

These notes are in the following order:

1. Attendance
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3. Administrative Items
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5. Community Comment
6. HFBR Remedial Alternatives, Bruce Lein
7. Agenda Setting

1. Attendance

Members/Alternates Present:

See Attached Sheets.

Others Present:

C. Adey, M. Bebon, J. Carter, M. Cowell, F. Crescenzo, J. D'Ascoli, B. Dorsch, K. Geiger, G. Goode, L. Hill, S. Kumar, B. Lein, L. Nelson, D. Paquette, S. Penn, A. Peskin, D. Quinn, A. Radiejko, D. Ryan, J. Tarpinian,

2. Correspondence and Handouts

Items one through five were mailed with a cover letter dated April 14, 2006. Item six was provided in the member's folders and items seven through eight were available as handouts.

1. Draft agenda for April 20, 2006
2. Draft notes for March 9, 2006
3. Final notes for February 9, 2006
4. Final notes for January 12, 2006
5. Final notes for December 8, 2005
6. Action Item response on tritium in the BLIP plume
7. Action Item responses on HFBR costs and the radiological inventory
8. Presentation on the Peconic River Surface Water Sampling
9. Presentation on HFBR Alternatives

3. Administrative

The meeting began at 6:37 p.m. Those present introduced themselves. Reed Hodgkin went over the ground rules and the draft agenda. Reed asked for questions on the agenda.

Member Sprintzen asked for consideration on the agenda concerning a letter from 19 of America's leading physicists that raised concern about the plans of the American government to engage in nuclear action in Iran and the dangers that presents to all civilizations. He thought that some of the members were emeritus of the Laboratory and it seemed to him that it was a relevant question that the CAC might want to address considering the seriousness of it.

Reed said he would put Member Sprintzen on the agenda to brief the group during the administrative period and then the group could decide to add it as an agenda item tonight or another time.

Member Mannhaupt asked to make an announcement regarding NEAR. Member Guthy asked to make an announcement as well. Reed invited Dr Chaudhari to the microphone.

Dr. Chaudhari expressed regret that he would not be able to stay with the CAC for the entire evening due to a conflict that resulted from the change of the meeting date. He thanked all of the members for their solid counsel and said he had enjoyed the democratic process at work. He said it was wonderful to see all of the members take positions and not agree with each other but all of the members had a common goal and that was the welfare of the Laboratory and the community. Dr. Chaudhari expressed his thanks to the members and stated that he did not want to take them from their normal routine or agenda. Dr. Chaudhari answered a few questions and thanked the CAC again.

Member Sprintzen expressed how sorry the CAC was to learn of Dr. Chaudhari's departure and expressed the CAC's appreciation for his contribution to the group. Member Mannhaupt called for a standing ovation as Dr. Chaudhari departed.

Reed asked for comments, corrections, additions or deletions on the draft notes for the March 9, 2006 CAC meeting.

Member Chaudhry asked for corrections to the fourth paragraph on page five. He asked that his question be changed to read that he asked about the effectiveness of the concrete cap in view of its porosity and tendency to crack. On page eight, he meant to ask why there is no alternative in between Alternative D, which finished the cleanup by 2012, and the 75 years. That question will be changed to ask why no alternatives were considered that would have faster cleanup than Alternatives B and C but take longer than Alternative D.

Member Shea offered corrections for the January 12, 2006 final notes. Reed asked if the CAC wanted to hear the corrections. Member Shea discovered in the January minutes if they are grammatical and minor in nature and don't change the sense of the minutes. The members agreed they did not need to hear them if they were minor in nature. Reed will review them at break with Member Shea and if they look like they are of substance he will bring them back to the group. (The corrections were all typographical. sj)

Reed asked for other corrections, additions, deletions, or if anyone needed more time to look at the March notes. The notes were approved as amended, with three abstentions.

Jeanne D'Ascoli announced that a farewell reception was to be held for Dr. Chaudhari next Thursday and the CAC was invited. The reception is from four to six p.m. in Berkner Hall. D'Ascoli announced that Dr. Sam Aronson had been named as interim Director for the Laboratory. Dr. Aronson was Chair of the Physics Department and then became the Associate Laboratory Director for High Energy and Nuclear Physics. She said the CAC would be meeting Dr. Aronson in the future. D'Ascoli called attention to the Action Item responses that were stapled together. Information on the HFBR costs, the radiological inventory including half-lives and decay rates, and the percents of activated component activity and isotopic composition were provided as requested. She said Ed Kaplan had asked about a programmatic EA for the Nanocenter. She investigated this week and found that it is much more than just putting a piece of paper into a folder. She would like to arrange for a presentation on it at the first opportunity that there is time on the agenda. D'Ascoli asked if there were questions, the CAC had none.

Reed asked the CAC members to make their announcements.

On the letter from the physicists, Member Sprintzen said it's probably not something that the Lab would do, but it is something that the CAC might consider. Recent articles, for example Seymour Hirsch's article in the New Yorker last week, which is referred to in the letter, make it clear that the President and the Administration are planning, seriously planning, not just contemplating, the use of nuclear weapons in Iran. This is a matter of utmost importance and it is a matter that does address and does concern the scientific community, the Lab in general, and the CAC's relation to it. Member Sprintzen had the letter written by the scientists, he was not able to make copies. He said that perhaps copies could be made and the topic could be taken up later in the meeting and after people had a chance to read it. He thought it would be appropriate for the CAC to express their support of the intentions of the letter and thought it was something people should be doing all across the country. He brought it to the attention of the CAC because of their special role and asked how they would like to proceed.

Member Shea thought this was a very important issue and a frightening situation and noted that one of the reasons she stayed with the CAC was because they were against the production of weapons at the Lab. She asked to have the letter read.

Reed suggested the letter be read now and that any discussion be held until after the CAC finished with its regular items. Member Sprintzen agreed and read the letter. The letter was passed around the table.

Member Mannhaupt informed the CAC that NEAR's Technical Assistance grant through the EPA is completed and all the reports are in. The EPA is in final review of the technical reports. A final payment is expected to be made to Frank Anastasi within 30 days. Once that is done, the corporation will be dissolved. As of June or July, NEAR will no longer be participating on the CAC. When the EPA releases the report it will be forwarded to Jeanne D'Ascoli for distribution. Reed congratulated Jean on her success.

