for the fact that you can't find it in the regulations and it

doesn't exactly have that word "constraint," that's exactly how the system of protection is working today. And it would actually be a very nice move if everyone could agree that a constraint was something which under most circumstances a licensee imposes, the regulator's job might be to make sure that you, licensee, have a constraint running your program.

You set your program; you run it. If something happens that you bump against a constraint, that doesn't mean you have violated us, other than you need to go and work your program back.

CHAIRMAN RYAN: Don, just a couple of points while we're on this topic. If you recall, at our first working group meeting we had representatives from a broad spectrum of interests. You know, I asked a question about this, would any of this new kind of approach add any value to radiation protection practice in the U.S., and the answer was no.

And very specifically, we had Dana Powers from the ACRS join us because of his knowledge of ALARA and the reactor area, and our own knowledge of reactor in the materials area. And, again, the view was that what you've just described is the system. It's just slightly different terminology.

MR. COOL: Right.

CHAIRMAN RYAN: So --

MR. COOL: I would point out that at that time it was not at all obvious from reading the words in the previous draft recommendations or otherwise that this was the direction that ICRP actually intended. The last year and a half has helped to move it in this direction, and I would note the NEA held the first of their three workshops in Tokyo a week and a half ago.

And one of the outcomes of that was, again, particularly within the Japanese and the nuclear industry in Asia, coming to very much this conclusion that, oh, well then this works out pretty well, and this is what we do, and so this all makes sense to us now. So there is some evidence internationally that this is beginning to come together in that role, and people are actually reading it the same way now.

CHAIRMAN RYAN: But it raises the question that, you know, it really is just a matter of terminology. It's not a matter of radiation protection practice.

MR. COOL: Correct. As I said on the first slide, in the end --

CHAIRMAN RYAN: Right.

MR. COOL: -- this is a description of a good program.

CHAIRMAN RYAN: Yes. Thank you.

MR. COOL: Let's move on to the next.

Gender averaging. ICRP does not recommend any gender-specific data for purposes of radiologic protection. This is gender average, tissue weighting factors, numeric risks. Although we agree that this provides adequate protection, and, in fact, there are a number of legal precedents, it would make it incredibly difficult to try and implement a system that might be gender-specific, which we don't think is necessary.

It's unfortunate that the ICRP has not actually written down the reasons why this is an adequate approach. We, in fact, believe that there are a number of reasons that they can write down, the changes in some of the weighting factors which are specific for breast for females, which have been significantly raised, so that the average exposure you would calculate is certainly not as low as that if it was only in male, not quite as high if it was a female.

All of these things working together provide adequate protection, but none of that

explanation is actually presented in this document. Again, looking forward to the context of, what would we write in a statement of considerations that would argue and justify for why we believe we have provided adequate protection, we would not be able to cite this material as providing some of that explanation for us, and so we would request that they write that into the document.

Let's go on to the next slide.

Exemption or exemption exclusion clearance, depending on which set of terms is your favorite buzz word at the moment. These recommendations related to small quantities of material. Unfortunately, they are internally inconsistent, they could lead to some misinterpretations.

Depending on how you read this, you could come away with the view that ICRP now says that unless the dose is down at 10 microsieverts you ought not to exempt something, which of course gives us and the staff more than a bit of heartburn, because there are a number of reasons that you might exempt something from some or all regulatory requirements after you have reviewed the device, ensured inherent safety, and some of the other things.

It also could be misinterpreted that anything less than 10 microsieverts, 1 millirem, is safe, and anything over 10 microsieverts, 1 millirem, is unsafe -- again, a view which we do not share.

Furthermore, when you look at this and you take this -- all of this applying to the manmade materials, that which we have done generated in reactors or otherwise, and then you look at the values that are associated with naturally-occurring materials, you find that their recommendations differ by about two orders of magnitude, the only reason being that they are not as amenable to control and, therefore, we're just going to behave that way.

So while there is a logic constructed, which is very reasonable in terms of looking at it from the standpoint of, can you do anything about it, the logic does not exist continues as, unfortunately, we have had for a number of years where the logic does not match up in the context of the actual risk posed to an individual.

There are also a few things in there which give us a little bit of heartburn, one of which is the suggestion that a suitable generic exemption is the material internationally from food and agriculture, and otherwise the codex alimentarius, which were

originally designed as values for food stuffs immediately following an accident.

These now appear in these draft recommendations as something which ought to be automatically exempted under any circumstance. And we're not quite prepared to go there on the basis of the underlying models and activities.

Let's go to the next slide.

Collective dose. Another one of our favorite topics. We very much appreciate the observations that the ICRP has put in regarding the inappropriate use of collective dose and the calculation of health effects. There are some very good quotes at the 30,000-foot level about how it is inappropriate to use collective dose over all space and all time. It doesn't really help you with much of anything. It's inappropriate to calculate those health effects from very, very minuscule doses to a large number of people.

While these general statements are very nice, when you get down to, again, the nastiness now of regulatory decisions, they don't end up being particularly helpful, because there is nothing in this document that helps you understand what low is or what small is or some of these other factors that would

actually go into the calculation.

So while we have the broad statement, and the broad statement we agree with, when we actually get to the regulation of risk communication the document doesn't contain some benchmarks or guidelines that would help us translate that into reasonable regulatory decisions.

What we plan to suggest to the ICRP is that they try to articulate some of these boundary conditions. What are the values that are associated with some of the different techniques, the epidemiology, the cellular molecular biology, at which you actually have some demonstration? What are the ranges that you can use? Where are the calculations valid or not valid? to try and help provide some guidance to actually do this.

This is an area which could have a great impact on the way in which we did business, if we could get a little more practical and consistent in our approach, and be able to communicate it reasonably in a risk communication standpoint.

Let's go to the next slide.

Protection of the environment. This now is a two-page chapter which is not a policy, it's not an assessment framework. It's a plan of activities

for what ICRP is thinking to do over the next few years in their new Committee 5. In one sense, it is much less obnoxious or egregious, depending on the word you might use, than the previous discussions which had a lot more statements in it, and for which we had a lot of heartburn.

On the other hand, really all it is is a plan of work, and as such we don't find that it has any real place in a set of recommendations. A plan of work might be good for an annual report or something like that. We know they're working on this. The first document, Publication 91, was out several years ago.

The foundation document last year which laid out reference plants and animals was pulled back into Committee 5. There may be a new draft of that late this year. I would know more after the committees meet this fall, but they are in progress, and so our recommendation to them actually is they ought to just delete the chapter.

We would very much want to continue to be able to interact with them as they work on developing an assessment framework for how to look at these things. In the specific comments the staff is generating, we actually have laid out a number of

particular points which could usefully be in a paragraph, starting with, as you have observed before, there is no evidence at this point that the environment has not been protected by the current system of radiation protection.

Yes, we all recognize that demonstrating that to people is sometimes difficult, because the system is all aimed at demonstrating doses to man at the endpoint of the chain, not at different points of the environmental pathways and chain.

With the increasing focus on the environment -- there are many -- and particularly now looking various places in Europe, where there is an increasing demand for there to be a more quantitative and consistent demonstration.

All well and good -- develop an assessment framework, continue to work on that, hope to benchmark some of the various models that are out there so that we can be consistent in demonstrating that which it is, but be careful not to give the implication that the underlying system of protection, which in the end is translated as, what do we require in terms of effluence, or what do we require in terms of releases, or what do we require in terms of acceptable dose rates at the perimeter facilities?

There is no obvious indication that any of those would actually have to change. You just might, in the end, want to have something where you can consistently show that that which you are doing is doing the job.

Let's go on to the next one.

Implementation. This is a new chapter in the recommendations. Did not really exist in the previous draft or in previous drafts. It consolidates a lot of material, most of which in fact is material which comes from various IAEA, the basic safety standards, the safety fundamentals, and other documents, various national regulations.

If it were ICRP's job to be drafting a draft of a set of international regulations, then this might be an appropriate chapter. We believe that, in fact, that's the role for organizations like the IAEA, European Union for their Directive, for the NRC in federal guidance to write these sorts of materials, and for the most part, in fact, it's not necessary or appropriate to be in the ICRP recommendations, and that it, in fact, be deleted.

We're not saying that it's wrong, but it doesn't seem to be the right place for that kind of material.

Next slide.

Finally, there are lots and lots of editorial issues as you go through this. As in any draft that is written by a number of people, and which in the end everyone gets their homework done at the 11th hour and 59th minute, and Jack Ballentine then has to put something up on the website, because he has promised it to everyone for comment, there are all sorts of editorial issues, inconsistencies, references to chapters where there's not the chapter anymore, references to documents and publications in the reference list which don't exist or are wrong, etcetera, etcetera, etcetera. And there's much that needs to be done there.

We have for the most part tried to resist the urge to catalog even some small subset of all of those things, because a lot will continue to need to change.

Next.

To back up the general observations that the staff has, we have also generated specific comments to try and be useful to ICRP. We have tried to capture in the various paragraphs of the document specific places where these issues come up, where a wording on a phrase about constraint is incorrect, and

suggest an alternative which would correct the issue.

That results in the current comments that are going through concurrence having 110 specific comments that are part of the list to back up these general observations. So we've had quite a set of comments that have been pulled together. I want to compliment right now the staff across all of the offices -- Research, NMSS, NSIR, and NRR, and State and Tribal Programs -- because all have contributed to this.

It has worked extremely well over the last few weeks, a lot of extremely good issues and details pulled together. Of course, we had some duplication and overlap, but the different views resulted in quite an array of views, and there were an amazing number of things that only one or perhaps two of the reviewers picked up pulling together this compendium.

So our conclusions at this point. The draft recommendations are clearly an improvement from that which was put out in 2004, but they're not quite there yet. We don't believe it actually states -- achieves all of the objectives that ICRP had originally set out for themselves.

There needs to be additional clarity in thinking and explanation around a number of the

documents, and so we are in hopes that there is some additional work that will be done on this, and that they will consider taking the time necessary to make sure that these get done correctly.

As I said this morning, these are our preliminary observations. I think that they will go through fairly well, but obviously the senior management and the Commission, we may have some additional things that we would wish to do. And, of course, you may also have some observations.

And with that, we turn it back to you and welcome your questions.

CHAIRMAN RYAN: Thanks, gentlemen. We appreciate it. Maybe we could just start with a few questions I'd like to ask on the slides.

Slide 8, please, Vince. I struggle a little bit with this first bullet from the standpoint of -- does that make any real sense? I really think normal situations, emergency situations, and existing exposures, which I guess is background, you know, those are completely different things. And in the U.S. they have been regulated as different things in some ways.

I struggle with why it's -- it might sound logical that they should all be under some umbrella,

because a rem is a rem is a rem -- pardon me for not saying sievert -- but, so what? You know, I just -- I don't -- the value of that logic escapes me.

So I just point that out for you to think about. And I'm not sure we shouldn't challenge that principle.

MR. COOL: I think we could -- we would agree in part and perhaps want to discuss it a little bit more.

CHAIRMAN RYAN: Sure.

MR. COOL: In one sense -- in one sense -- I will play ICRP's side of the coin, and then we'll play your side of the coin.

CHAIRMAN RYAN: Sure.

MR. COOL: From ICRP's side of the coin, no matter what the situation, what you -- you know that there is something at which you're always going to take action, and then you want to do the best you can within that. The place that you always want to take action is a constraint, and doing better is optimization.

And it doesn't matter whether you came across this old, abandoned site which you realize now didn't -- wasn't cleaned up very well, or it's looking ahead at the activities of this nuclear medicine

facility at some point in the future. The way that you would approach the thing is always about the same, and all of that is true.

CHAIRMAN RYAN: I don't disagree with that, but --

MR. COOL: Now, to play our side of the coin, does this explanation help us in writing Part 20? I don't think so.

CHAIRMAN RYAN: No. Okay. We're on the same page. But I -- this kind of implies that they're all the same. You know, emergency response and background exposure, normal exposure, are regulated not just by the NRC, as you well know. I mean, they're regulated by EPA and SSA, DOE, DoD, you know, just to name a few. Even the Postal Service has regulations for radioactive material.

So, you know, I think it doesn't recognize that in some countries that ICRP guidance has read that the situation is much more complex than what they've outlined here, and they haven't -- I mean, this is, frankly, a little bit sophomoric in the sense that it's just a logical construct and doesn't recognize the realities of countries or governments or different approaches to accomplishing what you said right at the beginning, Don, which is we're trying to,

you know, identify a limit and then do the best we can under a limit. To me, that's a regulatory requirement in ALARA.

MR. COOL: Right.

CHAIRMAN RYAN: So we're back to the comment that the working group gave us, which is, what are we adding in terms of value here? And the answer is, "Not much, except a lot of logically-constructed, although somewhat flawed from your review of 110 comments, you know, paragraphs that write up the same concept." So I struggle with that.

Slide 11, please. Thank you. It's the -- where you talk about public health and safety. Is that right? What happened to workers? I mean, we do the same thing in the worker environment, so I -- you know, I understand that, you know, we -- and I think we've done a pretty good job if you look at how ALARA has worked in, say, nuclear power or other segments where we've really done a pretty good job at the national level of managing worker radiation exposure as well as public health and safety.

MR. COOL: Our use of the phrase "public health and safety" in the first line was intended as the Atomic Energy Act, which covers all of the above.

CHAIRMAN RYAN: I just wanted to make sure

we're not leaving workers out.

MR. COOL: No.

CHAIRMAN RYAN: Because, again, that's an area of great strength. In my view --

MR. COOL: In fact, much of what they have done in describing the program is, in fact, mostly specific towards the occupational exposure regime.

CHAIRMAN RYAN: Just a fine point to make sure we don't get misunderstood there.

12. I think we said in our earlier letter -- I just want to be clear on this -- we didn't comment on tissue weighting factors. We commented on radiation weighting factors and internal dose models. I'm not sure we said tissue weighting factors previously. We'll go back and check.

MR. COOL: I'm going to leave it to Neil and the others.

CHAIRMAN RYAN: We'll take a look. I quickly looked --

MR. COOL: I also thought it was encompassing, but that's fine.

CHAIRMAN RYAN: Yes. I quickly looked, and we talked about the radiation weighting factors, which were the neutron and proton --

MR. COOL: Correct.

CHAIRMAN RYAN: -- differences. But the weighting factors brings up another point, and that is that if you look -- you know, the details of it are kind of interesting, and I'm sure you've covered these, or I'm guessing you have -- that the weighting factors -- I tried to do a BEIR VII versus ICRP draft guidance comparison and found myself in trouble, because the bases for what ICRP reported are completely different. And it's not easy to translate them. In fact, I couldn't figure out how to get it done.

Vince is shaking is head no either. So, you know, their organ weighting factors are different. The treatment of lethal cancer and life impairment are different. The constraint for estimating hereditary effects is different. The hypothetical populations at risk are different. And the population transfer of the Japanese A-bomb data is different.

So, you know, it's a Rosetta stone of how we're going to see if one equals the other. But the good news is they're not that much different anyway, so it's coming to the same basic conclusion, the one I reached, was that risk factors are in essence the same as what has previously been reported. So I didn't see any big, dramatic differences there.

MR. HOLAHAN: I think the biggest issue that we have with the weighting factors and the nominal risk coefficients is the fact that the new numbers that they're proposing are primarily based on the DS-86 dosimetry. They tried to make some adjustments with DS-02. Then, what they did is they looked at cancer incidence based on the numbers that were available around 1990 and 1991 that Preston put out in '94.

The issue that we have is with Dale Preston being on the committee, he is the one that's got access to the new incidence data. In BEIR VII, one of the big points that they made was that their reports and their coefficients are so much better, because they can go back and now look at Japanese incidence data and it's a more reliable tool than mortality.

The problem is is that's not publicly available. Because Dale was associated with the National Academies, some of that material was provided to BEIR VII. It's not available to UNSCEAR, the United Nations Scientific Committee on the Effects of Atomic Radiation. It's not available to us, as you can see in the annex. They specifically state that it's in preparation. It's not in press; it's in

preparation.

If you look at other organizations at the international level, we use UNSCEAR to review the basic science. We do not consider anything that is not published in a peer reviewed journal. With that, the preposition would be -- is ICRP would look at the basic science recommendations that come out of UNSCEAR. They would make their recommendations, and then the IAEA takes those recommendations and makes implementing suggestions.

This has circumvented the system here where we're now looking at what committee members plan to be writing up or what -- the information they have access to.

CHAIRMAN RYAN: Yes. And the obvious problem there is that's all subject to a change in peer review that, you know, then you're turning it all over again.

MR. HOLAHAN: Now, one of the major criticisms we had two years ago was this information wasn't available to the stakeholders. The process, the materials that they were looking at, and we didn't know where the numbers were coming from. We just had to accept them.

The committee has gone a long way to

articulate how they do things. And because of that, we can now come back and say, "You know, we've got some problems with the radiation weighting factors. We're not sure how you've come up with this."

Remainder tissues consider prostate, small intestine, kidney. They're not radiogenic. And in those cases where there might be a suggestion of radiogenic, it's due to therapeutic exposures, where we're talking about tens of gray of exposure. Is that what you want to put into a document where you're looking at low dose rate effects? And what we're asking for the committee to do is please explain.

CHAIRMAN RYAN: That's fair enough. We did say, "As the ACNW stated, the Commission should consider deferring action on any draft ICRP recommendations until BEIR VII is published and available for review, and consider implementing changes in tissue weighting factors, radiation weighting factors, and more recent methods of internal dose. There is no urgent need to make these changes. They can be made when regulations are revised for other reasons."

So we did have it in that last go-round. It wasn't in the first one. But, you know, again, for all of these reasons, I think we should comment that,

you know, we agree with you that we should hold off until we have the foundational information for this risk recommendation.

MR. COOL: I just want to reemphasize something that Vince just said. At the moment, now that you see the details of the remainder tissue, you have organs which do not appear to be radiogenic. If you start to assign weighting factors, it sure makes it look like they are radiogenic, cancer-induced.

You immediately go to the compensation side of the house, and everyone assumes that you're going to need to compensate for any exposure of those organs. And so this starts you down what would appear to be a fairly steep slippery slope, if these actually come into play.

CHAIRMAN RYAN: Well, and just on this point, I might advise everybody that our current schedule for a presentation from the National Academy of Science -- the French National Academy of Science Committee will be in November at an ACNW meeting, so that's up and coming.

And they have, of course, a different view of the world in their published documents that a 10 gray -- that they see a clear threshold and they are pretty specific and crisp on the point that they view

that radiation epidemiology shows a threshold. So we'll hear their views, which we can then compare to -- in November.

Vince, can I get you just to go to Slide 13? And I think in conclusion it's really right on the point of ALARA, that I really struggle with the idea that there's anything new and different in this construct than the construct of what we have now, which is a dose limit and the application of an ALARA program, which, as you pointed out, across reactors and material licensees, and large and small frankly, all meet that requirement. It's a requirement in regulation, and it's a requirement that I can say from firsthand experience is routinely inspected --

(Laughter.)

-- and evaluated. So, you know, I think the record of occupational radiation exposure as one example shows it's working pretty well, because we've had trends in a downward direction that we have reported on in previous letters.

MR. COOL: I'm glad that our friends in the agreement state program of South Carolina are doing their job.

CHAIRMAN RYAN: Well, it's not only South Carolina, but I'm sure they'll be happy to hear that.

But in addition, you know, I think we concur with your comments on collective dose. We find that to be silly, to quote comments. I just doesn't work at low doses, either on an individual basis or on a collective basis.

So we concur that ought to go away as a measure of anything in an absolute sense. I mean, we have commented on it being useful as a relative measure. It's used all the time in ALARA assessment. If you do this work this way, you get some number of person rem. And if you do it that way, you get some other number. That's a helpful kind of a measurement --

MR. COOL: Right.

CHAIRMAN RYAN: -- tool, but --

MR. COOL: And I would --

CHAIRMAN RYAN: -- as an absolute measure of cancer risk, it's not really meaningful.

MR. COOL: I would note that the ICRP draft in fact lays out much more clearly now that that's exactly where collective dose has a usefulness. The previous draft had not said much that we were happy about. This draft has both these statements and the statement about, "With proper boundaries and with additional information constrained to particular times

or particular workgroups, collective dose is very useful in optimization." Those are also some good words.

CHAIRMAN RYAN: Right. And, finally, I think we concur and agree with your lack of evidence that the standard for protection of the environment, as cast in ICRP, doesn't really have a foundation. You know, the principle that we've all used for pushing 60 years is that if you protect man you protect his environment and everything in it. It still holds and has not been controverted in any way that I'm aware of. And I continue to look very hard to find one.

So with that, you know, we agree with your comment that at this point it's -- it doesn't have a technical or a scientific foundation to proceed with what might be logically constructed but certainly doesn't seem to make a lot of sense.

I did have the opportunity to ask the President of ICRP at an NCRP meeting -- it was not a public meeting, but I asked him if he could provide me with any, and he couldn't -- any evidence that it was needed foundation and he didn't have any references to provide. So I struggle with its value as well.

That's my questions. Professor Hinze.

MEMBER HINZE: A comment about this protection of the environment. It seems to me that's morass. You have taken the position to remove this segment entirely from the report. I wonder how realistic that will be in terms of its achievability. And I wonder if you've given any thought to any drop-back position, which does not go to full removal.

