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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Charles Bechhoefer, Chairman
Dr. Jerry R. Kline
Dr. Peter S. Lam

In the Matter of:	
GEORGIA INSTITUTE OF TECHNOLOGY	Docket No. 50-160-Ren
Atlanta, Georgia	ASLBP NO. 95-710-01-Ren
Georgia Tech Research Reactor	
Renewal of License No. R-97	

THE GEORGIA INSTITUTE OF TECHNOLOGY'S PROPOSED FINDINGS OF FACT AND CONCLUSION OF LAW

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PREFATORY COMMENT ON THE WANT OF ANY NECESSITY FOR DETAILED FINDINGS OF FACT IN THIS CASE

The ultimate or "bottom-line" issue before the Board on the intervention of Georgians Against Nuclear Energy (GANE) in this license renewal proceeding is single, brief, and clear-cut. It is whether, as GANE *alleges*:

> "management problems at GTRR [i.e. the Georgia Tech Research Reactor] are so great that public safety cannot be assured." *See e.g. Commission Memorandum and Order* CLI-95-12, Docketed October 12, 1995, p. 11; *GANE Amended Petition for Leave to Amend*, filed December 30, 1994, p. 10 [bracketed matter added for clarity].

The Georgia Institute of Technology (Georgia Tech) respectfully submits that not only has this single *ultimate* issue has been the subject of *direct* expert testimonial evidence *contrary* to GANE's assertion which is *uncontroverted*. Indeed all of the expert witnesses called to testify on the point, each and every one, including those called by GANE, uniformly and without exception testified against GANE on this "bottom-line" issue. In specificity, four senior and well-experienced NRC staff members (i.e. NRC Staff, Panel "A," namely Douglas M. Collins, Paul E. Fredrickson, Albert F. Gibson and George B. Kuzo) who were knowledgeable about the management problems experienced by Georgia Tech in 1987 and 1988 testified:

> "we believe the events in 1987-1988 were appropriately dispositioned by the Licensee and that the management problems which had been identified prior to restart were satisfactorily resolved. Accordingly, at the time the NRC Staff determined to allow restart of the GTRR in November 1988, the Staff was satisfied that the Licensee's management of the facility *provided reasonable assurance that the public health and safety would be adequately protected in the future*." See *NRC Staff, Panel "A,"* Tr. 1740 Insert, p. 8.[1]

In response to the direct question, "Do you agree with GANE's assertion that those events demonstrate that Georgia Tech's management of the GTRR facility presently fails to provide reasonable assurance of adequate protection of the public health and safety?", all four of these NRC experts answered "No." *Ibid.*

Senior NRC staff members Craig H. Bassett, Edward J. McAlpine and Marvin M. Mendonca (NRC Staff, Panel "B"), likewise rejected GANE's view of Georgia Tech's management of the reactor facility being inadequate to provide reasonable assurance of the continued protection of the public health and safety. See *NRC Staff, Panel "B,"* Tr. 2813 Insert, p. 5.

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[1] The citation of "Insert" and a page number following a transcript (Tr.) page number refers to the pre-filed written testimony (and pertinent page of that written testimony), admitted into evidence and inserted as a part of the record immediately following the cited transcript page.

Refuting GANE's bare "allegation" with *evidence* (i.e., expert opinion evidence nowise controverted by anyone), Messrs. Bassett, McAlpine and Mendonca testified:

> "Based upon our inspections of the facility and our reviews of these matters, we have concluded that the corrective actions taken and other improvements made by the licensee acceptably resolved the licensee's previous management and organizational problems. Accordingly, we have concluded that *the present organization and management* of GTRR provides reasonable assurance that the public health and safety, as well as the health and safety of GTRR employees will be protected in the event that license renewal is authorized." *Id.*, at p. 7 (emphasis added).

> "In sum, it is our conclusion that the licensee's *present* organization performs its various functions in a manner which assures proper attention to the protection of the public health and safety." *Id.*, at p. 29 (emphasis added).

Finally, NRC Senior Project Manager Alexander Adams, Jr., agreed with Marvin M. Mendonca in NRC Staff, Panel "C" testimony that GANE's *allegation* that Georgia Tech's "organizational structure" was inadequate lacked merit. The two based their opinion on:

> "our knowledge of the GTRR organizational and management structure, the checks and balances incorporated in that structure and the way in which GTRR organizational and management structure compares with the structures in placed in other research reactors and with applicable generic standards for research reactors." See *NRC Staff, Panel "C,"* Tr. 3171, Insert, p. 8.

