

confusion is created by the fact that, as modified, the Contention refers to not only the 1960 Hazards Analysis for this reactor (which has been withdrawn), but the 1980 Safety Analysis Report as well (which has been amended). CBG has indicated that this contention relies for its basis on the 1960 Hazards Analysis. With this clarification the modification to the contention is accepted. We have also reviewed Staff's objections to other modifications and CBG's response and approve those modifications.

Staff identifies Contentions I.2.a. and V.3. as Contentions which should have been modified to reflect the withdrawal of the 1960 Hazards Analysis. We disagree. Contention I.2.a. asserts that the 1980 Safety Analysis Report repeats almost verbatim the 1960 Hazards Analysis. CBG is entitled to make this assertion if it chooses. Similarly, Contention V.3 simply relies on the 1960 Hazards Analysis for a certain proposition. The withdrawal of this Analysis as a basis for the application does not also withdraw it as a basis for a contention.

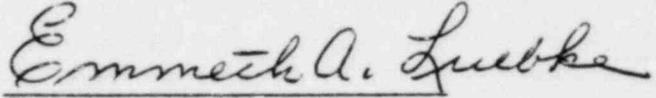
A restatement of the contentions as modified is attached.

In consideration of the above, it is this 16th day of August,
1982

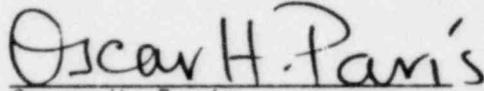
ORDERED

CBG's modifications to its Contentions are approved.

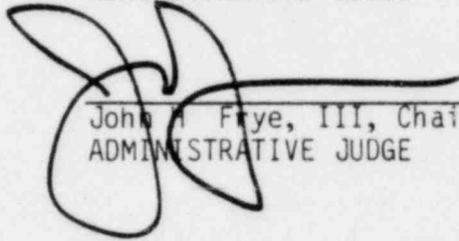
THE ATOMIC SAFETY AND
LICENSING BOARD



Emmeth A. Luebke
ADMINISTRATIVE JUDGE



Oscar H. Paris
ADMINISTRATIVE JUDGE



John H. Frye, III, Chairman
ADMINISTRATIVE JUDGE

CBG'S CONTENTIONS CONCERNING THE APPLICATION FOR RENEWAL
OF OPERATING LICENSE FOR UCLA RESEARCH REACTOR, ADMITTED
PURSUANT TO BOARD ORDER OF MARCH 23, 1981, AND MODIFIED
PURSUANT TO BOARD ORDER OF AUGUST 16, 1982

- I. The application, together with its supporting appendices, is deficient in failing to meet the minimum standards for such applications. Specifically:
 1. The application reference to experimental vibration of the reactor is misleading.
 2. The application submitted by UCLA was not "original" in all respects as shown by:
 - a. its submission of a 1980 Safety Analysis Report (SAR) which repeats virtually verbatim its 1960 Hazards Analysis,
 - b. its submission of an environmental impact appraisal which repeats virtually verbatim the language of a 1974 AEC memorandum on "Environmental Considerations Regarding the Licensing of Research Reactors and Critical Facilities," and
 - c. its inclusion by reference of "Analysis of Credible Accidents for Argonaut Reactors" by Hawley, et al., and "Fuel Temperatures in an Argonaut Reactor Core Following a Hypothetical Design Basis Accident (DBA)" by Cort.
 3. Material and inaccurate statements have been submitted in both the 2/80 application and 6/82 amendments:

- a. "The reactor and its supporting laboratories will be used for the education of senior undergraduate and graduate students in nuclear engineering and related sciences. In addition to formal courses and demonstrations, the reactor will be used to support research at the M.S. and Ph.D levels." Page 5, 2/80 application, as amended 6/82.
- b. "No structural weaknesses (earthquake vulnerability) have ever been identified." Page 7, 2/80 application, as amended 6/82.
- c. "No attempt has been made to alter the content and provisions of the technical specifications other than the four changes noted in the forward to the technical specifications." Page V/1, 2/80 application. This statement is inaccurate because:
 - (i) the excess reactivity limits were changed from $\% \Delta k/k$ to \$;
 - (ii) the definition of 'annual' for the purpose of instrument calibration requirements has been changed from 12 months;
 - (iii) the requirements to do heat balance instrumentation calibrations has been removed;
 - (iv) the requirement that ALARA be met has been removed;and