Is there a place for an appendix that would suggest areas of investigation of study? As Dr. Ryan has pointed out, there is no evidence that you're not protecting the environment by protecting man. But I guess the question really is: what is the evidence that you're really protecting all of the environment by protecting man?

And I just think that it would helpful if you gave further consideration to how you're going to deal with that problem.

MR. COOL: I think there are about four questions in there, Dr. Hinze. I'll try to get them, perhaps not in order.

Yes, the staff is taking a position at the general comment level that the chapter should be deleted on the basis of the things that we talked about. Within the specific comments that we currently have in our proposal, we have in fact suggested to

them a fallback position, which is that the key points in relation to protection of the environment.

And at this moment, we actually have them bulleted out for them with regards to there being no demonstration, with regards to the need to continuing to develop a consistent assessment technique.

MEMBER HINZE: And where would that go, then, Don?

MR. COOL: And those specific comments -- that specific comment suggests that rather than a separate chapter that that paragraph or paragraphs be included much earlier in the document where they're talking about the general system of protection.

We haven't actually suggested that they include an appendix, although they certainly could do that, and we will think about that, because that's actually an interesting suggestion to allow them to put some more material in. Personally, I think your assessment of our ability to impact them is also about right.

Something will be in this document. So what we have, in fact, suggested is something that would be a couple of paragraphs rather than a separate chapter. And I look at Vince, but I think your suggestion of a possible appendix for them to present

some of the information might help to give them a path forward that they might actually be able to use.

MEMBER HINZE: If that appendix could be made in a broader sense, which would include some other topics, it would take away the pointedness of it, the directness of it if you will.

MR. COOL: The recommendations, as we expect them to be published now, will have two major appendices or annexes, one dealing with the biological information, in essence the contents of one of the foundation documents from last year, and the other dealing with the dosimetry and the calculation of these various weighting factors, which was another one of the foundation documents last year.

So there was already a precedent for taking some of the material that was a foundation document last year, and it ending up being as an appendix to the final report when issued.

CHAIRMAN RYAN: Just a followup. You know, I struggle with the ICRP's work in this environmental area, because they've just -- or have recently formed a task group to try and address this, yet they're providing recommendations without a task group report. It seems to me like they're jumping the gun.

So I appreciate Professor Hinze's vote to accommodate in some way, but I'd stick with the original idea -- take it out, because they have not provided any foundation for it. It doesn't make any sense at this point. So, you know, the fact they're working on it certainly can be mentioned, but I just think that it really is literally without foundation and very premature in advance of what our task group has been charged to examine and report on.

MR. COOL: Yes, I agree. I would note, again trying to play both sides of the equation in an at least somewhat unbiased manner, if you compare these two pages that are in this draft report with the material that was in the draft two years ago, it's substantially toned back. Before there were a lot of things that really caused us concern, because it was bordering on the edge of writing a policy and standards which had no foundation.

Now at least they are to the point where they are saying there is no apparent need, and we're working on this and that. So there is an evolution in the thinking which says that we are influencing the direction and speed with which these activities are progressing.

CHAIRMAN RYAN: I would be happy if they

would add to their one or two paragraphs the statement that we don't have one reference to point to that says this needs to be done.

MR. COOL: Vince?

CHAIRMAN RYAN: That's true.

MR. HOLAHAN: Whether or not the Maine Commission will accept our recommendation to remove the chapter or not is very difficult to say. What I would say is you can ignore a voice, but it's very difficult to ignore a chorus.

With that, as Don had mentioned, the agency is going to present its views on several multiple fronts. Obviously, like any stakeholder, we're going to submit our comments directly as NRC comments, and have them posted on the ICRP website.

The second main focus is going to be the Nuclear Energy Agency workshop that will be held here in Bethesda the 28th and 29th of August. This is going to be an opportunity for stakeholders from the U.S., Canada, and Mexico to meet, to discuss views, to share our views with the Chairman of the ICRP.

As Don mentioned, after that regulators will get together for one or two days and we will compare/contrast specific comments. And this will go into a rapator's report that will be combined with the

reports from the previous Tokyo meeting and the up and coming Budapest meeting that will be in October. And then, NEA will submit all of these views to the ICRP formally, but they have received the input informally also.

And, finally, the agency, through ISCORS, the Interagency Steering Committee on Radiation Standards, will look at all of the federal agencies' views and provide a third response to NCRP as to where the U.S. Government stands on the recommendations. Hopefully with all of these we can clearly articulate what our druthers are with regards to Section 10. They will know what our position is, and the Maine Commission will just have to go ahead and make whatever decision they're going to make.

CHAIRMAN RYAN: Allen?

VICE CHAIRMAN CROFF: I think maybe I know the answer to this before asking, given this very recent dialogue, but I'd like to ask or suggest maybe something a little bit more extreme. Ever since this ICRP business has started, we I think -- both staff and the ACNW -- have seen essentially nothing beneficial out of it. It's not really helping us do anything, and we've all expended a lot of effort trying to keep it from doing harm basically is where

all of our letters and comments have come from.

And I see that continuing into the future. After listening to you, it's sort of the same old thing. All these parties -- you know, Vince just mentioned the NEA, the other countries. Do you sense that there might be enough sympathy for just stopping this effort and not issuing a report, but it might have some traction at this point?

MR. COOL: Okay. $164,000 question. During the previous rounds of commenting, that view was expressed early and often. We have a new draft. I would expect that the view would be expressed again in multiple fronts.

At this point, if I were going to be a betting man, I would suggest that it would not be sufficient to actually turn off the proposal. It may continue to have it be slowed down in a sense and worked through and try and get some of these other issues.

It has clearly resulted in the ICRP draft coming back towards harmony and less change. In one sense, that means that there's even less that's of any change here. But recognizing that much of the comment towards that, particularly in Europe, particularly from the IAEA and other regulatory organizations that

implemented ICRP 60, have continually expressed the view, "We do not want to have to make significant changes to the structure of the regulations that we have just now put in place and begun to implement."

And what we have here in essence is a continual movement towards something which tweaks the edges at 50,000 feet, sort of provides a unifying idea, but which in the end isn't going to make them have any significant changes in the structure of their regulations.

We, the United States, are in a slightly different place in the sense that we have not implemented ICRP 60. It came out at the same time that we had finally finished the long run with Part 20. Now, some of the things we knew about were coming, and so they are already in Part 20. Some of them are not.

But even at that, when you boil down the basics of the program, as Dr. Ryan pointed out a minute ago, we are implementing a system which fundamentally aligns with the proposal. And so other than the underlying scientific information, we don't have much to change.

We might wish that they would decide to wait another five or six years. I am not sure that I

would assign a very high probability. It might be down in the range that you were discussing with vulcanism a bit earlier this morning.

VICE CHAIRMAN CROFF: Okay. Thanks.

CHAIRMAN RYAN: Before I forget to mention it, I -- you know, you mentioned the comments that you received from across the staff. One thing that has helped us become prepared in what is a very short time horizon for us is the cooperation that your office, gentlemen, has provided to us, and also the other staff folks that have -- we have communicated with to try and learn and get the documents.

So I just wanted to publicly recognize you for that cooperation and their continued efforts to understand the ways of ICRP. So thank you very much.

Ruth?

MEMBER WEINER: In keeping with your very excellent suggestion that nothing should be included in these documents that isn't published and available to the public, there were a number of papers on this question of protection of the environment in -- it's either the 2002 or 2003 National -- meeting abstracts of the National Meeting of the American Nuclear Society. I'd be happy to look up the references for you, but they support your position is all I can say,

and I think it might be helpful to you.

A question I have is: to what extent has the report of the French National Academy of Sciences, and Orenga and Tubiana, influenced the ICRP?

MR. HOLAHAN: I would say next to none. They do recognize it. There is a section in the report where they recognize there are dual reports out there. But they basically -- and I think this is indicative of the former Committee 1 Chairman, Dr. Cox -- he is very much a believer in the linear non-threshold hypothesis -- recognizing that there is additional data out there. The data is not mature enough to be considered for a regulatory recommendation at this point.

MEMBER WEINER: Could we go back to your Slide 11 for a moment? The last bullet rang this French Academy of Sciences bell with me. I do believe that there are compelling public health and safety arguments for considering these reports. And I'm sure that, you know, I'm not telling you anything that you don't know and haven't considered.

But I believe that there is -- it is time to change our point of view, because this -- the linear non-threshold theory and the use of collective dose, which you've very excellently pointed out,

resonates through all of the public attitudes toward radiation.

And I just wanted to make that point, but thank you for clarifying that.

CHAIRMAN RYAN: Ruth, we mentioned that we are going to hear from the Academy in November, which will help us I think offer advice on exactly the point you're raising. In addition, we have on our agenda to hear from the Department of Energy's low-dose studies and other radiation biology fundamental studies that are underway and ongoing, so we're working to get that information as well to add to the things we can then report and advise the Commission on. So --

MR. COOL: Yes. The Department of --

CHAIRMAN RYAN: -- it's all coming together from those two presentations as well.

MR. COOL: The Department of Energy's low-dose program is having its next get-together.

CHAIRMAN RYAN: Yes, it's the end of the month. It's the 29th through the -- no, the 30th or 31st through the 3rd of August. Yes, 31.

MR. COOL: Which will give us the next interesting snapshot of where some of that research --

CHAIRMAN RYAN: Right.

MR. COOL: -- is or isn't coming together.

Of course, because we only get these periodic snapshots, the one we've got is now a little over a year old. And what it basically showed was there is lots of interesting things going on. There is some fascinating research. They have equipment nowadays that can result in a single track through a cell and trying to track that cell, and some of those things.

And depending upon the cell line, and the method of measurements, you get things which sort of look linear, which don't look at all linear, which they can't tell how it looks. And if I could synthesize it a bit non-technically, interesting results, can't manage to reproduce it between laboratories or with different cell lines, and there is not the mechanism at this point to figure out if those observations move up to -- from single cells to tissues to organs to individuals, which is, of course, the level at which we behave.

And as you get additional mechanisms and additional mechanisms coming in, which says there is a lot of stuff out there, and we're still a long ways away from being able to translate that to something which -- and I'll put my regulator writer hat on -- to do a regulation we would need to have something which was consistent, predictable, reliable, demonstrated,

well validated. It would allow us to communicate the risk and to control all of the materials in a systematic and logical manner.

At this moment, there is all of this stuff, which is really interesting, but we can't pas that kind of test to put it into a regulatory structure. On the other hand, do we really want to be taking licensees and situations and driving them into the dirt -- pardon the pun -- when there may be some of this evidence around there, and trying to find that balance between what is adequate protection of public health and safety and what are reasonable expenditures of this nation's resources.

Wonderful questions, $164,000 question, no answers yet.

MR. HOLAHAN: Just to clarify, the only reference to the National Academy report is paragraph 56 on page 21. That's it. One of the things that I think that comes out of the draft recommendations is the caveats that they want to place on this collective dose issue.

As I guess an open invitation, the National Academies, they're going to have a series of seminars tomorrow morning. Dr. Daniel Cruski from Canada will be talking about cancer as a result of

Chernobyl fallout in Europe, and I would presume this is going to be a continuation of a prediction of either cancer incidence or cancer mortality due to the Chernobyl releases through the year 2065.

This is much of the work that was done by Cartis where she is estimating some 16,000 cancer deaths over an 80-year period to 570 million individuals in Europe as well as the Ukraine, Belarus, and portions of the Russian Federation. Many of those individuals will have exposures of half a millirem.

So now we're going down to collective dose numbers. She also recognizes -- this is Dr. Cartis -- that this is going to be with a background of some 200 million cancer cases among those "exposed individuals."

CHAIRMAN RYAN: I would like to see the statistical analysis that verifies that.

(Laughter.)

MR. HOLAHAN: It's essentially plus or minus a factor of three.

We had an opportunity last week as part of an Office of Nuclear Regulatory Research, one of our seminars, Dr. Ethel Gilbert was here, and we took the opportunity to question her about the strength of the statistical analysis that they used for many of these

epidemiological studies, and questioning whether or not there really is some sort of lower bound where we shouldn't be doing collective dose and making predictions about future health risks, whether it be cancer incidence, cancer mortality.

And basically, she went back to LNT. Any incremental exposure there is an incremental increase in risk. That's where we ended up.

CHAIRMAN RYAN: And that's irrespective of the fact you're extrapolating from high doses down to low doses to get those factors and --

MR. HOLAHAN: That was very much observed and pointed out, yes, sir.

CHAIRMAN RYAN: All right. Thank you, Ruth.

Jim?

MEMBER CLARKE: Thanks, Don. I want to join my colleagues in expressing concern about this protection of the environment piece. And it seems that the lack of evidence is most compelling, and obviously you would want to lead with that.

The other thing I wanted to mention is the EPA, as you know, has gotten into this with ecological risk assessment at contaminated sites and so-called hazard evaluations for new chemical products. And

it's a morass of multiple species, multiple endpoints, multiple pathways, and my experience with it has been that people tend to pick a pathway they know and run with it.

The other interesting observation is there actually is evidence that there are some chemicals to which, say, aquatic species are more sensitive than we are -- for example, PCBs and aluminum I believe.

You have a situation where there's no evidence at all of that. But, you know, if this program were to go forward, I just wonder if anybody has thought through about how it would be implemented, I mean, how you would -- how you would do these assessments, how you would deal with it, you know, multiple pathways and all of that.

And I wondered if any of the specific comments pulled you into that. I agree that a lack of evidence is the most compelling. But just the other difficulties in getting into something like this, based on what I have seen the EPA is dealing with. Will your comments address that at all, or have you seen comments that get into that?

MR. COOL: We have certainly seen comments like that at various times. We're aware of what they're doing. One of the issues that continues to

float around is how whatever assessment framework that the ICRP might wish to suggest would fit in or not fit in with the many different things that are being done here in the United States and elsewhere, because a lot of people are working on various things.

At this point, the staff's specific comments do not make those kinds of observations, since none of that material is present in these draft recommendations. But that's -- you can read between the lines. This isn't the right -- read between the lines that we want to be able to comment on the assessment framework as it's produced, because in fact that is the sort of thing that is very much of concern.

MEMBER CLARKE: And all the comments will be available on their website. Is that what you said earlier?

MR. COOL: Correct. Yes. ICRP's website, although not fancy, is actually fairly simple to navigate. And you can go to the comments and see everything that everyone has commented all the way back to the original document. And they will have all of them posted, so we will be able to see everything that people are putting in over the next few months.

CHAIRMAN RYAN: And there's one big

missing piece, Jim, along the lines that you're talking about. I mean, absorbed doses is a physical quantity. It's energy deposited per unit mass of material, independent of the material. But when you try and translate that to rem or to sievert, you need to understand what endpoint of risk you're talking about.

Is it going to be cancer, fatal cancer, incidence of cancer, some other ailment? And so how do you look at all of the -- you know, the various endpoints, and then what do you do for a dose equivalent kind of concept? And that structure just doesn't exist at all. Period. And, again, I agree with the staff, there's no foundation to say it needs to exist.

MEMBER CLARKE: That is the most compelling argument that --

MR. COOL: There are really two separate issues here.

MEMBER CLARKE: -- if we were to get into this, there are --

MR. COOL: Yes, there are really two separate issues, one dealing with the whole question of whether or not you need to do anything, and from that standpoint I would look at: is there something

that would need to change in Part 20 or the other regulations in terms of the way that we control sources?

There's clearly no evidence at this point that there is anything that we would need to or want to change in regulatory structure. When you go to try and then start assessing effects, as you have rightly pointed out, what is a rem or a rad or a sievert and otherwise? And what effect are you looking at?

In discussions with Jan Patrithe, who is now the Chairman of Committee 5, Jan is actually pretty clear. We don't yet have a clear agreement on what organisms are the right kind of organisms? What kind of effects are the right kind of effects? Are we individuals? Are we populations? Is it a killing of a population? Is the population viable?

So we don't know yet who we're trying to protect, what we're trying to protect them from, or the details of the mechanism and the way to measure what the unit increment is of whatever it is that we're giving to them. So there's three key components to an assessment framework, none of which are actually agreed upon at this moment. So from an assessment development standpoint there is still a huge amount of activity.

And then, you have the huge amount of work that has been done in chemicals. You have a lot of work that has been done in various places in radiation in the environment. Over in Europe you have the ERICA. E-R-I-C-A, it's an acronym. We can talk about it later. Program and followup programs, which have been trying to do some of these assessments, the Department of Energy's RESRAD-Biota code, which looks to try and do some assessments.

There are similarities. There are differences. If I give you a case study, and ask you to run those two programs, would they come up with the same thing? No. So part of what is also needed is once you decide on the answer to those three questions is you then have to figure out how to try and benchmark, so that when somebody does an assessment and someone else wishes to verify it, they have half a chance of doing so. We have a long ways to go.

MEMBER CLARKE: Well said. I think you -- I think I've made my point. Thank you.

CHAIRMAN RYAN: Any other questions? Comments?

Gentlemen, thank you very much. We appreciate -- any other questions? I'm sorry. Any other questions? Hearing none, thank you again for

your presentation.

We're probably going to take up the draft letter we plan on writing on this at 3:00 today for the first time. So we'd welcome you back to sit in on that letter-writing session. Great. Thanks very much.

We are a bit ahead of schedule. It is now just a little bit after 11:00. We had left a larger block of time here, so why don't we adjourn until 1:00. Is that correct? Until 2:00? We're going to -- I'm sorry. We're going to adjourn the ACNW meeting until 2:00, and then we'll have our planning and procedures meeting at 1:00.

All right. Thank you very much. We'll see you all at 2:00.

(Whereupon, at 11:09 a.m., the proceedings in the foregoing matter went off the record unti 2:07 p.m.)

CHAIRMAN RYAN: We'll go back on the record and in session. This part of our meeting is called the NRC Staff Review -- let me know when you are done, Latif -- NRC Staff Review of Revised International Commission -- I'm sorry -- the exchange of information between NMSS management and ACNW members. And we are here to hear our reorganization

of NMSS and STP. Welcome.

MR. MOHSENI: Thank you very much. Good afternoon. Thank you for the opportunity to brief you on the NMSS and STP reorganization. I am expecting that Dennis Rathburn from STP, the Deputy Director, will join us. And so will Mark Shaffer from NSIR, the principal parties impacted, if you will, with this reorganization with NMSS.

MEMBER HINZE: Excuse me, could you let me know what those acronyms are?

MR. MOHSENI: Yes.

MEMBER HINZE: What NSIR is and so forth?

MR. MOHSENI: Yes. Sorry about that. NMSS, Nuclear Material Safety and Safeguards Office, Jack Strosmider is sitting there, the Office Director. STP is the Office of State and Tribal Programs. And NSIR is Nuclear Security and Incident Response in NRC. I apologize for using acronyms. We are so used to them.

I want to first give you some background before getting into it. And I have used some acronyms here. And I apologize. Please stop me if I need to clarify.

SECY-06-0125 was issued in June 1, in which the staff recommended a reorganization of STP

and NMSS. The June 16th SRM did approve the reorganization as proposed by the staff. And furthermore directed the staff to share the draft functional statements of what came to be called in the paper the new Office of National Materials Program with state leaderships in Office of Agreement States and Conference of Radiation Control Program Directors to obtain their feedback on the new functional alignment, which we are currently doing.

There will be two new office effective October 1, the Office of National Material Program and a new NMSS. And NMSS today carries the same name but this will be a new office with a new focus on programs.

It is important to note though that the SRM also directed the staff to further look at the office titles to ensure that they reflect the roles of agreement states in the National Materials Program and the importance of intergovernmental liaison. We will talk further about the structure later.

NMSS currently has a wide range of activities, uranium recover, conversion, enrichment, and fabrication, medical, industrial, academic, and commercial uses of radioactive materials, transportation including certification of transport

containers, spent fuel storage, safe management and disposal of low-level and high-level waste, and management of decommissioning of reactors and materials facilities.

NMSS organization has been stable for the last probably decade, even more. It has had four technical divisions, Fuel Cycle Safety and Safeguards, Division of Waste Management and Environmental Protection, Industrial, Medical, Nuclear Safety, and Spent Fuel Projects Office.

In March of 2004, NMSS created the High-Level Waste Repository Safety Program. That was really the biggest change in the past decade in organization in NMSS.

The Office of State and Tribal Programs, which shares our reorganization in this phase, currently encompasses two areas: Agreement State Programs and Federal, State, and Tribal Liaison Program. The Agreement State Program deals with the formal agreements that we have currently with 34 states who have entered into formal agreements with NRC to assume regulatory responsibility over byproduct, source, and small quantities of special nuclear material.

There are about 21,600 licenses nationwide

in the U.S. of which the states have 17,000 of those. The remainder, which is about 4,500 are issued by NRC. And recently we have also heard that three more states are being added -- are requesting agreement state status with the NRC. Those are Virginia, New Jersey, and Pennsylvania. When they come online, if you will, as agreement states, the portion of NRC licenses goes from 20 percent, which is what currently it is, to about 10 percent.

The National Material Program is a term developed in the last '90s to define the broad collective framework within which both NRC and the agreement states function. It includes the organization of agreement states and the Conference of Radiation Control Program Directors in the states.

The other part of the State and Tribal Program is the Federal, State, and Tribal Liaison Program. That program ensures NRC's cooperation with those jurisdictions to promote greater awareness and mutual understanding of the policies, activities, and concerns of all parties with respect to radiological safety in NRC-licensed facilities.