It was the expert opinions of Messrs. Adams and Mendonca, based upon their experience as NRC Staff Members, that Georgia Tech's management of its facility complied with NRC regulatory

requirements and accepted standards for research reactor licensees. *Ibid.*

An independent expert, Dr. Nicholas Tsoulfanidis, a full professor of Nuclear Energy and for 21 years Radiation Safety Officer at the University of Missouri-Rolla, was asked by Ms. Pa Guilday of the Georgia Attorney General's Office in November 1995, if he would be interested in undertaking an evaluative investigation of the management structure, organization and functioning of Georgia Tech's nuclear research facility in the context of GANE's "management" contention. He agreed to do so. *Tsoulfanidis*, Tr. 1939 Insert, pp. 7-8. With reference to GANE's contention that "Management problems at the GTRR are so great that safety for the public cannot be assured," Dr. Tsoulfanidis was specifically asked whether as a result of his investigation and evaluation he had found any evidence which in his professional opinion substantiated GANE's contention. He responded under oath as follows:

> "I did not. Quite to the contrary, I found the Director of the Center, Dr. Ratib Karam, to be very safety conscious. My review indicated to me that the Nuclear Safeguards Committee was operating effectively with excellent membership, an outstanding feature of which is that some of the members are <u>not</u> Georgia Tech employees. Every year the Committee conducts an annual audit of the program, an audit which includes a review of all procedures--in my judgment and excellent practice. Based upon the structure of the radiation safety program at the Center, I found no evidence which would warrant concern on the part of the public about the safety of the Center's operation." *Id.* at pp. 10-11.

Dr. Tsoulfanidis further opined:

> "It is my professional opinion, based upon my education, experience and expertise in the area of nuclear engineering generally, and with specific reference to Health Physics and Radiation Protection, that the managerial organization and operation of the Georgia Institute of Technology's Neely Nuclear Research Center, as presently constituted and under its current director is not inimical to the reactor's safe operation or to the public safety generally." *Id.*, at p. 12.

Dr. Rodney D. Ice, who has served as the Manager of the Office of Radiation Safety at Georgia Tech's nuclear research center since 1992, is a Ph.D. in Health Physics (i.e., from Purdue University in 1967). *Ice*, Tr. 1992 Insert, p. 6. He has also been certified as a Health Physicist by the American Board of Health Physics since 1972. *Id.*, at p. 6. As Dr. Tsoulfanidis, the Manager of Georgia Tech's Office of Radiation Safety viewed Director Karam as "very safety conscious" (*Id.*, at p. 18), and stated his expert opinion:

> "It is my professional opinion, based upon my education and experience, including my work at the Neely Nuclear Research Center from 1992 to date, that the managerial organization and operation of the Center as presently constituted and under its current very safety conscious director, are not inimical to the reactor's safe operation or to the public safety generally." *Id*, at p. 20.

Dr. Ice was unaware of any occasion at the reactor since he has been there where he thought that safety wasn't being adequately assured. *Ice*, Tr. 2019.

Dr. R. A. Karam, the Director of Georgia Tech's nuclear research center, is a recognized international authority in the field of nuclear engineering, specifically including

nuclear safety. *Karam*, Tr. 2723 Insert, pp. 2-9. He has, at the request of the governments concerned, made evaluations and recommendations concerning the nuclear energy programs of Brazil and Japan (*Id.*, at p. 7), and for the United States Department of Energy *Id.*, at p. 8. He has published extensively in refereed scientific journals. *Id.*, at pp. 2-13. He testified:

> "It is my professional opinion, based upon my education and experience, that the managerial organization and operation of the Center, coupled with its now highly qualified Health Physicist staff and operators results in the highest level of safety respecting both reactor operations and the safety of the public generally." *Id.*, at p. 53 (emphasis by Dr. Karam).

Nor has this unanimity of expert opinion in contradiction of GANE's allegation concerning management problems at GTRR in any way been contraverted by the testimony of the two experts called by GANE. Robert M. (Bob) Boyd is a former head of the radiation safety unit at Georgia Tech's nuclear research center. He was there at the time of the managerial difficulties of 1987 and 1988, and was replaced in less than friendly circumstances in connection with those problems. Notwithstanding his admitted bitterness toward the Center in general, and his extreme hostility to the Center's July 1, 1987, "reorganization" in particular (a reorganization which ended Boyd's independent and admittedly largely unsupervised functioning by placing him under the control of Director Karam, see *Boyd*, Tr. 2366, 2368, 2370-2371, 2374-2376), Boyd agreed

with Drs. Tsoulfanidis and Ice that Dr. Karam was extremely safety conscious, and additionally conceded that the management structure he so despised and still feels so strongly about was:

> "not so serious as to say that the safety of the public cannot be assured,"

and that he:

> "did not consider the present organizational structure to constitute an immediate health hazard." *Boyd*, Tr. 2396.

