

Community Advisory Council
February 14, 2008
Action Items/Notes

Final

These notes are in the following order:

1. Attendance
2. Correspondence and Handouts
3. Administrative Items
4. CAC Input on Future Presentations & Discussions on Nano Sciences & Nano Environment, Safety, & Health Issues
5. Agenda Setting
6. Community Comment
7. HFBR Remedial Alternatives & Preferred Alternative, Panel Discussion

1. Attendance

Members/Alternates Present:

See Attached Sheets.

Others Present:

C. Adey, S. Aronson, M. Bebon, J. D'Ascoli, K. Geiger, L. Hill, S. Johnson, B. Lein, M. Lynch, R. McKay, S. Penn, D. Pocze, D. Quinn, A. Rapiejko, K. Tuite

2. Correspondence and Handouts

Items one through four were mailed with a cover letter dated February 8, 2008. Item five was provided in the member's folders.

1. February 14, 2008 draft agenda
2. Draft notes for January 10, 2007
3. Final notes for November 8, 2007
4. Responses to questions asked by CAC members at January 10, 2008 meeting.
5. Information on possible Nano speakers

3. Administrative

The meeting began at approximately 6:41 p.m. Reed Hodgkin reviewed the ground rules and the draft agenda. Those present introduced themselves.

Sam Aronson, BNL Director, gave a brief update on the budget for FY08. He told the CAC that an omnibus bill was passed this year that has resulted in a reduction in the plans for 2008. Some of the main consequences are that funding for running RHIC and the Light Source and for the NSLS II project has been reduced. RHIC's running cycle has been reduced to 18 or 19 weeks instead of 30 and the running time for the Light Source has been reduced by 15%. The Lab has \$15 million less than expected for the NSLS II project, which has resulted in a slowdown in hiring. However, they should still be ready by the end of this year for the final

critical decision to begin constructing the project. We do not anticipate any layoffs this year. The President's budget request for 2009 was released on February 4, 2008, and looks good for science. We anticipate it will have a hard time getting through Congress, though, and we will probably not have a budget passed in October again this year. Next year's continuing resolution will most likely last longer than this year's. The first half of next year doesn't look good; the upcoming twelve months looks fraught with uncertainty.

Member Guthy questioned the problem between Congress and the President. Is it political reasons, they don't want him to go out on a good note, or is there a real concern about the affordability.

Aronson said it looked to him like anything he was for, they (Congress) were against. He gave the zeroing out of funding for an Office of Science project – the ITER experimental reactor in Cadarache, France as an example of one of the budget items cut.

Member Garber asked if the cost of electricity is part of the problem with the budget. He asked what it costs to run RHIC.

Aronson answered that ultimately it is, but he didn't think that was the problem this year. He said it costs half a million dollars a week to run RHIC.

Approval of Minutes

Reed asked for corrections, additions or deletions to the January 10 draft notes. Member Shea noted that on page 4 begins was misspelled and Member Garber stated that his wife, Liz Garber was present. The notes were passed with two corrections and three abstentions.

4. CAC Input on Future Presentations & Discussions on Nano Sciences & Nano Environment, Safety, & Health Issues

Reed asked the CAC how they would like to go forward with their nano discussions. What topics/outside experts they wanted to bring to the table. He said his understanding was that there are two aspects of nano that the CAC is interested in. One is the global aspect of nano ES&H and the other is BNL specific nano ES&H. The Laboratory has a list of possible speakers and has invited the CAC to bring in names of possible speakers as well. He asked how the CAC members would like to go forward from here.

Member Kaplan said that he is interested in hearing what aspects of nanotechnology fall into the health and environmental areas for worker safety and the surrounding community. He said he thought that after hearing from these experts they could then reflect back to the Laboratory and ask what type of work is done in regard to nanotechnology. He thought he could get a better understanding of what the Lab is doing as far as planning for contingencies.

Reed said that the way he understands it is that you are looking to first understand safety and health nano issues globally and then understand the scope of activities here at BNL, both near-term and long-term. Then take what you have learned and focus in on what all this means for nano ES&H here at Brookhaven. Is that the way everyone understands that as a basic process forward? Okay, let's get back to learning about nano in general and the overall aspects of ES&H. You have the names that BNL has suggested, do you have others, do you have comments about those names, who should we tell BNL to invite?

Member Giacomaro said that there is an association that scientists belong to and asked if people who are part of that association could be brought in? He thought it was a volunteer organization in Texas called Nanotechnology Environmental and Health Implications Work

Group. Having direct contact with that group may serve us as equally as having individual presenters.

Reed said BNL has a strong presence in that group and you would be looking for someone that has leadership in the workgroup, not just a BNL representative.

Member Shea said that she would like to see someone who is outside the industry on the agenda. She said she would do some research on the subject to come up with some names.

Reed said that perhaps she could take the lead in trying to identify a watchdog group outside the organizations that are tasked with doing nanoscience.

Member Garber asked Member Kaplan if he knew Dr. Charles Geraci and if he thought he would be a good candidate to come and speak.

Member Kaplan said he had not heard him speak.

Reed asked if Member Garber was suggesting we invite Dr. Geraci?

Member Garber said he thought that Member Kaplan had heard him speak.

Member Sprintzen asked if anyone knew anything about the Delaware Biotechnology Institute. When no one did, he said he would look into them.

Member Shea said that the last name on the list, Dr. Andrew Maynard, looks interesting. He has been working with health and safety and the risks of nanotechnology.