- (v) the specification regarding exhaust stack height, flow rate out of the exhaust stack, and access restrictions to the roof area have been altered.
- d. "No deep wells have been drilled on the campus of UCLA or in the vicinity of the campus." Page III/3-1, 2/80 application, as amended 6/82.
- e. "Accidents ranging from failure of experiments to the largest core damage and fission product release considered possible result in doses of only a small fraction of 10 CFR Part 100 guidelines and are considered negligible with respect to the environment." Page II/3-1, 2/80 application, as amended 6/82.
- f. "There are no suitable or more economical alternatives which can accomplish both the educational and the research objectives of the facility." Page II/5-1, 2/80 application, as amended 6/82.
- g. "SPERT and BORAX tests showed that plate type fuel elements survived step radioactivity insertions of \$3.54." Page V/3-6, and parallel statement, 6/82 amendments, page V/3-7.

II. The Applicant has applied for the wrong class of license. Applicant has applied for a Class 104 license despite the fact that in the past, more than fifty percent of reactor funding and more than fifty percent of the hours of reactor usage have been devoted to the sale of services, rather than research or education. Given this history, and without any indication that Applicant intends to change reactor usage, Applicant under 10 CFR § 50.21(b) and 10 CFR

§ 50.22 should have applied for a Class 103 license.

Specifically:

Applicant should apply for a Class 103 license because

- a. Applicant's financial statements indicate that more than half of the reactor funding comes from sources other than the UCLA School of Engineering and Applied Sciences, and
- b. More than half of the reactor operating time is spent on commercial, non-educational projects.

III. Applicant has failed to demonstrate adequate managerial and administrative controls in the application, as required by 10 CFR § 50.34(b)(6)(ii), and further, has demonstrated throughout its operating history grossly inadequate controls. These inadequacies make it impossible to find that Applicant's managerial and administrative controls are adequate to responsibly protect the public health and safety. Specifically:

1. Applicant failed to provide the information required in 10 CFR § 50.34(b)(6)(ii).
2. Applicant failed to get prior approval from the Reactor Use Committee or the Reactor Director for changes in reactor systems and for non-standard experiments.
3. Applicant failed to get prior Commission approval for facility changes.
4. The Lab Director and/or Assistant Director were absent for extensive periods of time and provided inadequate supervision.

5. Unlicensed visitors to the reactor facility were invited to operate the reactor controls in violation of 10 CFR §§ 50.54j, k, l; 55.2; 55.3a and b; 55.d and f; and 55.9a and b.
 6. Applicant kept inadequate records and lost a maintenance log, and
 7. Applicant failed to hold administrative meetings and conduct reviews required by the Technical Specifications.
- IV. Applicant has been consistently cited for violations of NRC regulations as well as violations of the provisions of its own Technical Specifications. This consistent pattern of regulatory non-compliance and the lack of assurances that the pattern will not continue in the future indicates that the Applicant cannot adequately demonstrate that future operation of the facility will comply satisfactorily with the regulations to protect the public health and safety.
- V. The amount of excess reactivity which is permitted by the Technical Specifications to be installed in this reactor is too great in that it does not provide a sufficient safety margin and thus could lead to a serious power excursion which could bring about melting of the fuel cladding and significant release of fission products, seriously endangering the public health and safety. Specifically:
1. The amount of excess reactivity permitted at this facility under its license should be limited to less than that needed for prompt criticality.

2. The reactor has lost several significant self-limiting features in that
 - a. the level of excess reactivity has been changed so that it is now higher than that needed for prompt criticality,
 - b. a deflector plate which prevented repeated excursions has been removed,
 - c. the assumption that there is a large negative temperature coefficient appears to be wrong in light of information regarding a positive graphite temperature coefficient, and
 - d. the reactor's power level has been increased from 10 Kw to 100 Kw.
3. The currently licensed amount of excess reactivity (2.3% k/k) could cause melting of the fuel cladding according to the 1960 Hazards Analysis.
4. The value for the reactor's void coefficient has changed since the initial calculations were done.
5. Through the conversion of $\% \Delta k/k$ as the excess reactivity limitation in the current Technical Specifications to \$ in the proposed Technical Specifications and the use of a different from that used in the Hazards Analysis, the Applicant may have changed the limitation, thus presenting the potential for a serious excursion and melting of the cladding.

