Minutes of Faculty Senate Meeting

February 21, 2001

Professor Howard Howland, Neurobiology and Behavior and Speaker: "I would like to remind the body that there are no photos or tape recorders allowed during the meeting. I would like also to announce that all persons wishing to speak obtain recognition from the Chair before speaking. Also all information questions should be addressed to the Chair, not to the speaker. The plan of the meeting is that we're going to have some introductory remarks by Professors Thorp and Ünlü for about five minutes, and then we'll give twenty minutes for one or more open presenters to state the case in opposition to LAC recommendations. And then we'll open it up to the general audience. We would like you to either limit your remarks to three minutes each, and we'll go around and try and get everybody who wants to speak first, and then we'll come back if you want to speak a second time, if there is time. Professor Cooke has some remarks."

Professor J. Robert Cooke, Dean of the University Faculty: "Just to give some sense of the process. Today is for discussion only, trying to examine the report, offer points of view on it. If you wish to do anything as far as producing a resolution, the thing you need to know is that the University Faculty Committee will set the agenda for the March meeting on March 6. In order to get on the agenda, it has to come to the UFC. Motions have to go there to be put on the agenda. The operating procedures are on the web site, in case you want to look them up. Senate procedure, for visitors who might not be familiar with our process, is that you cannot just simply come to the meeting and introduce a motion. There is a process that has to be followed. Here is my understanding of the situation at the moment. I suspect that the most likely scenario is that the Senate will hear the report and receive it, which means that it will receive it without taking any action pro or con. But we are giving you an opportunity to put information in the record and offer opinions. However, the LAC, the University Faculty Committee, or the CAPP Committee which has been asked to look at this because it had a role in creating the Ward Center, has the authority to bring a resolution to the UFC if it wishes to do so. If there are amendments, they have to be submitted 24 hours before the meeting in March. Just so that you will understand that this is my understanding of the lay of the land. That's where I think we are. Thanks."

Speaker Howland: "Thank you very much. So for the first ten-minute portion of the meeting, I would like recognize first Professor Thorp."

Professor James Thorp, Electrical and Computer Engineering and Chair of the Local Advisory Committee, for the review of Ward Center: (Overheads-Appendix A) "For a brief review, the LAC wanted me to remind you that you created the LAC to give advice to the Provost on the kinds of issues that we have worked with over the years. One of the important issues was that the advice clearly separate advocacy and from dispassionate evaluation. We feel we have done so, and the report you received on our first three years of activity supports that. The members of the committee this year, we also didn't tell you at the first meeting, are from all over the university in terms of the physical sciences and engineering. Barry Carpenter, Joseph Burns, Jim Gossett, Don Bartel was on leave for a year, and we replaced him with Robert Buhrman. Persis Drell was the chair for eighteen months; I'm currently the chair and Charles Walcott, Larry Walker and Dale Bauman.

"We were asked by Bob Richardson to make an evaluation of the Ward Center for two reasons. One–there was an overdue Senate request for a report in 1999, and two–the re-licensing of the reactor by the NRC was

scheduled for the year 2003, and Bob wanted advice in a timely fashion. He also spelled out the things that he wanted us to look into in the order of importance. The current and potential future faculty involvement with the research programs of the Center was first, and money didn't come up until third. The role of the Center in graduate and undergraduate education was second. The fourth included the value of the Center as a service facility balanced against potential uses of the building and the space that it occupies.

"I won't go into all the details, but our process included talking to a lot of individuals involved from the Director of the Center, Dr. Ünlü, to users of the Center, and John Silcox and Jack Lowe about financing of the Center. We interviewed thirty faculty members across campus individually who had been identified as users or potential users of the facility. We visited the Center, and we met with representatives of the Department of Energy who were on campus in December.

"Our findings again are summarized on the overhead the Executive Summary; there are longer rationales in the document. This isn't about safety. At present Cornell does not have a substantial academic or research program in nuclear fission engineering because the engineering college disbanded the program in Nuclear Science Engineering in the mid-90s. We find there is no compelling case for the connection between the existence of the Ward reactor on campus and any role Cornell might play in future research in the field of nuclear engineering. The arguments for that are that four out of the top fourteen schools according to *US News and World Report* do not have reactors, and two of the top four do not. Reactors are being closed throughout the country for a variety of reasons; both cost and programmatic, even with universities that have active programs. There are only twenty-eight of the original sixty reactors in place on campuses. In cost funding raises itself as an issue as I said it isn't first, but it is a consideration. There are disagreements about cost, but in some of the later discussions we can talk about how you might compute figures differently and what they all mean. Last, given the absence of the program that I mentioned in two, the justification for support and continuation of the Ward Center must be primarily based on its serving effectively as a university-wide facility. Taken in total, we didn't find the evidence that the reactor is having an important, major impact that is proportionate with the overall cost of maintaining and operating the Ward Center. We don't see it changing in the future.

"Lastly, the ^{60}Co source is used more than the reactor by the larger number of users and for more hours, and is not as expensive to maintain. So our recommendation was that the reactor be decommissioned, that the ^{60}Co source be maintained and that the University be proactive in addressing the transition of potential and current users as they transfer their research to other facilities. We made the recommendation and the longer report is available for you to read on the web."

Speaker Howland: "Thank you very much. I would like now to recognize Dr. Ünlü for the second part of this recap."

Dr. Kenan Ünlü, MSE and Director of the Ward Center for Nuclear Science: "I have actually a ten minute presentation, but I have to cut it in half. First of all, here is the picture of The Ward Center building. This is the building that houses the reactor which was built in 1960. This picture shows what's inside; that's the top of the reactor pool. There are some students looking at the core and looking into the beautiful blue Cherenkov radiation. (Appendix B-overheads)

"OK. So what is the mission of the Center. I would like to go over this pretty quickly. The central mission of the Ward Center for Nuclear Sciences is to provide safe, nuclear analysis and testing facilities in support of the research and education by members of the faculty, staff and students at Cornell University. The Center's resources are also available to users outside of Cornell as part of the public service function of the university, symbolized as the status of a land grant university. This mission given to us in the Charter and to

provide in support of this mission, we have to provide nuclear analysis and testing services to the campus community and the outside academic users, and also teach academic and industrial users how to safely carry out the service and use of the Center facilities. We have a structure for some charges for the outside users and internal users are not being charged. For internal usage, we have in the fiscal year 1998-99, ten faculty members from eight different departments, and in 1999-2000, seventeen faculty members in twelve different departments. We also established some collaboration from outside collaborators; those are national labs and corporations involving sixteen scientists.