Dr. Bryant Copcutt, who had been the Radiation Safety Officer at the University Virginia for a number of years before a short stint of slightly over three months at Georgia Tech, was also called as an expert witness by GANE. He too disliked the organizational format he found at Georgia Tech. *Copcutt*, Tr. 1107, 1111. It gave him less independence and autonomy than he had been accustomed to at the University of Virginia. *Copcutt*, Tr. 1079, 1102, 1104, 1107, 1111. Not liking what he considered to be "micromanaged" (*Copcutt*, Tr. 1107, 1169), coupled with an employment opportunity at a considerable higher salary in California, caused Coputt to view his employment at Georgia Tech as a "career mistake" on his part, and he resigned. *Copcutt*, Tr. 1105, 1107, 1259.

Dr. Copcutt conceded that during the brief time he was at Georgia Tech he: (1) did not know of a single occurrence where, in his opinion, a matter which should have been documented wasn't (*Copcutt*, Tr. 1160, 1164), (2) that as of the time he resigned, he did not know of any regulatory violations

which had not been rectified (*Copcutt*, Tr. 1162), (3) that he was unaware of any safety problem that wasn't being handled properly (*Copcutt*, Tr. 1164), (4) that he couldn't point to any instance where Dr. Karam's solution to a problem was either improper or inadequate (*Copcutt*, Tr. 1010, 1064), and (5) that he was unaware of any instance where Dr. Karam's solution to a problem compromised radiation safety. (*Copcutt*, Tr. 1164). He said that during his employment he had identified various safety issues, but that all of them had been resolved. (*Copcutt*, Tr. 1165). He wasn't aware of anything not reported to NRC which he thought should have been reported. *Copcutt*, Tr. 1040.

In sum, all of the witnesses qualified to testify as experts who addressed the ultimate issue, including GANE's own experts, have in sworn testimony directly contradicted GANE's contention that the management problems at GTRR are so great that public safety cannot be assured. Given this unanimity of *direct expert opinion evidence* against GANE's bare "allegation," we submit that in this proceeding, there is an absence of any real <u>evidentiary</u> dispute on the single ultimate issue which is involved in the case--the adequacy of the reactor's management, structurally and functionally, to operate the facility safely. We respectfully submit that it would be most unseemly, if indeed not an abuse of discretion (under the circumstances), for a fact-finding body to reject what has been uniformly and directly testified to by <u>all</u> thirteen of the experts testifying on the point on behalf of <u>all</u> of the

parties--when there is no direct evidence to the contrary, not a scintilla, on this ultimate and controlling issue.

While there are exceptions (e.g. inherent improbability of the testimony), it has long been the general rule, in accordance with the proposition that legal decisions are supposed to be based on *evidence*, not speculation or conjecture, that as stated by the Supreme Court of the United States over one hundred years ago in Quock Ting v. United States, 140 U.S. 417, 420 (1891):

> "Undoubtedly, as a general rule, positive testimony as to a particular fact, uncontradicted by anyone, should control the decision of the court."

See generally 32A C.J.S. *Evidence* § 1038, pp. 728-729. It is elementary in this regard that evidence not contradicted cannot be arbitrarily disregarded or rejected by the fact-finder. 32A C.J.S. *Evidence* § 1038, p. 729. We think it would be arbitrary indeed to reject the expert opinion of thirteen expert witnesses, all of whom have testified the same on the ultimate issue--that the present management structure and functioning of Georgia Tech does furnish reasonable assurance of its safe operation.

Moreover, as second point, a party (here GANE) is ordinarily bound by the testimony of its own witnesses when that testimony has not been contradicted or impeached by other evidence. See Slater v. Erie Lackawanna By. Co., 300 F.Supp 1, 3 (W.D. Pa., 1968), affirmed, 411 F.2d 1015 (3d Cir. 1969); 32A C.J.S. *Evidence* § 1040(1), pp. 761-764.

And finally, as a public official who is working for a governmental agency rather than his own personal commercial profit, Dr. Karam, as Director of Georgia Tech's nuclear research facility, is entitled to the benefit of a presumption. The presumption, while rebuttable, is that public officials are presumed to have performed their official duties in a proper manner. United States v. Chemical Foundation, Inc., 272 U.S. 1, 14-15 (1926); 31A. *Evidence* § 146, pp. 318-322.

While any one of the three above reasons would in and of itself seem to obviate any necessity for a more detailed recitation of "findings of fact," and call for a judgment and decision in favor of Georgia Tech on the ultimate issue posed by GANE's intervention forthwith, we respectfully submit the present confluence of all three reasons all the more obviously calls for this end result.

We consequently submit that any further findings of fact are unnecessary, surplusage, and ought not be required. In deference, however, to the fact that we have had a four-week evidentiary hearing and amassed some 3000 pages of transcript plus many pages of documentary exhibits in the matter, and out of what we hope is no more than an abundance of caution, we will go forth and take what we believe to be the unnecessary step of furnishing what in a situation of "controverted" evidence, would be the sort of detailed findings of fact which might be required or appropriate.