Reed asked if there were any other thoughts. No one from the CAC indicated that they had any additional input. Reed asked if what the CAC has heard was good enough or if they wanted more research into potential speakers? Is anyone not satisfied? There was no indication that anyone wasn't satisfied.

D'Ascoli asked if it was okay to have individual speakers come in as they are identified or as your interest evolves. This is a very big subject. I think you want to see both sides of the issue. Dr. Gibbs suggested a panel discussion. I'd like your thoughts, would you prefer individual speakers, perhaps interspersed with things that are being done at the Laboratory. I know you're interested in the ES&H, but I think it's important to see the big picture. If it's okay for us to establish the agendas like that then that would be helpful guidance.

Member Guthy said that it is important to start somewhere and then as we get information, it will lead us one way or the other.

Member Giacomaro said there is an International Council on nanotechnology, a consortium of experts in the public and private sector. Also, the FDA is coming up with regulations regarding nano ingredients in the products that we buy. Maybe they should be part of the discussion.

Member Kaplan commented that this is such a wide field. After 9-11, Homeland Security needed to come up with different scenarios about what could possibly happen, so they invited all sorts of experts including a group of science fiction authors to come up with wild ideas. These people think way out of the box. Why not do a literature search and have some of these authors talk to us about some worst case scenarios. We don't know what could possibly happen.

Member Sprintzen mentioned Ray Kurzweil who does a lot of research on nanotechnology and has some fascinating thoughts on the subject.

Reed commented that this is thinking way out of the box. You need to decide what you want to do with these ideas. I can walk through them and you can say thumbs up or thumbs down on each of these potential topics, or you can say anything on the list is fair game and let's go do them all. Do you have a preference?

Member Sprintzen said that he would like to begin by hearing from the BNL recommended experts on the global perspective.

Reed said that he has heard three different categories of inside the box thinking: BNL recommended experts; outside experts; and someone from a national or international organization working on ES&H guidelines

Member Shea said that she thought a panel would be great if the CAC could set the agenda.

Reed said that another way would be to bring them in and give them each a whole evening.

Member Shea replied that she was concerned about it being too one sided if they came in one at a time.

Member Giacomaro felt they should focus more on the parts of nano that the Lab is working on instead of going international.

Member Sprintzen said that they should invite the first person on the list, Dr. Colvin. Then later develop a panel and see where it goes.

Reed asked if they were suggesting getting an educational background followed by a panel discussion. Would that work? Is that okay with everyone? Member Sprintzen is suggesting that Dr. Colvin is a good place to start for an educational background. Then you could decide if you need more education or if you want to put together a panel.

Member Sprintzen encouraged everyone to look at Dr. Kurzweil's website. I think it would be fascinating to hear him.

Reed said that we will invite Dr. Colvin for a substantive presentation that will provide a general overview of nano ES&H and then the CAC will decide if you want more information or if you want a panel discussion to bring in multiple perspectives. Then after that, the intention is to focus on BNL.

Member Chaudhry said that industry has already done so much work and there are already experts in industry that could give us their perspectives based on their experiences.

Reed said that what I think you are saying is that you want to find people who have already done ES&H in nano and bring them in here to share their experiences.

Member Giacomaro commented that some of these workgroups have members of industry, government, and academics all sitting in one group. So if we can get that group to come to us, we would gain a broader spectrum.

Reed said something you want to do early on is to decide what group that is involved in developing ES&H standards that you want to be involved with. Is everyone okay with that path forward, which is a presentation by Dr. Colvin followed by your decision of more education or

put together a multi-perspective panel discussion and decide who is going to be invited from different perspectives. You've got some research activities from different members to be brought back for discussion as well. What I'd like to do is to put together a summary of what in chemical terms is called "life cycle management", or the life cycle of nano at BNL, which is from birth to death. What happens to a nano particle from the time it's produced until the time it is either used up or disposed of. That's something that is available to you as well, to understand what the life cycle is. That has huge ES&H implications. If you'd like to hear about that, I think that may be available soon from the Laboratory.

Member Garber asked if that is a talk or a document.

Reed replied that it's a presentation.

Member Kaplan said that you are talking about a nano particle. Nanotechnology spans much more than that. Some of these things are totally off the menu for the Lab. Maybe we could have a short presentation from the Lab telling us what things are either planned or people are thinking about if they get funding. Then, as a follow up to the first speaker, we could take that into consideration as we go forward.

Reed said after the initial education, the Lab would come in and provide a presentation on the scope of nano at BNL, both short-term and long-term. Then also the life cycle which describes the Laboratory's understanding of how nano is managed from birth to death. That would happen after the first educational piece so that you have the basis for asking questions.

Member Shea commented on the minutes from the last meeting. A proposal for a new consortium between BNL, Stony Brook, and Cold Spring Harbor in the areas of cancer, neurobiology, plant genetics, and bio-informants was discussed on page two. She asked how that impacts on nanotechnology, because they probably would be involved with that too.

Dr. Aronson replied that this is an exciting possibility and he would like to speak about it on another occasion. The topics that have been chosen for research are not connected to nanotechnology. They are mostly focused on the medical imaging at BNL, PET and MRI imaging. The initial concept of the planned research is not related to nanotechnology.

5. Agenda Setting

Reed said that the HFBR will be a continuing focus for next month. There is room on the agenda for an additional item as well. An update on the Peconic River data collection analysis will be available next month or in April. I am not sure if we will be ready to bring in the speaker next month.

