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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

OFFICE OF SECRETARY  
DOCKETING & SERVICE  
BRANCH

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of )  
THE REGENTS OF THE UNIVERSITY )  
OF CALIFORNIA )  
(UCLA Research Reactor) )  
\_\_\_\_\_ )

Docket No. 50-142  
(Proposed Renewal of Facility  
License Number R-71)

December 2, 1983

UNIVERSITY'S RESPONSE TO CBG'S OBJECTIONS TO REBUTTAL TESTIMONY

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## I. INTRODUCTION

University submitted its rebuttal testimony on November 7, 1983 in accordance with the schedule set by the Board at the conclusion of the October session of the hearing. As discussed below this testimony responds to new matters raised by CBG, or new issues raised by CBG concerning matters previously identified, which arose subsequent to the time for University to submit its direct case.

On November 17, 1983, CBG filed objections to essentially the entire University (and NRC Staff) rebuttal testimony. As grounds for its objection CBG asserted generally that the testimony exceeded the limits placed on such testimony by the Board. CBG also complains about the length of the material; renews its objections to all of University's Wigner energy testimony; and accuses University of deliberately delaying these proceedings. Finally, CBG complains of the "humanly impossible task" of preparing for cross-examination on University's rebuttal which was filed three weeks before the scheduled hearing.

University is the party with the burden of proof in these proceedings and its burden is to respond to the claims made in the intervenor's statement of contentions. In its February 8 and March 23, 1983 Orders the Board set out the issues it wished considered in this hearing. Those issues related to some but not all of CBG's contentions. In its May 11, 1983 Order the Board, at CBG's insistence and over University objection, reversed its earlier ruling and added dispersion to the topics to be considered. The Board instructed University and Staff to respond to "CBG's positions as set out in its (January) declaration." Memorandum and Order, April 7, 1983, at 3. This ruling, however, was obviously

limited by the Board's rulings concerning the scope of the upcoming hearing. University's direct case did respond to CBG's stated positions as those positions were related to the specific contentions and issues the Board had set for hearing. And, with the exception of some portion of the Wigner energy testimony, University's rebuttal has been limited to new issues raised by CBG or, in a single instance, to an issue in CBG's declarations not reasonably related to any matter set out for hearing by the Board in its Orders.

With respect to CBG's complaints about the length of the material, University points out that CBG has been insisting on detailed calculations and has no cause to complain when that is what it has been provided. Fully one-third of the entire testimony represents detailed calculations to support three different values: a temperature rise in an excursion, a flux value, and a stored energy release. Concerning CBG's "humanly impossible task" University notes that CBG, provided with three months to prepare its rebuttal still defended its "right" to submit over 80 pages of rebuttal without any reasonable prior notice to the other parties.

CBG's charge that University is delaying these proceedings is patently false and University will take another opportunity to respond fully to this preposterous assertion. University notes only that CBG is the direct cause of this latest delay. Its objections could have been resolved without having to delay the hearing. University responds to each of CBG's objections below, including CBG's objection to all of University's testimony on the Wigner energy issue.

## II. DISCUSSION

### University's Rebuttal Concerning the Shutdown Mechanism in the UCLA Argonaut

#### 1. General Response

This rebuttal testimony responds to new matters raised at the July/August session of the hearing and relied on subsequently by CBG in its case presented in October.

The testimony attempts to account for the asserted differences in the operation of the shutdown mechanism between the SPERT and Argonaut reactor cores. The first part of the testimony analyzes the differences in void coefficients and reduced prompt neutron lifetimes in terms of the shutdown model presented in the Forbes article (Staff's Exhibit 2). The Forbes article and analysis was introduced for the first time by Mr. Hawley in his written testimony of June 15, 1983. Mr. Hawley described the Forbes article as presenting another method for analyzing the shutdown mechanism, but that he had not evaluated the method. CBG conducted extensive cross-examination of Mr. Hawley concerning the Forbes method and the parameters that affect the shutdown coefficient. (Tr. 2231-51, 2317, 2331-53). In Answer 3 to its "Panel I Rebuttal" testimony presented in October CBG asserted that UCLA had not taken into account the Forbes "correction." In addition, during oral testimony CBG's witnesses asserted that the significance of the void coefficient and prompt neutron lifetime differences had not been properly analyzed.

The first part of University's rebuttal testimony on the shutdown mechanism is to analyze the shutdown process in accordance with the method

suggested in the Forbes article. CBG made no mention of the Forbes "correction" in its January declarations. University's response on this matter is appropriate rebuttal.