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THE GEORGIA INSTITUTE OF TECHNOLOGY'S
PROPOSED FINDINGS OF FACT AND CONCLUSION OF LAW

INTRODUCTION

This is a license renewal proceeding in connection with the application of the Georgia Institute of Technology (Georgia Tech) to renew its NRC license for the operation of the Georgia Tech Research Reactor. A petition for a leave to intervene in the proceeding was filed by Georgians Against Nuclear Energy (GANE) on October 26, 1994. As amended on December 30, 1994, GANE's petition sets forth ten contentions in opposition to the grant of Georgia Tech's application. Both Georgia Tech and the

Nuclear Regulatory Commission (NRC) Staff opposed GANE's intervention. It was opposed on grounds of both (1) a want of "standing" of GANE to intervene, and (2) the belief that none of the ten contentions set forth by GANE in its amended petition constituted an "admissible contention" for purposes of allowing intervention.

On April 26, 1995, the Atomic Safety and Licensing Board granted GANE's petition for leave to intervene, admitting two of its contentions and denying eight. *See* LBP 95-6, 41 NRC 281. 291-308 (1995). One of the admitted contentions (GANE contention number 5) related to allegedly inadequate security at the facility, while the other, GANE Contention 9, alleged that management problems at GTRR were so great that safety for the public could not be assured. *See GANE, Amended Petition*, pp. 7-8, 10; see also 41 NRC at pp. 295-299.

The fifth contention (GTRR "security") became "moot" by virtue of Georgia Tech's commitment (subsequently carried out) to remove the high-enriched (HEU) fuel which had been in the reactor prior to the Olympic games, and to replace it with low-enriched (LEU) fuel after the Olympic games were over. The Board by its "Partial Initial Decision (Mootness of Security Contention)" docketed on November 1, 1995, dropped this contention of GANE as having been "resolved." *Id.*, at pp. 8-9.

The Board's earlier decision that GANE's Ninth Contention (i.e. that management problems at GTRR were so great that the public safety could not be assured), had been stated with

enough sufficiency to constitute an "admissible contention," had already been affirmed at the time (along with the "standing" question) by the United States Nuclear Regulatory Commission in its Memorandum and Order docketed on October 12, 1995. Noting that what was required for a "contention" to be "admissible" for intervention purposes was but "a minimal showing" that material facts were in dispute and indicated that further inquiry was appropriate (*Id.*, at p. 11), the Commission, while describing the question in this case as "a close one," declined to disturb the Board's finding that GANE's management "*allegations* were relevant to the NRC's determination of the issue of whether GTRR can be safely operated. The Commission noted that:

> "If GANE can *prove* that the GTRR's *current* management is either unfit or structured unacceptably, it would be cause to deny the license renewal or condition renewal upon modifications." *Id.*, at p. 16 (emphasis added).

The Commission admonished that the proceeding could not properly be made into a forum to litigate whether Georgia Tech had made mistakes in the past:

> "but must focus on whether the GTRR *as presently organized and staffed* can provide reasonable assurance of candor and willingness to follow NRC regulations." *Ibid.*, (emphasis added).

PROPOSED FINDING OF FACT

I. The Neely Nuclear Research Center

[A] Nature of the Facility

1. From a physical viewpoint the Neely Nuclear Research Center is actually composed of two connected buildings. One is an office building, the other is the "containment" building. The containment building, which is where the radioactive fuel materials are stored and used, is a steel shell, round in shape with a dome on top. Entry into the containment building is by means of two heavy steel doors. The purpose of this "steel shell" is to enable the building to be sealed off, this being an important nuclear safety feature. *Karam*, Tr. 2723 Insert, p. 10 (see also Tr. 2705).

2. Two radioactive source materials have been commonly stored and used at the Center. Cobalt 60, stored in a "Cobalt Pool" (under approximately 20 feet of water) is used in a small room known as the "hot cell." Various objects are exposed in the "hot cell" to the gamma rays emitted by the Cobalt 60. Special "windows" permit the process to be observed. The

special windows are composed of two plates of lead glass, each two inches thick, with a liquid solution (Zinc Bromide) in between. While the solution is transparent, it has the density of concrete. The Cobalt is moved from the pool where it is stored into the "hot cell" by mechanical means. The Center's activities relating to the use of the Cobalt 60 is regulated by *State* government. *Id.*, at p. 11.

3. The second radioactive source material which has been used at the Center (it is currently removed in connection with the Olympics) is Uranimum 235, which is stored and used in the reactor. The chain reaction process which occurs in the reactor is different from the simple radioactive emission of Cobalt 60 in the "hot cell." Exposure takes place here by lowering the materials to be tested into the reactor. Reactor operations are *federally* regulated. *Id.*, at pp. 11-12.