D'Ascoli commented that the speakers we have recommended are very well known in their field and she is hoping to have the latitude to work with them to find out if they, or a member of their organization, might be available to come. A lot depends on where they are located. Dr. Colvin is in very high demand. We will certainly get in touch with her and see if we can get her on the schedule.

Member Giacomaro asked if the Lab would like an alternate choice from the list.

D'Ascoli responded that we could go down the list and try to get a hold of every one of them. It's hard to say how long it will take for us to get on their calendar. We are doing our very best to reach out to them and find out their availability. Is everyone getting our e-mails when we send them out and if that was an effective way to communicate. We will let you know as this goes on, how we are proceeding. If we have a date from someone, we will let you know.

Member Giacomaro said so you are saying it could be months before we get a speaker?

D'Ascoli answered that is correct.

Member Giacomaro asked if the CAC wanted to wait that long, or did they want to get at least some speaker in as quickly as possible. He thought that was a more important issue than waiting for a top of the line educator.

D'Ascoli said that is why I said before that maybe a couple of you could work with me on this.

Members Giacomaro, Shea, and Kaplan volunteered to work with D'Ascoli. (Member Heil also agreed to work with D'Ascoli.)

Reed said that now we have a sense of what you are interested in, we can work out the logistics. We can look toward what is logistically possible in the March and April time frame and bring that back to the group.

Member Giacomaro asked if a time table was being set for a speaker for next month.

Reed said that we need a little lead time. We could look forward to Peconic next month and then look toward having something on the agenda for April. That would probably be the wisest thing to do. You may not get what you really want if you just say get us something.

Member Garber brought up global warming. He said it is an enormous topic and Professor Hanson's presentation did not cover the whole topic. He would like to keep that topic open. There are a number of people here at BNL who have worked on this topic and he would like to hear Steve Schwartz.

Reed asked if Steve Schwartz was someone the group would like to hear from?

The members agreed they would like to hear Member Schwartz speak on global warming.

Reed asked Member Schwartz if it was okay to put him on a future agenda.

Schwartz said it was.

Reed reviewed the March and April agendas. HFBR and the Peconic will be on in March and nano education will be on April's agenda.

Member Giacomaro asked if there will be anything about membership on the agenda.

Reed asked if the CAC would like to bring membership back as a topic.

Member Shea asked if copies of Hanson's presentation and article were to be made available for all CAC members as it said in the minutes.

Reed said the copies were on the table.

Member Anker stated that one of the agenda topics is education and she wanted to know how BNL connects with other places. She would like to hear more.

Reed asked if she was looking for a presentation or overview of how the Laboratory connects with the community. Is that something that would be appropriate around the table?

Member Sprintzen commented that it sounds too vague.

Member Anker responded that she would like to know how BNL helps the community. What type of outreach the Lab does, how BNL science reaches students.

Member Giacomaro commented that there was a report produced in the last three years to show the economic benefit of Brookhaven Laboratory and asked if that would have the information she was looking for?

Reed said that what he is hearing is that in order to set the stage for having a conversation on how BNL can serve the community, the CAC needs to first find out how it already serves the community right now. What are the existing programs and the data and statistics? What schools does the Lab work with and how does it go out to the community in general.

Member Garber said that Member Anker has a good point. There are numerous programs available at BNL. It might be an awesome presentation to have it itemized stating exactly what programs are in place.

Reed said it sounds like there is enough information to put it on the agenda. Maybe we can get Jeanne D'Ascoli to give that presentation.

6. Community Comment

There were no community comments

7. HFBR Remedial Alternatives & Preferred Alternative, Panel Discussion

Reed introduced Les Hill, Director of Environmental Remediation Projects. In addition to Hill, the panel consisted of Bruce Lien, Chuck Adey, Dennis Quinn, and Kevin Tuite of WMG. Additionally, regulators Doug Pocze, USEPA, Chek Ng (on speaker phone), NYSDEC, and Andy Rapiejko, SCDHS were available to answer questions.

Member Giacomaro reported that the East Yaphank Civic Association had met the week before and Bruce Lein and Sherry Johnson attended to give a presentation on the HFBR. He said that most of their questions had been answered and they were satisfied with what was explained to them.

Member Kaplan asked the regulatory agencies how they felt about the revised dose estimates.

Doug Pocze answered that the EPA went back and looked at the data. Initially they had concerns, but they had numerous meetings with the Lab. They are comfortable with the explanations and re-evaluations of the data. Pocze noted that their final determination would be made after the public comment period.

Andy Rapiejko commented that the Suffolk County Health Department doesn't have any in house expertise so they relied on the State Health Department which has radiological expertise. They have no problems with the calculations.

Reed posed the same question to Ng.

Ng replied that the state is satisfied with the revised dose rate calculations.

Reed asked the CAC if they had any additional questions. There were none, so he asked if they were ready as a group to begin deliberations and to talk about their recommendation concerning the alternatives as presented.

Member Amper asked what the benefits are and the downside is of dealing with the other activated components, the confinement building, and the HFBR complex contaminated soils in the year 2026 versus a decay period not to exceed 65 years.