That gives you some background on how we are organized today and what now I'm going to talk about the contributing factors to prompting us to

propose that reorganization a month ago and the subsequent steps forward in that direction.

The factors that effect our performance today are tied to the following:

One, the number of agreement states are continuously increasing. As I indicated, we will end up with about 10 percent of the total licenses, NRC will. The other 90 percent will be carried by the agreement states. And as I earlier discussed, the National Materials Program is the framework by which collectively the two parties regulate the regulated industry in that arena.

We think time is right to enhance integration of the National Materials Program by merging the appropriate elements of NMSS and the State and Tribal Program. This will improve the effectiveness of the extensive coordination among staff. That is a strong driver. I will elaborate on that.

It is important to have consolidation of such activities as medical, industrial, and academic uses of rad materials, increased control of sources including international activities to support the code of conduct, implementation of the Energy Policy Act of 2005, mandating an NRC framework for certain

naturally-occurring and accelerator-produced radioactive materials, commonly known as NARM, decommissioning regulation of low-level waste, environmental reviews, and evaluation of DOE's incidental waste reviews, rulemaking and oversight of regional licensing, inspection and liaison functions.

What they have all in common are the following: a need to manage public and worker exposure considering public proximity to many of these activities, significant stakeholder interest -- there is always a huge public stakeholder interest in these activities that almost makes these activities stand out in that aspect. And then there is the extensive experience by states in these arenas.

So on the National Materials Program, these are the drivers, if you will, to improve our consolidation and enhance our integration. In those arenas where the number of agreement states are going up, the NRC will rely more and more on the agreement states to regulate that part of the industry.

And, of course, the regulatory framework is what National Materials Program is. An extensive coordination and collaboration would be needed in that framework. So enhancing it can only bring us more potential for successfully regulating the industry in

the future.

There is also a potential for significant emergent work on the horizon as well. Industry initiatives to increase fuel production, DOE's plans to changes in transportation packaging, aging, and handling at reactor sites or at surface facilities of the proposed Yucca Mountain facility. And, of course, everyone has heard the President's GNEP, Global Nuclear Energy Partnership Initiative to develop new proliferation-resistant recycling technologies.

And if these emergent work pan out, there is a net benefit in focusing management attention on these radical changes in the industry. These are radical in science basis, technologies, in developing the framework, regulatory framework by which we can conduct our mission basically is to regulate them safely.

By reorganizing, the span of responsibilities of the two new offices would be better focused to the potential changes in our regulated environment and the visibility of state and tribal programs would be elevated to a major program office, thereby enhancing coordination.

Now I want to briefly discuss the new organization starting with Office of National

Materials Program. The office title, as I said, may change. The SRM directed the staff to receive input from the states on the functional statements and then provide input back to the Commission on what are the appropriate titles for the office and the divisions that would raise the level of visibility of the state programs in this new reorganization.

We are working on those. At this stage, what we know is that there will be three technical divisions within Office of National Materials Program: Division of Industrial, Medical, Nuclear Safety, Division of Waste Management and Environmental Protection, and the Division of Intergovernmental Liaison and Rulemaking.

We are currently working on the organizations below the division levels. We don't have a clear organization yet below those levels. In the next few months, we will hope to have that finalized.

As for the new NMSS, the new NMSS will have a smaller scope of regulatory focus. It will be uranium conversion, enrichment, and fabrication, spent fuel, high-level waste storage, transport, and disposal. As I said, if those emergent work pan out, having this kind of a narrower focus on the regulatory

environment will provide us more opportunities to build the regulatory frame to deal with those new technologies and developments.

We know there are going to be three technical divisions again. But below those, we still are at work. That is work in progress. Fuel cycle safety and security is one. Spent fuel storage and transportation will be another. And high-level waste repository safety.

There is one new addition here. The need for Domestic and International Safeguards Policy on Regulation for Fuel Cycle Facilities, including materials control and accountability will move from Nuclear Security and Incident Response, NSIR, to NMSS -- to the new NMSS.

This will allow better integration of design processes and safeguards reviews. We are trying to maximize the benefit of this organization and bringing together those activities that are complementary with each other and give us some synerginistic benefit.

It is important to also note that we will -- the new NMSS will have to work very closely with NSIR to ensure continued coordination on related physical security policy with respect to fuel cycle

facilities.

In terms of resources, we are proposing the new organizations based on the fiscal year '07 budget estimates. There will be some transfers of FTEs from Nuclear Security and Incident Response to NMSS, as I said, dealing with the lead responsibility for domestic and international safeguards for fuel cycle facilities. But there were also an identification of 17 unbudgeted FTEs that were requested in the Commission paper. But the Commission disagreed.

Our challenges are twofold. One is transitioning into the new organization. And the other one is once the new organization is in place, new challenges that currently we don't have will probably surface. And those are listed here.

Our transition challenges are we have to transition into these new organizations without any additional resources. That means the work conducted in fiscal year '06 now, we have to keep our eye on the ball. We have commitments to meet. They are not effected by this reorganization. We will continue to focus on safety and security and reorganize.

And then again there are resources associated with the new organization, the 17 FTEs that

we are not going to get. So that means we have to find better ways, new ways of providing the kinds of services that we were providing within the regulatory framework to be able to deliver those functions without any additional resources.

There are also some coordination challenges and, as Jack would say, opportunities as well. Rulemaking and Environmental Review staff in the National Materials Program will be a Center of Excellence servicing NMSS and NMP and NSIR.

This is a cross-office service if you will. Currently NMSS does do rulemaking for another office, NSIR. Now we are going to add one more office so we are going to -- we have some experience in providing services to another office. This will expand on that.

But in addition to that, environmental reviews will be done in NMP but for not just NMP but for NMSS and NSIR as well. These will offer some both challenges and opportunities to learning from our Center of Excellence experience we have had in the past.

Another coordination challenge is that there will be one corporate support program. Currently each of the major offices in NRC has what we

call program support, planning, budgeting, contracting, hiring, IT support. In this case, we are going to attempt to deliver the services -- program support services to two offices from one. One program organization will reside in NMSS and that program support organization will serve two different offices, NMP and NMSS.

The last but not least of the challenges we face is that this also coincides with a huge move of the NRC to a new executive building not far from here. It is now expected that the new NMSS will move by October of '06 to the new location. So not only we are trying to reorganize, we are also planning to actually move the organization to a nearby building and we have those so-called operational challenges.

Jointly with State and Tribal Programs with Nuclear Safety and Incident Response, we have developed a comprehensive communication plan and a punch list. Representatives from the EDO's office and Human Resources and Office of Public Affairs have provided critical support for this effort.

We looked at the lessons learned from other sister organizations who have gone through major reorganizations and what we have learned is that a transition team is absolutely critical to have a focal

point to transition, especially a reorganization of this magnitude.

We also have learned that involvement of all staff early on and throughout the process can also contribute significantly to a successful transition. And to put that into action, those lessons learned, we have created a transition team. We have created a steering group and an advisory team.

A transition team is composed of first-line SCSers and corporate staff of the three organizations effected, NMSS, STP, and NSIR, and their corporate staff. They form, if you will, the nuts and bolts operational level transition thinking at that level.

They will get advice from an advisory group which are volunteers from all levels of the three organizations who have volunteered to provide advice to the transition team when dealing with issues on every aspect of this organization. This is part of that lessons learned to get the staff involved as soon as possible and throughout the process.

And finally we have the steering group which is made up of division directors of the three organizations and regional offices. I think those are the ones who are effected critically at that stage.

And they will coordinate the steering direction that we take.

And they take it to the office directors any decision that need to be reconciled at the highest level. Office directors of the three organizations form that final group, the office directors' group.

We have also set up an internal website. It is an interactive website where the staff can provide comments, concerns, questions, suggestions, and we will take those and field them into the right transition process, champion, if you will. And from there, we actually deal with those suggestions and get back to the staff on how those suggestions or concerns were addressed.

In conclusion, I want to leave you with the thought that a reorganization of this magnitude coincident with a major move is probably rare. So we are going to recognize that we are going to learn from the experience. It is going to be challenging. There are a lot of aspects in the move that deal with the staff concerns, for example, parking, having access to a cash machine in the next building.

They are now folded into this reorganization. A lot of folks don't look at the reorganization as integral with the move. In other

words, the move is not viewed as a separate item that happens to coincide to this time. And so we have to take extra care in communicating and separating the issues. And if need be, addressing them based on their own merits. It just makes the issues more complex and complicated.

We are doing it without additional resources and, therefore, we are using an organization capacity model that Jack and Margaret Federline in NMSS have championed for us is to critically look at organizational capacity and tap into that as much as possible to address the needs that we have. And it turns out so far it is paying off.

And I'm open for any questions that you might have.

CHAIRMAN RYAN: It sounds like there is a lot to do. Let me go back to where you started, if I may, the relationship now that will exist with State and Tribal Programs and NMSS. And I'm going to try and focus the question on a specific issue.

I've noticed over the last months and maybe even years the number of folks who are retiring from headquarters NMSS and the programs that were involved in a whole slew of aspects with states where folks that had high levels of experience and high

levels of technical hands on, you know, they knew the detailed worked kinds of views, and with that resource pool shrinking.

And from what you described, I got the impression that you are going to be maybe taking a half of a step back from the agreement states because they are, by all reports in the INPEP Program, delivering their programs very well over the large part, and with what we have commented on is a very quality INPEP Program to actually look for lead indicators and be very efficient in the staff use.

Do you see a challenge there in terms of maintaining staff competence in technical areas over time? It is a thought that struck me. It maybe something you are thinking about in a different way but hiring and retaining, you know, good people is one aspect. And clearly that is going on. I've seen evidence of that. But I wonder if you will lose touch with the hands on part of the industry a little bit.

MR. MOHSENI: That's a good question. Jack, did you want to take a shot at that?

MR. STROSMIDER: Well, the first comment I would make is that I think this is an applicable question and challenge agency-wide. I mean when you look at the demographics of the Agency, you know, we

are losing a lot of senior staff.

And so looking in terms of what's, you know, sort of the buzz word of the day of knowledge management, we are taking that very seriously in terms of looking at what sort of programs we can put in place.

Some immediate or obvious things we are doing, we have the ability to what we call double encumber so if we know somebody is leaving, we can bring somebody in for that position and have some overlap. We have the ability to bring people back, the retired annuitant program, which we have done quite a bit of that. And that seems to be working well.

But then there is the other piece of leaving, you know, some of that knowledge so that people can pick it up and it is not lost. And we are doing that through a series of seminars. There are databases. There are things that are happening in a grassroots effort to do those things.

And I think, you know, the flip side of it is we are bringing in a lot of new people so we are getting a lot of good new ideas, you know. Aby mentioned the organizational capacity model. Part of that is looking at new ways to do things, not doing

things the way we have always done them. We don't want to lose the good but we can bring some other good things in, too.

CHAIRMAN RYAN: Again, as -- I'm sorry, go ahead, Jack.

MR. STROSMIDER: No, that's all right. I mean I think sort of big picture, that is it. But it is one of the, if you will, cross-cutting issues that we identified.

If you go back to our program briefs to the Commission in February and we talked about the challenges that we saw and one of them was exactly this issue of maintaining, recruiting, and developing staff. So we are putting a lot of focus on that. And we will be looking at strategies to try to address it.

CHAIRMAN RYAN: One that I maybe -- and you have probably thought of this, too -- but, you know, as you kind of step back just a bit from the states and give them more of the responsibilities or, you know, give them more of the direct role, you might think about an exchange program with states.

I mean I think there is tremendous pool of talent in state programs in the material side, not just the x-ray because they have --

MR. STROSMIDER: And that certainly is

true. And I don't know that we have ever looked specifically at an exchange program.

CHAIRMAN RYAN: Well, if you could send staff to the state programs and then have state program folks come up here for some duration, you know, if you are writing a rule or developing, you know, guidance or anything along those lines, it does two things.

One is it puts your folks in the field to see how things work day to day and how states are doing, you know, hands on inspections at good, bad, and ugly facilities and all of that. But, you know, and then it gives the state folks the ability to come up and, you know, see how the sausage gets made and all that sort of aspect of the regulations.

But that might be one way. It just struck me as you were talking about it -- building that in might help.

MR. STROSMIDER: Yes, it is a good thought. I would point out that with regard to things such as rulemakings and those sort of activities, that we do typically set up working groups and task groups and we have traditionally had state people come here.

CHAIRMAN RYAN: OPD and OIS have --

MR. STROSMIDER: Yes, if you look, for

example, at the implementation of the Energy Policy Act, we had a representative from the states here for I think it was maybe a couple months.

MR. MOHSENI: A couple of months, yes.

MR. STROSMIDER: So it is not quite perhaps as far as the exchange program but we can, you know, that is certainly an idea we can think about.

CHAIRMAN RYAN: Well, you know, again, as you scout for FTEs, then, you know, that is a way to at least get knowledge exchange and some of those things. Just a thought.

MR. MOHSENI: Indeed. Yes, that is a very powerful -- you know in knowledge management, obviously that helps us in transferring where the experience is. Clearly in the future, it will be more state experience gained in the field than here. And perhaps even in the regions. And equalizing that requires exchanges, various processes to exchange knowledge. And one of them is exchanging individuals.

CHAIRMAN RYAN: Sure. One of the things that, you know, struck me in this regard was a recent presentation -- it's now a paper in the Health Physics Journal by Bob Emery from Texas where, and as you both know, the radiography source overexposure have been a chronic kind of question periodically over time.

And he actually found quite clearly that it tracks new entrance into oil field work where there have been big pulses of new employees in the oil field work, guess what?

Those over exposures or high exposures have occurred on three different cycles and the correlation coefficient was .89. So, you know, I mean that's the kind of experience and knowledge and the kind of thing that the state folks get a hold of is because they deal with it every day. So just a thought. Thanks.

MR. STROSMIDER: And I thought I'd just comment on that, you know, just one final thought on that. I think that is a really good thought. And I think it is a really important point.

Part of the motivation for this reorganization we are talking about of merging NMSS and State Programs is to bring those talents together and to take advantage of them, build this capacity, and, you know, I think that is really a driving force. And I think it is consistent with the suggestion that you are making.

The other thing I want to emphasize here is we hear some discussion about well is NMSS absorbing State Programs? Or is State Programs

absorbing NMSS? And what we have to make sure of is that this is an equal blending of the two so that we come up with a program that is good for the nation.

CHAIRMAN RYAN: Well, I mean to me, is you deliver an effective radiation protection practice and proper management of materials. That's the goal, yes. Great, great news. Sounds like a lot of challenges ahead and a lot of fun to try and fit it all together and make it work.

Bill?

MEMBER HINZE: Your discussion has focused on the higher level aspects of this. And we have a great deal of contact with the technical divisions that are in your new NMSS. How far down is this reorganization going? And to what extent can we expect to find new faces and new assignments and so forth at these lower levels?

MR. MOHSENI: I'll take the first shot and Jack is here. I don't think you are going to see too much of a huge difference in the lower levels. There will be some changes. For example, I talked about the lead in Safeguards, Domestic and International, which will have some change from NSIR probably to NMSS. That -- in FCSS, that may become visible.

But in other aspects, basically you have

the same technical staff largely still there. Although we haven't really completed the lower reorganizations, we don't anticipate significant changes in faces that you will be dealing with in terms of expertise and work that is being done.

MR. STROSMIDER: I guess I would -- two comments -- I would first point out one other change that I'm not sure if you mentioned it, Aby, is moving the uranium recovery activities from the Fuel Cycle Division to the Division of Waste Management and Environmental Protection, which would actually put it -- keeping it in the National Materials Program Office.

That's -- for those of you who have been with us for a while, you know that that program was previously with that division. The motivation for that change is that there is a lot of interaction with the states in that program. And we think that it is important to have that close alignment.

But having said that, I think as part of our philosophy and one of the guidelines that we are trying to use in this is to maintain the stability that we can maintain in the technical staff and in the functions that are going on. So I think we have identified the major changes that we are aware of.

And beyond that, we are going to try to keep as much stability as we can. There is enough going on at the higher level and with the move that we talked about. So we are going to try to maintain stability where we can.

MEMBER HINZE: Will these technical divisions also be moving then to a new building?

MR. STROSMIDER: Yes, the new Office of Nuclear Material Safety and Safeguards, which will essentially be the Fuel Cycle Facilities, Spent Fuel Project Office, and High-Level Waste Repository Safety will be moving to the new building.

MEMBER HINZE: Thank you.

CHAIRMAN RYAN: That's great. I guess this was going to be a two-way street so we are prepared to tell you how we have dealt with our SRMs. And we've got a couple of SRMs that have caused us to revise our action plan, which we have done. And that has been sent up. And we are also now working with your staff and everybody has been very helpful to try to identify how we are going to get those things on our 12-month rolling calendar and get activities scheduled.

So I think what we are going to attempt to do in the next little while is have John Larkins give

an overview briefing and we certainly can provide you with -- and you probably already have it -- our 12-month rolling calendar up to date. And then talk a little bit about some of the technical content of various areas.

The members will be kind of working on those questions. And then the staff are prepared to talk about the logistics and where we are in planning and so forth. And I think the idea is -- and John correct me if I'm wrong -- you would perhaps take away this information and other follow-up one-on-one conversations and then when we get back together -- I think we are scheduled in September to have a more formal view, we can kind of be on track with where we are there.

MR. STROSMIDER: Good. And just let me point out I will have to leave a little before three but Aby will be here and other staff. And we need to make this coordination happen. And I think, you know, making your operating plan and this new organization work together is going to be --

CHAIRMAN RYAN: Yes, we are looking forward to that, too, Jack. So thanks.

John?

MR. LARKINS: Yes, I'll try to go through

this quickly, Jack, while we have you here for a few minutes anyway.

But the idea was to give you some insights as to how we've factored the SRMs into the revised action plan. And then further included that into the ACNW 12-month calendar which we use along with your staff for coordination of meetings and things like that.

And what I'd like, hopefully, the take away from this discussion for you is to have an opportunity -- and since you are having your retreat the next two days is to mention this to your E Team and all your division directors that, you know, we have planned for a number of technical reviews over the next 12 months. And you will have copies of the 12-month calendar.

See if there are things in terms -- questions -- omissions, if we have left something out which you think is important which we should schedule. Also the timing that we have in the 12-month calendar for these reviews. And then maybe some questions on the role or how we carry out some of these reviews. I'm thinking right now like in the area of igneous activity.

But anyway, I'd like to quickly go through

how we made some revisions in our calendar. And it is not just John Larkins but also Antonio Dias will provide insights as to how things have been scheduled. And if you have any questions about the technical matter between the members and staff to answer any questions.

Okay, the action plan was revised -- we had sent up the action plan back in December. And we also had a Commission meeting. I think that was in the January time frame. And the Commission sent out two separate SRMs.

And as you recall, there were a list of items in those SRMs, a number of which we hadn't really listed in our action plan. So it was a significant challenge to go back and take a look and update it to reflect these new items the Commission had asked us to do.

And try to schedule as many things as we could within the same budgetary constraints that we were living with earlier. So we didn't get any increase in budget, as you know, so some of these things are going to represent a challenge.

Turning right now to the proposed Yucca Mountain repository. One of the items that was listed prominently in the SRM was to analyze the current

state of knowledge regarding igneous activity. And to prepare a report that could be used by the Commission -- I'm not sure if it is the Commission or the staff -- I think really it is as much the staff as the Commission -- as the technical basis for decision-making in this area.

And the approach is going to be is to develop a White Paper. And then to have this White Paper sent out to a number of stakeholders. And engage people in a working group meeting to see if all of the issues have been outlined in that paper. And secondly, if it adequately states what the state of the art is or our understanding of what is going on in this particular area.

And, Antonio, what do we have scheduled?

MR. DIAS: Yes, what we have scheduled right now is in February we have a working group meeting on public comments on the SMW activity-wide paper. This is going to be a very large group of people coming together and exchanging ideas and information about igneous activity. And we like participation of NMSS in that working group as well.

MR. LARKINS: Yes, but even before that, I think Bill is planning on having a White Paper, a draft White Paper that would be made available to the

staff such that --

MEMBER HINZE: By the first of the year -- before the first of the year.

MR. LARKINS: And hopefully NMSS staff will take a look at it and be able to comment on it and participate in that working group meeting along with DOE and other stakeholders.

CHAIRMAN RYAN: One of the efforts, too, I think, which is an important part of Bill's work and the White Paper is that we are really working hard to adequately and fairly document the range of views that exist on some of these key issues because we feel like that if we can adequately present to the Commission the range of views and detail those views, that that best serves their decision-making.

So that's really kind of a focus. It's not to decide which one is right. It's really to adequately document the range of views. And that is part of the stakeholder engagement is to make sure we have been fair and adequate in documenting, especially where there are, you know, perhaps wider-ranging views.

MEMBER HINZE: And it is important that we have the most up-to-date views as well. And sometimes it is not that easy to make certain that we are really

there with the most recent view. That's why we really need the review of the NMSS staff to make certain that we do our presenting in the correct view.

MR. LARKINS: Yes, I think in the whole Yucca Mountain arena, there are a number of questions that will have to be looked at over the next 12 to 18 months. And I know NMSS has sent a list of potential technical exchange areas to DOE. And once, you know, there is some agreement, I think, between DOE and NMSS on those, then we can factor that into future review plans for the ACNW in that area.