''What do we do with the Center facilities? Here is a list of the research facilities at the Center. Basically we have neutron activation analysis by which we can analyze seventy different elements in a parts per million or parts per billion level of sensitivity. We have a neutron radiography system, in real time radiography and film radiography. We have also cold neutron source, only two universities with research reactors have the cold neutron source in the United States. Also we have fast neutron irradiation facility which is to irradiate silicon wafers for creation of intentional damage. We have two techniques being developed. The first, neutron depth profiling, funding, as well as all the equipment are available. Second, prompt gamma activation analysis, this is the extension of the cold neutron source because we have to utilize the cold neutron source to be able to provide prompt gamma activation analysis. These two new techniques will be ready probably in six months if we have time to continue without interruption. Then we have these future opportunities: neutron-induced auto-radiography, that's a technique for which we already show the potential at the Center by borrowing the equipment from the Fuji Corporation. We have also potential for the boron neutron capture therapy facility about which Professor Kallfelz will make a short presentation. Also the neutron powder diffraction–there is a possibility that we can actually apply this technique at this reactor. Here are a few graphs for the radiography just to get your attention. This is a real time radiography which is measuring the preferential flow of water in sand, and we can capture this image in real time. This is film radiography containing the neutron and x-ray radiography in concrete core samples that were from Professor Kenneth Hover from Civil and Environmental Engineering. You can see in the neutron radiography all the cracks and holes etc. This is another example, Entomology at the Geneva testing station, corn with worm larva in situ with live form which we can see in an in situ case. This is a fossilized dinosaur bone which is from the Geological Sciences, and the list goes on and on. I will continue my other five minutes in the second session."

Speaker Howland: "Do you want me to call now on Professor Scott? Professor Scott."

Professor Norman Scott, Agricultural and Biological Engineering: "What I would like to do very briefly in two minutes or less is to give you the background on the development of the Center. In 1995, John Hopcroft and I discussed the Ward Lab and in that discussion, we recognized the changing character and course of nuclear engineering within the college. We discussed the fact that in addition to that the users of the Center were from across the university. So the concept of a university center to be the repository for this kind of research became hatched. In that process we formed jointly a request with some people to be on an advisory committee and an executive committee, and they came forward with a report which you have, dated February 1996. It had four recommendations - specifically to continue the reactor, secondly that the laboratory be reorganized as a center for nuclear science and under the Office of the Vice President for Research and Advanced Studies, that the Ward Center for Nuclear Science be managed by a non-faculty director who reports to a faculty advisory board, an entrepreneurial service based on costs be instituted for the Center aimed at serving clients efficiently and safely. In that process, from the executive committee and the advisory board, there developed a charter in 1996 which was taken to then Dean of the Faculty, Peter Stein, and through the CAPP Committee, as you've heard, and approved by the Trustees in January of 1997, recognizing the Center as a place which involved faculty from across the campus to do the kind of research you are going to hear about. So rather than me saying much more, other than to say that I believe the

Center has done extremely well in terms of its original mission and that, in particular, the Director, Kenan Ünlü, has carried out in a very outstanding fashion an increase in the way in which the research has advanced and the way in which people have been involved. So I would add that to my comments in terms of the quality of what has happened. Thank you."

Speaker Howland: "Thank you. Professor Ünlü, do you wish to begin?"

Dr. Kenan Ünlü: "I would like to use, maybe, five minutes. The Center also involves academic courses. These are the courses listed. Only Engineering 150 which is tours and the rest involves some type of activity, including Physics 208 in which students actually take data and write a report.

"Our other functions mandated by our charter are that we have to provide services as a land grant institution to the outside world. These are the companies utilizing the Center. Because of the specific structure of the Center, we can provide gamma radiation; we can provide fast neutron, thermal and epithermal neutron beams. We can do that because of the unique structure and design of this facility. These companies are mostly from upstate New York, and we are providing for example, for some companies, this is all unique, testing services for almost 80% of the detectors which is being used in the power reactors in the world. Almost all nuclear navy reactor detectors are tested over here. Of course our involvement with Corning is also unique, we are testing High Fused Silica Glass samples for sodium impurities for Corning.

"This is our budget. We have about $500,000 budget, and the majority of the budget goes to personnel expenses and our operating expense is $83,000. These are our income–a $200,000 subsidy from the university, and the rest we generate from the service fees and also the research and other fees.

"For the research funds--these are the amounts which were shown last time. Basically in 1998, we started with $29,000 federal funds, also $421,000 in 1999, and then $623,000 in 2000. Now $971,000 this fiscal year is actually pending. Now, as you are aware, we have a major bill on the senate floor, and it will be introduced next week on the house side; it's called the DOE University Nuclear Science and Engineering Act. That's part of the current funding twelve million dollars and it's going to go up to 30, 41, 47, 55 and 64 million–$240,000,000 in five years. Cornell will be eligible for all of these funds, particularly the one that is helpful, it goes to the universities who have the nuclear research reactors. Therefore, there are only maybe junior faculty research initiation grants we may not be able to get because we don't have the department, but all the other ones we will be eligible to apply and seek funds. I believe DOE wrote to all the senate representatives stating that given the past history and performance of Cornell, we will get probably a major amount of funds from this new initiative."

Speaker Howland: "Professor Kuniholm. Is he here?"

Professor Peter Kuniholm, Art History: "I'll be very brief. This was in *Science Magazine* a few weeks ago . . . a comment about global warming. The criticism of that graph is that the data set is less than 150 years old. I have a data set now that is 1,500 years old, and we've got the same spike going up in the last thirty or so years. We would like to think that our data set is more solid than what you are seeing right here. This is observed instrumental data; we are using three ring data, as the trees respond to temperature and rainfall fluctuations. I have a proposal in front of NSF right now for $589,000 to fund the rest of this; I have three undergraduates working away at Ward this moment. There will be two more by the end of this month, and if we get the grant, there will be ten. We'll make a research experience for undergraduates, a center for ten kids over there. I'm probably the most trivial of all of these things. I think we ought to turn it over to someone who is doing serious work."

Speaker Howland: "I call now on Professor Kallfelz."

Professor Francis Kallfelz, Clinical Science: "Thank you, Mr. Speaker. I mentioned briefly the area of boron neutron capture therapy at last Wednesday's meeting of the faculty. This is a technique for radiation therapy of particularly central nervous system tumors, but other tumors and other potential treatments as well are an area that the College of Veterinary Medicine is very interested in as part of its significant initiative in comparative oncology that began about a year ago. So our goal would be to develop such techniques for use in tumors in animals, as a prologue to the use of such approaches in human tumor therapy. (Appendix C - overheads)

"Boron neutron capture therapy is a radiation therapy that is based on the selected accumulation of B-10 which has a specific affinity for absorbing low energy neutrons. So what you do is bind the boron to either a monoclonal antibody or some other compound that will bind specifically in the tumor cell itself. Thereafter the tumor is exposed to a certain energy of neutrons; the boron nucleus absorbs the neutrons and decays by giving off what is known as an alpha particle (a helium nucleus) which is the particulate radiation that actually does the damage. What happens is that the boron absorbs the neutron, which makes the nucleus unstable; it decays to lithium and releases an alpha particle–the alpha particle is given off at a certain energy, which travels only a very, very short distance in the tumor, actually only about the diameter of one cell and gives off a tremendous amount of energy in that very small volume, and therefore can destroy tumor cells, and yet spare the surrounding normal central nervous system tissue.