The second part of this testimony responds to two technical issues first raised by the Board at the July session of the hearing. The Board asked: (1) What happens to the expanding water during a power excursion?; and (2) What degree of increase in fuel temperature will occur during "power chugging?" (Memorandum and Order, October 4, 1983, at 2.) (Subsequently, in its November 23, 1983 Memorandum and Order, the Board requested further clarification of the rebuttal testimony concerning what happens to the water and response to an additional question: What stops the addition of water from the cooling system flow? University's supplementation of this testimony is being transmitted together with this response.)

CBG objects to the first part of this testimony as "an expansion of (Mr. Ostrander's) mass of the core theory" and an attempt "to correct previous errors in not considering void coefficients in computing energy release." CBG's arguments seem to go to the substance of the response rather than whether it is appropriate rebuttal. But in any case the arguments are incorrect. The testimony provides only a demonstration that consideration of the Forbes method, which defines a specific relationship based on values of the void coefficient and reduced prompt neutron lifetime, does not lead to a significantly different result. The analysis again proceeds on the basis of comparing energy densities because in University's view that is a useful way to make the needed comparisons. This represents no novel theory.

CBG objects to the second part of the testimony because it concerns "voiding" through the rupture disk and the fact that the UCLA reactor is a "closed system," issues which CBG raised previously. In fact, both Mr. Hawley and Mr. Ostrander testified that the "voiding" that canceled the reactivity addition in the fast transient situation was a consequence of the formation of steam bubbles in the core which would displace a relatively small quantity of water upward in the fuel box and plug assembly. The "voiding" that occurs through the burst graphite rupture disk as a consequence of the pressure pulse created by the steam voids is delayed in time relative to the "other voiding" and, although it would be effective in terminating the excursion and preventing any "chugging" episode, it is not the "voiding" that is relied on in the first instance to cancel reactivity and reverse the power rise. (Tr. 1530-31, 1535-40, 1627-28, 1631-32, 1636-37, 1676, 2178, 2355-59, 2370). Admittedly, the physical picture presented by this cumulative testimony is not very clear. University notes, however, that the question of the subcooled nucleate boiling process, the formation of steam voids and expansion of water in the fuel box assembly is not raised explicitly in any of CBG's contentions. In any event, in response to the Board's questions University has attempted to provide a more coherent and detailed treatment that explains where the water goes.

## 2. Specific Responses

With respect to CBG's specific objections University provides the following comments. Answer 1 and the figure on page 2 (taken from Mr. Ostrander's earlier testimony) are intended to provide a framework for comparing the 400<sup>0</sup> C peak adiabatic temperature rise calculated based on the Forbes method with the

other methods used by the parties. The page 2 figure also conveniently shows that in the range of 14 msec periods (for a \$3.00 instantaneous reactivity change in the UCLA reactor) a predicted adiabatic peak temperature rise of  $400^{\circ}\text{C}$  is extremely conservative with respect to actual measured values for the Borax and SPERT reactor data plotted in the figure, a point which supports the testimony.

Answers 3 to 31 describe the shutdown coefficient for the UCLA reactor in terms of the model proposed by Forbes which predicts the peak power density based on the value of the shutdown parameter. CBG claims that this testimony should have been included in the direct testimony prefiled in June. However, since Mr. Hawley did not identify the Forbes article and present the method therein contained until his prefiled testimony was submitted in June it was not possible for University to respond to this matter in its direct. Moreover, CBG did not reveal its reliance on what it calls the Forbes "correction factor" until it presented its case in October.

As previously explained, Answers 32 to 51 represent University's attempt to provide a coherent response to the several questions raised by the Board concerning the "voiding" that reverses the power rise in the fast transient excursion.

Answers 25 to 29 respond to CBG's claim that the UCLA thesis by Robles supports the value being asserted by CBG for the graphite component of the overall temperature coefficient of reactivity and that this graphite effect could significantly influence the course of a fast transient. CBG had previously asserted a value for the graphite coefficient based on a statement made in an

NRC inspection report. At the October session, CBG for the first time identified the Robles thesis as independent support for its assertion concerning the graphite coefficient. The neutron transport calculations, which were undertaken in connection with the Wigner energy question, were not completed until the second week in July. This information is relevant to the explanation why a number of CBG's alleged graphite effects are insignificant in the Argonaut reactor.