6. The assumption that Borax I and Spert I test results can be extrapolated to the UCLA reactor is questionable, particularly in the absence of error bars for the Borax I and Spert I data.
8. The analyses of excess reactivity characteristics of this reactor fail to include an adequate review of the current nuclear safety literature relating to the relationship between excess reactivity and destructive power excursions.
9. The analyses regarding excess reactivity are based on unverified and unidentified assumptions which can be used merely to estimate a range of excess reactivity additions and their possible hazard and is thus inadequate to support present licensed limits. Additionally, error bars have not been provided for the computations and analyses.
10. The reactor has a pneumatic "rabbit" system that allows rapid insertion of excess reactivity. This system did not exist when the reactor was built and has experienced frequent operating problems since installation.
11. The proposed licensed limit on combined experiments or the current licensed limit could cause melting of the fuel cladding.
12. Removal of a beam tube could cause insertion of excess reactivity into the reactor because neutron absorption would be removed and reflection savings would be increased.
13. Applicant has violated excess reactivity limits suggesting it is impossible to prevent possible excursions.

14. Applicant failed to analyze the possibility of eutectic melting.

VI. Applicant has in the past and is at present emitting excessive radiation, violating radiation standards, and conducting inadequate monitoring. Applicant has failed to demonstrate in its application or in its recent performance any evidence that these conditions can reasonably be expected to improve in the future, in the absence of which demonstration, grant of an operating and SNM license cannot be made without undue threat to public health and safety.

Specifically:

2. Several conditions which cause present emissions to be in excess of applicable standards have not been changed; therefore, emissions which are in excess of applicable standards can be expected in the future.
3. Applicant has not in the past nor in the present application been able to reasonably demonstrate that exposure in unrestricted areas is not in excess of applicable standards because it lacks an adequate radiation monitoring system.
4. Applicant has not complied in the past and presently does not comply with the radiation standards in 10 CFR §§ 20.1c, 20.106(b)(1) and (2), 20.106(c), and Part 20, Appendix B.
5. Applicant does not now, has not in the past, nor can it reasonably assure that it will in the future meet the requirements of section V.d of its current technical specifications which states that "[t]he release of radioactivity

from the reactor facility shall be kept to as low a level as practicable."

VII. The reactor has in the past experienced a persistent pattern of numerous unscheduled shutdowns, abnormal occurrences, and accidents. These occurrences are so pervasive that they evince a pattern of unreliability which makes it impossible for Applicant to reasonably assure that the reactor can be operated in a manner which does not endanger the public health and safety.

VIII. Radiation exposure to the public from the maximum credible accident at the UCLA reactor would be unacceptably high. Specifically,

1. the 1980 Safety Analysis Report and 1960 Hazards Analysis, despite being based on unrealistic assumptions which minimize the expected public exposure, postulate an unacceptably high radiation dosage of 1800 Rems thyroid. The insufficiently conservative assumptions are:
 - a. assumption of a release limited to only 10% of the volatile fission products and none of the non-volatile products,
 - b. assumption that the reactor has been operated at 10 Kw long enough to have attained equilibrium concentrations of relatively short-lived fission products,

- c. assumption that the reactor is in a two-story building with possible exposure to the public occurring outside the building,
- d. assumption of a building leakage rate of 20% of the reactor room volume per hour for a 30 mile per hour wind, assumed to be directly proportional to wind velocity,
- e. furthermore, the assumptions upon which the analysis was based have not been adequately tested nor have they been adequately reviewed against the current nuclear safety literature regarding dose and dispersion models.

IX. The Applicant in the past has not adequately maintained its equipment nor calibrated its instruments properly, thereby increasing the chances of equipment failures and erroneous instrument reading. Due to this failure, the NRC cannot conclude that the issuance of a license for this facility will not be inimical to the public health and safety. Specifically:

1. Applicant has failed to calibrate instruments at the required intervals.
2. Applicant's personnel are not familiar with the calibration requirements of their own technical specifications.
3. Applicant has failed to maintain, or has lost, calibration records, making accurate calibrations and data interpretation impossible.