MR. STROSMIDER: Yes, and I would just make two quick comments. One is this area of the seismic issue is obviously -- igneous activity, excuse me -- is obviously an important one. You know the performance analysis, sensitivity studies, et cetera have shown that it is important. It is a significant driver. So -- and I agree with everything that was said in terms of laying out the perspectives and making sure that it is up to date.

With regard to the technical exchange meetings -- and you have seen the listing, John, I hope --

MR. LARKINS: Yes.

MR. STROSMIDER: -- and we have provided

that to the Department of Energy. We have been discussing this in our quarterly senior management meetings for some time. And we have agreement with them now. We are going to be looking at that list and trying to set up these technical exchanges between now and the end of the year. When you look at that, it is a fairly long list.

MR. LARKINS: It is a great list. I'm not sure if you are going to be able to do them all.

MR. STROSMIDER: Yes, so there is plenty of work. And I will just put a little pitch in here. There are a lot of people who have the impression that because the application is delayed that that means, you know, we sit around and twiddle our thumbs. But there is this unique pre-license -- opportunity for pre-licensing interactions on Yucca Mountain. And that's why these things are very important.

If we want to meet the Commission's schedule and if we want to make sure we get a complete, high quality application, these interactions are extremely important to make that happen. And we would look forward to being, you know, present as work --

MR. LARKINS: Yes, and it would save us resources if we can piggyback on your reviews and not

to have the same presentations here. So, you know, it would save us resources. So we will try to, again, work between the staff to do something to coordinate activities where we can.

Another item in the SRM was to identify and assess synergy between monitoring for compliance and prediction of performance using analytical modeling. Specifically consider how methods of monitoring for compliance could strengthen reliability and durability of institutional controls.

And here we have got a number of --

MR. DIAS: Yes, we have several activities related to that. In September, we are going to have a working group meeting on environmental modeling and monitoring interface.

In November, we are going to be discussing a White Paper, a summary of the role of institutional controls in decommissioning. There is a site visit to decommissioning site, a complex material site undergoing decommissioning. And also in September, there is a DOE -- we are going to be hearing the comments that you received on the DOE West Valley EIS.

MR. LARKINS: I would just say that I think there is going to be a number of activities coming out of this. I think the idea here is to see

how we can use monitoring in a number of areas. And so there will probably be a couple of activities. One related to model verification validation and the other to see how it might feed into what requirements or regulations there are for institutional controls for various decommissioned sites.

So, Jim did you want to comment?

MEMBER CLARKE: Yes, as John said, there are a lot of pieces to this and it is hard to put them all in two bullets. But there is a lot of interest in reliability and durability of institutional controls. You have taken, I think, a very fine approach to that with your graded approached and your high- and low-risk sites.

We have very little experience with institutional controls as applied to waste management situations but there is a fair amount of experience in other applications. And we thought it would be good to round up the current thinking on this and prepare this White Paper.

So the modeling and the monitoring going hand in hand a little better we think is certainly going to be helpful. If we are monitoring for compliance, what else can we do to build model confidence is the way I think we would like to say

that. That would give us a handle for the time periods perhaps for which institutional controls might be needed.

And as far as the reliability goes, putting together a White Paper of what everyone knows so far, we thought would be helpful as well.

MR. LARKINS: Okay, the next area is decommissioning. And I'm not going to go through all of these on each one of these sheets. But I'll just hit a few.

The Commission has asked -- I think this is lessons learned of where we are or what we have learned in the area of decommissioning over the years. And see how it could be applied to improving designs of new reactors and materials facilities. And the Committee will be providing a paper on this subject to the Commission in April of '07.

Also, they are talking about thoughts on how -- what we have learned in decommissioning that might be applied to reprocessing so that, you know, we take advantage of what we have learned from the past so we'll create the same type of legacy sites in other sites in the future.

We've got a number of things scheduled here but this is going to be an evolving area in my

mind because as things become clearer to you in terms of what the expectations are in this particular area, then we are certainly going to have to work closer to schedule those things.

MR. DIAS: Yes, in September we have a briefing on NMSS lessons learned efforts related to decommissioning. This is scheduled for the September meeting.

And in November, for example, we have a working group on design and construction considerations for decommissioning.

Okay, this is just two activities. We have several activities related to that.

MR. LARKINS: And also you are planning on -- the Committee is planning on doing a White Paper --

MR. DIAS: Yes.

MR. LARKINS: -- on reprocessing, outlining some of the issues concerned in reprocessing and looking at the proposed different processes.

MR. STROSMIDER: I would just comment, I think it is sort of interesting because this sort of spans the spectrum because one part of this is knowledge management and that is documenting what we have learned, particularly for reactors, because we will have a long hiatus before we do that again.

And one of the lessons learned is that the right time to deal with these issues is up front. And so now we have an opportunity with new reactors and with some of these new technologies to deal with it now. So I think it covers the whole range. And it is -- but that is an important lesson is that this is the time to make some decisions that are going to avoid problems down the road.

MR. LARKINS: Yes, unfortunately when I was discussing this with the staff, it is almost too late for some of the -- you know, designs like the ESBWR and the AP-1000 and others which are pretty close to design certification. But there still may be things that we can --

MR. STROSMIDER: Yes, certainly there are operational issues that are important.

CHAIRMAN RYAN: John, just one other comment. I think the decommissioning area, Jack, is one that when you have your retreat that I would mark as an A plus in terms of the cooperation between the staff and the Committee. We started very early on, as you recall, with a working group meeting that you held across the street. And it really came to a fine point for us when, you know, we had this same working group panel in to review the revised guidance. And they

reported to us that all the questions that they had raised in the first working group had been addressed.

And which, you know, that's a huge thumbs up from our perspective that, you know, we were able to give you input very early on in your process, which, you know, you can adequate reflect in the final product.

And it was something that was, you know, kind of a real win. There were practitioners in the field and they came in, you know, twice and felt that they had really given good input on things that would help them. And they were real positive about it. So if we have a model to go by, that's probably one to follow.

MR. STROSMIDER: That's good feedback. Appreciate it.

MR. LARKINS: Okay. Another area is waste determinations. I think we are making reasonable progress in this area. Now there were some things that were included in the SRM which were somewhat of a surprise like monitoring research on technology regarding waste incidental to reprocessing. We had planned to provide comments on the SRP. And we are in the process of doing that.

And in looking at representative cases in

terms of the review of the implementation or use of the SRP. And I think also there is another item which relates to providing support or looking at special issues related to waste determinations. And we are doing that actually this month with a working group meeting on behavior and degradation of barriers.

MR. DIAS: Yes, this is beginning to -- I'm sorry -- tomorrow there is full-day working group meeting on synergies that bear on the performance of those barriers. Also during this July meeting, we are going to be reviewing the draft standard review plan for the waste determination.

There is a visit to the Hanford tank waste sites that is going to be in October. The whole Committee is going to hold meetings. And they have the site for four days there.

There is also a review in December. We are planning a review of DOE's waste determination research reports. So we are trying to gather enough information so that we can be better instructed on those tings.

MR. LARKINS: Allen, did you want to chime in on anything?

VICE-CHAIRMAN CROFF: No.

MR. LARKINS: No, okay. The only thing I

would add -- this is sort of challenge because you know the budget is very limited in the area of waste determination so the added items that were placed in the budget were somewhat unfunded. So we had to take a look at a way to do this within the resources that we currently have available.

The next item is on low-level waste. And the ACNW started on a proactive initiative here to determine the adequacy of the NRC's technical basis and guidance to meet future challenges. And these challenges disposal options for greater-than-Class C waste, risk-informed waste classification schemes, other opportunities to risk inform Part 61.

And as you know, we have had a working group meeting on this subject. There was a White Paper that was prepared and reviewed and commented on by the staff and others and stakeholders. And that paper I think has received a lot of positive feedback.

We are now in the process of writing a letter -- or the Committee is in the process of writing a letter where they comment on the adequacy of the infrastructure for low-level waste regulations and what types of changes could be made in order to meet some of the challenges that exist.

And to me I look at this as sort of a win-

win situation because I think there were a lot of stakeholders who were looking to make significant changes in the regulations, including going to Congress and proposing changes in rulemaking and legislative changes.

And I think some of the suggestions that are going to come out of this will fit well within the strategic or the strategy that the staff was developing in this area. With maybe some modifications.

MR. DIAS: Yes, the only activity that we had scheduled for this was initially scheduled for September. This was to hear the public comments that NMSS received from the proposed rule that just went out for public comment last week. And I understand it is now -- it has been extended. It is going to be 60 days. So it is not going to happen in September.

October, the whole Committee will be in Hanford so we would like to hear those comments in November -- during the November meeting. This is the only activity we have related to this item.

CHAIRMAN RYAN: And very quickly, I think this is another success story in that Larry Camper and Scott Flanders, Jim Kennedy and others, have all participated with our efforts early on. The White

Paper will end up being published as a new reg. And that is also an example of knowledge management. Not just for the sake of documenting the history of low-level radioactive waste from the Ocean Disposal Act of '65.

But it really helped us prepare for one of the good questions we can ask.

And I think you see in the letter that there are suggestions for things that are currently within the regulatory framework that can be easily addressed to better risk inform approach as to low-level waste management questions. And maintain proper health and safety. And to do a real good job of risk informing different options.

You know the waste that were on the table in '79 when the regulation came around are not the way ways that are on the table today. But there are some real positive opportunities.

And, again, that is an example where both, you know, the NMSS staff, us, and the industry participants really made it a very fruitful working group. Low Level Waste Forum and others participated and it really, I think, gave us a very rich letter. I hope it is of great use.

MR. STROSMIDER: Yes, I would agree. In

fact, I was going to comment on it, too. I think this was a very good process, particularly the way it was worked up with the Committee and the staff early on in terms of our overall approach to this issue. It is a significant issue. It is complex. I don't need to tell you but I think, you know, we laid out the approach that would be used by the Committee and the staff working together.

And we are -- the Commission is expecting a paper from the staff later this year. I'm not -- it was originally September but I think it may have been --

PARTICIPANT: Closer to the end of the year now.

MR. STROSMIDER: -- closer to the end of the year. So that has slipped a little but the foundation that is laid in the White Paper and in the workshops and the other discussions are going to be very helpful to us in putting that together. So I think that was a good collaborative effort. Appreciate it.

MR. LARKINS: Yes. And we don't have any follow-on activities currently scheduled. But I think after the Commission gets back to the staff and the Committee on your paper and on the Committee's letter

report, then, you know, collectively we can decide on, you know, how to go forward from there.

So I think it would be a good opportunity for the Committee to continue to work with the staff in looking at the regulatory framework in the area of low-level waste disposal.

MR. STROSMIDER: Unfortunately, I do have to leave but I appreciate your time. There is some staff here that can continue the interactions. Thank you.

MR. LARKINS: I was going to -- one more, Jack, just -- I think Mike and I are planning on being at your retreat the next two days. And we appreciate that opportunity. So if there are any questions, we certainly can try to --

MR. STROSMIDER: Great. Yes, we are looking forward to having you there. I think we've -- we are trying to expand our participation and finding that that adds a lot of value to our efforts. So good, look forward to seeing you.

MR. LARKINS: Thank you.

We might as well finish up. Health physics -- the Commission was interested here in finding out the review and comment on the March 2005 report of the French Academy of Science on radiation

levels -- risk of low-dose rates and how that was used in the BEIR VII report or if it had been considered at all.

And also the data developed by DOE's Low-Level Radiation Research Program. And I'm not sure how we are going to handle that report. It says report on the differences. I think it will be a report on how this information may or may not have been used. And whether it had any influence at all.

And I think we heard some of that this morning in this morning's discussion. So that will be a follow on. And I think we are scheduled to have the French come in --

MR. DIAS: In November.

MR. LARKINS: -- in November.

MR. DIAS: Yes.

MR. LARKINS: So I would think we probably be issuing a report sometime in the December time frame.

MR. DIAS: Yes. We are also scheduled to attend -- there is a NEIS IRCP workshop at the end of August. There is also a DOE workshop on Low Dose Radiation Research Program late July, early August. So those are all going to be, you know, data gathering.

MR. LARKINS: Any other comments on that?

CHAIRMAN RYAN: No.

MR. LARKINS: No? Fuel cycle facilities, scheduled to review and comment on rulemaking addressing the in-situ leach uranium mining. And we talked about that a little bit earlier today. And I think that is coming along.

We have got trips scheduled to Nebraska,--

PARTICIPANT: Jackron, Nebraska.

MR. LARKINS: -- Jackron, Nebraska to take a look at a facility out there. And the staff is scheduled to come in with a proposed rule in September, is it?

MR. DIAS: That is correct.

MR. LARKINS: And at that time, the Committee will start drafting or thinking about providing comments. When are the comments due to the -- when is the rule due to the Commission, I guess I should say?

MEMBER WEINER: It's due in January.

MR. LARKINS: Okay. So we've probably --

MEMBER WEINER: We need to get a letter out in December.

MR. LARKINS: November?

MEMBER WEINER: November, December.

MR. LARKINS: Okay.

MEMBER WEINER: Yes.

MR. LARKINS: There are a number of other activities that are scheduled in this area. Briefing by technical experts on existing and advanced nuclear fuel recycle technologies, briefing by NRC staff on regulatory framework to support licensing of fuel recycle facilities. And one of the things that the Committee had decided was to prepare a White Paper on this subject, I guess with options. At least that was my thinking.

And, Allen, maybe you can correct me.

VICE-CHAIRMAN CROFF: I think the White Paper is going to be mostly focused on gathering together background, sort of a little bit historical on the fuel cycle. But trying to get in one place in a coherent form these advanced fuel cycles so we understand just what is in them. And then can try and identify what might need to happen based on that.

Right now our level of understanding is pretty rudimentary. And so it is really an education process. And then we will try to see what we can --

MR. LARKINS: This would sort of be like the low-level waste White Paper.

VICE-CHAIRMAN CROFF: Yes. Conceptually

yes.

MR. LARKINS: Okay. Anything else on that?

MR. DIAS: Basically, in order to support that, we also expect some annual briefing from NMSS on how they are progressing their recommended reprocessing rules.

MR. LARKINS: Right now there is no schedule for a proposal?

MR. DIAS: No, it's on the queue. We don't have anything scheduled. We are also in the queue potential recycle rulemaking activities. If we hear anything, we would be, you know, scheduling that presentation as well.

MR. LARKINS: Okay.

MR. DIAS: Yes, that is kind of in the future.

MR. LARKINS: We got transportation of radioactive materials. This is a Tier 2 issue also. You know we were scheduled to get a briefing on the package performance study and test plan.

However, with the redirection, the DOE, and the focus on the TAD, the multipurpose cannister, that is being put off to the future at which time we will get some information on design and I guess the

staff will, at that point, come forward with a new test plan.

So at that point, we would provide comments to the Commission. And that was it.

Any questions?

MEMBER WEINER: I have a question. I understand that SFPO or whatever their new form may be is looking at revising NUREG-0170, the EIS. Have we heard anything about that? NUREG-0170 is the Environmental Impact Statement on transportation.

MR. DIAS: No, I am not aware of it. No.

MEMBER WEINER: Okay.

MR. DIAS: We can ask them on Thursday.

MEMBER WEINER: Do that.

MR. LARKINS: That's it. If you have no questions, that is sort of a quick snapshot of how we have revised the calendar and the action plan to be responsive to the Commission's directions for the coming year.

CHAIRMAN RYAN: Okay, lots to do.

MR. LARKINS: Lots to do, right.

CHAIRMAN RYAN: With that, on we go.

I think we are scheduled now to begin a letter writing with the ICRP letter first then the low-level waste letter second. I'm hoping the ICRP

letter will go fairly smoothly and quickly.

And so without further ado, Michele, if you will put that on the screen, I'll just read it out from the screen.

(Whereupon, the above-entitled meeting was concluded at 3:10 p.m.)

CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Advisory Committee on Nuclear Waste 172ND Meeting

Docket Number: n/a

Location: Rockville, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

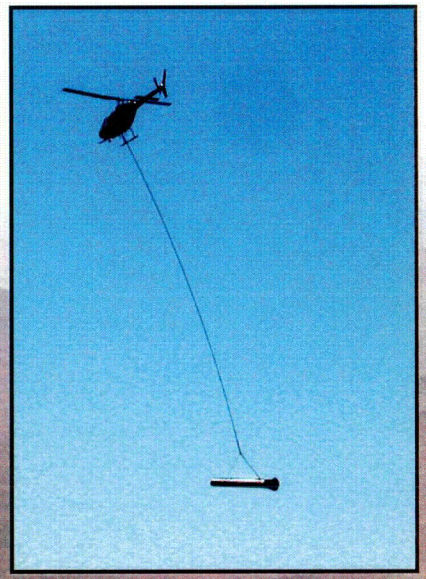
Lindsey Barnes

Lindsey Barnes
Official Reporter
Neal R. Gross & Co., Inc.

U.S. Department of Energy
Office of Civilian Radioactive Waste Management

www.ocrwm.doe.gov

Status and Interpretation of Aeromagnetic Survey and Drilling Program to Support Probabilistic Volcanic Hazard Analysis - Update



Presented to:
Advisory Committee on Nuclear Waste

Frank Perry
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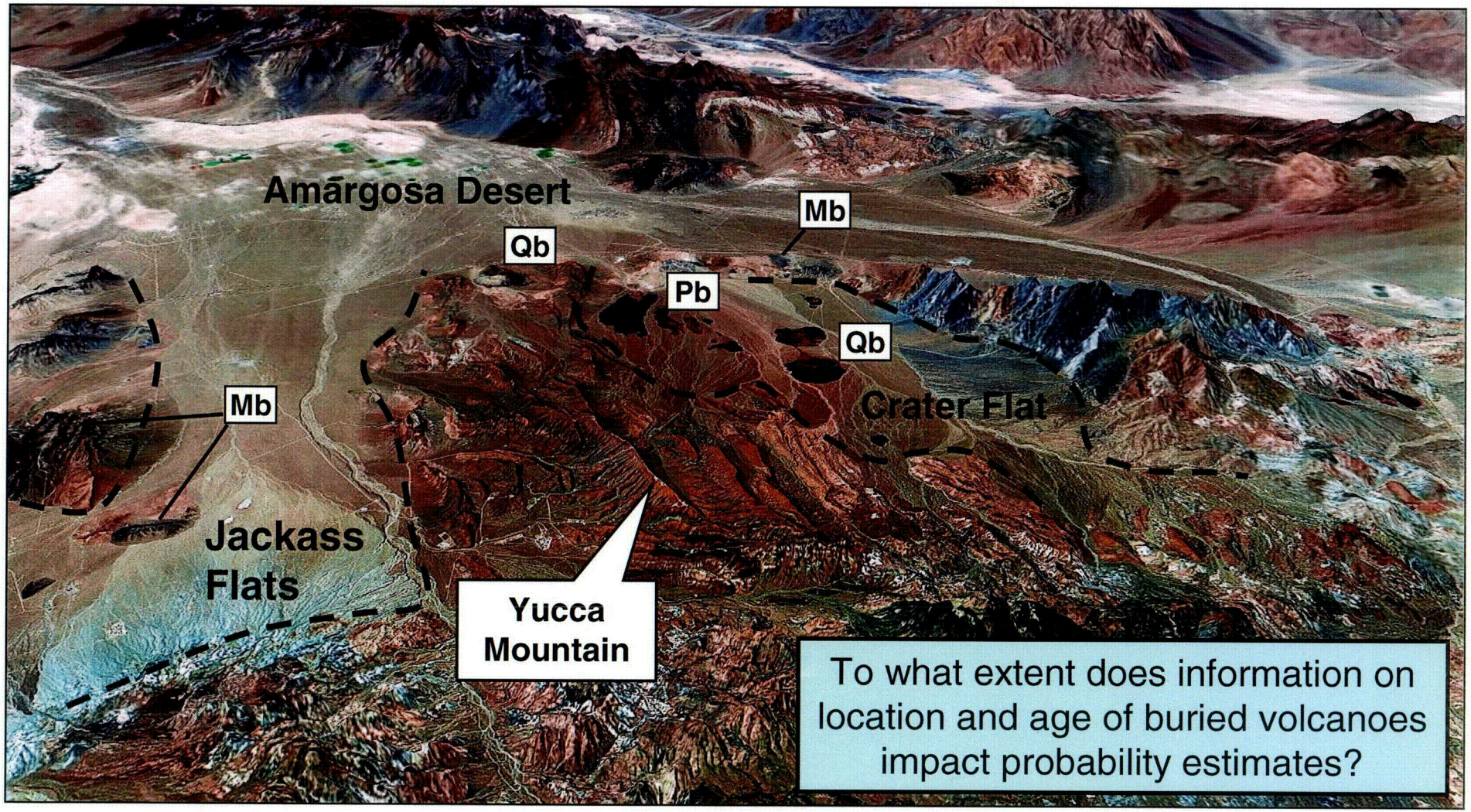
Robert Fleck
United States Geological Survey