#### University's Rebuttal to CBG's Panel I Rebuttal

Question and Answer 1 respond to CBG's Panel I Rebuttal, Answer 1 and Table I which purports to be a quantification of reactivity effects CBG claims will raise the reactivity worth of the UCLA core. University's rebuttal response addresses the Table I calculations item by item and explains why CBG's calculations are in error.

CBG makes several claims that these issues had been raised in its January declarations. However, the earlier references were speculations only without calculations or any opinions being expressed on the magnitude of the asserted effect or how it could influence a fast transient event. CBG's Table I represents its first attempt to quantify the claimed effects. University's rebuttal responds to CBG's attempts to quantify the effects.

CBG also claims in several places that certain of University's rebuttal statements "lack the necessary foundation." CBG misconstrues the "foundation" requirement. There is no foundation problem. If CBG wishes to explore the basis



for certain statements made in University's testimony it will have ample opportunity to do so during cross examination of University's witnesses.

Answers 2 and 3 respond to questions why UCLA needs \$3.00 excess reactivity. University submits that this issue is not properly raised by any CBG contentions and is therefore outside the scope of this hearing. However, the Board asked questions about the earlier amendments which had the effect of raising the excess reactivity limit to \$3.54. In addition, Mr. Norton, in his oral testimony in October, rhetorically questioned why "so much money" was needed. University's rebuttal response is to clarify the present need for the proposed excess reactivity limit.

Answer 4 directly responds to CBG's Panel I Rebuttal Answer 8 and statements made during CBG's oral testimony that certain quantified reactivity insertion rates were possible. Comments made previously by CBG's witnesses did not include assertions about specific reactivity changes and insertion rates.

Answer 7 responds to the issue raised by CBG's Exhibit C-I-5 (UCLA Radiation Use Committee Minutes, 1977), whether misadjustment of the dump valve sensing switch could result in a positive reactivity insertion due to inadvertent change in core water-level height. The response quantifies the magnitude of the possible effect and notes a system design change which remedied the condition reported in Exhibit C-I-5.

Answer 8 directly responds to CBG's Panel I Rebuttal, Answer 7, and various assertions made by CBG's witnesses in October with relevant information

concerning the water-moderating effect on the energetic neutron flux. The information was not available at the time UCLA submitted its direct testimony.

Answer simply responds to the claim made by CBG in its rebuttal and oral testimony that Mr. Ostrander is attempting to explain all reactor differences on the basis of the mass of the core. The response is a factual statement not a legal one.

University's Rebuttal on Credibility of a Graphite Fire at the UCLA Reactor

This testimony responds to the new arguments made in CBG's "Fire Rebuttal" testimony.

Answer 3 responds to the assertion apparently being made by CBG that a graphite fire accident like that which occurred at the Windscale reactor could occur at the UCLA reactor. University says "apparently" because CBG's claims with respect to the Windscale reactor fire are not clear. The comparison table that appears on page 3 of the testimony is intended to point out the more important differences between the Windscale and UCLA reactors.

It is true that the Windscale fire was mentioned in the January declarations of CBG's witnesses. However, it was not then being cited for the purpose for which it is now being cited. Except for its mention in connection with the Wigner energy issue (Koku, para. 63; DuPont, para. 10) and the fire response issue (Warf, paras. 15 and 31), issues not relevant here, the Windscale reactor fire is cited only for the proposition that graphite can be made to burn. University has never disputed that simple proposition. The UCLA

Application states that graphite is "the principal combustible material routinely present in the reactor room" (UCLA Application page III/8-6). The only material dispute concerns the conditions necessary to the self-sustaining and self-propagating burning of the block of graphite surrounded by the concrete of the UCLA reactor.

In its contentions CBG has made no explicit claims asserting the existence of Windscale graphite-fire-type conditions at UCLA. Moreover, except in the context of the Wigner energy issue, CBG's January declarants made no explicit claims regarding Windscale-type conditions at UCLA. And, since University was not disputing that graphite could be made to burn, the Windscale matter was not material to an issue in dispute and did not require a specific response.

However, beginning in July with CBG's cross-examination of Dr. Wegst and continuing to its "Fire Rebuttal" testimony which was admitted at the October session, CBG has been making new assertions concerning the conditions under which graphite will burn. In particular, CBG now asserts for the first time in Answer 5 of its "Fire Rebuttal" that certain of the circumstances of the Windscale reactor are present at UCLA, in particular CBG's observations about thermal conductivity at Windscale and the implicit claim that this information is relevant to the UCLA reactor. University is entitled to response to these matters.