Hill answered that the pros associated with waiting the 65 years is that there will be less radiation exposure and less risk. It becomes a project similar to what we are doing right now at the Graphite Reactor, which has been decaying since we ceased operations in 1968. The year 2026 would be the fastest we could do it. Even if we started mobilizing next week, we probably wouldn't be done until 2020. Between now and 2026 the radiation won't be reduced by all that much. We would still be dealing with very high dose rates. In 65 years, you will be dealing with much lower dose rates and you would probably be doing everything robotically. It will be much easier to dispose of the waste. In the year 2026, we would have to get into segmentation, and then you run the risk of contaminating the building because of dispersible particles. That's the downside risk of doing it sooner rather than later. Right now the activated components are in a relatively stable form. The radioactivity is actually an intrinsic part of the metal right now. There are multiple barriers to prevent migration from where it is to the environment and to protect human beings. There is a two-inch thick thermal shield surrounding the aluminum reactor vessel that is surrounded by the 8-foot thick biological shield. From a risk standpoint B, C, and D are equivalent because of the inherent stability. So there is not much of an advantage to do it sooner, but there is a big downside issue. That is how we have summarized it in the PRAP.

Quinn commented that the thermal shield is the one large component that has the highest radiation dose and it will take about 65 years for it to get down to 100 mrem/hr, which is a relatively safer level where it can be handled directly.

Member Amper asked if in looking for the downside is there anything that's more problematic if it's left alone. Is there anything that could be a bigger problem 65 years from now than 20 years from now for any of these components? Or, is there a hybrid approach to this that makes sense. Where you deal with some portion of this component now because we don't know what natural phenomena or anything else might occur between now and 65 years. The probability that some unexpected occurrence might impact this facility is greater the longer you wait. I am trying to balance that.

Reed asked the panel if there are other pieces that you could deal with earlier than 65 years.

Member Amper asked if there is something that might be a problem, where 90 percent of this is going to be easier to deal with 65 years from now, but is there something that isn't?

Hill responded that when you look at the activated components, there is nothing that is going to be more difficult to handle 50 or 60 years from now. The control rod blades constitute a third of the source term and have been removed in the past. They are designed and built to be removable so we are able to flood the reactor vessel and remove them now. This is not a small undertaking, but because they were designed for removal and replacement, we have the ability to go in and extract them without the downside risk that we have with going in and segmenting and pulling the reactor apart and taking down the activated components. The hybrid approach is Alternative C, where we are taking out a third of the source term.

Reed asked what pulling down the reactor meant.

Hill explained that it would be flooding the reactor vessel and dismantling all the other activated components including the reactor, reactor internals, the thermal shield, and all the other activated components.

Reed said you mentioned that you can pull the control rod blades out. Can any of the other pieces be done separate from dismantling the whole facility?

Adey replied that there is a possibility of pulling out some of the other pieces, but it would only result in a small incremental reduction of the source term. You could start mechanically disassembling some of the internals, but the majority of the additional inventory in the reactor is the transition plate. That's the largest radioactive component of the internals and that cannot be taken apart without segmentation. To do that now would require tooling out and developing some remote cutting technology that doesn't have to be done to remove the CRBs. There is no segmentation required to remove, package, and dispose of the blades.

Member Amper commented that the expense is greater because there is more work now, the challenge is greater, and the cost of providing protection to workers and the public is greater. Is there any cost disadvantage as a result of paying for this in year 2100 money?

Hill responded that they have looked at present value cost; they have not looked at escalation, discount rates and the like. We haven't done that historically for these various alternatives because you can get into a wide range of discussion and opinion on discount rates and what numbers you would be using. What is factored in are the full life cycle costs, including the annual care taker cost to maintain the facility.

Member Kaplan commented that on any project that he has seen, they always include a discounted value to get back to the present when comparing the cost of the alternatives. I would have expected a full present value comparison to be a part of your calculations.

Hill replied that whatever numbers you might be inclined to use would be subject to a wide variety of opinion. We have never done that here, that's been the agreement we have with the regulators. We look at present value cost. He asked Doug Pocze, USEPA, if he has seen this any place else in connection with other remedies?

Pocze replied the EPA mainly looks at present value cost otherwise it would be opened to various interpretations.

Member Sprintzen commented that he wouldn't want that to be included. That's guess work and would undercut any serious analysis. I think you cannot predict what numbers would be accurate. I feel that would be a great compromise to the scientific integrity of the analysis.

Member Kaplan said at the last meeting Member Esposito had asked about the length of the rods and you said that when you get into segmentation some of the higher dose rates can actually extend beyond the BNL site. What did you mean by that?

Hill responded that was said in the context of waste transportation.

Member Sprintzen pointed out that there was an error in Figure 2 in the responses to the CAC questions that was sent out. On the graph, the yellow part should be the thermal shield instead of the reactor vessel. That was labeled wrong. The maroon is the biological shield. You can't see the color of the reactor vessel.

Adey commented that Figure 3 is a microscopic look at the 100 mrem/hr and the time at which the dose rate of the thermal shield falls below that 100 mrem. It is difficult to see on the diagram.

Member Sprintzen stated that it appears that everything is well below the 100 mrem.

Adey replied that the other components are below that. This is the limiting element. To take the vessel out, you have to come into close proximity with the thermal shield, and we need the overall dose rates in that area to be down below 100 mrem/hr.

There was some confusion caused by the figures in the responses to the CAC questions. It was discovered that the plotting of the thermal shield on Figure 2 did not print, and therefore the graph appeared to be wrong.

Member Corrarino made a point of clarification that when they looked at the Peconic River cleanup, they looked at present value.