Member Guthy noted that Mary Jane Sheridan, wife of Tom Sheridan, had passed away a few weeks ago after a three-year fight with cancer. Member Guthy commented what a lovely lady she was and asked that everyone say a prayer for her.

Prior to speaking about safety issues, Mike Bebon mentioned that the Lab is planning a small memorial for Mary Jane Sheridan as she was very active with the User community at the Laboratory. A tree will be planted in her memory at the Recreation Center in the apartment area. Bebon informed the CAC that last Friday, shortly after 10:00 a.m. an incident occurred at one of the power supply buildings of the Relativistic Heavy Ion Collider. A BNL employee was injured during an electrical switching operation when the switch failed internally causing an arc blast. The individual was transported to Stony Brook hospital and released approximately three hours later. He has not lost any time at work. He did sustain burns to the face and hands that were luckily confined to first and second degree. DOE has commissioned an accident investigation team and the Lab is working with them to determine all of the dimensions of what caused the electrical failure and the subsequent injuries to the individual. The team is continuing its work and the Laboratory will proceed to implement the recommendations received from the team. The Lab has been doing its own review to determine factors that were related to this so that such things may be prevented in the future.

Bebon was asked to come back to the CAC with the recommendations once the team has finished their review. They also asked if this was a defect in the mechanism or a procedural error by the employee. Bebon responded that wouldn't be known until the team completes all of its work and interviews. There are electrical experts who are taking apart the switch that failed to try to determine what the cause was. There are a lot of possibilities that are being narrowed down.

Member Jordan-Sweet passed a card for Dr. Chaudhari around the table for CAC members to sign.

4. Update Peconic River Water Sampling, Skip Mederios

Reed welcomed Skip Mederios back to the CAC. Mederios reported on the first year of surface water sampling following the cleanup. The cleanup of the onsite section of the river was completed in September 2004 and the off-site section of the river was completed in May 2005. Samples were collected in June and August of 2005 so they represent the river at a state of flux where it had not yet adjusted to the cleanup and had not totally healed from the remediation.

Mederios discussed the sections of the river that were sampled and the results. He said good results were achieved in the on-site and off-site sections and the sediment itself is quite clean now. Other analytes had a similarly successful cleanup.

According to the ROD, sediment, surface water and fish data must be collected and reviewed with EPA, DEC, Suffolk County Department of Health Services, the Department of Health, and the Suffolk County Parks Department with the goal of demonstrating or evaluating that we have achieved our cleanup goals and reduced potential health risks through fish ingestion.

There were 21 stations sampled in June 2005. In August, not all were sampled because the river dried up. The mercury and methyl mercury concentrations in the water were very low. The units used to measure them were nanograms per liter, which is equivalent to one part of mercury in 999,999,999,999 parts of water, one part per trillion. Samples were also collected from the Connetquot River to provide a range of data from another location. In June of '03, '04, and '05 samples showed the surface water levels of mercury decreased downstream.

(tape changed)

Member Esposito: Could it be attributable to low water levels?

Mederios: I do not believe it was low water levels because there was sufficient water in June. The values were lower in August 2005 relative to June 2005. The trend is the same for total mercury and there's been a substantial reduction in the methyl mercury production. Interpretation of the data was difficult because it was close to the time the sediment was excavated and there was an absence of data due to the drought conditions the previous summer. The results from 2005 may reflect sediment disturbance from remediation and not indicate future levels that one could expect. It will be necessary to collect more data before an interpretation can occur. Between 2003 and 2004, there were substantial differences at individual stations because of the environmental factors that influence the processes of converting methyl mercury from total mercury. This is something that will be watched for the next several years.

Member Hall: For many years there had been mistrust between the Peconic River Sportsman's Club and the Brookhaven Lab. For many years Brookhaven Lab removed samples of soil, water, and fish from our property. That mistrust has changed a lot. It was Skip Mederios who brought trust, honesty, confidence in this place, and integrity. On behalf of Peconic River Sportsman's Club, I would like to say welcome back, Skip. At one point we surprised Skip and told him we're splitting the samples. Yours can go to your lab and our samples will go to our lab. I'll never forget the confidence that Skip had when we came here for the results of our tests. He was right on the money.

Member Jordan-Sweet: What are the error bars on the measurements?

Mederios: I can't show them, but they're very broad and significant.

Member Schwartz: Could you review the processes controlling mercury and methyl mercury? Is it leaching out of the sediment and establishing a steady state in the water concentration that is then governed by chemical kinetics and by flow? Could you go through that?

Mederios: The total mercury is largely influenced by the amount of suspended material that's in the water column. An influence on total suspended solids is the collection process, shallow water and the amount of coverage of the surface by plant matter. Characteristics that can influence the process for converting total mercury to methyl mercury, which is a mechanism that is carried out by microorganisms. Sulfate-reducing bacteria are bacteria that get energy from materials like sulfide in an anoxic environment; typically there are low PH's. This process is also influenced by temperature, which causes the bacteria to move and reproduce much more quickly.

Member Schwartz: Is the bacteria making the methyl mercury?

Mederios: It is converting the methyl mercury from an inorganic form to an organic form.

Member: What is the removal process for that methyl mercury?

Mederios: Other organisms can consume the methyl mercury when they eat plants. It can be released to the atmosphere. It travels up the food chain and when eaten, it gets more concentrated. The methyl mercury in fish and the carnivores at the top create the health hazard.

Member Talbot: Are you prepared to give an evaluation of how effective the phragmites reduction program was?

Mederios: The goal for phragmites reduction is to achieve not more than 10% surface area coverage following the cleanup. Preparation is in process to remove phragmites from the river; they will be hand- weeded in mid-May, and in August the tassels will be removed and the stalks will be cut. That will remove most of the nutrients. This is to be done for two years. The results will be shared with the CAC and with the regulatory community. If this does not enable us to control it, other measures will be evaluated.

Member Talbot: Is there controversy about use of the wicking process and is it going to be repeated. Was it worthwhile?