Answer 4 directly responds to new claims made in CBG Answers 1, 2, 3 and (in part) 4 and corrects for the mischaracterization that is made by CBG of Dr. Wegst's earlier testimony. It is appropriate rebuttal.

CBG objects to those portions of Answers 6 and 7 that mention the results of the neutron transport calculations. The history of these calculations is discussed below in connection with University's Wigner energy rebuttal testimony. University notes here only that information pertaining to the percentage of fast neutron energy that reaches the graphite in the UCLA reactor as compared to graphite-moderated reactors is clearly relevant to the new issues raised by CBG in its October testimony: the asserted "18-fold" increase in oxidation rate due to irradiation damage (CBG's Answer 4); and the asserted "20-fold" reduction in thermal conductivity due to irradiation damage (CBG's Answer 5). These two new claims and CBG's general argument about irradiation damage effects on the thermal conductivity of the graphite represent a new and wholly independent justification for the admission of any information concerning the water moderating effect on the fast neutron flux.

CBG's objection to Answer 7 goes to the substance of the response and not whether it is appropriate rebuttal. Answer 7 directly responds to new claims made by CBG in its Answer 5.

CBG does not argue that Answer 8 is improper rebuttal. Its "without foundation" objection is baseless. If CBG wishes to explore the support for any of the statements made by any of University's witnesses CBG will have an opportunity to do so on cross-examination. CBG's objection to the "Ostrander Monte Carlo calculation" is without merit. The information is being offered as probative on several entirely different and new issues; whether or not the information was earlier ruled inadmissible has no relevance to the instant matter. University notes, however, that the calculations were not previously offered and

were not ruled inadmissible; the Board merely ruled that Counsel's redirect inquiry of Mr. Ostrander concerning the results of the calculation exceeded the scope of the cross-examination and was therefore disallowed.

The portion of Answer 10 to which CBG objects directly responds to the claims made in CBG's Answer 6, second paragraph. University also notes that "hearsay" is not an objection in these proceedings. By definition, the hearsay declarant is never present to be interrogated.

CBG's objections to the first paragraph on page 12 is clearly responsive to the claim made by CBG in third paragraph of Answer 6. On a substantive point, neither Dr. Wegst nor any other University witness has asserted, as CBG claims, that "the graphite is inherently protected against combustion by its chemistry." Moreover, CBG deliberately misconstrues the Board's rulings concerning the fast transient accident scenario with the graphite fire scenario by asserting that "(t)he Board has repeatedly ruled that it didn't want to get into how the accident sequences occurred, but whether the reactor was inherently protected against the accident, no matter how initiated." That is decidedly not the issue with respect to the graphite fire scenario. University has never claimed that the facility was "inherently protected" against fire. In both the Battelle study and the UCLA SAR (UCLA Application, page III/8-5), graphite fire scenarios are discussed in terms of the credibility of the initiating event. In fact, University has on several occasions pointed to the fire scenarios as best demonstrating the meaninglessness of the phrase "inherently safe" except as shorthand for the idea of protection against credible accidents posing risk to the public that is based on "inherent" (as opposed to "engineered") or "passive" (as opposed to "dynamic") features of the system.

Answer 11 responds to new claims made by CBG in its Answers 10, 11 and 12. The quotation from the Battelle study in the last paragraph of the answer responds to CBG's assertions, contained in its Answer 12, about what is demonstrated in the Battelle study.

#### University's Rebuttal to CBG's Wigner Energy Testimony

##### 1. General Response

University's Wigner Energy testimony comprises the largest section of its rebuttal. It may be considered as consisting of three parts. The first eleven pages (except for Q./A.3) respond directly to the new claims and arguments put forth by CBG in its 27 pages (with figures) of "Wigner Energy Rebuttal" which CBG submitted at the October session. University has not otherwise had an opportunity to respond to these matters. This first section is appropriate rebuttal.

The third section consists of Question and Answer 3 of the first part and the seventeen pages of attachments reporting two separate thermal flux measurements recently performed at the UCLA reactor, which are referenced in Answer 3. These flux measurements, which were made in the weeks following the October session, directly respond to the new claim that has been made by CBG concerning the thermal neutron flux of the UCLA reactor.