July 17, 2006
Rockville, Maryland

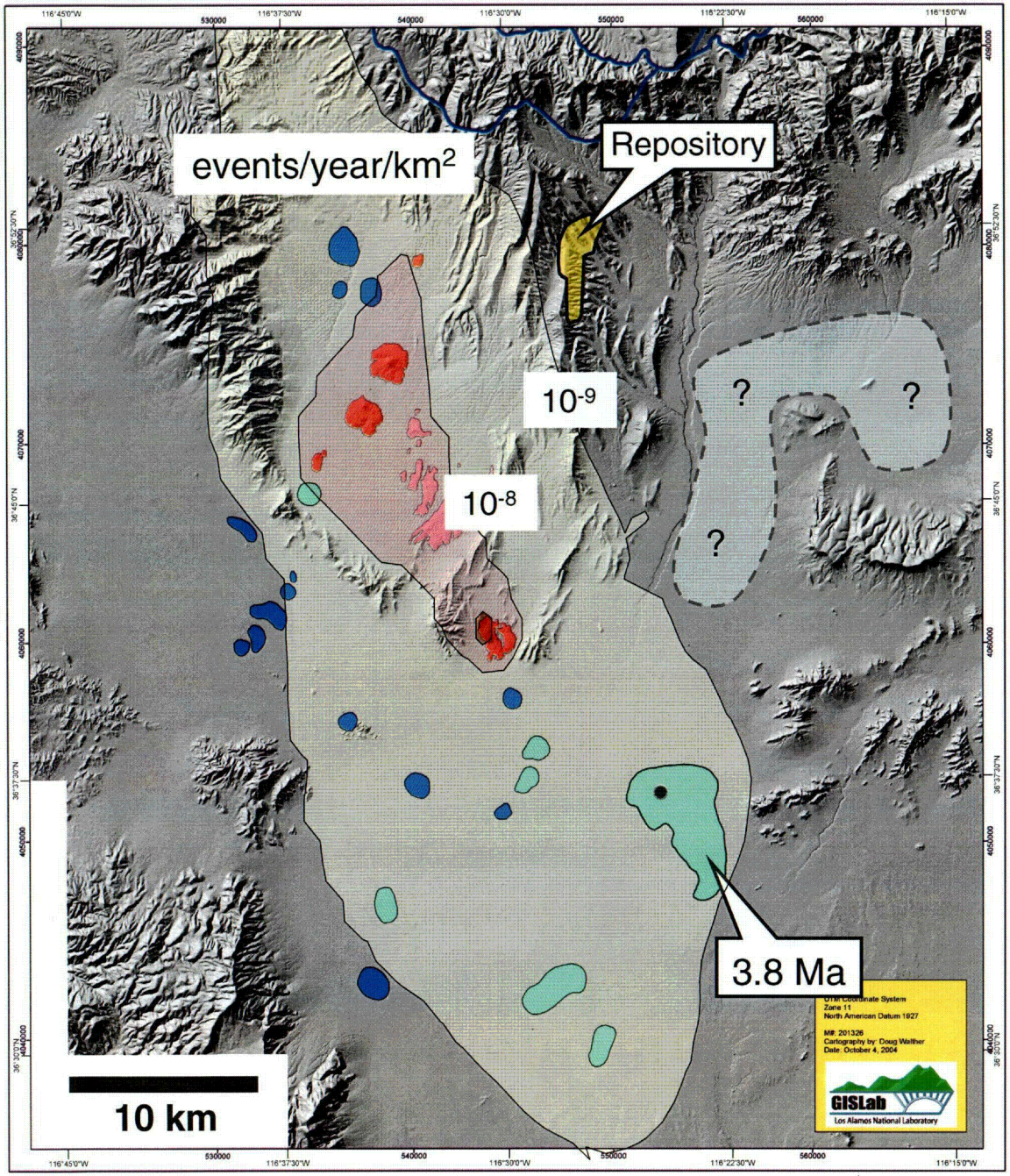
Overview of Aeromagnetic Survey and Drilling Program

- Results support update to 1996 Probabilistic Volcanic Hazard Analysis (PVHA-U)
- Provides information on location and age of buried basalts, lengths of vent alignments, dike azimuth and length
- Other data available since 1996 (geologic mapping, tectonic models, crustal strain measurements, teleseismic data, etc.) also support PVHA-U

Issue of Buried Basalts: Yucca Mountain, Volcanism, and Surrounding Basins



Looking South

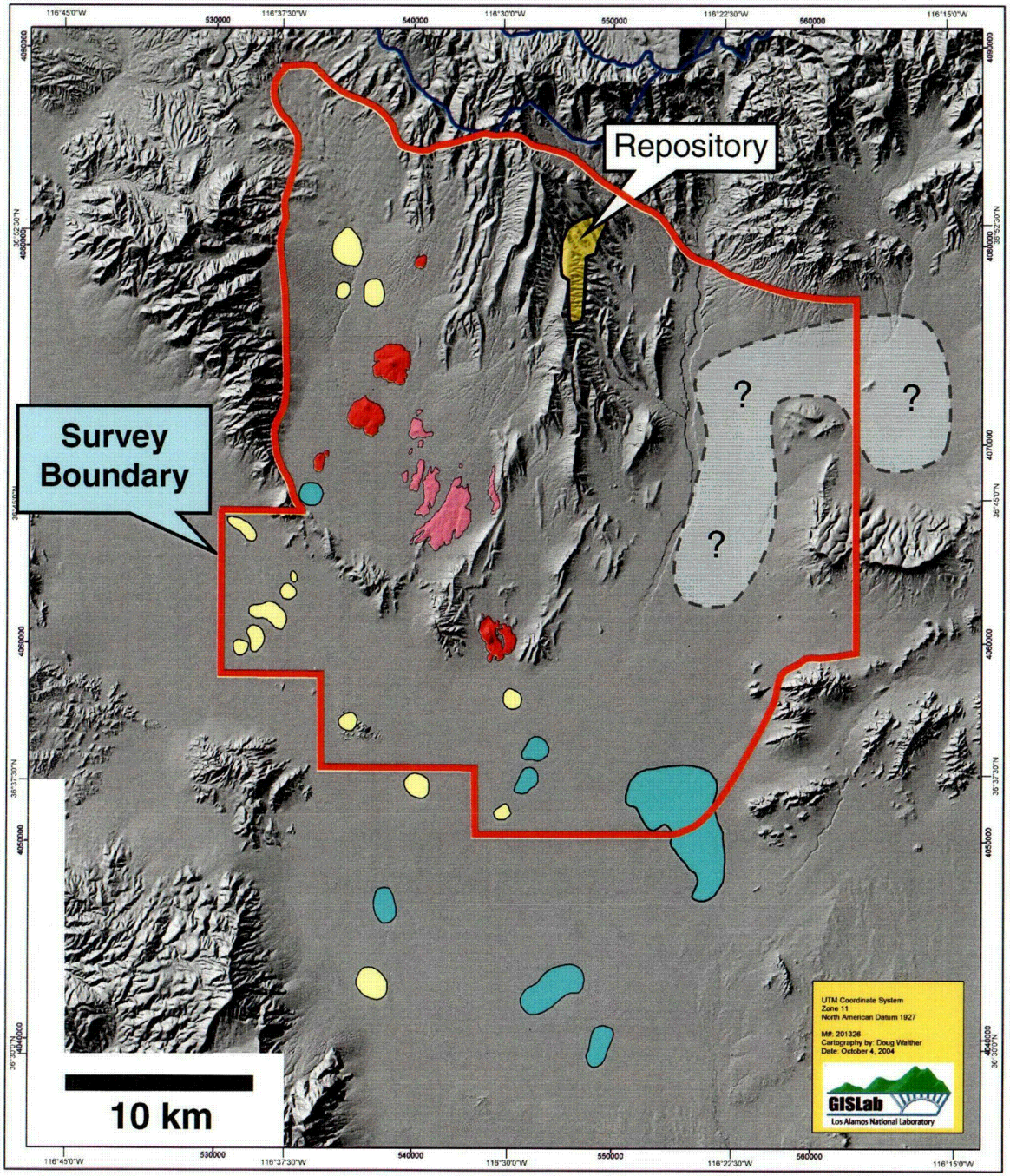


Background

- **1996 PVHA probability estimates depended heavily on distribution of known post-Miocene volcanism**
- **Seven anomalies factored into 1996 PVHA hazard estimate of 1.5×10^{-8} disruptions/year**
- **Post 1996: Additional anomalies identified from ground surveys and 1999 aeromagnetic survey**
- **Spatial event frequency from 1996 PVHA generally reflects distribution of all anomalies *except for potential buried basalt east of Yucca Mountain***

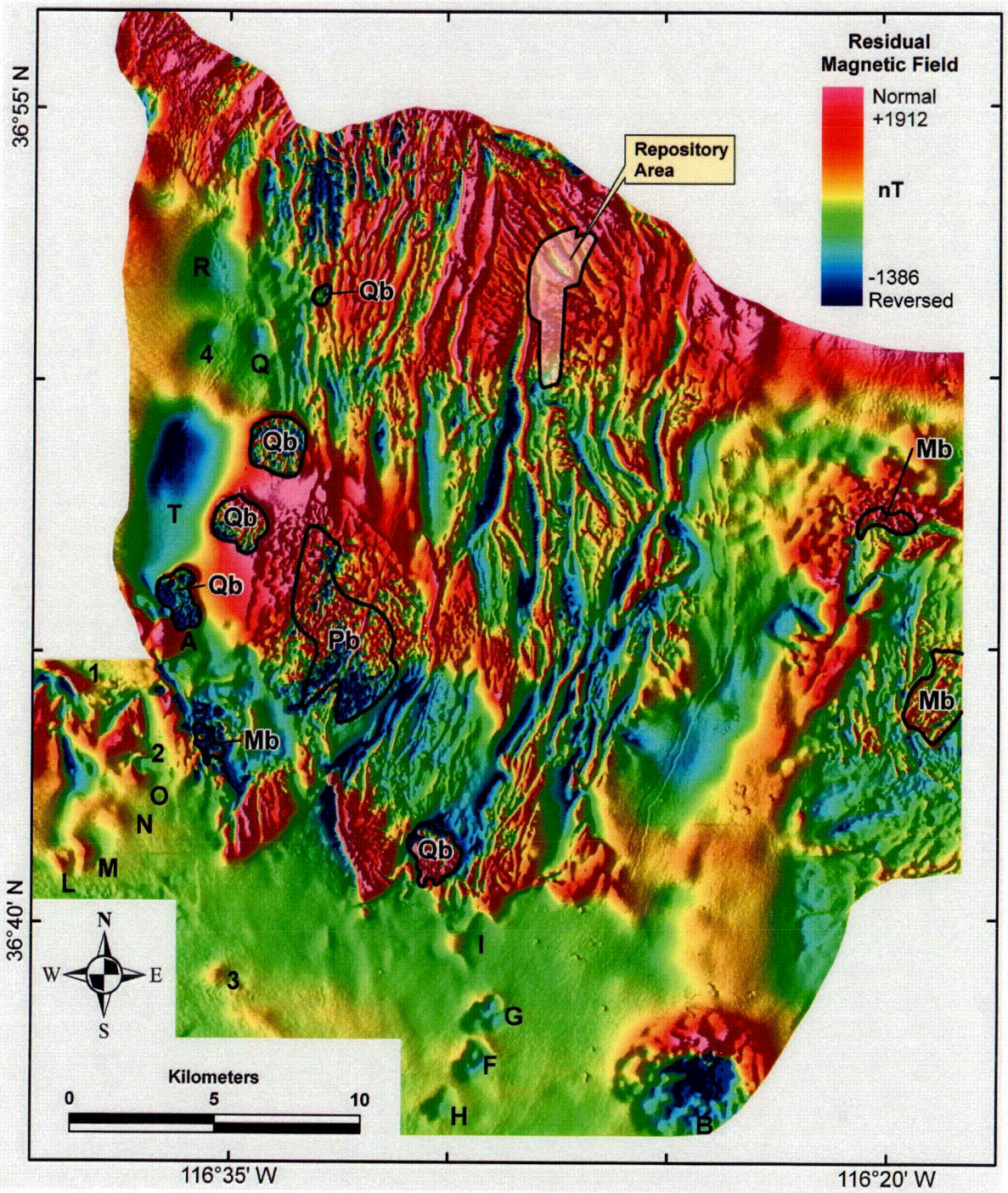
Background
(Continued)

- Probability estimates depend primarily on spatial and temporal models of volcanic activity, and estimates of the length and azimuth of basaltic dikes
- Knowledge of location and age of buried basalt is important for defining spatial and temporal models of volcanism
- Aeromagnetic and drilling program address spatial and temporal models, *as well as characteristics (azimuth) of feeder dikes*



Aeromagnetic Survey Design

- Helicopter-borne, low-altitude, aeromagnetic survey designed to optimize detection of basaltic features near Yucca Mountain
- E-W flight lines at 60 m spacing, ~45 m altitude over flat terrain; 16,000 km of flight-line data
- ~30×30-km survey area includes area most critical for probability estimates in terms of spatial relationship to repository and clusters or alignments of anomalies
- Primary goal – constrain location of buried basaltic features



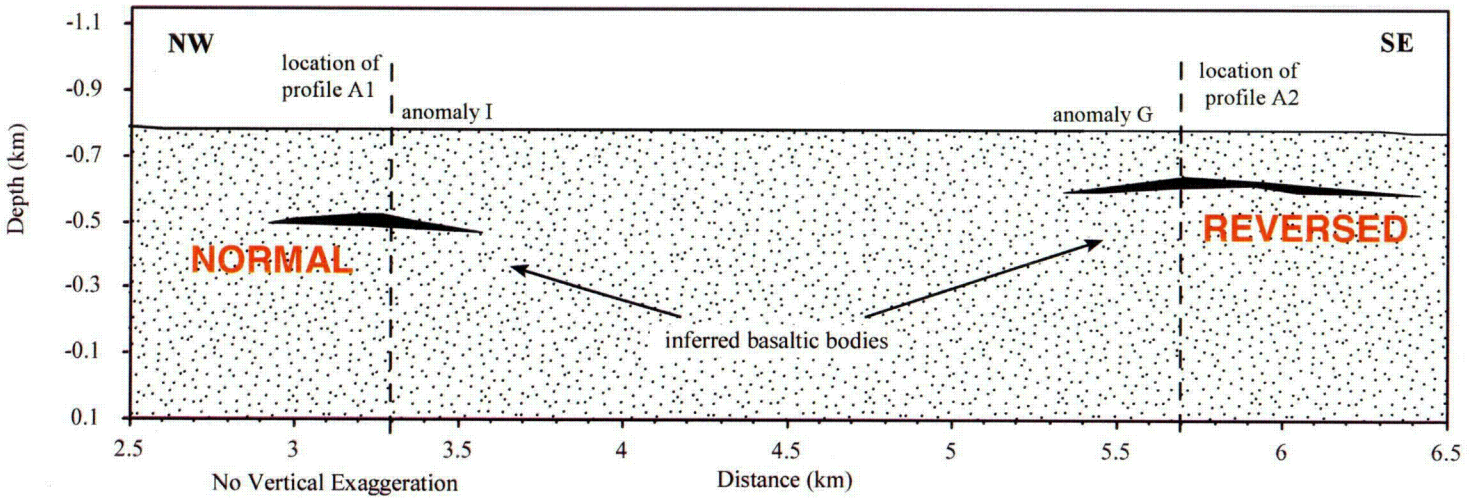
Survey Summary

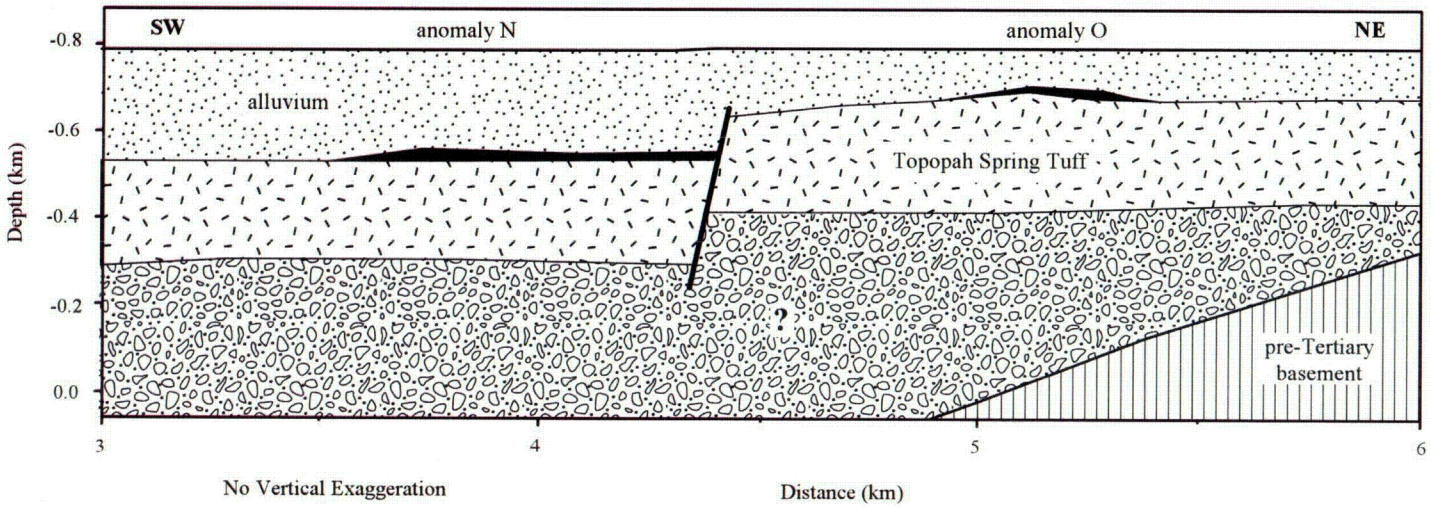
- Yucca Mountain range block dominated by linear anomalies induced by faulted tuff
- Distinctive short-wavelength pattern of basalt flows aids in interpretation of shallowly buried basalt
- High resolution and broad coverage allows better interpretation of buried basalt versus tuff, faults beneath shallow alluvium, and relationship between faulting and volcanic features
- Essential tool for selecting and prioritizing drilling targets

Selection Criteria for Drilling Anomalies

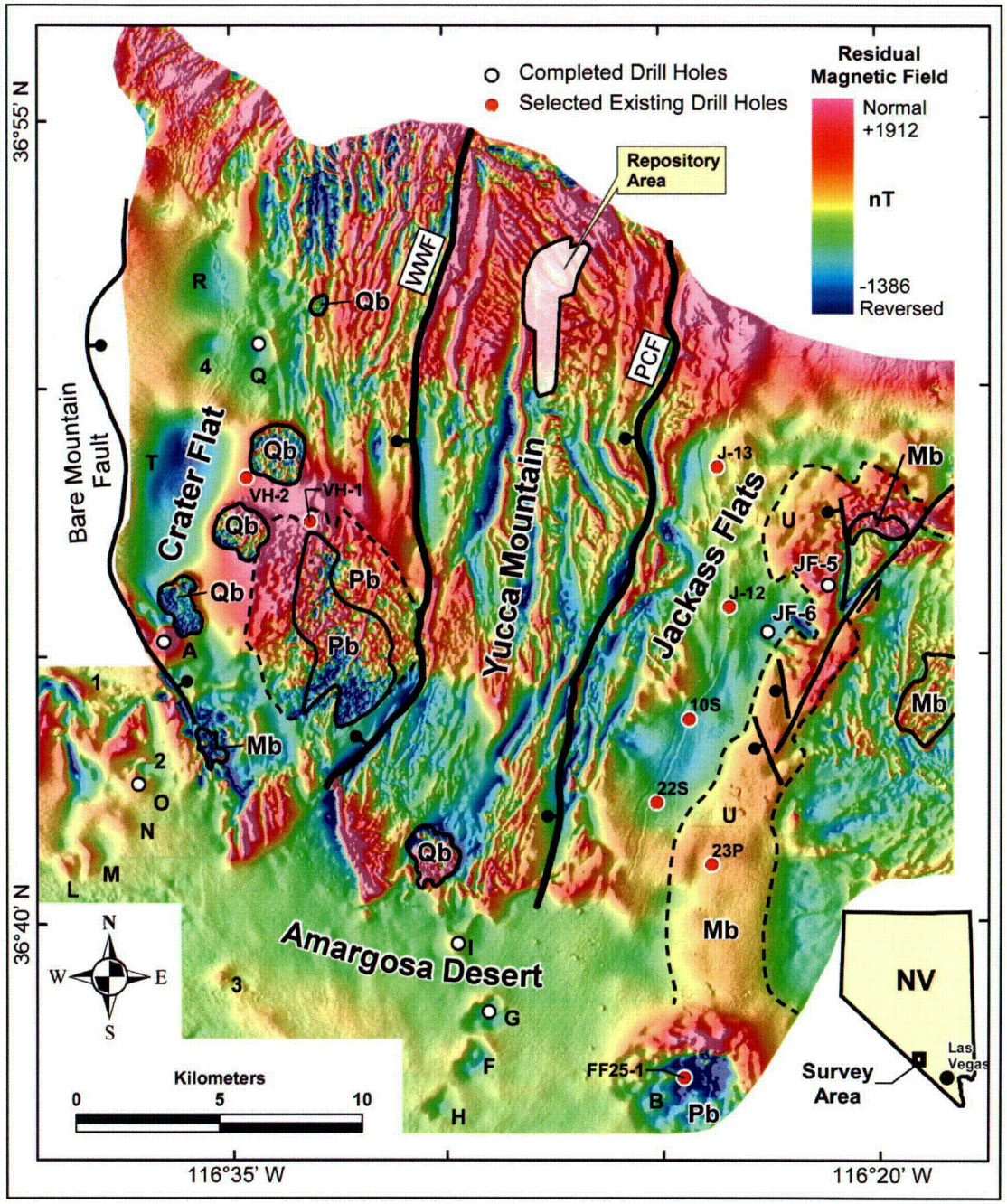
- Location as it impacts probability estimates (e.g., distance from repository, impact on event lengths)
- Sample each major cluster or alignment of anomalies
- Range of potential ages based on differences in burial depth, magnetic polarity
- Balance of "high confidence" vs "low confidence" anomalies (i.e., basalt versus tuff)