"This is just an example of what the situation might look like in a human situation. Dr. Ünlü showed you pictures of the TRIGA reactor and the tank, and this just shows a human patient in the path of a neutron beam where the brain would be exposed to relatively low energy neutrons that actually do the damage. This is just another example, in the upper corner –the neutrons are impinging upon the brain; this is depicting the tumor that has been loaded with boron-10. The neutrons come in and striking the boron, create an unstable nucleus, which then decays with alpha particles which do the damage, and a lithium nucleus that can also provide a small amount energy to tumor therapy. Again, beams of neutron impinge upon the boron nucleus which then splits into lithium, and the alpha radiation. This is a bit exaggerated because both of these cells would be less than 10 microns in diameter and the damage from the alpha particles would all occur within the cells in which the boron is accumulated.

"This is just an example of the flux of neutrons that various types of reactors produce, and what we are interested in is thermal and epithermal energy neutrons and actually lower power reactors with specific geometry produce a larger flux of these lower energy neutrons than do higher power reactors. This is one in Finland which is .25 megawatts. Ours, as you know is a .5 megawatt reactor. These others are higher power and give off considerably less of a flux of the neutrons that we are interested in. Just to finish up here, there are a number of such facilities in the world. The one at Brookhaven is no longer in existence, but in the United States, there are reactors at MIT, Washington State, Ohio, Rhode Island Atomic Energy Commission, the University of Tennessee and so forth where this work is going on, and there are also reactors in Japan, Finland, the Netherlands, Sweden, Germany, Italy, Australia and Argentina. We feel the presence of our College of Veterinary Medicine and the patients that we would have available would provide a very unique opportunity for developing and applying this technique here. Thank you."

Speaker Howland: "Thank you, Professor Kallfelz. I call now on Professor Burlitch. We have approximately ten minutes now for the presentations."

Professor James Burlitch, Chemistry and Chemical Biology: "I've agreed to just address each point that the LAC report brought up, so I will put them here. First, there's the question of safety. We agree there are no concerns about safety, but there was a point about the control system brought up in the report, saying that that was a first concern. Yet, all of the controls are less than ten years old. We don't really understand why there should be such a concern. It wasn't really spelled out in any detail. The second point is relining of the

pool is not needed now and probably won't be, but if it should be, the best estimate that we have based on Washington State University's experience is $250K. Theirs actually cost $350K, but they said in retrospect they could do it for $250K, and I'll get back to this question of first time costs more later on. In any event, it's quite likely if the Senate bill goes through, DOE will probably pick up such a tab. The report makes reference to some cooling tower; I don't understand that; we don't have one. We hook up to the university chilled-water system, therefore we don't need any $150K for repair to a cooling tower. (Appendix D - overheads)

"Second point, 'Cornell doesn't have a substantial academic or research presence in the area of nuclear fission engineering.' That's true, but there is a graduate field in nuclear studies. There were five Ph.D.s in the1993-1999 time period, fifteen M.Eng and M.S. degrees in that same period. The point I'd really like to make is that the kind of person that we're looking for in this area is exemplified by Professor Ünlü. He is the one who is building the facility; he's the one bringing in money. The committee is looking for young people? He's a young man.

"The user center profiles–there are major users. There's Professors Kuniholm, Kay and Ünlü. They provide equipment and spend a lot of time there. But there are many others like me and colleague Professor Giannelis in Materials Science and Engineering and many others in several departments who have specific projects to do. We will get in there and do it and we get out, and we really appreciate the opportunity to be able to do that project with unique facilities. This is what a great university is about, it has infrastructure. It matters. It's capable.

"Now I'm going to change order here slightly. Go to number four, where reactors are being closed around the country. Well they may not be as closed as you think, or were led to think by the report. In fact, Berkeley's reactor closed a long time ago, and yet it has Livermore next door and UC-Davis not far away. In fact, the students use those reactors. Point is, it's very difficult to have a program in nuclear engineering without a reactor. Illinois put its in safe storage, just in case, and in fact, the latest correspondence which Prof. Ünlü has is that they are planning to reactivate that reactor. Michigan hasn't done anything; they're just making noise, basically saying, "well if the DOE doesn't come up with money, then they will close it." Well the DOE is going to come up with money, as Professor Ünlü described in this Senate bill. So I am not so sure that these closings are so significant.

"And so let's get to the next point then, 'no compelling reason or case for strong connection between the existence of the Ward reactor', I would say the opposite is in fact true. Universities with the reactors are going to have a much better chance at this money. They will be able to make a much stronger case for the resurgence of a nuclear engineering program. Now we may or may not be interested in doing that here at Cornell, but why throw away the chance?

'Point number five has to do with the cost of continuing the operation of the Ward Center. And of course they point out money doesn't matter, I'm not too sure about that. But, it was not first on the list at any event. The allotment, as Prof. Ünlü has shown you, was 200K per year. The balance that is referred to, about 400K per year operating expense, comes from about 200K in ancillary costs, which are things like electricity, insurance, police protection, and all those things which any building or facility on campus uses. These costs actually will be treated as cost sharing for the DOE money coming towards Cornell from this new Senate bill.

"Point number six, says that 'Given the absence of a significant Cornell academic program.' Well, yeah, OK it's not there. So what about serving as a facility for multi-wide users? Well there are a lot of them. I think that probably fifteen is a little exaggerated. Twelve to thirteen maybe the right number, plus the Johnson Museum of Art. The usage in hours is substantial, not counting set-up times, and if you take this usage from one year, this is now just 225 hours in the year 1999-2000. That would be worth $90,000 at commercial

rates. So students and faculty from these departments got $90K worth of services and weren't charged a penny. Now what's the impact? Well there are 130 publications in the past 10 years that have come out of this center, more than that probably. But what about impact? Well just the fifteen publications that Professor Kay cited had over a thousand citations in *Science Citation Index*. I don't know if the LAC was aware of that. They should be, because that's what impact is about. And none of those kinds of details were in that report.

"What's the impact on education? Well, we train undergraduates to appreciate and understand nuclear science. The center has, first of all, trained graduate students to carry out experiments carefully. Yes, we've been advised that you can send samples to the University of Pennsylvania, maybe you can even drive down there, or to Michigan or elsewhere, and have somebody else run your experiment for you. The student doesn't learn a damned thing and has no control over the experiment in those circumstances. And it makes a difference. For undergraduates, 550 of them, I counted up tuition time about $100,000 worth of instruction just based on tuition alone.

"Now finally, point seven. The cost of relocating the gamma facility, which was recommended. The Committee did not say what it was going to cost us to carry out their recommendation. Prof. Ünlü, who knows a lot about this facility and its huge lead shields and its cranes to lift these cobalt rods and put them in place, estimates $4 million or so to move this facility. Now I ask you, why spend $4 million to move a facility, $4 to $5 million to take out the TRIGA, when no dollars will leave the place as it is and allow it to grow."

Speaker Howland: "Thank you very much. So we now pass to the open discussion. I'm going to recognize Prof. Thorp, and we'll try to get one side of the argument and then the other side of the argument."