CBG has claimed that the correct value for the integrated thermal neutron flux at the UCLA reactor is  $3.3 \times 10^{12}$ , citing page 53 of the UCLA

"Bradshaw thesis" of 1965. This claim appeared first in Mr. DuPont's January declaration, page 4, paragraph 18 and the accompanying footnote, and was repeated in testimony CBG prefiled as its direct case in June (Panel II, paragraph 46 and accompanying footnote). University did not plan to offer direct testimony concerning that value because CBG had made an obvious error in relying on the Bradshaw thesis and that error could be easily exposed on cross-examination. (The error is explained on page 4 of the first part of the rebuttal and is apparently related to the fact that CBG assumed the Wigner energy calculation used a value of the total flux as an entering argument instead of just the thermal flux. See Tr. 1800.) University's staff have had full confidence in the value reported by UCLA for the thermal flux and had no need to conduct new measurements to confirm the reported value and respond to this CBG claim.

However, in its September 26, 1983 letter CBG "corrected" its testimony by substituting a new value of  $3.0 \times 10^{17}$  for the current UCLA thermal flux purportedly found in the 1962 "Taylor thesis." The inconsistency of the Taylor thesis value with the currently reported value is not easily explained because it requires speculation on the conditions of the measurements during an entirely different core-loading situation that existed in 1962. Because of this latter fact the UCLA staff regards the Taylor thesis value as irrelevant and University sought to have the value excluded on those grounds. The Taylor thesis value was admitted over University's objection. University's testimony respecting these flux calculations is appropriate rebuttal.

The second part of the testimony consists of eighteen pages of Dr. Pearlman's Wigner Energy Release Calculation including a description of the

neutron transport calculations performed by Mr. Ostrander. CBG objects to this section on the grounds that the calculation should have been submitted with UCLA's direct case on June 15. Moreover, CBG seeks to have Dr. Pearlman's entire testimony thrown out on the grounds that without the calculation there is no "foundation" for the testimony.

University regrets that it was unable to submit the actual calculation on June 15. However, University notes, contrary to the assertions being made by CBG, that there is no "foundation" or other evidentiary requirement that an expert witness must prefile in writing all of the calculations that support an opinion or conclusion to which he is to testify. The rules of evidence generally applicable to these proceedings make it clear that expert witnesses may testify in the form of an opinion or inference. F.R.E. 702. Such testimony is not deficient because the expert has not disclosed the underlying facts or data that support the opinion, although the expert may be required to disclose such facts under cross-examination and the court can order such disclosure. F.R.E. 705. In Commission practice the Appeal Board has ruled, in ordering that a utility's witness would be required to disclose the calculations supporting a conclusion on a significant safety issue over objection raised on grounds the information was "proprietary", that the details pertaining to the correctness of a conclusion may be made available either in the prepared testimony or on the stand (under cross-examination). In the Matter of Virginia Electric Power Company (North Anna Power Station, Units 1 and 2), ALAB-555, 10 NRC 23, 27 (1979). Of course, testimony that is not adequately supported may be accorded less weight than testimony that is fully supported.



However, University did not withhold the calculation for any legal reason. The calculation supports University's claim and University had every interest in getting it squarely in the record. University has explained the circumstances surrounding the preparation and submission of the calculation exhibit (UCLA-14) (Tr. 1756-62 and off record discussion). As it was, University did not initially seek to have the exhibit admitted. But CBG sought to throw out the entire testimony of Dr. Pearlman on the grounds (CBG's "foundation" objection) that the details of the calculation which supported a conclusion of the testimony were not prefiled. Moreover, CBG engaged in an extensive and probing cross-examination of Dr. Pearlman on every aspect of the disputed calculation (Tr. 1764, 1766, 1768-69, 1773, 1795-87, 1789-94, 1796-97, 1800-1801, and 1806, for example). If CBG was prejudiced by lack of adequate notice of the details of the calculation that defect was remedied both by the nature and extent of the cross-examination and the fact that, at the Board's request, University agreed to recall Dr. Pearlman for further examination.

There are additional circumstances that are relevant to the Board's consideration of this matter. First, although in University's view the Wigner energy issue does not raise a significant safety question, the issue is complex and is further complicated by the fact that the parties are applying a calculational method that was devised for graphite-moderated reactors. Second, CBG's "calculation" in the declaration of Mr. Dupont was not set forth with particular clarity. University notes that it was the Board that asked CBG's witnesses if there was a supporting memorandum which revealed how the results were reached (Tr. 2920-21). Third, both UCLA and CBG have made changes to their calculations in order to refine the analysis or correct for errors. Finally, CBG cannot now

claim it has been prejudiced in this matter since it has been on notice of the calculation method and supporting arguments since July.

University submits that if the submission of its calculation in July was untimely, it was not unduly so, nor was the delay unreasonable under the circumstances as explained to the Board at the time. There was no legal compulsion to submit any calculation. On the contrary, the calculation, with the accompanying explanation, represents a comprehensive refinement over the calculations currently in the record. University submits that the information will be helpful to the Board and ought to be considered.