Mederios: We thought that it was in the area it was used. It was a process that would have to be repeated. This is also a process that will have to be repeated but it allows for giving physical removal a good try before another way like wicking is considered.

Member Esposito: There were three years of data during the time when the most vigorous remediation occurred. There is more testing planned in 2006. Do you expect to see a reduction or is it too soon? Can you make a prediction?

Mederios: I can't give a prediction of what the numerical value would be because there are so many seasonal influences. The anticipation is that an improvement would be seen. An evaluation will have to begin if an improved trend is not seen, but it won't be definite for several years.

Member Shea: Are there certain species of fish that are more efficient at absorbing mercury?

Mederios: The most efficient fish at absorbing mercury would be those that consume the most food and the higher up on the food chain they are -- large mouth bass and pickerel. The higher expectation of mercury in the fish would be because they eat fish that have concentrated the mercury by eating other fish that have concentrated the mercury, that have eaten dissolved plankton that concentrated the mercury.

Member Shea: Are there any fish species that are more effective at concentrating the same amount of methyl mercury than other species are?

Mederios: Not on a metabolic basis.

Member Conklin: Were the phragmites removed from a mile and a half of river?

Mederios: Yes.

Conklin: Was the wicking effective?

Mederios: It wasn't effective everywhere; it was effective in some areas. A die-off was observed in the areas where it was done but there may be plants coming up from rhizomes that are still beneath the sediment.

Conklin: What is the number of people needed to do the actual hand pulling and then tassel removal?

Mederios: There are two to three dedicated contractors. They expect that it will take a total of 360 person hours for each removal process.

Member Hall: The top of the food chain in Donahue's Pond appears to be the snapping turtle. Why have you never tested the snapping turtle?

Member Esposito: Is that allowed?

Mederios: The fish were chosen because they were widely distributed throughout the river and were a better base.

Member Conklin: The brown bullhead is a bottom feeder, how did that correspond with your pickerel and bass at the top of the cycle? These feed in the mud all the time, any correlation? Are there enough to target for future sampling?

Mederios: The brown bullheads also have elevated concentrations, the larger ones in the same range as the top carnivores. The fish-sampling program looks at two top carnivores and two bottom feeders: the pickerel, large mouth bass, the brown bullhead and the white sucker. Five of each of the species is required. Sunfish are the back up species for the top carnivores but there are none for the bottom feeders.

Member Mannhaupt: Are you officially back?

Mederios: I'm working as a contractor for Bill Dorsch to address Peconic River issues.

Reed: Is a June round and an August round of sampling planned for 2006?

Mederios: Summer surface water samples will be collected in June and August, fish samples once between June and August, one collection of sediment samples in June. That data will be shared with the CAC in the future.

Member Esposito: Can the information be received before '07, or when?

Mederios: A report is targeted for the January timeframe summarizing all of the Peconic River data and can be shared with the CAC then.

5. Community Comment

Member Graves: I am no longer the official designee of the Town of Brookhaven. I thank the CAC for what I have learned from the group. The CAC and BNL are very important to the Town and a representative will soon be designated.

Member Mannhaupt: Why aren't you the designee?

Jeanne D'Ascoli: A letter from the Town stated John Turner was going to represent the Town at the CAC. At the BER meeting he indicated he is going to be serving on the BER (Brookhaven Executive Roundtable) rather than on the CAC.

Member Mannhaupt: Do you want to come back?

Graves: I will be happy to serve in whatever capacity.

Member Mannhaupt: I will make follow up calls to the town.

Reed summarizes to the group advising them they may take individual actions to support the process.

Member Guthy: Is it appropriate for the CAC to send a letter to the Town of Brookhaven?

Reed suggested that the CAC look for an action that's appropriate for this group to do. Jean Mannhaupt volunteered to draft the letter. She will e-mail it to Sherry and Sherry can distribute it. Member Guthy asks that it be done quickly.

George Goode, BNL: To get a sense of what is being done on the front end, a performance track program two year goal was established to reduce mercury use on-site and prevent further Peconic contamination. The annual report to the EPA showed a 38% reduction of onsite mercury, a reduction of 185 pounds. The lab replaced 450 mercury thermometers with non-mercury substitutes. Non-essential switches containing mercury were replaced with non-mercury substitutes.

Member Proios: What are the mercury numbers at the sewage treatment plant as compared to before?

Goode: I do not know the answer to that but it's well below standards. That number can be obtained.

ACTION ITEM: Obtain mercury numbers at Sewage Treatment Plant.

Reed asked for further comments, none are asked and announced a ten-minute break prior to the HFBR discussion.

Member Schwartz told the CAC that Ed Kaplan, the Friends of Brookhaven representative, has taken retirement from the Laboratory. He will have a guest appointment and does intend to continue to serve as the representative for the Friends of Brookhaven. Member Schwartz said he would continue to serve as the alternate.

6. HFBR Remedial Alternatives, Bruce Lein

Reed announced the continuation of the discussion of the remediation of the HFBR. There will be a presentation and then a Q & A panel. The intention is to give information to the CAC that will serve as a basis for discussion after the presentation.

Les Hill provided additional information about the four alternatives that were presented at the last meeting regarding the HFBR and the distinguishing features among these alternatives. He will explain why time is important and relevant to decommissioning. The feasibility study and the draft PRAP have not yet been given to the regulators, which puts this process ahead of the curve.

Reed stated the Laboratory is looking for an understanding from the CAC of what their values and interests are and for a recommendation on the alternatives.

Bruce Lein reviewed the alternatives. Alternative A calls for no additional action. Alternative B, phased D&D, will remove the ancillary buildings, underground ducts, pipes and soils by 2009. The control rod blades, the activated components, the confinement building and the remaining HFBR contaminated soils will be removed after 75 years. Alternative C is phased D&D with near-term removal of the control rod blades, ancillary buildings and underground piping ductwork. After 75 years, the remaining activated components, HFBR confinement building and the remaining contaminated soils will be removed. Alternative D is near-term D&D. By the end of Fiscal Year 2012 all work would be completed.