[B] Radioactivity Detection

4. It is well recognized that radiation, if high enough, can cause injury or death. Varying lower levels of radioactivity, on the other hand, are found in nature. There can be an altitude variance. While at sea-level one might often find a cpm measurement of

less than 100, 150 cpm would not be unusual in mountainous areas. Similarly, there would be more radioactivity near a cement wall than out in the open. There are some areas of the world, India, for example, where deposits of thorium produce a cpm in nature of approximately 1,000 to 2,000. Even this relatively high natural level of radiation has not been demonstrated to have resulted in known health problems for people who live in the area. The Neely Nuclear Research Center has typically maintained a cpm of less than 100, lower in other words, than normal background radiation in nature. This is "clean" for a nuclear facility. *Id.*, at pp. 12-13.

5. GTRR has various means of detecting and measuring radioactive contamination. In additon to the customary Geiger counters, there are air-monitoring devices which are strategically placed in the facility to detect airborne contamination. There is a liquid scintillation counter to detect radioactivity in water or other liquids. Area smears are taken on a daily basis. Personnel leaving the "containment building" routinely use Geiger counters on their persons. Personnel also wear dosimeters to measure cumulative exposure. This, while descriptive, constitutes in

fact but a very small portion of the total monitoring and precautionary system in place at the Center. *Id.*, at p. 13 (see also Tr, 2706).

[C] Security

6. A substantial number of security measures are in place at the Center. Access cards which are issued to personnel serve as "keys" to certain areas, and will work only during normal work hours. Motion alarms, as well as video cameras, are placed in strategic locations, with alarms being directly wired to the Georgia Tech Police Department. The breaking of glass or even opening of doors can set off an alarm. In additon, personnel have identification badges which they are required to wear in secured areas. *Id.*, at pp. 13-14.

II. The Center's Personnel: Operations and Health Physics

7. Excluding clerical employees, as secretaries, personnel at the Center can be divided into two functional categories, namely operations and radiation safety (sometimes referred to as Health Physics). The operations side would normally be viewed as

encompassing the operators of the reactor or "hot cell." Those operating the reactor are required to have a license from the Nuclear Regulatory Commission. The Center normally has had three or four NRC "licensed" operators to operate the nuclear reactor. The operators for the reactor, just as the operators for the state licensed "hot cell," are responsible for the actual movement of radioactive materials and for the operation of the reactor and "hot cell." The other distinct component of personnel at the Center is the "radiation safety" (or Health Physics) staff, normally composed of three full-time individuals, assisted by part-time student employees. This component carries out its activities through the use of various detection devices ranging from simple Geiger counters to far more complex and expensive equipment, such as the liquid scintillation counter used to measure radioactivity in liquid substances. *Id.*, at pp. 14-15.

III. Appointment of Dr. Karam as Director of the Neely Nuclear Research Center

[A] Dr. Ratib A. Karam

8. Dr. Karam is a tenured full professor of Nuclear Engineering at the Georgia Institute of Technology, having been a member of the Nuclear Engineering faculty since 1972. *Karam*.Tr. 2723 Insert, pp. 1-2.

His Ph.D. is in Nuclear Engineering and before coming to Georgia Tech, he was employed for almost ten years by the federal government at Argonne National Laboratory, where he served as Reactor Manager from 1967 to 1972. *Id.*, at p. 4. He has published extensively in the area of Nuclear Safety (*Id.*, at p. 9; *see also* GT-4, pp. 7-13). Dr. Karam is a recognized international expert. At the requests of the governments involved, he has gone to both Brazil and Japan to evaluate their nuclear programs. *Id.*, at p. 7. He has also served in a consultative relationship with the United States Department of Energy, working on an evaluation of LMR designs, and, has similary worked for the Veteran Administration at a reactor in Omaha, Nebraska, his evaluation there having to do with the *nuclear safety program* at that reactor. *Id.*, at p. 8. He has been a consultant to the Georgia Power Company and the Southern Company from 1985 to date, his focus here too being that of the *safety of reactor operations*. *Ibid*.

[B] Dr. Karam's Appointment

9. Dr. Karam was approached by the late Walter Carlson, who was then Interim Director of the School of Nuclear Engineering, in the Fall of 1983 concerning the possibility of his being appointed as Director of the

Center. There had been dissatisfaction with the Center's operation both from the viewpoint of its large annual operating deficits, and its under-utilization, including a low level of graduate student involvement in the facility's operation. There had been talk about the possiblitiy of decommissioning the reactor. When Dr. Karam took the position it was with the understanding that his mission was to move in the direction of ending the yearly operating deficits by attracting funded research, and also to get more graduate students involved in the facility's nuclear research programs. *Id.*, at pp. 15-16.