Example of selection criteria: anomalies modeled as basalt in 1999 Survey include different polarities and modeled burial depth, indicating different ages





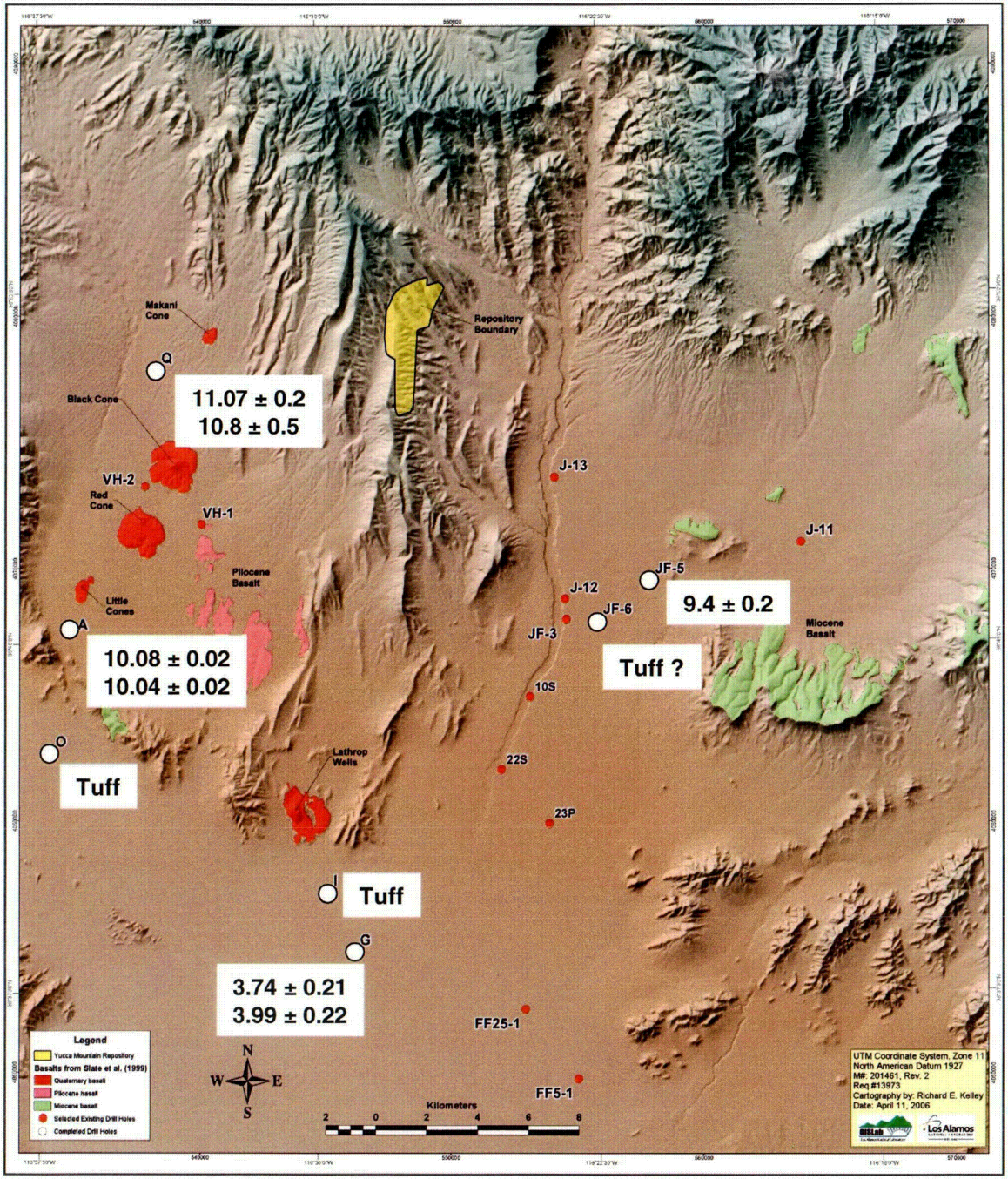
from O'Leary et al. 2002



Modified from Perry et al.(2005)

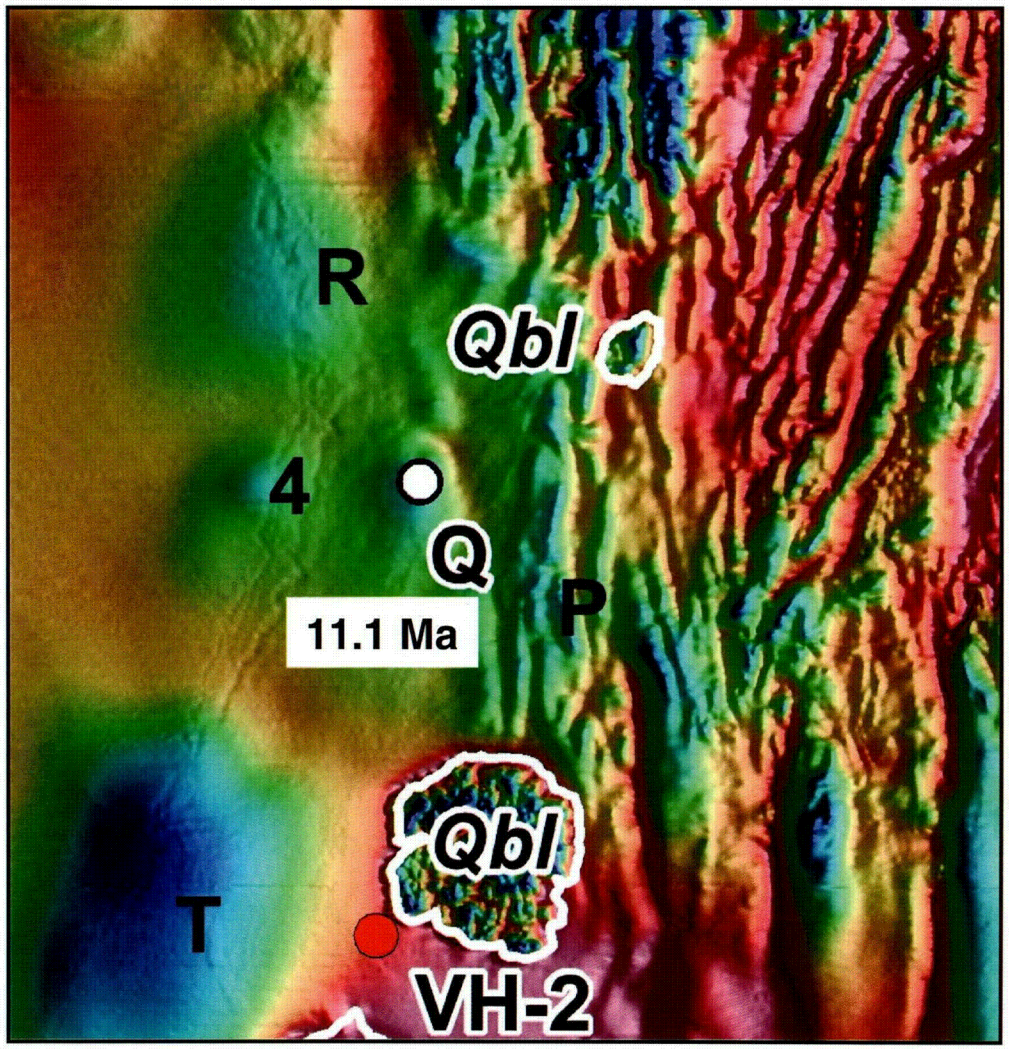
Drilling Program

- Seven drill holes completed, two in Crater Flat, three in Amargosa Desert, two in Jackass Flats
- Four drill holes penetrated basalt at depths of ~80 to 150 meters
- Tuff targeted in three cases to test alternative interpretations of anomalies
- Goal to improve understanding of age and location of buried volcanic features



Summary of Drilling and Age-Dating Results

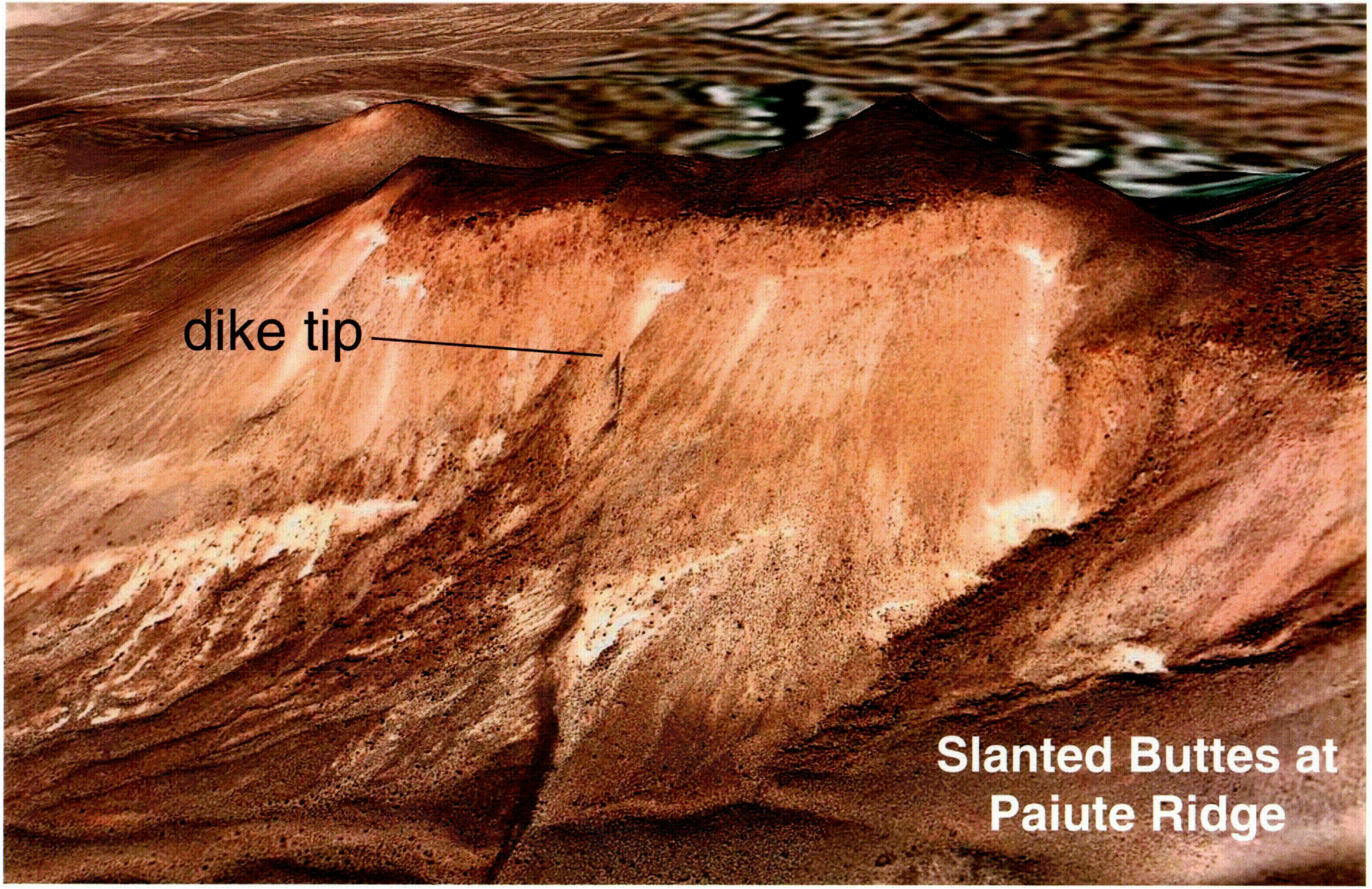
- Three anomalies due to buried Miocene basalt
- One anomaly due to buried Pliocene basalt
- Two anomalies due to Miocene tuff
- One anomaly probably due to faulted tuff; less likely Miocene basalt



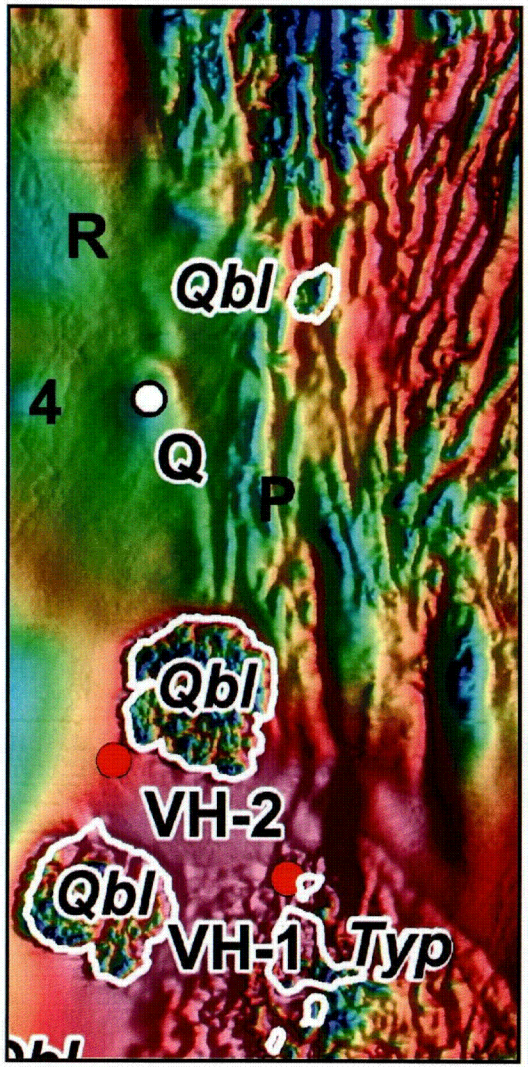
Anomaly Q

- Basalt encountered between 140 and 163 meters
- Four lava flows separated by flow breccia, scoria
- Flows underlie Paleozoic dolomite and quartzite (slide block)
- Stratigraphic correlation with VH-2 and southern Crater Flat basalt consistent with age of ~11 Ma (verified by dating)
- Anomalies R and 4 are expression of same basalt based on similar magnetic signatures

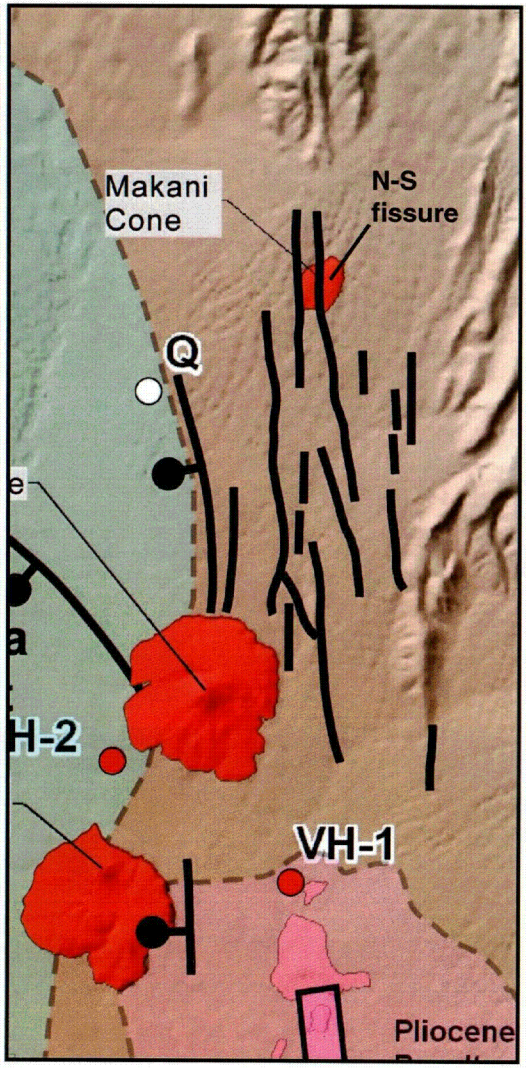
Observation from Analog Studies: Dikes Intrude Normal Faults



Interpretation of Dike Orientations in Northern Crater Flat

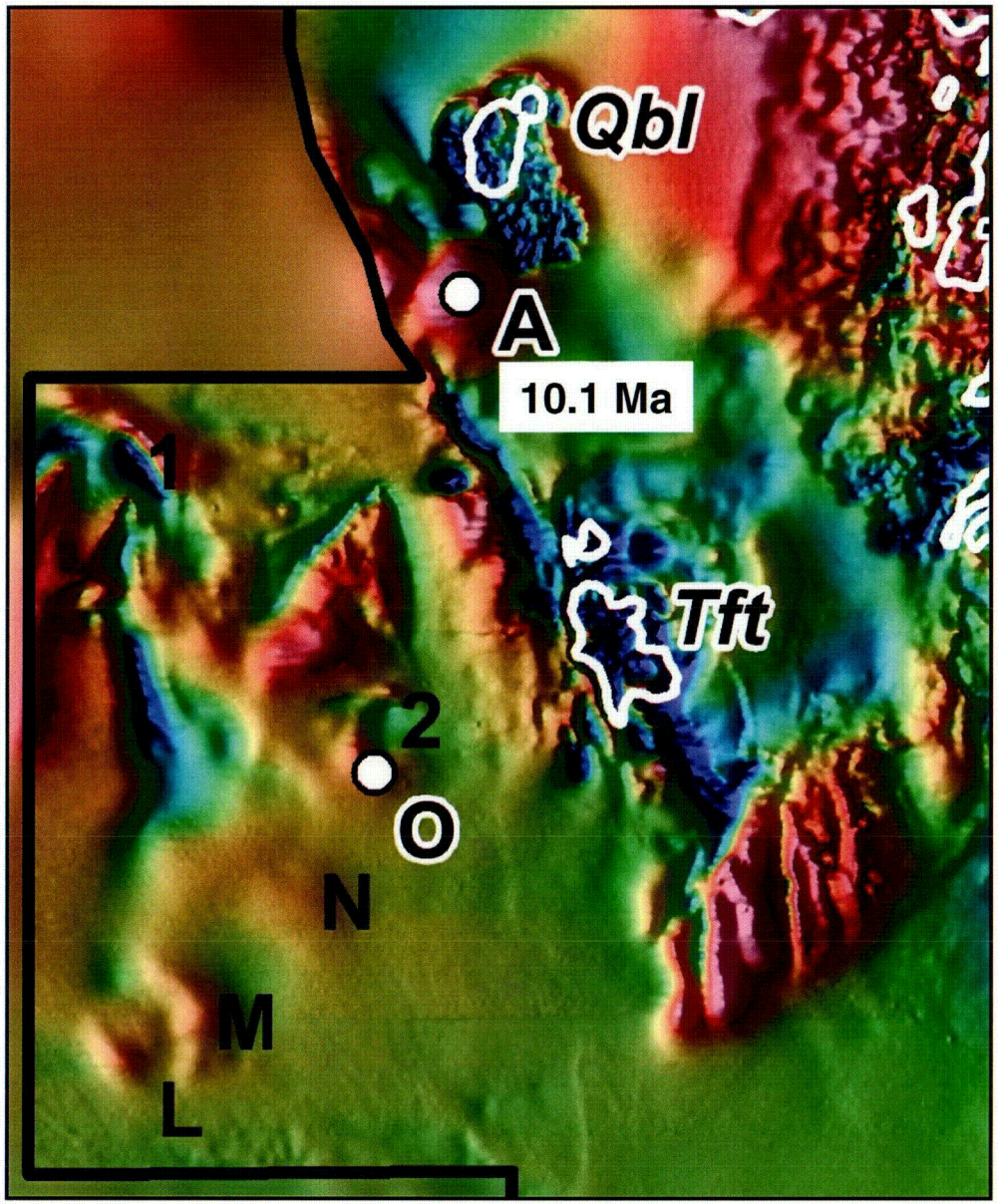


Residual magnetic field



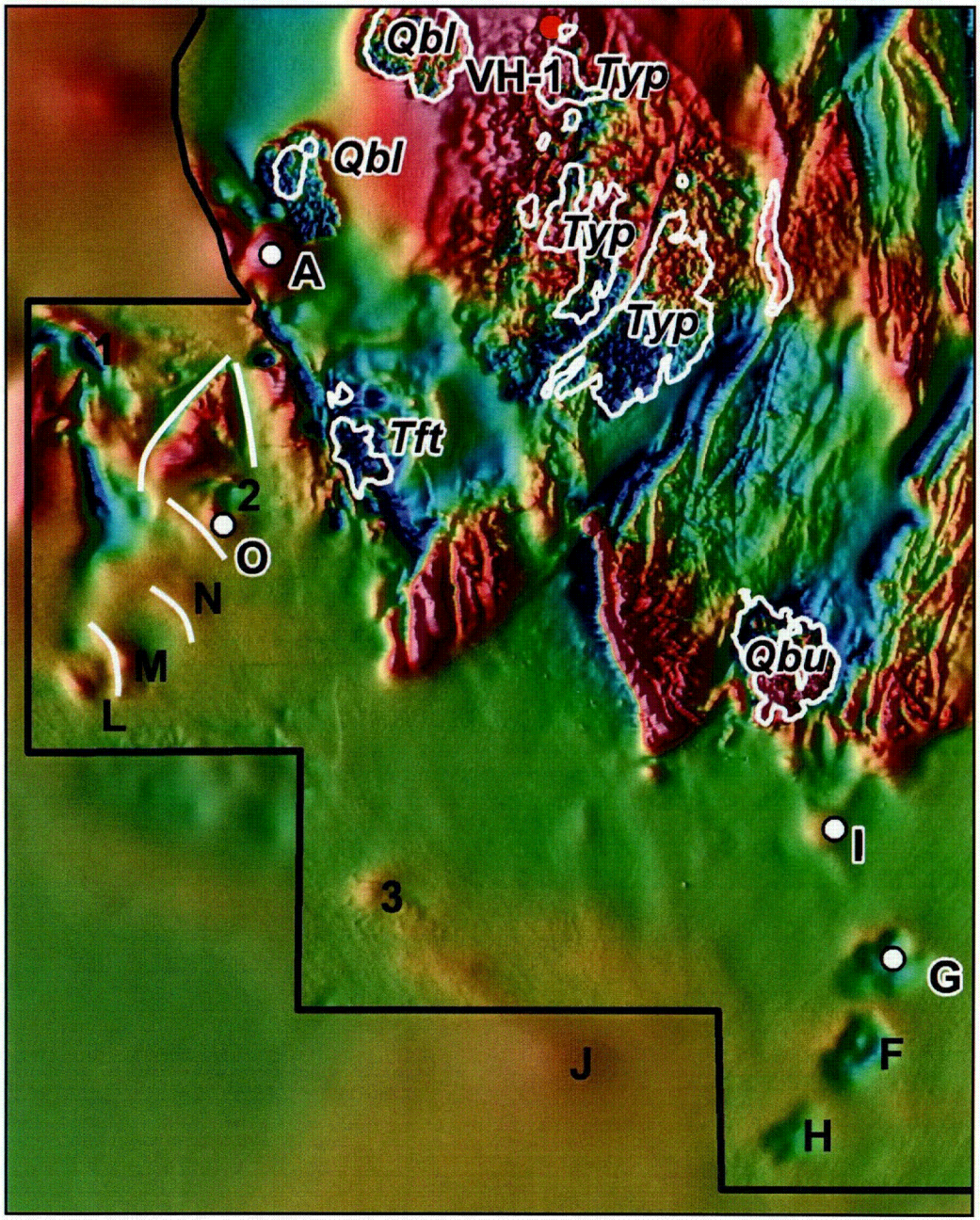
Interpretation

- North-trending faults associated with Black Cone and Makani Cone evident as linear anomalies beneath shallow alluvium
- If feeder dikes are captured by normal faults, implies NNW oriented dikes instead of NE-trending dikes
- Parallels dike trends in Pliocene Crater Flat basalt
- Provides mechanism for dikes that deviate from control by regional stress field in shallow crust