The key focus for this project is dealing with the removal of the activated components, which are the reactor internals, the control rod blades, the vessel and the thermal shield and the bio shield. The materials in these components account for over 99.9% of the radiological inventory, approximately 416,000 curies of activity in the complex. The BGRR was approximately 5,000 curies of activity. The control rod blades account for 70%, or approximately 290,000 curies of the activity. That amount of activity and those curies relate to very high dose rates that are potential for exposure to the workers, for the public that would have to be considered in the D&D planning. There are eight main control rods in the reactor and eight smaller auxiliary control rods. They are hollow and the absorbent material is inside.

Member Conklin: What is the absorbing material?

Lein: The absorbing material in the short control rod blade is all europium. In the longer one, the top part is analyzed dysprosium and the lower, more effective region, is europium.

Lein explained the key focus area is the activated components and the control rod blades. He explained their location in the reactor.

Member Mannhaupt: Do you have a thimble?

Lein: No.

Lein explained when these materials absorbed the neutrons they became radioactive material that is not dispersible. The distinguishing feature between alternatives B, C and D is the timing of the HFBR dismantlement because it will determine the amount of decay that will take place. Decay determines how much radioactive material is present. The amount of radioactive material present determines dose rates and the dose rates determine the hazards and risks for the project. Time relates directly to the dose rate at the time of the D&D and dose rates drive D&D hazards and risks to workers on-site. High dose rates will require underwater segmentation, remote handling and packaging, control of segmentation fines, control of contamination and secondary waste and will elevate the risks /consequences of off-normal conditions and events. Dose rates drive off-site hazards and risks. High dose rates determine the number of shipping containers, the number of shipments and the disposal sites that are available.

Member Proios: Besides the actual radiation dose can you also equate potential risk to the form the radiation is in?

Lein: Yes. Most is in solid form. The majority of the activated components are all solid waste. When the components themselves are packaged they would all be considered solid waste. The water would be treated separately. The small fines could be transported and get into the air. When the activity is in the control rod, unless the control rod is moved, the activity can't move on it's own. It's not like dust.

Member Esposito: What is the size of the control rod and why do you need to cut them?

Lein: This is an actual spare control rod. (He had brought an unused control rod and blade to the meeting to show the CAC). One control rod could be 80,000 R/hour, a very high dose rate. A shipping package or cask has limits and criteria as to how much material and the dose rate it could carry. This rod would be too high to put in any one cask, it would have to be cut.

Member Esposito: It's not the physical size but because of the dose rates.

Member Corrarino: How many pieces would you have to break it into?

Lein: The small ones would not have to be cut; just the large ones.

Reed asked that questions be limited to clarification for the presentation and questions of substance be saved for the discussion period.

Lein described the storage hazards and risks. Timing drives the complexity of the requirements to protect human health and the environment. While material is stored, controls would be implemented to limit worker exposure to the material, prevent potential migration of radioactive materials to the environment, and requirements would need to be met for engineering and institutional controls throughout the duration.

Lein discussed the significant changes in relation to time for the large activated components: the reactor vessel, thermal shield and bio shield. He explained how the hazards and risks change over time. Work in near-term (Inaudible)1000 R/hour, would require work under-water, remote handling to minimize dose, segmentation to meet package requirements, and segmentation fines will be created.

Member Schwartz: Are fines like pieces of sawdust, just metal, that result from sawing?

Lein: Yes. Twenty-nine high Rad cask shipments will be needed. Dispersible materials are created by the small cutting fines and the consequence of an off normal event would be at it's highest.

Member Mannhaupt: How do you know 29 high Rad casks are needed?

Lein: A calculation of the amount of material and the dose rates is done. There are criteria for how much can be put in a cask and it can be determined how many casks are needed.

Member Proios: Is that if each one is loaded to its max?

Lein: Yes, to maximum efficiency.

Lein pointed out the significant change after 50 years of decay. Due to the lower dose levels the components could be packaged into standard low-level waste containers.

Member Esposito: What are the primary radionuclides that will decay over 50 years that will reduce the total curies?

Lein: There is a chart attached that can be reviewed with the panel that shows the breakdown every five years and the make up of the radionuclides can be seen.

Lein spoke about the radiation exposure for the worker. At 50 years there is reduced potential for exposure due to contamination. There is less cutting and, therefore, less dispersible material. The consequence of an off-normal event would be diminished. In another five years the dose rate drops from about 2 to 1. This significant change means underwater work will not be required, secondary waste is not created, there is less remote handling, less cutting because the rates are lower, and less radioactive dispersible material. The potential for exposure is lower and contamination and public hazards consequences are diminished because there is less dispersible material produced.

Member Mannhaupt: How can this be determined when there is still a gamma emitter?

Lein: This can be covered during the panel discussion including dose rates, what's being emitted during the work, and the controls that would be used to do that level of work.

Member Corrarino: Are these tables meant to correlate or justify the 75-year decision?

Lein: That is correct. The next significant change is at the 75-year period. In the previous presentation we said we'd like to do this work as standard radiation work rather than high radiation work. That dividing line is 100 mrem/hr. At about 73.5 years there is enough decay to get below that.

Member Schwartz: Is the dose rate calculated at some distance of an individual to a component?

Lein: At one foot from the component.

Member Jordan-Sweet: What about the remaining radioactivity? What does that mean, because 52 (curies) sounds like it's not 30% of the total radioactivity.

Lein: There are 416,000 curies in the complex. Before the vessel, thermal shield and bio shield are moved out, the control rod blades and internals would have come out. The balance of the complex is left, and that is the 52 curies.

Member Jordan-Sweet: I thought it was 50% of the total.

Lein: The remaining balance of the activity within the complex is less than a tenth of a percent, 400 curies. A lot of that is locked in beam tubes that are stored on experimental levels. There are approximately 52 curies that are in systems like the tanks, filters, and soil contamination and the slight amount of contamination that is in the ancillary buildings.

Member Jordan-Sweet: Is this all the activated stuff except for the control rods blades?

Lein: Except for the control rod blades and the vessel internals. The control rod blades are 78%, the vessel internals add more and this is what is remaining so that when these are removed, the only thing left is the small amount in the balance of the plant.

Member Chaudry: What is the margin of error in all these figures?