10. Dr. Karam believes that he has in general succeeded over the years in both respects. Funded research has increased and the annual deficits have been eliminated. The involvement of graduate students in nuclear research programs at the Center has also increased. *Id.*, at p. 17.

[C] Administrative Organization of the Center when Dr. Karam Was Appointed its Director

11. Under the organization which was in place when Dr. Karam was appointed Director on December 5, 1983, he reported to the Director of the School of Nuclear Engineering, who in turn reported to the Dean of the College of Engineering, who reported to the Vice-President of Georgia Tech for Research, who reported to the President of Georgia Tech. Shortly after he was appointed Director, a reorganization eliminated several of these levels of bureaucracy and he reported directly to the Vice-President of Georgia Tech for Research, Dr. Thomas Stelson, who in turn reported directly to the President. *Id.*, at p. 16.

12 There are two differing approaches to the structural organization at nuclear research facilities respecting radiation safety (or Health Physics) personnel. Under one format the Manager of the Health Physics Unit does not report to the Director of the research reactor facility, but reports instead to a higher administrative official to whom the Director also reports. The other format has both Health Physics and Operations reporting to the Director. *Tsoulfanidis*, Tr. 1948-1949, 1959-1961; *Copcutt*, Tr. 1017. The format in place at the time of Dr. Karam's appointment was in theory the former, with the manager of the

radiation safety unit reporting to Vice President Stelson (to whom Dr. Karam was also reporting after the above-mentioned 1983 reorganization). *Boyd*, Tr. 2366. In actual practice, on the other hand, the manager of the Health Physics Unit was as to his day-to-day operations and the conduct of Unit's affairs, essentially independent and unsupervised by anybody. *Boyd.*, Tr. 2366-2368.

IV. Federal Agency Regulation

13. As all nuclear research facilities, GTRR is subject to extensive federal regulation and supervision by the United States Nuclear Regulatory Commission (NRC). The degree and level of comprehensiveness of NRC regulations has increased considerably over the years. Paper work and reporting obligations are in the opinion of Dr. Karam far greater today than they were, for example, in 1983. There are in excess 1,000 pages of CFR regulations. Moreover, these volumnious regulations are constantly being revised. In addition to compliance with these direct federal agency regulations, the Neely Nuclear Research Center, to maintain its license to operate from NRC, must also strictly adhere to its own detailed (and NRC approved) "technical standards." *Karam*, Tr. 2723 Insert, pp. 17-18.

14. The NRc enforces its own regulations, as well as a research reactor facility's compliance with its own technical specifications, through periodic "on-site" inspections to determine the existence of violations of the same. These inspections go into such areas as "security," the operations function, the radiation safety function, emergency preparedness, and nuclear materials, inclusive of all of the very extensive record keeping requirements concerning these matters. Violations can exist respecting paper work (i.e. record keeping) alone. *Id.*, at p. 18. A violation can exist through failure to have a "written implimentation procedure" for the carrying out of a written standard or plan even where the action taken was in fact the correct action; it is necessary to have a paper trail. *McAlpine*, Tr. 3140-3141.

15. The NRC has differing classifications for violations according to their seriousness. Until June 30, 1995, NRC Enforcement Policy categorized violations in Severity Levels I (the most serious), through V (the least serious). After June 30, 1995, NRC Enforcement Policy categorized violations by Severity Levels I through IV (i.e., Severity Level V violations no longer being routinely issued by the NRC). The

January, 1995 revision of 10 C.F.R. Part II, Appendix C, "General Statement of Policy and Procedure for NRC Enforcement Actions," Section IV, describes "severity of violations" as follows:

> "Severity Level I and II violations are of very significant regulatory concern. In general, violations that are included in these severity categories involve actual or high potential impact on the public. Severity Level III violations are cause for significant regulatory concern. Severity Level IV violations are less serious but are of more than minor concern; i.e., if left uncorrected, they could lead to a more serious concern. Severity Level V are of minor safety or environmental concern."

There are also what are known as 'non-cited violations' or NCVs. The NRC's current Enforcement Policy affords discretion for the NRC to treat as a NCV a violation that has not been formalized in a Notice of Violation, a procedure which is commonly used for a 'self-identified violation' of the Licensee. *NRC Staff Panel "B,"* Tr. 2813 Insert, p. 11. NRC Policy has long encouraged a Licensee to self-identify and correct its Level IV and Level V errors. *Karam*, Tr. 2723 Insert, p. 20.