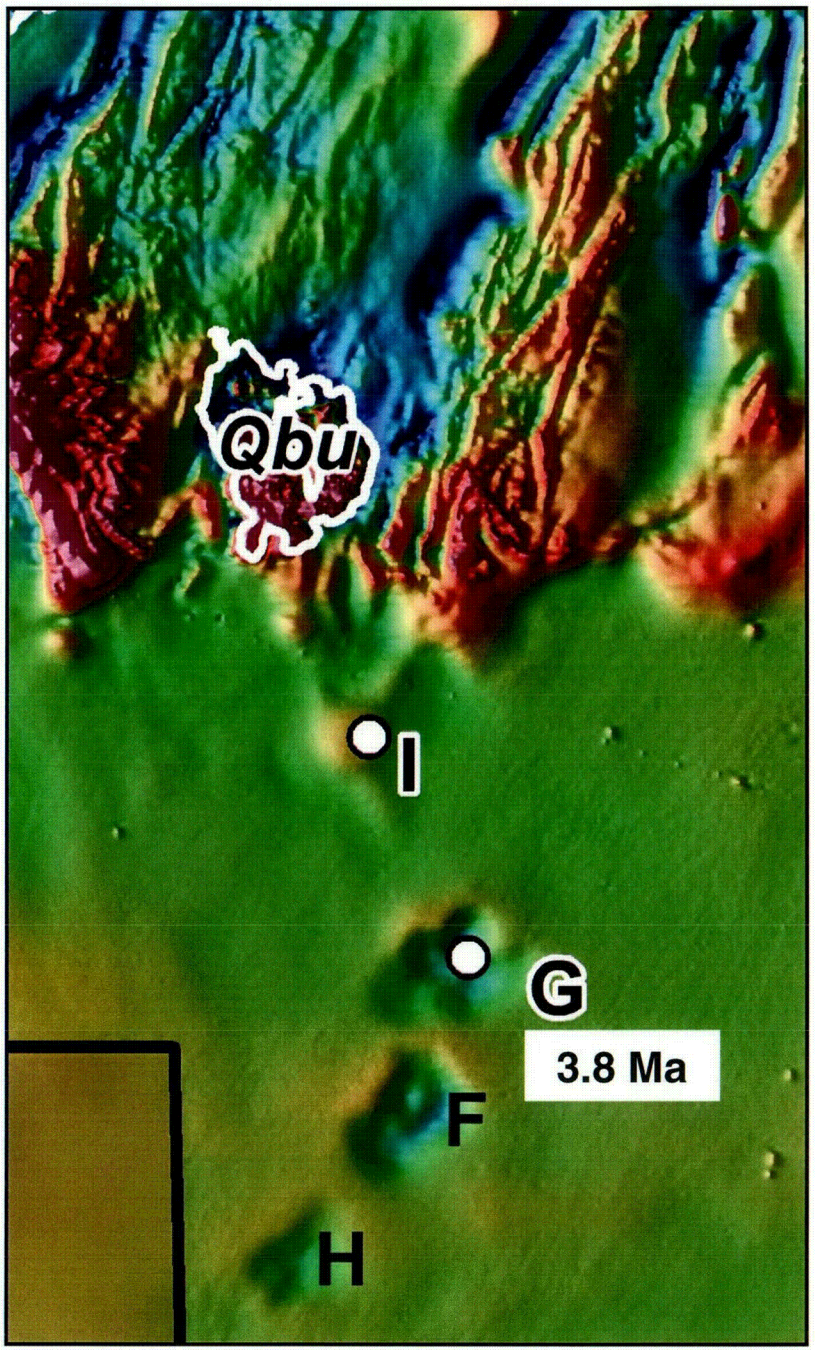
Anomaly A

- Basanite encountered between 148 meters and 211 meters
- Normal magnetization contrasts with reversed magnetization of other basalts in Crater Flat, indicating a unique age if basalt
- Basanite represents a mafic magma composition not previously seen in YMR
- Basanite contains differentiated veins of "mafic pegmatite"
- Lack of flow features and exceptional thickness with limited extent suggests that body may be an intrusive sill



Anomaly O

- Tuff encountered between 163 and 188 meters (Bullfrog Tuff at base)
- Alignment L-M-N-O modeled as alignment of basalt based on 1999 survey
- Improved resolution of 2004 survey shows fault patterns similar to those in faulted tuff terrain of the Yucca Mountain block
- Similarity of magnetic signatures indicates that anomalies L-M-N also represent faulted tuff, not volcanic alignment



Anomaly G

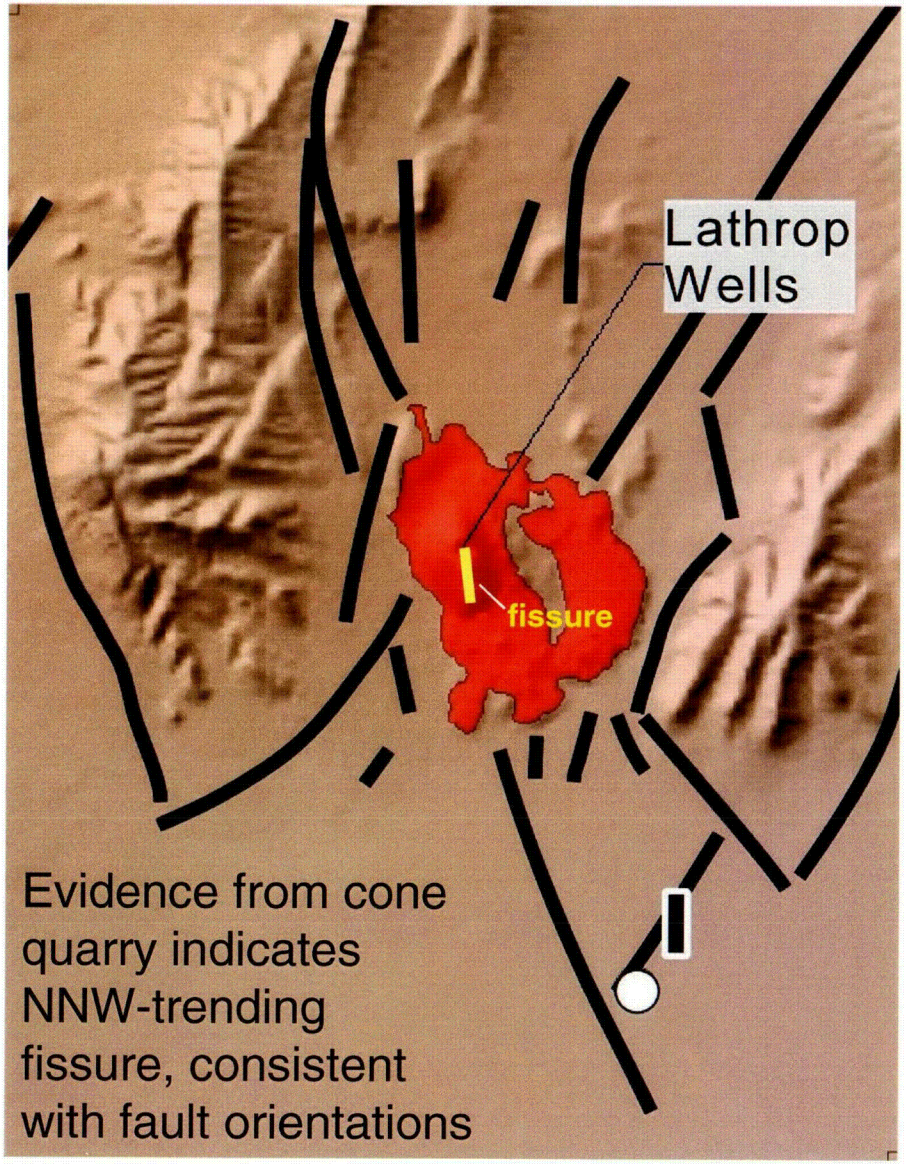
- Basalt encountered between 119 and 145 meters
- Nye County drill hole adjacent to Project drill hole encountered basalt between 120 and 150 meters
- Scoria at top and bottom of flow
- Basalt has ~10% hornblende phenocrysts, unique to region
- Alignment and similar magnetic signatures of G, H, F suggests that F and H are basalt of same age as G

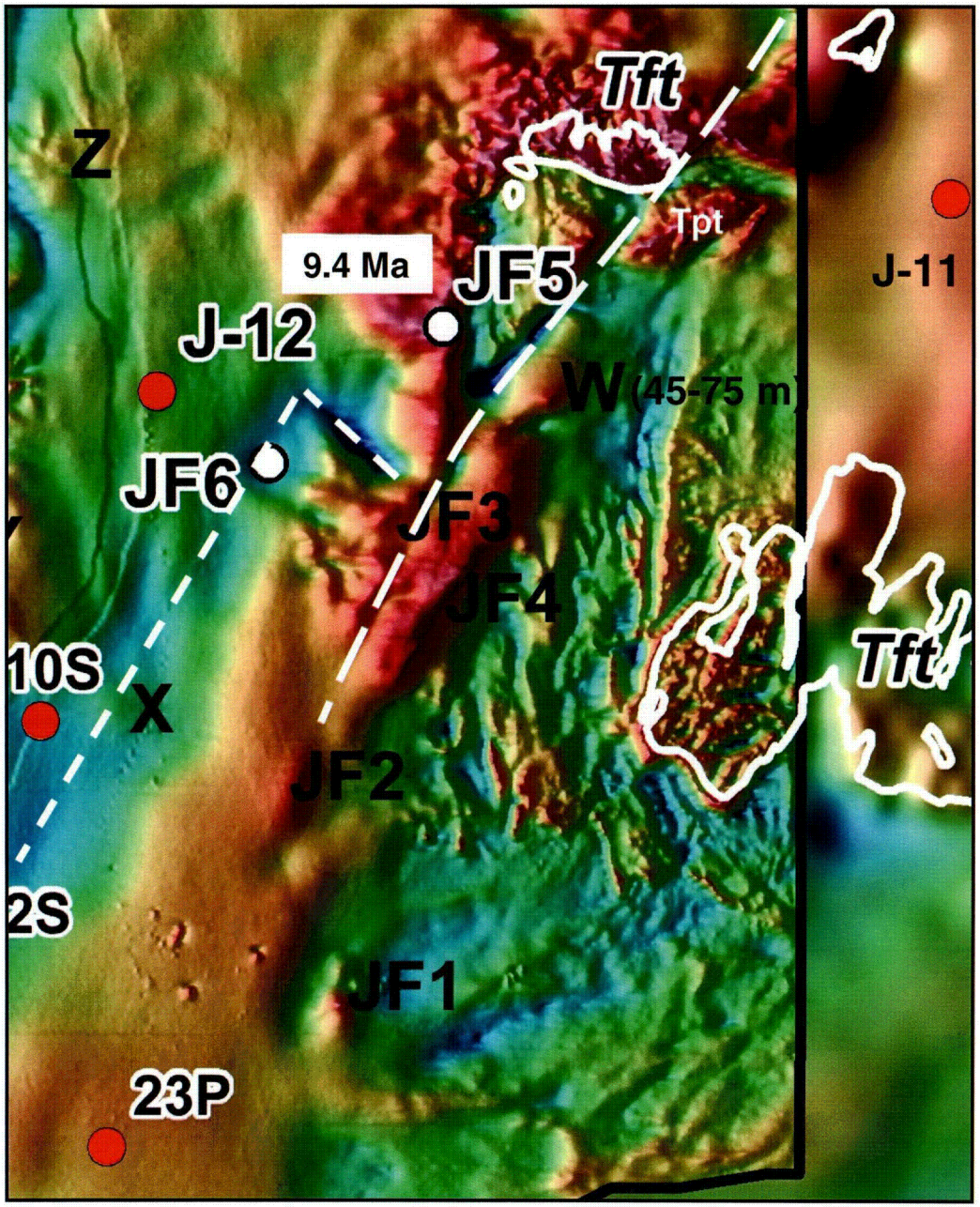
Photo of core from Anomaly G basalt

Core diameter = 2.25”

- Approximately 10% hornblende phenocrysts, 3% olivine phenocrysts
- Assemblage stable at relatively high P_{H20}, and low T (Nicholas and Rutherford 2004)
- Assemblage indicates rapid ascent from depth

Anomaly I and Feeder Dike Orientation at Lathrop Wells





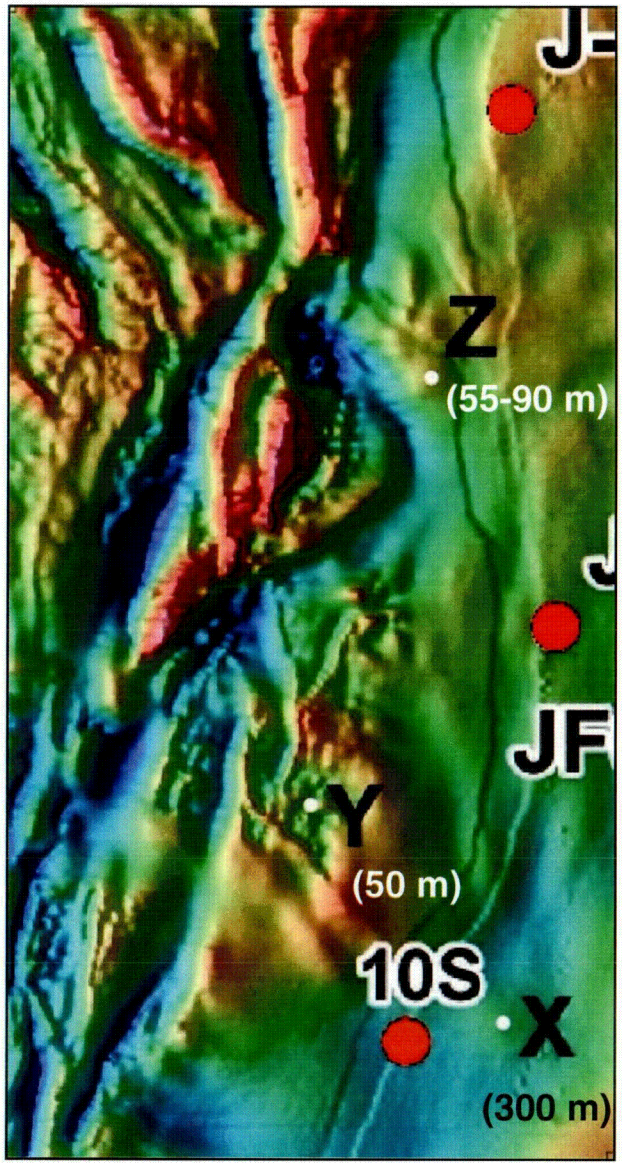
Anomaly JF-5

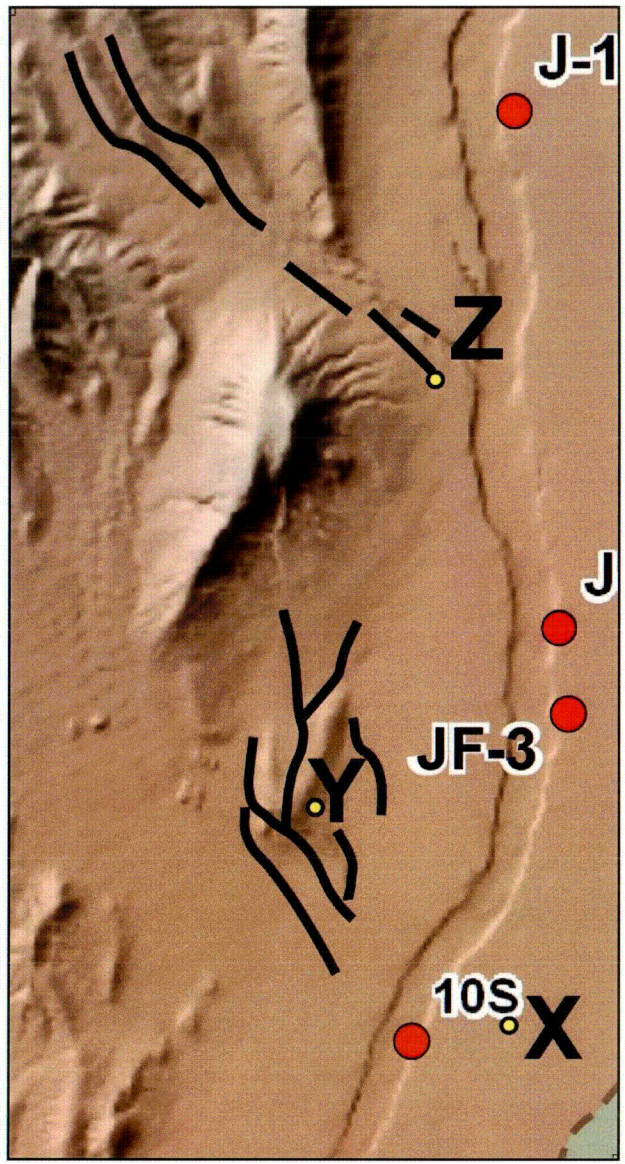
- Basalt encountered between 77 and 94 meters
- Correlates with basalts in drill holes J-11 and 23P and outcrop, based on mineral texture and fault patterns