Quinn: The numbers are estimates. For example, when the calculations were done in January of 2005 until now, that 416,000 curies is down to 350 – 360,000. It's already decreased. Those numbers are probably give or take 15 – 20%, which is probably as good as we can get them.

Member Mannhaupt: In order to do the reactor vessel, the shield and the bio shield, you have to take out the control rod blades? What is the sequence? The control rod blades come out first, then you can remove those, or those get removed and then you take out the control rod blades?

Lein: In that sequence yes. Using Alternative D as a guide, the sequence is first all the ancillary buildings come down, the underground ducts and then the activated components. First would be, because of the highest level of radioactive material and dose rates, the control rods from inside the vessel. Then you would take out the other vessel internals. When those are gone, you can actually take the vessel apart.

Member Mannhaupt: It is my understanding of how the HFBR worked and the core worked or the vessel worked, is that when we think something is radioactive, it's in the middle of whatever the reactor is. My understanding of the HFBR is radioactivity wasn't in the center, it did peripherals, so that everything around the vessel is radioactive?

Lein: All of these components are activated.

Member Mannhaupt: Right and they need to come out first. Now I realize the control rods have to be the first things that go.

Lein: Whether it's done near-term or later after 75 years, the sequence would be removal of the control rod blades and the other vessel internals in order to take the vessel apart. Then you have access to the thermal shield and the bio shield to take them apart. The large component table assumes the control rod blades are gone and the next table deals with just the control rod blades.

Member Proios: Under transportation, besides cask shipments should there be something that says water shipments?

Lein: We can discuss the complexities of introducing water, the cleanup and the waste, during the panel discussion.

Member Proios: When do you add the water? After the rods are removed?

Lein: The water would be introduced according to which component is being taken apart. Water would be introduced into the vessel to take out the control rod blades.

Member Proios: Before you take them out? That's the first thing you would do?

Lein: That's the shielding that is needed to do the work, correct.

Member Schwartz: The reason for doing the blades first is to keep the shielding around them until they are taken out?

Lein: If we flood the vessel with water, they are the most active component.

Member Schwartz: You can't take the shielding away without having taken the blades out first?

Lein: You would have to maintain the water as shielding before you could go further.

Member Mannhaupt: Are there any control rod blades from the HFBR at the Hazardous Waste Management Facility presently that are going to go with these?

Lein: There are 14 control rods stored at the Hazardous Waste Management Facility. There is an acceptable waste site and plans are to have them shipped prior to this activity.

Member Mannhaupt: How active are they?

George Goode: They (the control rods) are quite active. They are in a shielded cask and have decayed substantially compared to these. We've recently received approval to ship the control rods to the Nevada Test site. It is hoped they will be shipped within the year.

Member Mannhaupt: How long they have been here?

Lein: The control rods were taken out various times. Some as early as '69, some in the '70's, and the latest group were taken out in the middle '80's.

Member Esposito: What is the difference between the radioactive levels of those control rods and these control rods? Did those have to be cut too?

Lein: No. They were stored in the spent fuel pool at the reactor. A cask was not required because the water was the shield. When the shut down occurred, the spent fuel pool had to be drained and they were moved. There had been 15 – 25 years of decay, which made them easier to handle, and they could go into existing casks.

Member Corrarino: I'm trying to make a correlation between the control rod blades and the Alternatives.

Lein described the table designed to illustrate the options with the control rod blades because they are such a significant factor. They are 70% of the activated inventory; 290,000 curies are in them. He looked at near-term removal-Alternatives C & D, 75-year Alternative B...

(tape changed)

Member Mannhaupt: Why do the two tables use different years?

Lein: One table refers to the thermal shield and bio shield. These have different nuclides than the control rods that decay at different rates. The year's chosen illustrate the significant changes of hazards and risks over time. The changes occur at a different rate for the components than the control rods. The tables are based upon components, not upon work being done.

Member Proios: How much further out would the project need to go to not use water at all?

Quinn: Decay is fairly slow at that point, perhaps another 100 or 200 years.

Lein: The control rods contain a nuclide that has a 1,200-year half-life. As time goes on the decay will slow up significantly.

Member Schwartz: Can you explain the factors of reduction that vary between the dose rates and the curies?

Lein: It's related to the actual nuclides, their associated half-lives and the remaining radioactivity connected with the actual vessel internals, the thermal shield and the bio shield. The differences in the nuclides involved and their half-lives create the difference in the rate.

Member Schwartz: Aren't curies the measure of disintegrations per second? Why is the dose rate not proportionate to the curies?

Quinn: It depends on what's decaying; there could be high curies and low dose rates due to a weak gamma emitter. Some have very strong gamma emitters. Each radionuclide has different energy coming out of it.

Member Henigin: Why isn't there a correlation between the control rod blades and alternative timeframes?

Lein: There were certain alternatives chosen. The different time periods were used to show the effect that the timing has on the hazards and risks of the project. The choices are the alternatives that show near-term removal, C & D, compared to the 75 years. This shows the progression of change in the hazards and risks over time.

Member Evanzia: Has there been a cost benefit analysis?

Lein: There's been a cost projection. Maybe you would want to discuss that with the panel.

Member Schwartz: This was a valuable presentation.

A panel of Les Hill, Bruce Lein, Chuck Adey, and Dennis Quinn answered the CAC member's questions.

Member Garber: I can only imagine how much paperwork goes into qualifying a shipping cask. If there was a very small volume of control rods with very high radioactivity and if there was a qualified super high radiation cask; that could really change your breakpoints. It would have an impact on costs. The timetable for getting the paperwork through could be five or six years. If you could then have this shipping container, demolition could be started earlier without cutting. The size of the maximum container is a big parameter here. Are my observations correct?

Hill: Yes. The Lab looked at the fleet of shipping casks that are available today. They will look for casks for the control rod blades that have the highest amount of shielding. So that is correct.

Member Garber: My question is not what's available today. Start the lobbying to get much more shielding on the shipping casks so that the entire control rod assembly could be put in much quicker. There's going to be more paperwork but the savings will be in the millions.

Reed: Could you go for a type of cask that does not exist today?

Hill: Yes, that could be done. The lead-time in designing, licensing, and qualifying a new cask is probably five or six years.