Professor Thorp: "This is a response, well two little things in response to Ron Ehrenberg's question which was posted on the web. His argument was that $200K a year cash subsidy equaled five percent of the $4 million, put the $4 million in the bank and not do anything. $200k is the annual cash subsidy. As it was just pointed out, there is an additional charge for maintenance, utilities and what have you. That number reported by Dr. Ünlü to DOE is $470K net cost. Secondly, the LAC is concerned that although we don't have to repair a leak today that if you are going to continue this facility into the future, (it's 40 years old) there will be maintenance costs and the value of this program has to be sufficient to offset potential future maintenance costs. There is, in fact, we are told that Buffalo is doing a clean up which costs a whole lot more money than $250,000. The second issue of money where there is this great hope that this bill will pay all of our costs. We think this bill is 242, and I have stuff from the Congressional Record, not 245, but I understand the confusion, because he introduced 13 bills, four of them having to do with DOE, because he's in Los Alamos, he's a New Mexico Senator. In his introduction of this bill, he talks about students and young faculty in nuclear engineering. He seems to me to be addressing the program that we eliminated rather than the program that we have today, but I understand that, in order to get the money, we will try to amend the bill, and we, Michigan and MIT have been asked the figures for our costs. It seems different from the bill the Bingaman is proposing. His bill says he doesn't want to pay for the university share of maintaining reactors; he wants to support research students in programs that we don't have. The last thing, the figure of $100,000 for instruction, I hope the Provost is here and listening and will develop that policy. By my calculations my department's budget should be $21 million."

Speaker Howland: "Thank you. I'd like to recognize someone from the Ward side. Yes, Prof. Ünlü."

Dr. Ünlü: "First of all, I would like to use this slide one more time. As you can see in this bill. Only $39 million is designated for junior faculty. The rest of it is open to all nuclear engineering programs and departments, and half of it is it available only for universities who have the nuclear reactors. Second of all, I want to come

back to this budget issue, which is coming back again. Here is the chart which shows the operation budget of Michigan, MIT and Cornell. I have been asked by the University of Michigan Nuclear Engineering department to prepare this budget. Because their administration told them the university administration will shut down their reactor if DOE does not come up with a major funds until September 2001. For that reason they are the driving forces behind this bill. Also they would like to put some specific funds for themselves in the house version of this bill, but they don't want to do this alone, so they tagged on MIT and Cornell as well. For that reason they asked us to prepare the budget which should include all the expenses you can imagine. I can't tell you what's in this initiatives, but I'll tell you the result of it. This initiative has failed, because all other universities complained about why is this specific bill important for MIT, Michigan and Cornell, so for that reason they have another initiative going on in the senate to fund all the universities with research reactors**.** Therefore, the number which has been given to them is in use right now in supporting all other universities with such reactors. Let me give you what these funds equal. These funds equal, if you look over here, $420,000 for personnel costs. This personnel cost includes a half time health physicist from the Environmental Health and Safety. They sometimes come and check our detectors, monitors, etc., so that's the university part of that $30,000 for that service. Then there is $80,000 for operating expenses which is listed in our budget. Then it comes to this $190,000. This $190,000 comes from electricity, water, police patrol and also the maintenance which is calculated by or estimated by the footage of the building, which is $60,000, plus the insurance. All these expenses actually apply to other buildings on the campus."

Speaker Howland: "Thank you very much. Professor Burns."

Professor Joseph Burns, Theoretical & Applied Mechanics: "I wanted to give you a different take on the funding. Remember funding isn't a major concern or wasn't one of the major items that we dealt with. This is a table from the senate report showing enormous growth, going from less than $30,420 (Boy, I'd love to buy some of this stock.) we're up almost to a million dollars. If you look at that closely, this number is, in fact, $350 to bring in the fuel. There is no research funding essentially in that. If you look more carefully at what those numbers are, they come out in our account like this. The amount of research funding last year was at one peer-review proposal for the amount of $40,000. There are now three initiatives, so that is great growth. It's a better picture than it has been, but I don't think it is a rosy picture, and the amount of overhead that the university has fed back into the operation (taken off an earlier slide, that I just wrote down) is in the amount of $50,000 over the 3 years, so we see these numbers as being better than they used to be, but we see very little peer review research, only 1 and now 3 reports.

"We also see very little funding coming back to operate the Center and virtually no involvement from tenured faculty. But it is a better picture; we can't deny that. How can we put these numbers in perspective? That is the university support. This is a plot comparing the university support in various centers and you'll see that the Ward Center looks extremely modest, only a few hundred thousand dollars. If you add up a few hundred thousand dollars here and there, it gets to be real money, but it's still only a few hundred thousand dollars and modest compared to some of the other centers. It is interesting to compare those numbers against the amount of external research funding that has been brought in. Here's the Ward Center over here, the last year and the current fiscal year, and so it is perhaps interesting to compare how much external support has come in compared to the internal support, and the Ward Center is distinguished in this regard. It's the chart on the far right side.

"A way of possibly supporting the Ward Center, that has been mentioned several times, back in 1996 this was going to be a large amount of the funding coming in, was through user fees. That's also claimed in the current report; we're going to have user fees. So what are the prospects for getting user support. It says (this is coming out of the old report), 'we're convinced that there is an expansion of users.' All the other

centers on campus charge user fees, so the question is–is that possible here? The reactor user is very close to the level of 5 years ago, so it doesn't seem optimistic to us. Of the people who claimed in 1996 that the reactor was very important in their research, only 3 of them used it in 1999. If we look at, in fact, the usage, the usage of the reactor was over 100 hours by the Ward Center staff. There was one unfunded program in Geological Sciences. Here's our breadth–we've got an hour and a half of Civil Engineering time; we've got a hour by the Art Department."

Speaker Howland: "Thank you very much. Someone else from the Ward side."

Professor Suzanne Kay, Geological Sciences: "May I say something? I've published more papers using Ward reactor data than anyone else on campus, and I was not asked for anything. The report was made; no one asked what I was doing. It's not fair to say that my research is unfunded. It does not appear. . . the university gets overhead, and we're not charging user fees. But I'd like to just say a few things about some things we've been doing. The key advantage in our studies for instrumental neutron activation is that it's a nondestructive technique with no chemistry required. All other analysis types that people use in Geological Sciences, you put the sample in solution and you never know if you have the samples completely dissolved. We have been using it in a long-term research program in the central Andes to study the formation, evolution and destruction of the continental crust in a standing range representative of active and ancient processes, a wide variety of magnetic rocks, rocks available for study. I'm studying the fundamental processes of mountain building using the Andes Mountains. The recent focus has been the origin and evolution of copper, gold and silver deposits. Many of the world's giant deposits are in the Andes, and I've recently been to several international conferences as an invited speaker on the origin of ore deposits in the central Andes, based on my work mainly using data from Ward Laboratory.