The neutron transport calculations of Mr. Ostrander are described in pages 13-18 of the second section of the Wigner energy testimony. These calculations are a separate, distinct and non-essential part of the Wigner energy calculation. The task of performing the computer code ("Monte Carlo") calculations was undertaken in June and July in an attempt to quantify an element of conservatism that had been expressed only qualitatively in the testimony of Dr. Pearlman on Wigner energy in the UCLA reactor. However, as explained in the section on University's graphite fire rebuttal testimony, the basic result of the calculations is relevant to new issues raised by CBG concerning certain damage effects in the graphite caused by irradiation.

The neutron transport calculations were never offered in evidence by University for the simple reason that the results of the calculations were not available at the time for submitting University's direct case. Computer code

had to be developed, debugged and verified. The code requires that data be input and output retrieved interactively in a tedious, time-consuming process. University was not prepared to submit written details of the calculation at the July session. However, during the July testimony of both Mr. Ostrander and Dr. Pearlman the fact that these calculations had been performed was brought out. The Board ruled that certain redirect of Mr. Ostrander on the subject went beyond the scope of the cross (Tr. 1594). The Board did not rule the calculations were inadmissible.

In preparation for the adoption of the rebuttal testimony Mr. Ostrander rechecked his calculations and uncovered an error which affects the results reported in the rebuttal testimony. University will soon report the correction which in effect reduces the calculated percentage of fission neutron energy that is absorbed in the water from 85% to 71%. This value does not directly enter any calculations in University's rebuttal except for the last two lines on page 8 of the Wigner Energy Calculation testimony. Since Dr. Pearlman's final temperature estimate objected to by CBG at Tr. 1593 (the 15<sup>0</sup> C estimate) was based in part on these calculations it is incorrect and for that reason University will not oppose CBG's motion to strike that last exchange. University notes that it has agreed to provide the Board and parties with the raw data of the calculations.

These neutron transport calculations are not integrated into any mathematical analysis essential to University's case. However, as a quantification of an important element of conservatism that is relevant to several different

issues, including the new issues raised concerning the graphite fire potential, the calculations provide useful information that ought to be in the record. Nevertheless, University most emphatically does not want these proceedings further delayed. If in the judgment of the Board this safety hearing could be expedited by not considering these calculations at this time University would be willing to withdraw this portion of the testimony without prejudice to University's right to offer the information at any later stage of these proceedings that may become necessary. In any event, University will provide the data for the calculations to the other parties for their examination.

2. Specific Responses to CBG's Objections to Wigner Energy Testimony

Most of CBG's specific objections take issue with the substance of what is said in the rebuttal and not with its appropriateness as rebuttal testimony. University's Wigner Energy rebuttal directly responds to the new issues raised in CBG's Wigner Energy Rebuttal.

Answer 1 provides a general response to CBG's rebuttal testimony. Experts are permitted to testify as to their conclusions.

CBG's objections to the first five pages of Answer 2 are based on the argument that because the Wigner Energy calculation was not admitted in July University cannot rely on any aspect of it in responding to the new issues raised by CBG. That argument is incorrect. CBG's rebuttal provides new and independent grounds for considering the responses of University in its rebuttal

notwithstanding that the information may have been excluded from an earlier session. If CBG had not wanted to hear any more about the calculation it should not have raised the new issues in its rebuttal. University notes that CBG does not object to the last sentence on page 5 for the obvious reason that the statement is favorable to CBG's position.

The response on page 4 is relevant to the credibility of CBG's Wigner Energy experts. University had intended to cross-examine CBG on its incorrect use of the Bradshaw thesis, but CBG substituted the Taylor thesis value prior to its testimony. University is entitled to show that CBG's experts did not know that the calculation uses a value for the thermal flux and not the total flux (Tr. 1800-1801). The fact that a correction is made does not remove the matter from the record and is always relevant to the credibility of the witness, particularly when the explanation for the mistake is not believable as it is here.

The top paragraph on page 6 responds directly to CBG's Answer 7. It is one thing for a witness to make a mistake which when pointed out is then corrected. It is quite another to make a mistake and attempt to cover it up with an explanation that is patently false. University is entitled to demonstrate that CBG's witnesses are not to be believed based, in this instance, on the explanation CBG provides in Answer 7 to its rebuttal. In addition, the explanation CBG provides at the top of page 4 of its objections to University's rebuttal is also not to be believed: there are no "Kelvin" temperature values anywhere in CBG's testimony or previously-filed declarations concerned with

Wigner energy. The credibility of the witness in testifying is always at issue and is an appropriate matter to be addressed in rebuttal.