Member Garber: The cost benefit of this much larger cask could really speed up the demolition.

Hill: With the control rod blades, certainly. With the larger components, as the shielding increases, the weight of the cask increases. There is a point of diminishing returns. The shipping casks are quite heavy, especially with the larger components. The weight of the cask plus the payload would be astronomically high. We wouldn't be able to put it out on the road. With the control rod blades, it's a remote possibility.

Member Esposito: One of the detractors of doing it sooner was that the interior would have to be filled with water. How much water? What would be the level of the wastewater at the end of the process? If you use water are you creating another waste product? How much water would you need to use in this process? Would it be just tritium or would there be other radionuclides in the water? What is the waste product that's created and how much?

Hill: The spent fuel pool would be flooded. Between the spent fuel canal and the vessel, there are about 75,000 gallons of water. The control rod blades would be cut up and removed. The reactor internals would be segmented and transfers would be made to the tube that connects into the spent fuel pool. There are a variety of contaminants. Tritium is one. That's the least of the issues. As the components are segmented you end up with small, expressible quantities of cobalt-60 particles in europium. Basically all of the activation products in the solid metal get

released. Some are so fine that they will get suspended in the water, some float, some will sink to the bottom of the vessel, or wherever it is you're segmenting. These cutting fines will be extremely radioactive. A special engineering system would have to be designed and built to process and deal with this water. The first thing is to control water clarity to be able to see while work is being done. After a while the water becomes violently radioactive so worker exposure would have to be controlled. A filtration system would have to be installed and ionic exchange resin beds would be used. As these accumulate, these particulates become very, very hot. They require a good bit of shielding. The waste has to be processed. The beds have to be taken apart, dried out and shipped off-site. The ion exchange resin would be sluiced into a cask and would require cask shipment as well. At the end of the job the water would be polished using filters and ion exchange technology. The 75 to 80,000 gallons of water would need to be solidified and sent out as solid waste. Because it's been cleaned with the filters and the ionic exchange resin, it would ship as standard radioactive waste in solid form. The treatment of this wet waste is a significant project.

Member Shea: Has anyone ever done a study of the possibility of a category 4 Hurricane striking directly on Long Island within this 75-year time frame? How that would affect the various scenarios?

Adey: The original design of the confinement building took hurricanes and earthquakes into consideration. Being structurally sound it would withstand hurricanes.

Member Shea: What category?

Adey: A category was not specified. Wind velocity was discussed. If my memory serves me correctly, up to 120 mph.

Member Shea: What category would that be equivalent to? What is the risk within 75 years? I have been reading about the possibility of more earthquakes because of the temperature of the water. I would like to see that added to the hazards and risks.

Member Corrarino: Could the study be specific as to the risk of having a category 2, 3, or 4 hurricane?

Member Mannhaupt: It has to deal with all the weather elements that could hit Long Island if you're thinking of leaving it for 75 years.

Reed: That's what's called natural phenomena risk and that's what you're looking for.

Member Corrarino: And stratify it.

ACTION ITEM: Bring back information on natural phenomena risk associated with the alternatives.

Member Proios: Regarding storage hazards, what is the actual hazard to a human being that would occur by just letting it sit there? I don't see what's changing other than the actual radioactivity it contains so that actually it is less hazardous as time goes on.

Hill: The view is that as time passes the risk of uncertainty associated with storage would increase. At that same time, the amount of material that is being stored actually decreases. As time passes there are increased risks associated with the ability to maintain the facility and the ability to control and prevent the migration of what is inside the building. That is a risk that becomes larger over time.

Member Proios: But you're not predicting any kind of structural disintegration of the actual reinforced concrete around there within 75 years. That's going to remain intact.

Hill: That's correct. Civil engineering studies of the confinement structure itself have been done and it's a robust facility. With reasonable care and maintenance it will be intact for quite some time.

Member Walker: Reasonable care and maintenance was a little bit of a concern. Does the roof leak?

Hill: This roof doesn't leak.

Adey: A civil engineer evaluated the structural integrity and projected the interim life. A thorough inspection of the outside and the inside of the dome showed no evidence of any leakage. Historically there is no record or evidence of the roof leaking. There is a steel high beam framework and quarter-inch steel plate that is seal-welded. There is a continuous steel dome over the building. On top of that, there is insulation material and then aluminum sheathing. The sheathing has been visually examined from the outside. There is no evidence of failure in the sheathing. Even if there was a failure in the sheathing or the insulation there is still a fairly thick cross section of steel. It would take some time for water to go through the steel.

Hill: That is why we show that storage creates a hazard risk. The roof isn't leaking today but that is a consideration. Will the roof leak in the future? Five years from now there is some risk. If you are talking about many years, there is a greater risk that is why it is important to make storage one of those balancing issues that has to be evaluated. Making sure that this building stays intact is something that needs to be weighed, because it represents a future uncertainty and a future risk.

Member Sprintzen: There has been a lot of discussion about the most effective way for terrorists to disseminate nuclear material. Who knows what the world will be in 60 to 75 years, five years or even one year. It does increase the weight of the potential hazard.

Member Chaudhry: My first question would be regarding the seismic design of this structure. What kind of criteria was used in the design of this structure?

Reed: The thermal shield and bio shield?

Member Chaudhry: The bio shield for example. Were these structures designed incorporating some standard for seismic stresses? Do we know what kind of seismic stresses (were considered)?

Reed: We discussed hurricane risk; the question here is what about earthquake risk?

Adey: The earthquake history of this region was considered in the design of the structure. The design was based on the set values and horizontal acceleration values that are a certain margin of what the history has been. The value was .1g. when it was originally designed. Years later there was concern about what would happen to the workers inside the structure in the event of an earthquake. The DOE determined it was necessary to look at the protection of the human beings that were operating the facility. The structural integrity was reevaluated to .2g. It was found that some of the masonry walls in the control room were at risk. It was confirmed that the structural integrity of the confinement building was fine but some of the interior masonry walls needed reinforcing, which was done. The building is structurally fine for an earthquake up to .2g's. There have been no earthquakes in this area anywhere close to that.