"I have the world's most extensive database of some American magnetic rocks, in many regions the only data. With more than 1200 analyses; it's unique, because it's all done in the same laboratory, using the same standards. It's a global resource being actively sought in data compilations. We have published 90 peer review publications, three industry supported reports, over 150 abstracts and presentations. The data has appeared in 10 Ph.D. theses, not only Cornell, but some elsewhere, and in numerous Masters' and Bachelors' projects. Even though we have been using the reactor extensively over 15 years. I just returned from Chile; when I left I thought there was no problem, we just collected a number of samples to continue these studies, and I'm very surprised on coming back to find that the report suggests that the reactor be closed and that I was never consulted."

Speaker Howland: "Thank you very much. I'm going to recognize one side and then the other. Professor Gossett."

Professor James Gossett, Civil and Environmental Engineering: "It's important to realize that nobody on the LAC was thinking anything disparaging about any of this fine research. There is a lot of really fine research that has been conducted using the analytical facilities of the Ward Center. That's not in dispute. The number of papers cited that has used the Ward Center. . . none of that is in dispute. I guess the issue is would that work have gone on without the Ward Center. There are a number of alternatives. Clearly having the Ward Center there with free analytical fees basically. There are no analytical fees. It's convenient; it's free, and obviously, you know, there is a great benefit associated with that. The question is–are there reasonable alternatives? There are other technologies that are being used, like conductively coupled plasma, which can do the same thing with a lot more difficult preparation. I mean you have to go through a lot of preparation to do that, you can't just put the sample in. So clearly neutron activation analysis is convenient, and it's free of course. Could you do neutron activation analysis somewhere else? Last time at the meeting we heard Professor Kuniholm talk about how it was virtually impossible for him because the gold that he was analyzing in the tree rings has a 2 1/2-day half-life, and so no way could he do that. But

that's of course assuming that you want an irradiated sample sent back to you for you to analyze here. Most analytical laboratories will take the sample, irradiate it, measure the spectrum, and send you back a report of the gold content. Is there something lost in that? Yes, there is the issue of students not being intimately involved in gathering that data, the educational value associated with having the students actually be able to gather the data. We're not disputing that. It's a question of the amount of that that is going on and are there alternatives? There are laboratories that you can send samples to that do the neutron activation analysis. I've seen them as low as $14 a sample. I think that's a bit low, frankly, but it can be done certainly for $50 a sample, and we considered all that in our report. A lot of fine work is being done here. I think the question you have to ask is–would that work be done if we didn't have the Ward Center? Are there alternatives that could be budgeted after a suitable transition period with some kind of help from the administration? We felt that, given the general level of interest and use of the facility and the alternatives available, that our recommendation was reasonable."

Speaker Howland: "Thank you very much. I understand that we go around once for everybody who gets a chance to speak and then go round again."

Dr. Ünlü: "There are some questions which are not being answered, so therefore I'm raising my hand."

Professor Joseph Ballantyne: "I find this very unusual. There seem to be very strong opinions on both sides of the question and maybe there are some agendas. I don't know, but I am very impressed with the degree of interdisciplinarity that is shown by the users of this facility. It seems to me, perhaps, to be unique that we have people in the Arts and Humanities and so forth, archeology, working in the same facility with hard scientists. That seems to be quite unique and very appropriate for a university wide center, which this is. (Appendix E - overheads)

"The Center was approved by the Senate based on criteria, and I just read the minutes, including provision for a diverse array of services to the Cornell community and beyond, having a strong academic component that crosses college boundaries, establishing a strong funding base that make it independent of central administration funds, serving as a magnet for faculty and students. I point out that items two, three, four and the first part of item six in the Executive Summary are not related to any of the senate criteria stated in the 1996 minutes. There was no reference in that senate resolution of an active nuclear engineering program, and those four items all specifically relate to that point. A very unusual situation, a letter to DOE stating the university decision to close the TRIGA and remove the fuel rods is dated June 12, 2000. The LAC was asked on September 15 to review the Ward Center and make a recommendation on its future. I hope this is an artifact of an obsolete method of making decisions in the central administration**.**

"Next point–I wonder–I don't know the answer. Is there an appropriate local facility to house the Cobalt source and if so, what are the incremental operating costs to transfer the Cobalt source there? I think that would be useful to know.

"The funding charted in the graphs of the Ward Center Report is apparently the total multi-year dollars awarded in that year, which are to be expended over several years in the future as opposed to annual operating budget which are of course lower. Nevertheless, the rate of the increase of the funding awards of the Center has gotten remarkably positive in my view over the last few years. I did not realize that the bulk of the previous year was for fuel rods, but then if you subtract that, it delays the derivative one year. Certainly to go from $30K to $200K in one year's time is a remarkable derivative, and in fact will level out the charts that you show on the ratio of the funding. In fact, the budget for the current year, is about $240K, as you showed it, and that exceeds the $203K which was the total budget before Ünlü came. So during the current year, apparently, the Center could be self-supporting, and I want to say that it is unprecedented to include the police cost and all that kind of thing in evaluating the university costs for a center. I think that's

not relevant.

"Now having heard from a professor last time that there was a new faculty member coming to Vet Medicine attracted by this. So you can read the rest of these."

Speaker Howland: "Professor Buhrman?"

Professor Robert Buhrman, Applied and Engineering Physics: "I've been asked to say a few things about the potential scientific use of the reactor. I just have a comment on the boron neutron capture therapy proposal. It would be great if you could have the benefits to help people with destructive cancer. The question is whether or not this is a research area where there is growth and where Cornell can make a particularly strong contribution? I don't know. You go to the National Cancer Institute web site, and look at the number of programs that they are supporting in this area of research. What you find is not particularly impressive. The figure shows the number of programs that NCI is supporting for work related to boron neutron capture therapy. As you can see there is a disturbing trend down over the past few years. In fact, there may be only one active program that is still being funded. This is because the web site indicates that the funding period for two of these three final projects has expired, but Ivel he would not be interested in using it–1/20th is our current power ratio. To give you the scope of what's going on, at Oak Ridge, there's a reactor that is 85 megawatts, that's 17'm not sure if that's correct. This is a web site report for whatever it's worth.

"The other point is there are now currently two DOE programs pursuing BNCT work, one at the MIT and one at Washington State. As you have heard the effort at Brookhaven was shut down. This foil discussing the Washington State effort indicates what you have to do in order to get this type of program going. They made a proposal to DOE in 1997, we didn't. From this proposal they received a $200,000 grant starting in 1998; they also had a partnership with the Idaho lab from DOE which is providing $300,000 in material. They have a major building program. You looked at Dr. Kallfelz's diagram; you have to build a very big, very well shielded irradiation room for the patient, be it animal or human, that would be exposed to the reactor core to get radiated. This is a half million dollar construction project. At this point the Washington State project may or may not be operational. The web site does not give me the current update. But whatever the current status the existing work that is going on elsewhere clearly indicates that BNCT research is a very expensive program and that Cornell is well behind the curve in getting into an area for which federal support is currently declining.