Member Chaudhry said when you compare Alternatives B and C, there are highly radiated CRBs. Aren't we exposing ourselves to more risk by removing the CRBs now?

Reed clarified by saying that since the CRBs are highly radioactive and you are removing them now, why is it that you are not comfortable removing the other highly radiated components for 65 years?

Hill responded that the control rod blades were designed to be removed. There is equipment that is installed in the plant for extracting, removing, and transferring the control rod blades remotely. There is a special shielded chute that would guide the CRBs down into the fuel pool. The entire reactor facility has been designed to handle the CRBs, so we can do this without deviating from the use of the existing facility as it was designed. In fact, the CRB removal has been accomplished in the past. The facility was designed for this. The facility was not designed for the removal of the reactor vessel, the thermal shield, and the biological shield. That's one of the big differences. That would get into cutting these things apart and segmentation. We are comfortable doing the CRB removal because the facility was designed for that.

Member Chaudhry – So the risk of removing the CRBs at this time is acceptable?

Hill said, yes, it is quite acceptable. Originally, when we thought the dose rates were higher, we thought we were going to have to cut the CRBs up. Once we saw these different numbers, we said we can package the CRBs in two cask shipments and bury them in the casks out at the Nevada test site. From a handling standpoint, this is a fairly straight forward operation. We are very confident.

Lein added that we have experienced people that are going to give input and probably help do the job. We have that knowledge base here at the Laboratory for the removal of the CRBs.

Member Sprintzen commented that as a lay person in the community he never understood source term and asked what it meant.

Reed explained that source term was when the atmospheric or water transport of this stuff was calculated, you want to calculate how it transports or spreads. That's part of figuring out the concentration or what the dose of something would be at the end. There are a lot of things that go into it, but this equation that we use breaks down into several different parts. We call each of those parts of the equation a term in the equation. There is a part in the equation that goes to figuring out how much of the stuff is released. That's very important, as well as how it spreads. All the things that go into the part of the equation that talks about how much of the stuff is released is called the source term in the equation. It has stuck with people who do these kinds of calculations, it is almost meaningless.

Member Guthy asked the panel to give a short description of how they feel about Alternative C and were there any problems they thought about that were not addressed or should have been changed slightly in order to satisfy their comfort with their decision.

Hill said that they looked at the removal of the CRBs and we looked at what we had to deal with and what we had to manage at the reduced values. When we knew that we didn't have to segment the CRBs, we could put them in casks without cutting them up, it then became a whole new ballgame. We really thought that we could easily do this without a tradeoff. If we can reduce the quantity of radioactive material in this complex by about a third, and we can do so for about \$2 million, without the risk of contaminating the building, and without risk to the employees involved in the job. We really believe this is a good idea. We have a lot of confidence and think it is the right thing to do.

Member Garber said that at the last meeting he asked about the inventory estimates being off by more than a factor of two, which reduces the amount of confidence. He wondered if you could drop a detector into the vessel and look at the whole mix and get a sense of what the magnitude of the radiation is. It seems that all the difficult aspects that have to be done before a detector can be dropped in are the same things that have to be done to remove the CRBs. So if you remove the CRBs, the situation is there that you could start dropping things down for an accurate measurement. I am looking to find out if you are correct within a factor of two. I offer this suggestion, because I think it is important as a confidence building measure. I would hate to see you start pulling stuff out and then find out your estimates are wrong. I would continue to suggest that once you beginning pulling out the CRBs and you have access, this could be accomplished. Then you would not have an analysis, but actually have a hard measurement that could give us all some confidence that you do know what the inventory is.

Hill said that when they go into the reactor, they will have a whole cadre of radiation detection devices that will be looking at dose rates under water. What you are suggesting, we are going to do as part of the operations of removing the CRBs. I thought your question was if something like this could be done to get information that could be plugged into the equation beforehand so that there would be more confidence in it. I did not mean to make it seem like we were pushing it back, it is a good idea.

Member Garber continued that he was not just talking about the CRBs. He was talking about the other shields and things like that which the monitor is going to be looking at. Presumably it has been characterized so you know what the radiation flux is coming from and you could make a fairly accurate guess and it would give confidence that your inventory characterization is correct.

Hill responded that while they are in there with the CRBs out, they could get a lot of good data. Your suggestion is received and that is what we plan on doing.

Reed asked for other comments.

Quinn added that the reason why the question was answered like that was because with the CRBs and the other components it would be extremely difficult to figure out what was coming from where. Once the blades are out, it will make a lot more sense for the remaining pieces.

Member Esposito said that the 65-year time line in option C makes her uncomfortable. We have had many discussions as the CAC about how far out in time is too far. Why can't we keep it to 50 years? I feel that 65 years is too far into the future. We have always talked in the past, with the exception of the Sr-90 plume, about a 50-year timeline. We have had discussions as to

why 50 years makes sense. I'd like to keep with the consistency that we have established and the pattern of a 50-year timeline for remediation and cleanup. I realize that you are waiting for the radiation levels to get below 100 mrem/hr, but I would feel more comfortable if we were talking about a 50-year timeline, because we have done that in the past and we have agreed on that and built a consensus around that timeline. I have no problem with the first part of Alternative C, if we could change the 65 years to 50. I don't know what that would do to the price, but I think it adds a great deal to what we have done in the past.

Reed asked the panel what 65 years versus 50 years does to the price and risk.