The bottom paragraph on page 6 and the three paragraphs at the top of page 7 respond to the new claims made by CBG in its Answer 8.

The bottom paragraph on page 7 continuing to the top of page 10 is a response to the entirely new and discursive argument that appears in CBG's Answer 9. CBG's objections really go to the merits of what is being said. CBG's objections to lack of "foundation" are mistaken. CBG has the opportunity to explore the basis for any statement made on cross-examination. CBG's objection to the last paragraph of Answer 2 on page 10 asserts that the neutron transport calculations were denied admission to the record. University has responded above on this subject and wishes to note here only that those calculations are directly relevant to the claims apparently being made by CBG concerning water moderation effects in its Answer 9 although CBG's precise claims are unclear.

Answer 3, which reports the recent UCLA flux measurements which appear as attachments, responds directly to CBG's substitution of the Taylor thesis value for the Bradshaw thesis value done by letter of September 26, 1983. This issue was discussed above. University regards the Taylor thesis value as irrelevant to current operations if for no other reason than it was made with a different core-loading. The Board overruled University's objection that the 1962 Taylor thesis value was irrelevant. University has not had an opportunity to respond to CBG's use of this value and is entitled to respond in rebuttal. CBG's hearsay objection is unfounded. University's witnesses participated in the measurements and will be prepared to testify respecting them.

3. Additional Objections to "the Pearlman Material"

University has responded to CBG's objection to the Wigner energy calculation of Dr. Pearlman. Moreover, University has stated it will not oppose CBG's motion to strike Dr. Pearlman's reference to the "15<sup>0</sup> C" temperature rise.

University does not dispute that this portion of its testimony is basically an expansion of the Wigner energy calculation identified at the July session. The "expansion", however, is an attempt to respond to CBG's persistent requests for all the details of the calculations and supporting data. Within reasonable limits University has attempted to provide what CBG has requested. CBG has no cause to complain that the calculation is expanded. CBG's assertion that the Wigner energy calculation was "purposely withheld until the last moment" is false. University notes that CBG, at the bottom of page 2 of its objections, does not object to the material on page 3 of the calculation that supports a higher value for the stored energy, a conclusion that is favorable to CBG's position.

University has responded previously to CBG's objections to the neutron transport calculations. As explained, the calculations were performed to answer a question raised informally by the reactor staff during the preparation of Dr. Pearlman's testimony on Wigner energy. Developing, debugging and running the program consumed considerable time and the description of the calculation and results were not available when University submitted its testimony in July.

University's Rebuttal on Credibility of CBG's Fission Product Release Model

University's rebuttal responds to the fission product release model proposed by CBG's witnesses Dr. Anderson and Ms. Reid at the October hearing. In response to CBG's introductory comments, University has never stated that the iodine in the UCLA fuel existed in the form of a gas. Moreover, the UCLA SAR points out the extreme conservatism of the Battelle study release calculations and performs separate calculations of releases in the event of a fuel-handling accident which yield results an order of magnitude lower than those in the Battelle study (UCLA Application, pages III/8-7 to 8-12).

University is not aware of any rule-making on source term issues applicable to the UCLA reactor that would preclude consideration of the testimony being offered by University in response to the clearly new issues raised by CBG. This testimony on the form of the iodine in the fuel is being offered to support the extreme conservatism of both the Battelle study and the UCLA SAR fission product release estimates.

Answer 1 responds to the assertions made by CBG in Answer 1 of its "Fuel Handling/Core Crushing Rebuttal" concerning the Battelle study. University's witnesses are entitled to express their opinion on the same topic.

CBG objects to the material on page 5 of Answer 2 because it supposedly contradicts the assumption of the Battelle study and the UCLA SAR. However, those documents expressly state that the calculations are conservative. CBG's witnesses dispute that assertion and it is appropriate rebuttal to explain the reasons for the conservatism.



CBG's "foundation" objections to the top paragraph on page 7 are without merit. CBG will have an opportunity to explore the basis for any of University's statements during cross-examination.

CBG objects to two sentences on page 8. As explained above, these statements support the conservatism of the fission product release calculations of Staff and University. It is the conservatism of these calculations that CBG is disputing with its rebuttal witnesses.