"Another possibility was suggested that we could do neutron diffraction here. If you look at all carefully into the prospects for this application you find that there really is no possibility of this being a feasible application of our reactor. To give an example, there is no evidence that any university reactor in the country on a par with us in power (we are currently a half a megawatt) can offer that capability, so we would have to upgrade. That costs a lot of money. You also have to obtain an extensive and expensive array of equipment, detectors, monochrometers, etc. A request was made to Brookhaven to get some of their equipment. There has not been, as far as I've been told, a positive response to that. The Brookhaven reactor was closed down for political reasons, as many people know. Professor DeSalvo was asked if he would be interested in using it; he said very much so. I inquired about his needed intensity, ours is 1/20th of the Missouri reactor, and he indicated that at that le0 times the Cornell reactor. That's not good enough. The country is spending 2 billion dollars, approximately, to build a pulsed neutron diffraction capability at Oak Ridge. That's what people who do cutting edge research, the kind of research Cornell does, want to do in neutron diffraction."

Speaker Howland: "Thank you very much."

Provost Martin: "I just wanted to say Prof Ballantyne's remarks and jokes not withstanding, there was no decision before the LAC was asked to do its report by this administration to decommission the reactor. I didn't see Bob Richardson's letter until I was shown it yesterday by Prof. Ünlü and maybe Bob can explain it because I would, as I am always trying to do, like to dispel any suspicion here that some decision was made in advance."

Speaker Howland: "Prof Richardson "

Professor Robert Richardson, Vice Provost Research: "On June 12th, I sent a letter to Dr. Dirkmaat, the director of INEEL, the site that takes fuel, requesting permission to send the fuel to Idaho on the basis if we wanted to shut down the reactor. Let me give you some background. You have to get in line to get permission to send the fuel and you have to fill out quite a bit of documentation and paperwork. We sent the letter requesting permission to send the fuel, indicating that a point of decision was coming in the year 2003 for re-commissioning and that if the reactor was shut down, the space would be used for another purpose and we would no longer have a program in nuclear engineering at Cornell. Subsequently, and this was before the charge was given to the LAC, the forms were sent back to me by INEEL, the facility, asking us to describe the type of fuel rods that we would have, so that they could make an estimate of what's required on their end to receive the fuel. I requested that the Ward Reactor people fill out those forms. Dr Ünlü indicated that, because of competing time requirements for service to outside users, he wouldn't be able to do that, so we hired a consulting firm, NAC. They came in and actually looked at the fuel rods and made estimates of what it would cost to move the fuel rods if we decided to shut down the reactor, and if we were given permission by the Idaho site to move the fuel rods there. We've been told by a number of people that it takes a minimum of three years to go through that procedure to move the fuel rods. If, for example, the University decided not to re-commission the reactor in 2003 and at that point decided to move the fuel rods to Idaho, there would be an interval in which we would need to have high security around the reactor site for the protection of the fuel rods. Anyhow, it is the case that I wrote a letter on June 12th, but the decision was not made then to shut-down the reactor."

Speaker Howland: "Let's see, we were on the Ward side, I think. Prof Kay?"

Professor Robert Kay: "Maybe some of this has been covered before. I'll just talk about what I call 'currency of the realm.' We certainly talked about dollars a lot, and there was some allusion made to research productivity and some numbers, and when I met before the LAC for forty minutes back in November, I made that as a major point actually. I furnished them with a statement to that effect. Just to emphasize what this means. This is a citation, *Science Citation Index*, entry right off the web, you can get this in a minute. And this is basically what I'll look at. Forty-eight. This is a paper from 1993, it does not use exclusively Ward Laboratory data, but this is essential to the paper. This is on on-going effort, there's an isotopic table here, there is ICP data here, all right, fine, but this is a fairly nicely cited reference. I can look at any of your references, any of your papers in the audience, and if had 43 per this, and if you kept it up for 30 publications, and you get 1025 in the last decade, that is 12 years from 1988 to 1998, I think that you'd say this is something that I'd really like to keep doing, and this is an integral part of that. So I would just say, not to drag this out, this is a statement and I don't want to read it. First of all there are two Professors Kays here. There's me, and I was a member of the drafting committee of the 1996 report as was Jim Burlitch and Don Holcomb, and so naturally LAC did talk to me. I did refer to papers that were both Sue and I, and together, and variously, but the committee really never did talk with Sue, which is actually, come to think of it a little odd, since she was listed as a major user in the1996 report. And there were other major users listed in the 1996 report that were not contacted by the LAC. Had they done that, she would have told them what she just told you today. So we can talk about what we want in terms of essential and choices, etc. but this is certainly been more than convenient, and more than just slightly productive for us, and for Cornell

University."

Speaker Howland: "Thank you Prof. Kay. I'd like to call now on Prof Drell "

Professor Persis Drell: "The LAC is in agreement with the advocates for Ward and the vision laid out by the Ward Center, that the justification for the support for the continuation of Ward should be based on its serving effectively as a University wide center, that came through strongly in the interviews. To formulate our finding on that point, we attempted to meet with users and potential users on campus; we met with 36 people. We did not meet with Professor Kay, S. Kay. I apologize for that. The fault is mine; I was chair of the LAC at the time. I missed the fact that there were two professors Kay until it was too late. We tried to determine what is a reasonable assessment of potential, on campus for Ward usage, what is the long-term faculty interest, what are groups that will sustain the facility, write grants to develop new technology, supply man-power to bring those new technologies to maturity. A coherent picture developed from those many hours of interviews; it was heard by all members of the committee, that is the reason why we were unanimous in our recommendation. For the neutron activation and radiography, those were routine services available elsewhere. Even strong advocates agreed that there was a need for multi-function usage. Simply doing NAA did not justify the Center. On the expanded multi-function usage, many of those have been under development for some time. They are challenging technical efforts. We did not find an engaged, energetic group of faculty, particularly young faculty, willing to develop those techniques and make substantial use of them. We had no evidence from talking to faculty across campus that if the capabilities were established that they would have a major enabling impact on Cornell research programs. It was the absence of such an energetic group of young faculty willing to dedicate their intellectual, financial, man-power resources to develop capabilities for the Center that led us to finding 6 which is at the heart of the report and ultimately to our recommendation. To some extent, we saw and see a disconnect between the reality of the Center capabilities, level of interest and commitment of faculty on campus and the potential that is described by the advocates."

Speaker Howland: "Anyone else on the Ward side who wanted to speak? I've got one here. I'm sorry, I'm pointing at you, Sir."

Professor Bingham Cady, Theoretical and Applied Mechanics: "I've been given a really unhappy task. I've got to level with you about the failure of correct substance, especially in the Local Advisory Committee's report."

Speaker Howland: "I'm sorry. I want to remind you of the passage in *Robert's Rules of Order* which says, 'You will not question the motive of anyone in their deliberations.' So please keep your remarks impartial."