Anomaly JF-6

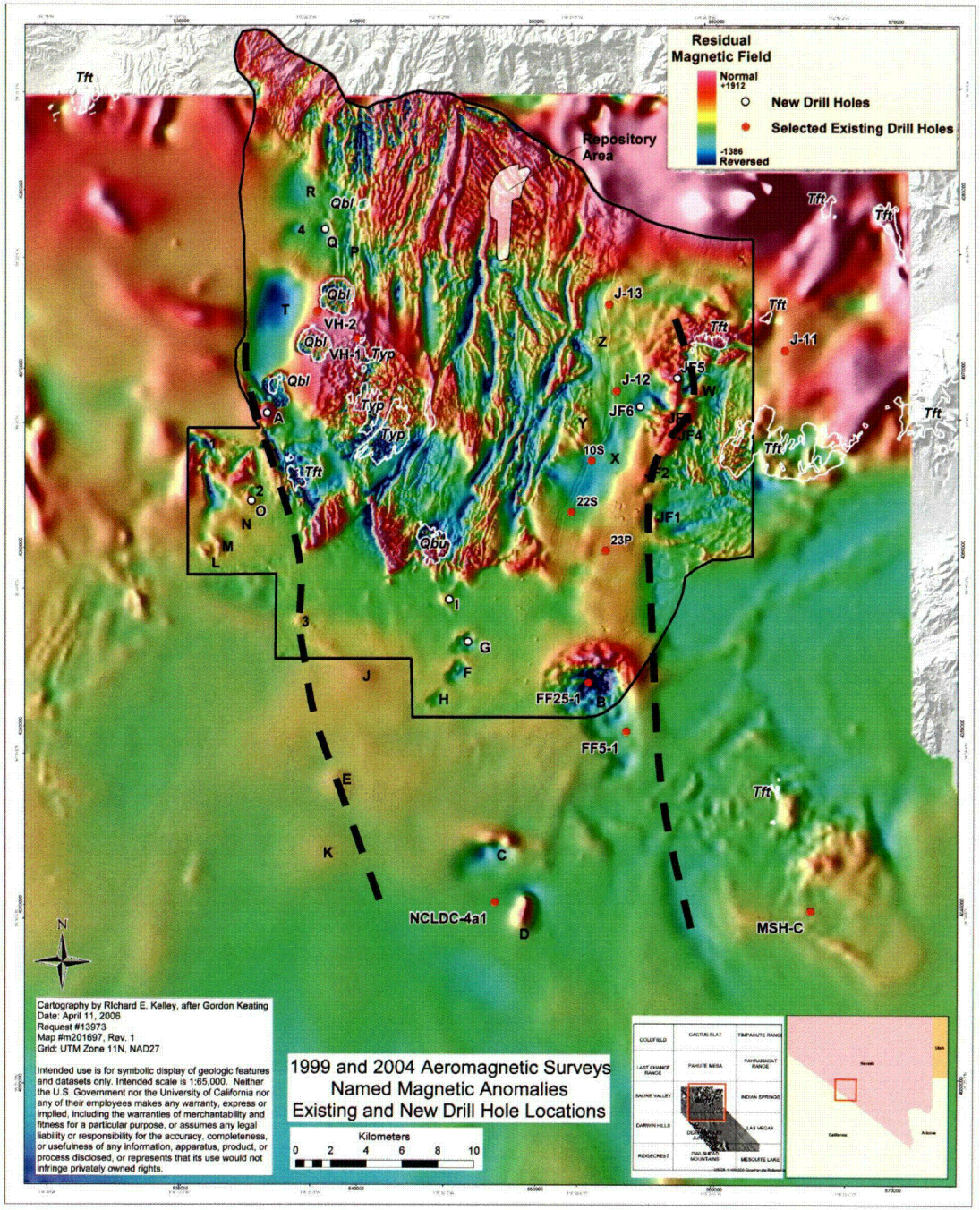
- Ended in alluvium at 196 meters
- Due to faulted tuff based on nearby drill holes along Fortymile Wash (tuff at <150 meters) and comparison with fault patterns in the Yucca Mountain block
- Basalt encountered below 200 meters would likely be of Miocene age

Interpretation of anomalies X, Y, and Z identified by panel





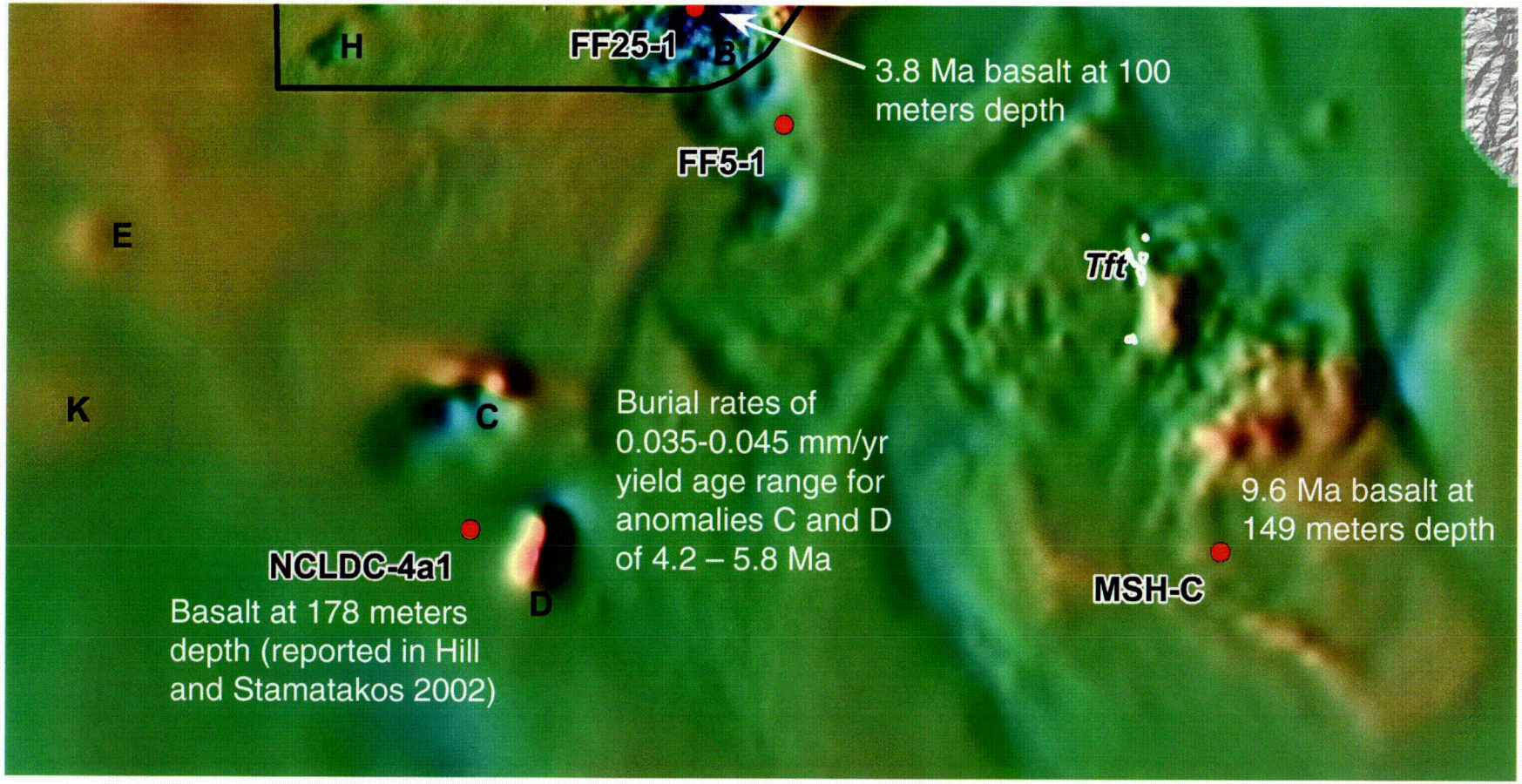
- Anomaly X has deep source; faulted tuff block within NE-trending fault zone?
- 10S, 1 km to west, of X encountered tuff conglomerate from 240 to 365 meters
- Anomalies Y and Z represent faulted tuff based on extension of faulted outcrop patterns into subsurface
- Anomaly Y is partly within bedrock

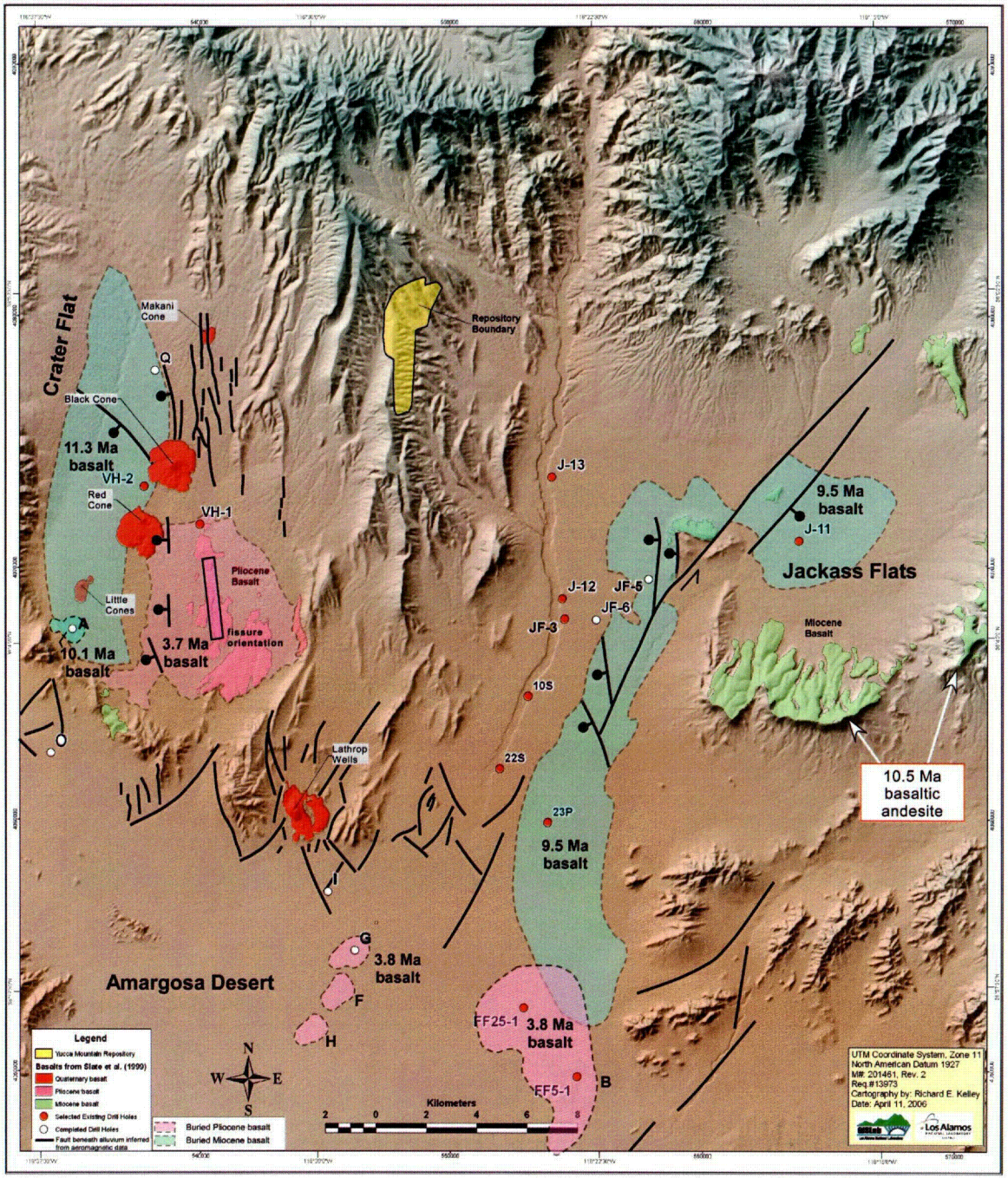


Assessment of Buried Basalts outside 2004 Survey Area

- Integration of 1999 USGS survey and 2004 Project survey allows better regional assessment
- Of particular interest are southern Amargosa Desert anomalies that lie outside Project survey
- Burial rates determined using data from four drill holes within Amargosa Trough vary by ~10% (0.039-0.043 mm/yr)

Southern Amargosa Desert Anomalies (1999 Aeromagnetic Survey)





Synthesis of Aero-magnetic Survey and Drilling Interpretations

- Four basalts in new drill holes represent four different basalt units erupted between ~11 and 3.8 Ma
- Some anomalies represent faulted tuff blocks
- No post-Miocene basalt in Jackass Flats; extensive buried Miocene basalt
- Several volcanoes fed by feeder dikes captured by NNW-trending faults

Remaining Technical Work

- Final age determinations and geochemistry from both subsurface and surface basalts
- Model depth, thickness, and volume of undrilled anomalies based on new data
- Integration of new results with existing volcanic framework of Yucca Mountain region

Preliminary Observations on ICRP 2006 Draft Recommendations

ACNW
July 17, 2006

1

Outline

- History
- Overview of the draft ICRP Recommendations
- NRC Staff Preliminary Observations
- Conclusions

2

History

- ICRP has been developing a revision of its recommendations for radiation protection for a number of years.
- Draft Recommendations for comment, Summer, 2004
- Draft Foundation Documents for comment, Summer, 2005

3

Schedule for Comment

- Draft Recommendations released on the ICRP web site on June 7, 2006.
- Comments due to ICRP by September 15, 2006.
- NEA sponsored North American Workshop on ICRP Recommendations August 28 – 29, 2006.
- Staff will work with ISCORS on Federal Agency comments
- Staff will work with NEA Expert Group on comments

4

Contents of Draft

- Aims and scope
- Biological aspects
- Dosimetric quantities
- The system of radiation protection
- Medical exposures
- Exposure to natural sources
- Potential exposures
- Emergency situations
- Exclusion and exemption
- Protection of the environment
- Implementation of the recommendations
- References
- Glossary

5

Aims of Revision

- To take account of the new biological and physical information and trends in the setting of radiation protection standards.
- To improve and streamline the presentation of the recommendations.
- To maintain as much stability in the recommendations as is consistent with the new scientific information.

6

Key Features

- Maintains the three fundamental principles of the system of radiological protection: justification, optimization, and dose limitation.
- Maintains individual dose limits for all regulated sources that represent the maximum dose accepted in planned situations, and retains numeric values for dose limits from ICRP Pub. 60.

7

Key Features

- Presents unified conceptual approach for constraining doses from a source for all exposure situations: normal exposure, emergency exposure, and existing exposures.
- Updates understanding of biology and physics, with updates of radiation and tissue weighting factors.

8

NRC Staff Comments

- NRC staff is developing general and specific comments on the draft recommendations.
- Staff comments are in concurrence, and will be provided to the Commission by the end of July.
- Staff plans to post comments to the ICRP web site before the end of comment period.
- Staff plans to work with ISCORS and NEA to influence comments provided through those organizations.

9

Preliminary Observations

10

Need for Change

- Current draft does not obviously consolidate or simplify the recommendations.
- Much of the material which elaborates and expands on previous recommendations is, in fact, a description of the current state of the system of radiological protection being implemented by many well run radiation protection programs throughout the world.
- There is no compelling public health and safety argument for any changes to the recommendations, or to national regulations which implement those recommendations

11

Weighting Factors

- Some of the changes to tissue weighting factors, and nominal risk coefficients for cancer and hereditary disease may be premature.
- Staff believes that a new set of tissue weighting factors and nominal risk coefficients not be adopted until the ongoing reassessment of the A-bomb data is completed and published in a peer-reviewed journal for public review and scrutiny.

12

Dose Constraint

- The attempt to clarify the meaning and use of dose constraint is an improvement over the previous draft, but further clarification is needed.
- The constraint, properly implemented in the context of a radiation protection program and a licensee's optimization of their activities, will contribute to assuring that each individual is adequately protected.

13

Gender Averaging

- The ICRP does not recommend gender-specific data for the purposes of radiological protection, and continues to present gender-averaged tissue weighting factors and numerical risk estimates.
- Although the NRC agrees that adequate protection is provided by the proposed approach, we will request that the ICRP clearly explain its rationale for this decision and how it accounts for gender differences in radiation sensitivity.

14

Exemption

- The recommendations related to small quantities of material, and the concepts of exemption and exclusion, are internally inconsistent, and could lead to misinterpretations.
- Staff disagrees with the presumption that some international values, such as those for foodstuff's following an accident, are appropriate for generic exemption.

15

Collective Dose

- The staff appreciates the observations provided to the ICRP with regards to the inappropriate use of collective dose and the calculation of health effects from very small doses.
- The general statements contained in the draft recommendations are not likely to impact practical regulation and risk communication if additional guidance is not provided.
- The ICRP should clearly articulate the boundary conditions within which the calculations are valid, and the dose ranges epidemiological and cellular or molecular data provide information on the health effects.

16

Protection of the Environment

- No policy or framework for protection, or the assessment of exposures and pathways, is proposed, nor are any recommendations provided.
- The entire chapter should be removed from the draft publication, and stakeholders provided the opportunity to comment as the assessment framework is developed.

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Implementation

- The staff believes that material related to specific implementation of radiation protection recommendations is generally more appropriate in the documents of the IAEA, and national regulations.
- The discussion in Chapter 11, for the most part, replicates the work of other organizations, would not seem to be necessary or appropriate, and should be deleted.

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Editorial

- The draft recommendations require a thorough editorial review.
- There are references to publications and documents yet to be drafted, being drafted, under review, or in press. If material is not publicly available at the time of publication, reference to this material should be removed.

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Specific Comments

- The staff has developed numerous specific comments that support and elaborate on the general comments.

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Conclusions

- The staff believes that the draft ICRP recommendations are an improvement compared to the 2004 version.
- The draft recommendations do not yet achieve the stated objective of the ICRP.
- The observations presented today are preliminary, and have not yet been endorsed by senior management.

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Reorganization of NMSS and STP

Presentation to ACNW

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July 17, 2006

Background

- SECY-06-0125, issued June 1, 2006
- June 16, 2006 SRM
- Two new offices to be created effective Oct 1, 2006

Background

- NMSS's current scope of regulatory activities
- NMSS and STP's current organizations

Factors contributing to the need for reorganization

- Enhancing integration of NMP
- Emergent work
  - New fuel cycle technologies
  - Changes in DOE's plans and activities affecting NRC
  - Global Nuclear Energy Partnership
  - Recycling/reprocessing

New Organizations

- ONMP
  - Merger of elements of NMSS with STP
  - Three technical divisions
    - DINMS
    - DWMEP
    - Division of Intergovernmental Liaison and Rulemaking (DILR)

New Organizations

- NMSS (new)
  - Elements of current NMSS programs and organizations dealing with fuel cycle (U conversion, enrichment and fabrication, spent fuel and HLW storage, transport, and disposal)
  - Three technical divisions:
    - FCSS
    - Spent Fuel Storage and Transportation
    - HLWRS
  - In addition, the lead for domestic and international safeguards policy and regulation for fuel cycle facilities, including materials control and accountability (MC&A)

Resources

- Use of FY07 budget estimates
- 10 FTEs in HQ and 2 FTEs in the Regions to be transferred from NSIR to NMSS
- Additional 17 unbudgeted FTEs were requested

Challenges

- Keeping our eye on the ball…
- Resources
- Coordination
  - Rulemaking and environmental review staff in ONMP will be a center of excellence serving NMSS, ONMP, and NSIR
  - Program support (planning, budgeting, contracting, hiring, IT support)
- Reorganization coincides with move to Executive Blvd

Transition to new organizations

- Communication plan
- Punch list
- Applied lessons learned
- Created transition team, Steering Group, and advisory team
- Internal website for staff involvement

Conclusion

- Challenging task to reorganize and plan to move
- No additional resources
- Seeking needed resources using our organizational capacity model

172nd ACNW Meeting
July 17, 2006

FY 2006 AND 2007 ACNW ACTION PLAN

John T. Larkins

Advisory Committee on Nuclear Waste

Overview

- Discuss recent SRMs and their impact on the FY 2006 and 2007 ACNW Action Plan
- ACNW Members will provide technical perspective on assigned SRM actions
- ACNW staff will discuss scheduled briefings

Background

- **ACNW Action Plan was revised in response to Commission SRMs**
  - *COMSECY-05-0064, dated February 7, 2006*
  - *SRM M060111B, dated February 9, 2006*

Proposed Yucca Mountain Repository

- **Analyze the current state of knowledge regarding igneous activity**

- **Prepare a report that could be used by the Commission as a technical basis for its decisionmaking on igneous activity (4/15/07)**

Risk-Informing Nuclear Waste and Material Regulatory Activities

- **Identify and assess synergy between monitoring for compliance and prediction of performance using analytical modeling**

- **Specifically, consider how methods of monitoring for compliance could strengthen the reliability and durability of institutional controls driven by risk informed decision making (12/29/06)**

Decommissioning

- **Analyze decommissioning best practices and lessons learned to identify improvements to the design and construction of new reactor and materials facilities (4/15/07)**
- **Focus on the merits of including decommissioning safety and costs as design criteria for reprocessing efforts**
- **Provide the Commission with early thoughts and insights on whether the possible design criteria for reprocessing are manageable**
- **Hold a followup meeting to examine results and insights provided by the West Valley performance assessments**

Waste Determinations

- Monitor research on technology regarding waste incidental to reprocessing
- Review the draft final SRP on waste determinations after resolution of public comments
- Review Implementation of SRP for representative cases

Low-Level Waste

- Determine the adequacy of NRC's technical bases and guidance to meet future challenges

- These challenges include:
  - disposal options for greater-than-class-C waste
  - risk-informed waste classification schemes
  - other opportunities to risk-inform Part 61

Health Physics

- Review and comment on the March 2005 report of the French Academy of Science on radiation risks at low dose rates (3/31/07)
- Compare the French study to the June 2005 BEIR VII report and data developed by DOE's Low Dose Radiation Research Program
- Report on the differences

Fuel Cycle Facilities (Tier 2)

- Review and comment on rulemaking addressing in-situ leach uranium mining
- Keep informed of technical developments in spent fuel storage and nuclear fuel recycle
  - Briefings by technical experts on existing and advanced nuclear fuel recycle technologies
  - Briefings by NRC staff on regulatory framework to support licensing of fuel recycle facilities
  - Prepare White Paper for Commission

Transportation of Radioactive Materials (Tier 2)

- Monitor the Package Performance Study and the test program for Type B spent fuel casks

- Provide Comments on the adequacy of the plan to the Commission