Answer 4 responds to CBG's interpretation of the data in the chart on page 4 of its "Fuel Handling/Core Crushing Rebuttal." CBG's objection really goes to the merits of the matter being disputed.

Answers 5, 6 and 7 provide relevant empirical data supporting the assertions made by University in rebuttal about the form of the iodine in the fuel and on metal surfaces. This directly responds to the assumption made in the model proposed by CBG's witnesses that gas bubbles form in the fuel and are available to escape due to microcracking. The fact that matters are under intense review within the agency, are hotly contested or are embroiled in controversy is no objection to their consideration in a proceeding unless they are currently the subject of rulemaking. Further, University's testimony on these matters is not being offered to establish new source term parameters. It is offered to rebut the totally unsupported and hypothetical model proposed by CBG on rebuttal and received in evidence by the Board.

Answer 8 responds to CBG's claim that fission tracks can be found in MTR fuel. CBG objects on the grounds that it is hearsay. Hearsay is not an objection in these proceedings. CBG will have an opportunity to demonstrate that it is not reliable hearsay. Moreover, any such objection would go to the weight to be accorded the testimony.

University's Rebuttal to CBG's Testimony on Dispersion

University's rebuttal testimony responds to several issues raised in CBG's testimony on dispersion that are not raised in its earlier declarations. CBG's January declaration of Mr. Aftergood was concerned with applying certain regulatory guide dispersion formulas to the situation of the UCLA reactor. Mr. Aftergood's declaration does not consider actual meteorological conditions relevant to the UCLA reactor situation, nor does it consider the relevant empirical data on dispersion.

Answer 1 responds to CBG Answer 8 of "Panel IV Rebuttal" and to the claims generally made by CBG's witnesses that the Sagendorf empirical data cannot be used to predict dispersion at UCLA because of the difference in weather conditions and other factors. (Tr. 3166-67, 3170, 3171, 3173).

Answer 2 extends the response to Answer 8 and to CBG's claim that its model is to be preferred to the empirical data of Sagendorf by pointing out that the Gaussian plume dispersion model is extremely unreliable under the conditions of the UCLA reactor. The hearsay objection goes to the weight to be attached to the testimony.

Answer 3 responds directly to the claims made in CBG's Answer 8 by explaining why "close-in" dispersion cannot be predicted by simple Gaussian plume model extrapolation, which CBG's witnesses disputed during their testimony in October. The explanation is supported by relevant data and references. The issues raised in CBG's rebuttal Answer 8 are not raised in the January declaration of Mr. After good.

Answers 4 and 5 attempt to address the implicit assumption in the crushed core accident dispersion situation that all the gas will be dispersed. The response points out that surface area effects in a crushed rubble bed reduce gas dispersion. This information does not rebut a specific CBG claim and can be omitted without prejudice to University's case.


Pages 7-10 of University's rebuttal respond to CBG's Exhibit C-IV-7 (Nuclear Theft, by Willrich and Taylor, excerpts). The response relates to the dispersion characteristics of plutonium not whether plutonium is dangerous. CBG is correct that the danger of plutonium was discussed in CBG's January declarations and could have been addressed in University's direct case. However, University questions how this matter got to be an issue in this hearing. What contention does this issue fall under? When did the Board direct that it be considered? The only plutonium at UCLA's facility is contained in the sealed Pu-Be neutron source and the use of the source is unrelated to reactor operations. University submits this plutonium issue is unrelated to the central safety issue being considered by the Board in this phase of the proceeding. In any event, University is willing to withdraw the testimony if this hearing can be expedited thereby.

III. CONCLUSION

University respectfully requests that the Board overrule CBG's objections to University's rebuttal testimony.

Dated: December 2, 1983.

DONALD L. REIDHARR  
GLENN R. WOODS  
CHRISTINE HELWICK

By   
WILLIAM H. CORMIER  
Representing UCLA

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket No. 50-142
THE REGENTS OF THE UNIVERSITY	)	(Proposed Renewal of Facility
OF CALIFORNIA	)	License Number R-71)
	)	
(UCLA Research Reactor)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of the attached: UNIVERSITY'S  
RESPONSE TO CBG's OBJECTIONS TO REBUTIAL TESTIMONY

in the above-captioned proceeding have been served on the following  
by deposit in the United States mail, first class, postage prepaid,  
addressed as indicated, on this date: December 2, 1983.

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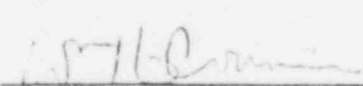
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THE REGENTS OF THE UNIVERSITY  
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