Professor Cady: "Very good. I will do that. I want to tell you a little bit about the history of the Ward Laboratory. It began in 1960. It was built with no contribution from the University. The NSF, AEC and Vitro Corporation built it, and Carlton Ward provided $1 million in lieu of operating expenses, which we used in the college for the master plan. He also endowed a Chair, the J. Carlton Ward Chair, and that is held by Professor Hammer in Electrical Engineering. The point is that nowadays we don't demand that centers be built without university money, or have operating funds or an endowment in lieu of operating funds, and we don't demand that the people who endow chairs do that. Not only that, the $200,000 that you heard about provides the full salary and fringe benefits of the director. The other centers don't do that, maybe half. So we are discussing something less than $200,000, because you have to understand it pays for a faculty member, the director, who teaches courses and supervises graduate students. The next is, you've heard this story quite a bit, that this is an open laboratory available to everyone. A truly remarkable vision, I think, by the people who recommended this in 1996. That has been discussed. It is university wide. It is not a laboratory captured by a small number of people where you have to be in the 'in-group' in order to

participate. Third, it's very unfair to Professor Ünlü, who has come on board two years ago in 1998 and done a remarkable job, has taken the Ward Laboratory forward, and now has hundreds of thousands of dollars worth of research grants and other grants in support of the laboratory in his two years here. It is not in the Cornell tradition to bring people in, tell them we are going to give them a job to do, have them perform it, far better than any of us could have expected, and then tell them to. I can't use the word because it's not appropriate. It's appropriate where I come from in South Chicago."

LAUGHTER.

Professor Cady: "Now I would like to say that the Vice Provost's office did decide to close the Ward Laboratory and wrote it down in the letter of June 20. That letter, nothing about motivation, I want to discuss facts, the letter is filled with untruths."

Speaker Howland: "Sorry, you can't say . . ."

Professor Cady: "All right, I can't say it; I take it back. Let me then say, let me read from it. 'It has thus become impossible to justify adequate funds to maintain the reactor at an appropriate level. Accordingly, we are initiating the steps to decommission the TRIGA Reactor.' It does not say we are thinking about it; it announces it. This came back to us. We need you to read the information we are giving to you."

Speaker Howland: "Let's see. On the LAC side."

Professor Peter Stein, Physics: "Sir. Is there any opportunity for neutral people to address the . . . ?"

LAUGHTER.

Speaker Howland: "I was just about to call on somebody neutral who signaled they wanted to talk. Professor Fine."

Professor Terrence Fine, Electrical Engineering: "One of the issues is why is this here before the Senate. It's clearly not because the Senate is a great scientific body, but it's because this Center was created by a motion that came and passed through the Senate, made reference to by Professor Ballantyne. But I have it right in front of me here. You are not supposed to read in front of a parliamentary body, but there were three whereases. One of them said whereas … is to put the Ward Facility on a firm financial footing, and then the resolution had two stipulations, their word. OK? One of them was 'B. that any funding for the Center subsequent to July 1999 for the general purpose budget be drawn from then existing appropriations of the several colleges from which come the faculty and student users of the Center by agreement of the relevant Deans.' So as I look at this motion . . .I mean you may not like what it says, but the motion is very clear. It says by 1999, there should not be any funding coming from the general purpose budget except through this path. Now, that, I think has not happened, maybe for good and sufficient reasons, but I'd like to hear that. Because that is the subject of the motion that enabled it."

Professor Cady: "Are you questioning me? I'd be glad to respond."

Professor Fine: "I can't question."

Professor Thorp: "May I respond?"

Professor Cady: "I'd be glad to respond."

Speaker Howland: "I have three people who would like to respond. Well, let's say one here and then one

here."

Professor Thorp: "We asked and we were told that one dean has made contributions, but only one."

Professor Cady: "I would like to point out that that's exactly what it says, that then existing appropriations should come from the college deans, but the Vice Provost's office declined to do that."

Speaker Howland: "Professor Stein."

Professor Peter Stein, Physics: 'I have another question for the LAC, because I'm trying to follow the arguments and I really am totally neutral, but on the one hand you say it isn't a matter of funding and on the other hand one of you says that you are not questioning the value or the quality of the research that is done. I just don't understand it, because if I take that literally, if it were free, you would still want to close it. I mean if it didn't cost us anything, you would still want to close it, and that seems surprising to me. Along with that, I 'm a little bit confused about, you know, the money. It certainly sounds different when it's presented by both sides, but I see sort of a constant subvention from the university which isn't going to change. I wonder is that correct? The other question I have is, have you considered the financial implications of closing it as opposed to the financial implications of not closing it. If they are right, if it costs half a million dollars to move the cobalt source someplace else . . .

Unknown: "Four million."

Professor Stein: "I mean four million, sorry. Four million dollars to move the cobalt source someplace else. . . and another whatever it is $5 million dollars to take out the fuel rods, and it's only costing us $200K a year, it just doesn't sound like it makes much sense to make that capital investment to do that. I really would like to have . . . it would be much cleaner if you could say, 'OK, look, here's the alternative. You can take the samples someplace else and have them analyzed and blah, blah, blah, blah. It you follow that path it costs one thing and if you follow the other path of keeping it open and assuming a sort of constant level of research as is currently going on, it would cost us another level. And, look, these two things are very different, and one side is favored over the other.' It seems to me that ought to be the argument."

Speaker Howland: "You wish to respond? Name please?"

Professor Barry Carpenter, Chemistry and Chemical Biology and member of the LAC: "It's certainly not the case that we failed to consider funding at all, but it is true that it was not a primary consideration in our decision. The primary consideration was–is this currently and is it going to be, as far as we can tell, a vigorous center for research of Cornell faculty? And when you ask that question, the first thing you have to recognize is that even the proponents say that we are looking at a 20 year life time for this thing from now. Well, 20 years is both a long time and a short time. It's a long time in the sense that we can't predict what's going to happen to a 40 year old reactor over that 20 years and so funding would come in to the extent that there is uncertainty about what it would cost to maintain the reactor during that time. But it's a short time in the sense that if there is going to be a vigorous program during the next 20 years, presumably we should be seeing now the young faculty who are writing the proposals to involve themselves in the use of this facility, and we did not see that.

"Furthermore, when we looked at the past history of what the proposals were for how this Center would be operating from 1996 on, there were rosy projections about what would be happening, including many of the same research projects that we are hearing about now that haven't happened. So given the only data available to us, we came to the conclusion that there was no convincing case that there would be a vigorous research program and that there was the possibility for substantial unknown cost to the university during

this 20 year period.

"Finally, let me talk about the bill. First of all, I don't know if you have looked at the news today, but President Bush is apparently recommending a 1% increase for the National Science Foundation for the next fiscal year. Apparently, the way he is going to be funding his proposed tax cut is to take money away from basic research. Given that, one has to wonder what is the probability that this bill is going to get passed at all? So, we're not talking about a certain revenue stream coming to the university, we're talking about some bill of uncertain future. Next, even if the money were to come in, since when is research at this university dictated by available funds without available faculty? That is, oh, we can get this money and then we'll find the faculty to do the research. That is not a way that I believe that this university has been conducting its research in the past, nor a way that it should conduct it in the future."

Professor Stein: "Even if I accept . . . "

Speaker Howland: "Professor Stein, I'm sorry. Yes, sir."