Quinn answered that it would increase the dose rate by a factor of eight. Five years is the half life of Cobalt 60, which is the primary radioactive nuclide. Every five years it changes by a factor of two. So it would be about a factor of eight higher. The question, which I don't have off the top of my head, is what does that do for remote tooling and that kind of thing. It is clear at 100 mrem/hr it would not be needed, at 800 mrem/hr possibly it would. There is some question as to where that cutoff point is and when you would need casks as opposed to normal transport.

Hill responded that he would have to do an analysis to figure out the cost difference.

Member Esposito commented that there is really no public exposure here though.

Hill responded that we are talking about worker exposure. In my opinion, transportation dose is nonconsequential.

Member Esposito commented that it could be cheaper to do it in 50 years rather than 65 because of the value of the dollar. It sounds like it is more of a technological challenge rather than financial.

Hill said the cost would be somewhere between the \$144 million and \$205 million. How far in between? I don't know. I'd have to look at it.

Member Esposito said that she didn't expect him to have a number right away. She was thinking more about what kind of challenges it would present. It sounded like it is a technological challenge of potentially using robotics as opposed to people.

Hill responded that the main reason for the 65 years was the 100 mrem/hour.

Adey said that we have the technological basis that we could build around. We have included in the alternatives the fact that we will do an annual review and discuss things with the regulators. A lot could happen in this period of time, advances in technology over the next 50 years plus having the benefit of a substantial amount of decommissioning work being done now with the closure of many of the power reactors. So we could find that in half that time there could be a more economic way or technologically sound way of doing it. We may have the opportunity to do that.

Member Esposito commented that she cannot see that happening. It is hard for her to imagine that it would be done quicker. Other things come up and you might decide to use that time and money for other things because you will think you have more time on this, so it can wait. That's the reality, we all work with budgets.

Reed said, so what we have is 800 mrem to the worker for 65 versus 50 years. Costs would be somewhere between \$144 and \$205 million and possibly some differences in methodology in cutting back the time period.

Member Garber responded saying that right now we are talking 65 years. I think it is possible to write a ROD that says in 65 years it definitely will be cleaned up, however, in 45 years there will be a major assessment of the technology situation. Clearly the radiation level will be what you are predicting, but if the technology looks like an efficient cleanup is possible at 50 years, then the ROD would mandate that it be reviewed and if possible to do it with reasonable worker safety and if the robotics are inexpensive enough then you would do it. We don't know what the technology will be like in 50 years. Probably it will be much better. That would be a variant of option C. It might make a lot more people happier if we have the potential of a cleanup in 50 years.

Hill asked Doug Pocze, EPA, if there was a technology review built into the Sr-90 ROD.

Pocze responded that the purpose of the Five-Year Review is to look at the remedy to see if it is working, or if there have been any advances. The problem with getting into specifics is that then you have to put specific criteria in as to what that would be triggered at. It is usually triggered by whether the remedy fails or not. Not so much at a certain point or time that you decide to do something different. If the remedy is operating properly and successfully, and you are looking at it every five years, you could look at other things to shorten the life of the overall ROD, but I'm not sure what specifics you could put in saying at this point we will take whatever technological advance there is. We will be doing that regularly on a 5-year review basis.

Member Guthy commented that she would like it in writing that as soon as technology becomes available, the time period, whether it's next year or later, should be made shorter. I think the Lab should make that commitment.

Member Amper said that we have to consider the impact of the risk to the crews. The risk to the crews is smaller when you are using robotics, so you get to the point where we don't need to use them and at some point those two lines cross. We need to factor that in. Is that accurate?

Hill said when you get into a comparison there is no black and white answer.

Member Amper continued saying that reducing it to where you can handle it with your bare hands versus not having anybody go near it, suggests that waiting a long time may not necessarily increase the safety factor for the personnel.

Hill said that there is a continuum here.

Member Amper said that you are presuming improvements in technology, but we're also going to inherit other BNL's and the shutdown of other nuclear power plants. I don't know what the competition is going to be like or what we are going to be up against. None of us knows what we are going to be dealing with in terms of the cleanup being done in this country or the world 65 years from now as opposed to today. It could be a benefit or it could be a downside. We could have to wait in line for the new technology. Is that valid?

Hill responded that usually if there is a marketplace for these services, they are out there in abundance. There are folks looking to decommission reactors, there are service providers that should be available.

Member Esposito commented that is not true with the casks. There is an inherent conflict in that statement. When we look for these casks for transportation, they are limited.

Kevin Tuite noted that Barnwell, the disposal site that takes all the D-waste, is going to be shut down in July of this year. There is not going to be a demand for those high activity casks beyond that. There is no market for them in the future.

Member Garber said that we are asking for something more. I am looking for something to be built in where at a certain year you would examine what the cleanup costs are. At 45 years would you make the argument to wait another 20 years or would you wait 5 years.

Member Shea expressed concern about the 65 years in terms of the high level waste. How do you know that you are going to have a facility to take this high level waste in 65 years? I have read that some companies are importing waste from other countries right now. Right now we are short of storage space for high level waste. Do you have a guarantee that in 65 years someone will take the waste?

Hill responded that in 65 years the radiation levels of the materials we are disposing of will be in the lowest class of radioactive waste. We will not be dealing with the high level radiation that we have now. There is only one place we can send it to right now, the Nevada test site. When you let this decay out, it opens up other avenues on the disposal sites.