Member Chaudhry: Is there state criteria to design these kinds of structures for .2g, .3g's, .4g's?

Adey: I'm not sure that there is a state criteria. The building would have met NRC requirements and I suspect it would have exceeded any state criteria.

Reed: The NRC is probably the best governing body for a standard and the facility would meet the NRC standard that would be in place.

Adey: I believe that is correct.

Member Chaudhry: Is it possible to get information regarding what the criteria were and where we stand in relation to the structure being designed to that criteria? If we are going to wait 75 years with these structures, I would be interested to know.

Hill: We can contrast the accelerations, look at the local building codes for normal buildings, and look at the NRC's criteria. Member Shea: Could you also tell us what year the .2g figure was used?

Reed: A brief summary of the seismic risk associated with the facility could be provided.

ACTION ITEM: Get information on seismic standards, including the year the .02g figure was used.

Member Garber: Is the purification system that was in the reactor still available for use in the cleanup?

Hill: The system's still intact.

Lein: The systems are intact and the components are there.

Member Garber: Can they be used for processing the water or are they not up to that scale?

Hill: The water would not be brought out into the plant. It would be kept as close to the source as possible. This water is going to be very radioactive. It would not be run through a piping system because the piping systems would become highly contaminated. The key is to keep everything confined to limit the possibility of risks and a major contamination event.

Member Mannhaupt: I need to know how the 75 years was determined. Along with the 75 years, I still want William's cost question answered even if it's not a cost benefit analysis. We specifically need the costs for leaving it and storing it. If it's left the way it is and looked at in five or ten years to see if we need to do something. The roof is always going to be repaired. It's always going to need to be maintained. If you leave it alone or you wait 75 years to clean it up the same things have to happen. What's the cost involved in all of that? It took \$12.5 million to build it. It's going to take at least six or seven times that to get it out of here, if not more.

Reed: So the question is what's the cost?

Member Mannhaupt: What's the cost and where did we come up with the 75 years?

Hill: The question on costs came up last month. They're attached to the back.

Hill: We identified a line of demarcation as decaying the large components down to 100 mrem/hr at one foot. The actual number of years is 73 point something and it was rounded out to 75. We wanted to try and come up with a fairly conservative value where you could go about this using standard dismantling techniques. One hundred mrem/hr per foot is still something you've got to watch and monitor. If we're going to wait and the building integrity is not an issue and everything is working well how long would we wait? We would start to get to the point of diminishing returns. We view 100 mrem as a benchmark and it takes 75 years to approach that benchmark for the large components.

Member Mannhaupt: Is the driving force the mrems of worker exposure or the mrems of the components?

Hill: These are the dose rates coming off the components, which are possible exposure rates for a worker.

Reed observed that the CAC would not finish the discussion at this meeting. He asked the CAC to decide where they wanted to stop. He recommended continuing the discussion at the next meeting.

Member Mannhaupt: What's the timetable on this?

Hill: We're not going to be ready for a public comment period for several months. Perhaps August or September. There is time on this. The feasibility study with DOE is not wrapped up. We have a couple more weeks of work with it before it goes to the regulators. They'll get it for at least a month and then the regulators' comments will need to be resolved. You do have a couple of meetings between the time that we'll have the go ahead from the regulators and from DOE to bring it back to the CAC.

Member Esposito: Are you saying it is fine to take it up at the next meeting?

Member Mannhaupt: Could a whole meeting be devoted to just discussing the alternatives?

Reed: I recommend you try to keep other things off of next month's agenda so you can focus on this discussion.

Member Proios: Are there any areas where there might be conflict in terms of work being done simultaneously between the BGRR and the HFBR, depending upon which path is taken? You're dismantling two reactors simultaneously, which I don't think is going on anywhere else in the country. I'm just curious if anybody's looked at the timelines for the other scenarios versus this. Is there any concern about that in terms of making choices?

Reed: Let me put that question on the list and bring it back.

ACTION ITEM: Is there any conflict created by having two dismantling projects run simultaneously?

Member Esposito: Could the costs associated with each option be brought back?

Hill: That's in the package.

Reed: Obviously you want to discuss costs, so your panel will come prepared to discuss each of those in the next round of your discussion.

ACTION ITEM: Prepare to discuss costs associated with the project's alternatives.

Member Schwartz: I get the impression listening to this that the process is being invented. There must have been other reactors that have been decommissioned in the past. I would like a run down on the experience of other people. How many curies they've had to deal with. How many Rads they've had to deal with, and how they've dealt with them. What their experience has been, or are they letting them sit for 75 years as an alternative possibility like here? I want a review of the industry in the United States -- Three Mile Island decommissioning, other countries -- so that we can put this in that kind of a perspective.

Hill: We can bring that. We have looked at that. It's very interesting. Each one of these reactors has its own story relative to the site it's on. You'll see a variety of experiences. We'll bring that to the table. We've got an abundance of information.

ACTION ITEM: Prepare information on the decommissioning of other reactors.

Member Jordan-Sweet: Thank you for all of the information. Could the pie chart for the compositions of isotopes be broken down into the control rod blades and the other actual components?

Hill: It could.

ACTION ITEM: Provide information (pie chart) on the composition of isotopes for the control rod blades and other components.

Member Corrarino: I would ask that we see a much more detailed breakdown of the costs. Are the costs in 2006 dollars? Was inflation factored in?

Hill: These are all present day costs. They weren't escalated. Regulators do not require that information.

Reed asked the CAC if the topic of escalation could be brought back at the next meeting to decide the appropriate thing to do. The CAC agreed. He said that the panel would be reconvened at the May meeting to continue the discussion.

ACTION ITEM: Revisit the issue of cost escalation.

Member Mannhaupt: Because of the length of time being considered, 75 years, and even though a ROD has legal enforceability, special attention needs to be paid to its wording so that the CAC could have confidence in the decision.

Reed: It's about confidence and commitment.

Reed suggested the CAC send questions for the next meeting's discussion via e-mail to Jeanne D'Ascoli. The questions will be forwarded to the panel so that they may prepare for the next discussion. The questions can also be forwarded to the group.

The CAC agreed to put the physicists letter on the agenda at the May meeting.