4. Applicant has significantly underestimated radioactive emissions for extensive periods of time due to errors in its calibration methods.
 5. Applicant has had continuing problems with heat balance calibrations.
 6. Applicant has not devoted adequate time to maintenance and calibration.
- X. The relicensing of the UCLA nuclear reactor is a major Federal action which will significantly affect the quality of the human environment. Therefore, an Environmental Impact Statement must be prepared by the NRC. There are suitable alternatives to the operation of this reactor which would not involve a significant impact on the environment.
2. The relicensing of the UCLA research reactor will significantly affect the quality of the human environment because
 - a. A design basis accident at the reactor is likely, and would expose great numbers of people to dangerous radiation dosages.
 - b. The reactor is located on a densely populated campus with classroom and office facilities enveloping the reactor building on three sides and above the building.
 - c. The reactor lacks inherent and engineered safety features, including the lack of a containment structure.

- d. A design basis accident is likely because of the reactor's use as a training facility and because of the history of lax administrative controls, abnormal occurrences, unscheduled shutdowns and minor accidents.
 - e. The facility is sited in a seismically active area and suffered significant damage in the 1971 earthquake.
 - f. The facility utilizes highly enriched (93%) fuel and is vulnerable to criticality accidents.
 - g. A design basis accident would result in fission product releases in amounts that would endanger the public health and safety.
3. Therefore, the NRC must prepare an EIS which considers the following alternatives:
- a. Training, research and education could all be accomplished at other existing facilities located in southern California.
 - b. The reactor could be used as a simulator without fuel for the training of reactor operators.
 - c. Commercial users of the reactor could rent reactor time at other facilities in southern California.

4. The benefits provided society by the reactor do not outweigh the costs of operating the reactor because
 - a. Only a very small percentage of the reactor operating time is devoted to training operators and educating students.
 - b. Most of the important and significant research done at UCLA which utilizes nuclear reactors is accomplished at other facilities.
 - c. The research that is done at this facility could be accomplished at other facilities in southern California.
 - d. A major percentage of the reactor operating time is devoted to commercial projects for paying customers.
 - e. The reactor costs the University over \$150,000 to operate and would cost over \$750,000 to decommission in 1980.
 - f. Over the proposed twenty year license period the beneficial uses of the reactor are likely to decline while the risks and costs associated with its operation are likely to increase.

XII. The safety features of the UCLA reactor are inadequate to protect the public health and safety. Certain engineered safety features are lacking; particularly lacking are features that are redundant and independent. Specifically:

1. The reactor is surrounded by a housing rather than by an adequate containment structure.

2. The high level radiation monitor system which activates the scram system is inadequate.
3. The reactor does not have an adequate boron-injection system, a radioactivity removal system, emergency liquid and gaseous emissions holding tanks, HEPA filters, an emergency core cooling system, or spare control blade motors.
4. The reactor lacks adequate shielding and access restrictions in areas where the public might be exposed to radiation.
5. The reactor has inadequate or non-existent interlock systems.
6. The reactor lacks missile shields, particularly for control blade drives.
7. Graphite used in reactors undergoes physical changes and thus poses a hazard.
8. The reactor has a history of fuel failures, particularly tie bolt failures.
9. The reactor's control blades are inadequate.

XIII. The information which Applicant has provided regarding the special nuclear materials license is inadequate to meet the requirements of 10 CFR 70.22(a)(7) and (a)(8) and 70.24(a)(1), (2), and (3). Furthermore, the enrichment level requested and the quantity requested of SMN are excessive and thus pose an unnecessary threat to public health and safety.

XIV. Applicant in its Safety Analysis Report has failed to adequately analyze problems common to Argonaut type reactors. In the absence of such an analysis, Applicant cannot reasonably assure that the operation of the reactor will not endanger the public health and safety.

XV. The operating license for this facility should be not be renewed because the adverse consequences which flow from its location and siting are too great. The following circumstances have exacerbated the adverse consequences of a facility accident and of normal operation. Specifically:

1. The density of the population in the unrestricted area immediately surrounding the reactor and within a ten-mile radius of the reactor makes the probable consequences of an accident at the facility unacceptably great. This population density has increased greatly over the past twenty years.
2. The reactor building which was originally separated from any other structures is now enveloped on three sides and above by classroom and office buildings. These buildings house a large population during working hours in close proximity to the reactor.
3. The heat, air-conditioning, and air-flow systems of the new buildings enveloping the reactor building interface directly and indirectly with those systems at the reactor facility.

XVI. The UCLA reactor and the principal component pieces of reactor equipment are so old that relicensing the reactor, particularly for a twenty-year period poses an unacceptable hazard. Because of the age of the reactor it is very difficult to obtain spare parts and key safety features required of newer facilities--specifically, an emergency core cooling system and a containment structure--are lacking in this facility. In addition, the following items of equipment are unreliable, difficult to repair and/or replace: reactor instrumentation and console instrumentation.