Professor David Hammer, Electrical Engineering: "I would like to move a little bit more to the philosophical side of the last half of the argument that I just heard. We heard discussions of some very interesting research that is taking place at Cornell University by individuals who are not nuclear scientists and who are not nuclear engineers. If there were an active program in nuclear science and engineering at Cornell University with several young faculty members or even faculty members my age, the program would not have been dissolved, the Center would not have been moved out from under the Dean of Engineering's bailiwick. Instead the users, present and future, in 1996 were seen to be the people who were using it then such as the Kays and the folks in archeology and paleontology and elsewhere. I suggest to you that their research interests and the research they do is just as important to Cornell University and the reputation of Cornell University and Cornell University's long term goals in research as mine would be if I were doing nuclear engineering research in the College of Engineering using that reactor. I think that it is an excellent tool and should be kept and made available for the people who want to use it. It is not a very large cost. The cost of eliminating it is likely to be much higher. Thank you."

Speaker Howland: "Other people who haven't spoken yet? Yes, sir."

Professor Richard Talman, Physics: "The previous neutral comment was right leaning, and so I would like to make a left leaning neutral comment. It seems to me that it's an issue of governance. OK? A committee of individuals who are on the average slightly more competent to understand the issues discuss this and came to a unanimous decision. To then repeat the arguments in a very brief format amongst people who are on the average a little less qualified to understand them I think is contrary to good governance of the institution."

Speaker Howland: "Anyone else? Professor Ballantyne. Since we're going around for the second time, I'm going to recognize Professor Ballantyne."

Dr. Ünlü: "I'd like to give a few comments?"

Speaker Howland: "Yes, please. Three minutes, and then I'll come to you, Professor Ballantyne."

Dr. Ünlü: "First of all, I'd like to get back to Professor Burns' comments. On this list only $350K, which is the cost of 12 fuel rods, received…. We periodically receive fuel from DOE, because fuel comes for free, is not peer-reviewed that is money coming to us. All the other research grants which you have seen, all the grants I should say, are peer-reviewed grants. You should look at the previous years, for example, for the Reactor

Instrumentation Grant**s**, those are all peer-reviewed. It was only … actually nothing prior to 1998. You see the increase. Same thing for the Reactor Sharing Grant, and also the same thing for this Utility Matching Grant. The Electric Power Research Institute chose Cornell, RPI and MIT to give $180K. The other $180K matched by DOE; this is again a competitive peer-reviewed application. I would like to comment also on this grant. This is called the Nuclear Engineering Education Research Grant and you have a 10% chance of getting it. Last year only 11 were awarded, and we got one of them. For this grant which is still pending and this grant we have collaboration with a group in Mexico, that is supported by Mexican NSF called ConaycT. The Mexican side is already granted and our side NSF doesn't know which funding category they have to put this application, so we are waiting for the results from this end. This grant, which is also competitive peer-reviewed grant, for this particular one we didn't get the funding. Our share will be $300 but it's not funded. So therefore, I will challenge Professor Burns that this is not just given money, a handout. These are all peer-reviewed grants.

"This is a paper presented last year at the American Nuclear Society meeting which is basically comparing the possibility of neutron powder diffraction in a small reactor. This is the Ohio State reactor which is a 500k Wt reactor which is the same as ours. It gives the numbers, and I can give you all the details if you want, but you can do for example 10 megawatt reactor at Missouri, 1 measurement in 10 minutes, here you can do it in 40 minutes. So it is just a matter of time. And, um . . . I forgot my last comment. I apologize."

LAUGHTER

Speaker Howland: "Professor Ballantyne."

Professor Ballantyne: "I just wanted to comment. The committee has placed a great emphasis on young faculty members building their research programs. As I look at this, this reactor has been showing some life for about two years. To get a young faculty person who is going to build the reactor, there is no department that is going to recruit a young faculty member who is a nuclear reactor faculty member. We have heard about one in vet medicine who apparently was affected by that, but to use the argument of young faculty over a time period of maybe three years of viability of the reactor with departments that are not directly related with nuclear engineering, I don't think it's feasible. I think you have to look at old faculty, people that are here."

Speaker Howland: "Let's see. Two people have their hands up that haven't spoken yet. One here and one here."

Professor Richard Baer, Natural Resources: "I have not read the report carefully. I was interested to hear of an endowed faculty position. Just a point of fact–do we have any responsibilities to whoever endowed that to follow through with something like the original intent or will closing down the reactor also permit us to fulfill those obligations?"

Speaker Howland: "Provost Martin would you like to answer that?"

Provost Martin: "It's a very good question. I doubt we have obligations at this point, but we will have to research it."

Professor Baer: "I don't mean just legal, but . . ."

Provost Martin: "Yes, absolutely, yes."

Speaker Howland: "Yes, here?"

Professor Larry Walker, Agricultural and Biological Engineering: "I'm a member of the committee. The representative from the Vet School–would the Dean of the Vet School be willing to invest money into the Ward Center?"

Professor Francis Kallfelz : "Sorry, I have not had to opportunity to discuss that detail with him. I saw him briefly late last week and indicated I would like to come see him and have not yet been able to do that. So I can't give you an answer."

Professor Burns: "I wanted to go back to these numbers as well. The question of peer-reviewed or not. This is the famous chart. We acknowledge that there has been enormous growth down here. You cite action B there, and whether or not these are peer-reviewed, I took off the web just before the meeting today, here's the peer-review on that one. All 22 universities got it . . . 22 out of 22 . . . that's the sort of peer-review I love. I'll stand up to it any time."

Speaker Howland: "Back here."

Professor Val Kostroun, Applied and Engineering Physics: "As one of the five members of the Nuclear Science Engineering Program, I would like to correct the impression that everything started . . . that the program started to grow two years ago. Before that I had $300K per year, Dave Clark had the same NEAR Program, DOE also had $200K, Steve McGuire had about $100K and so to say that this is all new is simply not correct. We did have money before, and I would also like to say that at that time in 1995, our program with five faculty members was put on probation by the New York State for having an insufficient number of graduate students, insufficient research and so forth. I think there are many other things that this committee and the university is just not aware of, that haven't been presented and should be taken into account."

Speaker Howland: "Thank you. We have about two minutes remaining. Is there anybody who hasn't spoken at all? In the back."

John Chiment, Department of Earth and Atmospheric Sciences: "The students who are waiting outside, 220 enrolled students in Art, Archeology and Analysis, will all visit the Center. The work that is being done at the Center is being done largely by the six faculty members who teach that class in Art, Archeology and Analysis. They are having their first prelim at the end of the week. I really find it is an interesting place in that faculty from many different parts of the university are there discussing joint problems daily. I met on Friday of last week with the Vice President of Corning, Inc. who suggested that they would be willing to endow a position at that Center and that they are now one of the largest users. They would simply like information from the university as to what an endowed position would cost their foundation."

Speaker Howland: "Thank you very much. Ladies and gentlemen, I have one announcement before we leave. Would the Senate members please remember to sign the roll? Thank you very much."

Adjourned.

Respectfully Submitted,

Charles Walcott

Associate Dean and Secretary of the University Faculty