Member Shea asked if there is a guarantee that you can say in 65 years somebody is going to take it.

Hill said no, there are no such guarantees.

Member Shea asked about the thermal shield. Isn't that high level waste?

Quinn answered that it probably would be considered low specific activity waste at that time. Even the thermal shield, which will be the highest of what we have left, will be considered low specific activity.

Member Amper asked everyone to think about the fact that part of the concern about the length of time waited to do this is the concern over the way public policy gets done. There is a will here to do this now. There is a focus on doing it. People who study this are ready to move. Where they will be in the future, I don't know. I have no confidence that anybody's going to do anything. This is not just a question of numbers, it is very hard to predict. Ten or five years ago we couldn't have predicted the cost of a barrel of oil, or who is going to be in the White House or how many people are going to need this waste disposed of. I hope the Lab will respond to the legitimacy of that portion of this argument. As we consider how this stuff gets done, that's going to change. It's not going to change between now and two years from now, but it's definitely going to change between now and 65 years from now. Before we make any decisions, we need to factor that in.

Member Anker said we are talking about what is going to happen 50 or 65 years from now and we don't know what is going to be here, what resources will be available to dispose of this. The sooner it's done, the better. My question is different. We know we have to wait. We know technology is going to change. We may not have this problem in 10 or 20 years. My question is what is the worst thing that could happen, how well is this protected? We are safe right now from this nuclear waste, but what would it take for the risk to increase?

Reed explained that Sarah is asking what would have to happen in order to present a tangible risk to the public from this facility while it is waiting to be dismantled and disposed of.

Hill said this was discussed in detail at an earlier meeting. The materials are in a non-dispersible form, it's embedded in the metal and concrete. Any type of catastrophe could result in a local issue here at the complex, but it wouldn't travel off of the site. The materials are in a very non-dispersible form, it just won't go anywhere. There is no way to pulverize it into a form that would impact anybody or anything off the site. The building has been designed and built to withstand

hurricanes. That's the dome itself. The vault, the biological shield is eight-foot thick heavily reinforced concrete and steel that is hurricane proof. It was designed to be a lot more radioactive than it is right now.

Member Kaplan said that going down to 50 years would increase risk by eight times. Would that require work under water?

Quinn replied that it was hard to say.

Member Kaplan continued saying that it is possible for an individual to receive up to 2 rem. However, you say the typical RAD worker working on a job in decommissioning receives from .2 to .3 rem in a year. A quarter of the eight times is two. So the bottom line is you could make it the 50 years and still stay roughly within that 2 rem limit. It is possible, correct?

Quinn replied that yes, it is certainly possible. It just would involve more radiation exposure and some more complexity. It is definitely possible.

Hill added that at 800 mrem/hr you are not going to be doing this work manually hands on. I wouldn't think about doing that. You probably would not have to flood the reactor, but I'd have to look at exactly how it would be done.

Member Kaplan said that his point is that it is conceivably possible to go to 50 years. The group seems to be saying 50 years seems like a comfortable amount of time.

Hill responded that we are here to answer questions and yes it is possible.

Reed asked if it is okay to resume deliberations next month.

The CAC agreed.

Member Sprintzen said that Member Kaplan drew a conclusion as to the desires of the group and I think it is an incorrect conclusion, as far as I am concerned. I don't agree with the 50 years.

Reed said, the statement that Member Kaplan made is attributed to him only.

Member Kaplan asked about the cost of the two casks and what they look like.

Hill responded that they are cylinders that are six feet high by four feet in diameter and they cost about \$50,000 each.

The meeting adjourned at approximately 9:20 p.m.

Agenda Topics	Votes
Global Warming, Stony Brook, Pine Barrens (1-10-08)	15
CAC as a conduit/resource to the community	13
Emergency Operations Center tour and drill	12
Nano technology	11
CERN – problems and implications	11
Site Environment Report – good and bad (11-8-07)	11
Nano safety	10
Regulator presentations on areas they oversee	10
Energy	9
Overview of programs	9
Deer Management	8
Anti-terrorism update	7
NSLS-II briefing	7
Nuclear power plant safety	6
Education Programs	6
Energy efficiencies	6
Sustainable transportation	4
Natural Resources management	4
Nano ES & H (October 11, 2007)	3
Safety and Security	3
Experimental Review Process	3
Latest RHIC findings	2
How the Lab supports nuclear facilities in the N/E region	2
Status of P-2 road show	2
Heating plant and efficiency research	2
Lyme Disease	2
CAC process	2
Alternative fuels	2
Update on phyto/bacterial contamination remediation research	1
Deforestation	0
Work planning process	0

New Topics Added After September 2007 Vote

Global warming – BNL research
 Nano toxicology
 Nano ES&H issues at BNL and beyond
 Nanotechnology/science at BNL
 Nano management policy issues
 Nano panel discussion with the DOE, EPA, and FDA
 Renewable energy research at the Lab
 BNL/CSHarbor/Stony Brook collaboration

Flip Chart Notes

Discussion on Nano

ES&H Aspects

- Worker Safety
- Public Safety

Understanding

- General ES&H
- Lab Scope Understood
- Lab ES&H

- o Invite Workgroup to present and establish relationship
- o One or two outside of industry and government “watchdog group” (Mary Joan Shea will lead search)
- o Dr. Geraci?
- o DL Biotech Institute (David Sprintzen will research)
- o Dr. Maynard?
- o International Council on Nanotechnology
- o FDA
- o Lecture by Author
- o Ray Kurzweil (check out website)
- o Dr. Colvin
- o On the Ground Experience
- o Presentations from Lab
 - Short term scope
 - Long term possibilities
 - Life cycle (after education talk)