16. When the NRC identifies a Licensee's Level IV (or formerly a Level V) violation, the Licensee is normally required to respond within 30 days, setting forth its position on the matter. This is in most instantces an outline of how the violation will be corrected. If satisfied with the Licensee's response,

the NRC will ordinarily advise the Licensee that it meets with federal regulatory requirements, and that examination as to the implementation of the proposed corrective action will take place during a future inspection. *Karam*, Tr. 2723 Insert, p. 20.

V. The "Operations" Staff and "Health Physics" Staff Conflict

17. Upon becoming Director of the Center in 1983, Dr. Karam had concerns about the technical qualifications of the radiation safety (or "Health Physics") staff; concerns which through discussion he found were shared by Vice-President Stelson. While the three members of the radiation safety staff had varying degrees of practical experience as technicians in the area of radiation safety, not one had a college degree, not even at the bachelor's level, in either radiation safety or in any other nuclear physics related area. The head of the unit, Bob Boyd, had a bachelor's degree in math. One of his technicians had a "mail order" B.S. degree from an university in New York where he had never been a student and whose campus he had never seen. The other technician had no college degree at all. While Dr. Karam viewed the radiation safety technicians as competent to perform routine record keeping responsibilities, he also thought that their lack of formal academic training in radiation

safe[illegible]ulted in a shallowness of their knowledge of the subject. As time went on this appeared to Dr. Karam to be an increasing problem in connection with their relations with the increasing number of better educated graduate students using the facility. A

> number of student complaints were received about the radiation safety staff, principally its attitude. *Karam*, Tr. 2723 Insert, pp. 21-22.

18. The staff's lack of formal education and academic credentials was not on the other hand, Dr. Karam's primary concern with the Health Physics Unit. From the very start his greatest concern with the radiation safety unit was its strained relationship with the operations staff. He had heard about this problem even before becoming Director of the Center, and upon becoming Director found the situation even worse than he had anticipated. Moreover, it seemed to Dr. Karam to be getting worse rather than better during the 1984-1986 time period. *Id.*, at p. 22.

19. Dr. Karam recognized that because of the nature of their differing functions, some degree of tension between the two groups might be normal and acceptable. He was concerned, however, that the situation might be moving beyond what is normal or

acceptable. It was his professional opinion as a nuclear engineer that the level of hostility between the two groups could reach the point where it in and of itself could compromise safety at a nuclear research facility. Simple by way of example, the manipulation of radioactive substances by an operator is best not done in a state of extreme anger or agitation brought about by verbal insults or rancorous arguments with radiation safety technicians. *Id.*, at pp. 22-23.

20. In an attempt to diffuse the level of hostility and improve inter-group relationships, Dr. Karam first attempted to bring the two groups together socially. At his own expense, he invited the entire reactor staff to Christmas luncheons in 1983, 1984 and 1985, 1986 and 1987. He also started a practice of recognizing birthdays with brief office parties, again in an effort to bring the two groups together. Dr. Karam found that these steps did not work and concluded that attitudes were simply too entrenched. *Id.*, at p. 23.

VI. The July 1987 Reorganization

21. One critical aspect of the increasing level of conflict between the Health Physics and Operations staffs was that under the existing organizational structure of GTRR, Dr. Karam, as Director of the Center, was not in a position to exercise normal administrative and disciplinary control over the Health Physics Unit. *Boyd*, Tr. 2399. The Unit was nowise subject, under the organization then in place, to the supervision and management control of the Research Center's Director. The Unit and its manager, Bob Boyd, were *on paper* (i.e., the organizational chart) under the supervision of Dr. Tom Stelson, Vice-President for Research of Georgia Tech. *See* GANE-42. But, as Bob Boyd conceded, his dealings with Vice-President Stelson were mainly of a fiscal nature, and he and his Unit in fact operated independently (*Boyd*, Tr. 2373), essentially unsupervised by anyone. *Boyd*, Tr. 2366-2368.

22. GTRR was at the time, as it is today, required by NRC to operate in compliance with its own Technical Specifications as well as all applicable federal standards and regulations. Technical Specification 6.1.a expressly placed responsibility of <u>all</u> aspects

of the reactor's operation in Director Karam, stating, *inter alia*:

> "The Director of Nuclear Research Center shall have over all responsibility for direction and operation of the reactor facility, including safeguarding the general public and facility personnel from radiation exposure and adhering to all requirements of the operating license and Technical Specifications." *See* GT-30.

Dr. Karam, as an administrator, was extremely uncomfortable about being held responsible for the work of a Unit over which he had no control, and which as he saw it, functioned independently, without giving any indication of being accountable to anyone. *Karam*, Tr. 2723 Insert, pp. 24, 27-28. It was Dr. Karam's opinion in connection with the continuing increase of animosity and hostility between Health Physics and Operations[2] that he was not in a position to meet his responsibility under Technical Specification 6.1.a, in resolving what he viewed as the safety implications of an unacceptable level of conflict between the two groups. *Karam*, Tr. 2723 Insert, pp. 24-28.