1. The reactor was built in 1959 by a company which is no longer in the reactor business.
3. The reactor equipment is old and outdated and deteriorating. The Applicant has not devoted the money to properly update or maintain the equipment in the past and without a change in Applicant's practices the equipment will continue to deteriorate with age.

XVII. The UCLA reactor should not be licensed because the physical location and site characteristics of this reactor unacceptably endanger the public health and safety. Furthermore, the license application does not contain current information and analysis concerning the site related safety problems sufficient to support the issuance of a license. Specifically:

1. The reactor is located on one of the most seismically active regions of the country.

3. The reactor sustained significant damage in the 1971 earthquake.
4. The existence of three floors of classrooms and offices, supported on columns, directly above the reactor structure creates a significant danger of collapse through the reactor building roof and onto the reactor itself in the event of an earthquake.
5. The application does not contain the current information on siting required by 10 CFR 50.34(b)(1).

XVIII. The Applicant does not possess and cannot give reasonable assurance of obtaining funds sufficient to cover the costs of operating the facility. Given this lack of assurance, Applicant fails to qualify financially for an operating license.

Specifically:

1. Applicant has deferred maintenance in the past due to lack of funds.
2. Applicant, as a public institution and subject to yearly funding, cannot reasonably assure that it will obtain sufficient funding for operation of the reactor from year to year.
3. If Applicant, as contended by Intervenor, is operating a facility described in 10 CFR 50.21(b) or 50.22, Applicant has not met the requirement of 10 CFR 50.33(f) that: Applicant possess or have reasonable assurance of obtaining the funds

necessary to cover the estimated cost of operation for the license period, plus the estimated cost of permanently shutting down the facility and maintaining it in a safe condition.

XIX. The Application's Safety Analysis is flawed because it does not include an analysis of the 'maximum credible accident' or a 'design basis accident'. In providing such an analysis the following hazard scenarios for the facility have not been considered.

1. Sabotage, such as explosives being thrown at or placed on the reactor itself, causing major damage and broken fuel plates.
2. Airplane crash such as a DC-10 or Boeing 747 scheduled to arrive at LAX or Burbank airports crashing to the the reactor room, or into the void area above the reactor, causing the building or portions thereof to collapse breaking apart fuel assemblies and releasing radiation.
3. Multiple failure modes--worst possible series of events.
4. Operator error which leads to design basis accident.

XX. Applicant has in the past and is at present taking inadequate fixed site physical security precautions to protect against radiological sabotage as well as protection against theft and diversion of the special nuclear materials it possesses pursuant to 10 CFR 73.60 and 73.67, thus indicating that the Applicant's

physical security plan is inadequate and its implementation of said plan is inadequate. Applicant has failed to demonstrate in its recent performance any evidence that its physical security measures can reasonably be expected to improve in the future, in the absence of which demonstration grant of an operating license and a SNM license cannot be made without undue threat to public health and safety.

1. Applicant has at its facilities areas containing vital equipment and special nuclear materials, areas which should be adequately protected against possible acts of radiological sabotage or attempts at theft or diversion of SNM, and to which access should be adequately controlled. Specifically:
 - a. the reactor room,
 - b. the control room,
 - c. the third floor equipment room,
 - d. the fresh fuel storage area, and
 - e. the "restricted area" immediately surrounding the reactor stack and exhaust fan on the eighth floor of Boelter Hall.
2. There exist areas adjacent to the above-mentioned vital and material access areas which should be sufficiently isolated and secured to prevent them from being used as penetration points or staging areas for penetration of the vital and material access areas. Specifically:

- a. The "access court" used for truck loading and unloading, located between the reactor building and the Engineering Building to its west,
 - b. the Tokamak lab adjacent to the reactor room,
 - c. the main entrance (reception lobby) to NEL,
 - d. the presently unrestricted roof areas of Boelter and Math Sciences adjacent to the "restricted area" around the reactor stack,
 - e. the rooms within Math Sciences whose windows open to the "restricted area" around the reactor stack, and
 - f. the entryway for the single locked door to the "restricted area" around the reactor stack.
3. Applicant's physical security measures for its vital and material access areas and the areas adjacent to them have been in the past and are at present inadequate to properly protect, isolate, and control access to those areas in that
- a. presence by guards and watchmen is too infrequent;
 - b. methods for detecting concealed guns, explosives, or incendiary devices that could be carried by people entering these areas, and SNM that could be carried by people leaving these areas, are inadequate;
 - i. Applicant lacks mechanical devices to detect firearms, explosives, incendiary devices, or SNM and