Agenda Setting

- HFBR (March)
- Peconic (March)
- Nano education (April)
- Steve Schwartz on global warming
- Membership (April)
- BNL Connections to Community

P = Present 2008	Affiliation		First Name	Last Name	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
	ABCO (Garber added on 4/10/02)	Member	Don	Garber	P	P										
	ABCO	Alternate														
	Brookhaven Retired Employees Association	Member	Graham	Campbell	P	P										
	Brookhaven Retired Employees Association (L. Jacobson new alternate as of 4/99)(A. Peskin 5/04)	Alternate	Arnie	Peskin												
	CHEC (Community Health & Environment Coalition (added 10/04)	Member	Sarah	Anker		P										
			Ann Marie	Reed												
	Citizens Campaign for the Environment	Member	Adrienne	Esposito	P	P										
	Citizens Campaign for the Environment (Ottney added 4/02-takenoff 1/05 Mahoney put on)(7/06 add Kasey Jacobs)	Alternate	Kasey	Jacobs												
	E. Yaphank Civic Association	Member	Michael	Giacomaro	P	P										
	E. Yaphank Civic Association (J. Minasi new alternate as of 3/99) (M. Triber 11/05) (Munson 6/06)	Alternate	Brian	Munson												
	Educator (changed 7/2006)	Member	Adam	Martin												
	Educator (B. Martin - 9/01)	Alternate	Bruce	Martin												
	Educator (A. Martin new alternate 2/00) (Adam to college 8/01)(add. alternate 9/02) (changed 7/2006)	Alternate	Audrey	Capozzi												
	Environmental Economic Roundtable (Berger resigned, Proios became member 1/01)	Member	George	Proios	P											
	Environmental Economic Roundtable (3/99, L. Snead changed to be alternate for EDF)	Alternate	None	None												
	Fire Rescue and Emergency Services	Member	Joe	Williams												
	Fire Rescue and Emergency Services	Alternate	Don	Lynch	P	P										
	Fire Rescue and Emergency Services	Alternate	James	McLoughlin												
	Friends of Brookhaven (E.Kaplan changed to become member 7/1/01)	Member	Ed	Kaplan		P										
	Friends of Brookhaven (E.Kaplan changed to become member 7/1/01)(Schwartz added 11/18/02)	Alternate	Steve	Schwartz	P	P										
	Health Care	Member	Jane	Corrarino		P										
	Health Care	Alternate														
	Huntington Breast Cancer Coalition	Member	Mary Joan	Shea		P										
	Huntington Breast Cancer Coalition	Alternate	Scott	Carlin												

P = Present 2008	Affiliation		First Name	Last Name	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
	Intl. Brotherhood of Electrical Workers/Local 2230 (S.Krsnak replaced M. Walker 1/11/07)	Member	Scott	Krsnak	P	P										
	IBEW/Local 2230	Alternate	Philip	Pizzo												
	L.I. Pine Barrens Society	Member	Richard	Amper		P										
	L.I. Pine Barrens Society (added P. Loris 6/05)	Alternate	Elina	Alayeva	P											
	L.I. Pine Barrens Society	Alternate	Susie	Husted												
	L.I. Progressive Coalition	Member	David	Sprintzen	P	P										
	L.I. Progressive Coalition	Alternate	None	None												
	Lake Panamoka Civic Association (Biss as of 4/02)	Member	Rita	Biss	P	P										
	Lake Panamoka Civic Association (Rita Biss new alternate as of 3/99)	Alternate	Joe	Gibbons												
	Long Island Association (Groneman replace 10/05)	Member														
	Long Island Association	Alternate	William	Evanzia												
	Longwood Alliance	Member	Tom	Talbot	P	P										
	Longwood Alliance	Alternate	Kevin	Crowley												
	Longwood Central School Dist. (switched 11/02)	Member	Barbara	Henigan	P											
	Longwood Central School Dist.	Alternate	Allan	Gerstenlauer												
	NEAR	Member	Jean	Mannhaupt												
	NEAR (prospect taken off ¾)(Blumer added 10/04)	Alternate	Karen	Blumer	P											
	NSLS User	Member	Jean	Jordan-Sweet	P											
	NSLS User	Alternate	Peter	Stephens												
	Peconic River Sportsmen's Club (added 4/8/04)	Member	John	Hall	P											
	Peconic River Sportsmen's Club	Alternate	Jeff	Schneider												
	Ridge Civic Association	Member	Pat	Henagan	P											
	Science & Technology (added 1/13/05)	Member	Iqbal	Chaudhry	P	P										
	Town of Brookhaven (Graves made member 6/06)	Member	Anthony	Graves	P											
	Town of Brookhaven	Alternate	None	None												
	Town of Brookhaven, Senior Citizens	Member	James	Heil	P											
	Town of Brookhaven, Senior Citizens (open slot as of 4/99)	Alternate	None	None												
	Town of Riverhead	Member	Robert	Conklin	P											
	Town of Riverhead (K. Skinner alternate as of 4/99)	Alternate	Kim	Skinner												
	Wading River Civic Association	Member	Helga	Guthy	P	P										
	Wading River Civic Association	Alternate	Sid	Bail												