Member Esposito: My organization cannot sign on. It is not our mandate.

Member Conklin: The letter made a recommendation, which was very important. Could the members get the letter?

Reed: David (Sprintzen) can send the letter electronically to Jeanne D'Ascoli and Jeanne will send it to the other members. We'll address it early in the meeting next time.

7. Agenda Setting

May 06 Agenda

Physicists letter

HFBR Panel Question & Answer

The meeting adjourned at 9:55 p.m.

10/30/2006– final notes April 20, 2006 meeting

| 2006 | Affiliation | | First Name | Last Name | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|-------------|-----------|------------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Chart Key - P = Present | | | | | | | | | | | | | | | | |
| ABCO (Garber added on 4/10/02) | Member | Don | Garber | | P | P | P | P | | | | | | | | |
| ABCO | Alternate | Doug | Dittko | | | | | | | | | | | | | |
| Brookhaven Retired Employees Association | Member | Graham | Campbell | | | P | P | P | | | | | | | | |
| Brookhaven Retired Employees Association (L. Jacobson new alternate as of 4/99)(A. Peskin 5/04) | Alternate | Arnie | Peskin | | | P | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| CHEC (Community Health & Environment Coalition (added 10/04) | Member | Sarah | Anker | | P | | P | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | Member | Adrienne | Esposito | | P | | | P | | | | | | | | |
| Citizens Campaign for the Environment (Ottney added 4/02-takenoff 1/05 Mahoney put on) | Alternate | Brendan | Mahoney | | P | P | | | | | | | | | | |
| E. Yaphank Civic Association | Member | Michael | Giacomaro | | P | P | P | | | | | | | | | |
| E. Yaphank Civic Association (J. Minasi new alternate as of 3/99) (M. Triber 11/05) | Alternate | Matthew | Triber | | | | | | | | | | | | | |
| Educator | Member | Audrey | Capozzi | | | | | | | | | | | | | |
| Educator (B. Martin - 9/01) | Alternate | Bruce | Martin | | | | | | | | | | | | | |
| Educator (A. Martin new alternate 2/00) (Adam to college 8/01)(add. alternate 9/02) | Alternate | Adam | Martin | | | | | | | | | | | | | |
| Environmental Economic Roundtable (Berger resigned, Proios became member 1/01) | Member | George | Proios | | P | | | 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 | | | | | | | | | | | | | |
| Fire Rescue and Emergency Services | Alternate | James | McLoughlin | | | P | | | | | | | | | | |
| Friends of Brookhaven (E.Kaplan changed to become member 7/1/01) | Member | Ed | Kaplan | | P | | 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 | | P | P | | | | | | | | |
| Health Care | Alternate | | | | | | | | | | | | | | | |
| Huntington Breast Cancer Coalition | Member | Mary Joan | Shea | | P | | P | P | | | | | | | | |

| 2006 | Affiliation | | First Name | Last Name | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|------|--|------------|------------|--------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | Huntington Breast Cancer Coalition | Alternate | Scott | Carlin | | | | | | | | | | | | |
| | Intl. Brotherhood of Electrical Workers/Local 2230 | Member | Mark | Walker | P | P | P | P | | | | | | | | |
| | IBEW/Local 2230 | Alternate | Philip | Pizzo | | | | | | | | | | | | |
| | L.I. Pine Barrens Society | Member | Richard | Amper | | | | | | | | | | | | |
| | L.I. Pine Barrens Society (added P. Loris 6/05) | Alternates | Elina | Alayeva | | | P | P | | | | | | | | |
| | L.I. Progressive Coalition | Member | David | Sprintzen | P | P | P | P | | | | | | | | |
| | L.I. Progressive Coalition | Alternate | None | None | | | | | | | | | | | | |
| | Lake Panamoka Civic Association (Biss as of 4/02) | Member | Rita | Biss | P | 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 | Lauren | Hill | P | | | | | | | | | | | |
| | Long Island Association | Alternate | William | Evanzia | | P | P | P | | | | | | | | |
| | Longwood Alliance | Member | Tom | Talbot | P | P | | P | | | | | | | | |
| | Longwood Alliance | Alternate | Kevin | Crowley | | | | | | | | | | | | |
| | Longwood Central School Dist. (switched 11/02) | Member | Barbara | Henigin | P | P | P | P | | | | | | | | |
| | Longwood Central School Dist. | Alternate | Allan | Gerstenlauer | | | | | | | | | | | | |
| | NEAR | Member | Jean | Mannhaupt | | | | P | | | | | | | | |
| | NEAR (prospect taken off 3/4)(blumer added 10/04 | Alternate | Karen | Blumer | | | | | | | | | | | | |
| | NSLS User | Member | Jean | Jordan-Sweet | P | P | P | P | | | | | | | | |
| | NSLS User | Alternate | Peter | Stephens | | | | | | | | | | | | |
| | Peconic River Sportsmen's Club (added 4/8/04) | Member | John | Hall | P | | P | P | | | | | | | | |
| | Peconic River Sportsmen's Club | Alternate | Jeff | Schneider | | | | | | | | | | | | |
| | Ridge Civic Association | Member | Pat | Henagan | P | P | P | P | | | | | | | | |
| | Science & Technology (added 1/13/05) | Member | Iqbal | Chaudhry | | P | P | P | | | | | | | | |
| | Town of Brookhaven | Member | John | Turner | | | | | | | | | | | | |
| | Town of Brookhaven | Alternate | Anthony | Graves | P | | | P | | | | | | | | |
| | Town of Brookhaven, Senior Citizens | Member | James | Heil | P | P | P | | | | | | | | | |
| | Town of Brookhaven, Senior Citizens (open slot as of 4/99) | Alternate | None | None | | | | | | | | | | | | |
| | Town of Riverhead | Member | Robert | Conklin | P | P | P | P | | | | | | | | |
| | Town of Riverhead (K. Skinner alternate as of 4/99) | Alternate | Kim | Skinner | | | | | | | | | | | | |
| | Wading River Civic Association | Member | Helga | Guthy | P | P | P | P | | | | | | | | |
| | Wading River Civic Association | Alternate | Sid | Bail | | | | | | | | | | | | |