- ii. Applicant fails to routinely search visitors and staff for firearms, explosives, incendiary devices, or SNM
- c. physical barriers to penetration are inadequate;
 - i. fences and walls are too short, lack barbed wire at the top, and otherwise fail to fully enclose the area to be protected
 - ii. windows and doors in walls that are to act as physical barriers are made of construction and fastening of insufficient strength such that the integrity of the wall is lessened by the opening provided by the windows and doors
 - iii. dual or redundant barriers are lacking; penetration of these areas can be made by breaching a single barrier
- d. security measures with regard to keys and locks are inadequate; and
 - i. doors that should be kept locked have been left open
 - ii. locks are of insufficient construction and strength to prevent tampering and penetration
 - iii. too many keys to areas that are supposed to be locked have been given out
 - iv. control of those keys is inadequate in that copies can be made, keys can be lent to unauthorized

personnel, and keys that are signed out are not required to be returned when not in use

- e. procedures to control access are inadequate.
 - i. groups that are too large for adequate supervision are given tours of the facility by one or two staff people alone
 - ii. these tours include visits to vital and material access areas
 - iii. NEL personnel unassociated with the reactor have ready access to vital and material access areas through egresses connecting their parts of the NEL complex with the parts of the complex utilized by the reactor.

XXI. Applicant's present Emergency Response Plan is insufficient to demonstrate that the plan provides reasonable assurance that appropriate measures can and will be taken in the event of an emergency to protect public health and safety and prevent damage to property.

1. The prohibition against notifying non-university individuals until instructions to do so come from the Campus police unnecessarily delays emergency response.
2. The requirement that the evacuation of Boelter Hall and the Math Sciences addition be cleared through the Vice Chancellor's office entails unnecessary delay.

3. The plan does not adequately provide for alternative personnel with evacuation authority.
4. The plan does not provide for alternative personnel with the authority to carry out the role of Health Physicist, as general director and supervisor of emergency response.
5. Applicant does not have adequate radiation measuring devices to accurately determine the extent and seriousness of an accident which would make the University initiate its emergency response plan.
6. There is no indication that a viable plan for evacuating the entire campus exists.
7. The plan does not provide for any emergency centers other than the UCLA Medical Center, despite the fact that it might be shut down in the event of a major accident.
8. The plan fails to indicate which equipment and what quantities of it are available at each equipment location listed in the plan.
9. The training exercises and drill specified in the plan are not carried out on a regular basis and therefore the plan will be ineffective in the event of an actual emergency.

XXIII. Applicant, in its license application has improperly dealt with intended changes to its facility. Specifically:

1. Applicant improperly relies on an intended future action-- installation of decay tanks--in defense of its ALARA performance.
 - a. Present and past observance of ALARA or other radiation standards cannot be defended by an action not yet taken.
 - b. Promise of intention to reduce the emissions in the future if relevant at all to the issue of license renewal, cannot be based on an action applicant asserts it intends to undertake in the future but has not yet proposed as an amendment to its license.
2. Applicant makes statements in its application regarding intended future actions that are contradicted by the facts and by each other.
 - a. On page V/3-11 of the application Applicant incorrectly states that an Amendment will be prepared and submitted prior to September 1, 1980, to authorize the installation of hold-up/decay tanks. No such Amendment was submitted prior to September 1, 1980.
 - b. The statement on page V/3-11 is further contradicted by a statement on page V/7-1, indicating the preparation of such a license amendment will "commence upon receipt of information confirming the acceptability of the present application."
3. If Applicant is permitted to rely on future intended actions in defense of a claim that relicensing will not likely lead to

emissions unduly harmful to the public health and safety, then all intended future actions linked to the decay tanks should be included, not merely those future actions which might tend to reduce emissions.

- a. The intention to increase the reactor use factor which Applicant has communicated to the Commission and public as being tied into the installation of decay tanks, and which would tend to increase emissions.
- b. The intention to increase reactors maximum permitted power, which Applicant has publicly stated its intention to do and which would likewise increase emissions.