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[2] Bob Boyd, as Manager of the Health Physics Unit, not only conceded the existence of the conflict, but testified that on one occasion he had had to call the Police in connection with an HP/Operations conflict.

23. Based upon his concerns of his inability to exercise normal managerial control over the situation under the existing organizational structure Dr. Karam initiated discussions with Vice-President Stelson in the Fall of 1986 about a possible reorganization to correct and remedy the situation. *Karam*, Tr. 2723 Insert, pp. 24-25. On January 26, 1987, Dr. Karam wrote Dr. Stelson formally recommending a reorganization of the Center so as to place both operations and radiation safety under the Director of the Center's control in order to better deal with quarrels "which could lead to safety problems." *Karam*, Tr. 2723 Insert, p. 25 and GT-5. This was followed by a May 6, 1987, memorandum to Vice-President Stelson pointing out that Technical Specification 6.1.a, which placed overall responsibility for both groups in the Director of the Center, was not being totally met under the then existing organizational structure because the radiation safety technicians were independent of any control by the Director. *Karam*, Tr. 2723, Insert, pp. 25-26 and GT-6.

23a. NRC was kept informed as to the proposed reorganization from the start. During a February 1987

NRC inspection, the inspector was informed of plans to reorganize the staff. See GANE 21, "Report Details," p. 7. Dr. Karam apprised NRC of the reasons why he thought the reorganization was necessary for compliance with the technical specifications which placed responsibility for *both* radiation protection and operations in the Director. *Karam*, Tr. 2723 Insert, p. 26. Conversations about the proposed reorganization were noted by J. Nelson Grace, Regional Administrator of NRC, as having taken place on May 4, 1987, in a letter he wrote on May 5, 1987, to Vice-President Stelson. *Ibid.*; *see also* GT-7. This NRC communication, after noting the reorganziation discussion, stressed NRC's view of the need for Georgia Tech's improvement in management oversight of its facility programs and verbatim compliance with its Technical Specifications (the Specifications which in fact placed responsibility for *both* functions in the Director). *Ibid.* From his conversations with NRC, Dr. Karam believed that NRC agreed with his assessment of the need for the contemplated "reorganization." *Ibid.*

24. In a "Notice of Violation" issued by NRC to Georgia Tech on May 26, 1987 (GT-8), NRC expressed <u>its</u> concern

(the concern Dr. Karam had been experiencing for some time) over the management control problem and the level of hostility between radiation safety and operations staffs:

> "We are concerned about the *management control and involvement in the implementation of your program for radiation protection*, reactor operations and control over experiments which contributed to the violations described in the enclosed Notice.... These findings indicate the need for improved *management control* of your licensed activities to ensure adherence to NRC requirements and safe performance of licensed activities. Consequently, in addition to the need for corrective action regarding the specific matters identified in the enclosed Notice, please address the root cause for the violations and the corrective actions you have taken or proposed to correct the *programmatic deficiencies* in the operation of your facility. *Particular attention should be given to how you will improve working relationships between Health Physics and Operations* and adherence to written procedures by personnel at the facility." See GT-8, p. 1. (emphasis added).

In Dr. Karam's view, "increased" *management control* over Health Physics as a means of attempting to improve the working relationships between Health Physics and Operations, was not realistically possible under the existing organizational structure where he had no administrative authority or control at all over the radiation safety technicians. *Karam*, Tr. 2723, pp. 27-28.

25. Dr. Betty Revsin, who conducted an NRC investigation in April 1987, indicated to Dr. Karam that the level of animosity between the two groups had reached the point where she had formed the impression from the radiation safety technicians, or at least some of them, that they actually wanted to close down the facility. She also said that from the viewpoint of competence the Health Physics program was very weak and way behind the times. *Id.*, at p. 28. As already indicated above (Finding No. 17), Dr. Karam had from the start been concerned about the lack of formal education and academic credentials of the Health Physics Unit, inclusive of its Manager Bob Boyd. As early as 1986, Dr. Karam had discussed the desirability of obtaining a new manager to head the unit, someone possessed of doctoral level training in Health Physics, with Vice-President Stelson. They also discussed the desirability of personnel changes on the staff itself, but arrived at the conclusion it would be best to proceed by first getting a new Ph.D. level manager, and to then obtain that more qualified manager's input on whether or not there should be further personnel changes in the Health Physics staff. *Id.*, at pp. 28-29.

26. In responding to the "Notice of Violation" (GT-8), Dr. Karam in so many words said that he shared Dr. Revsin's and the NRC's concern with regard to the facility's management control problem. *Id.*, at p. 29 and GT-9. Dr. Karam described the proposed reorganization as an attempt to resolve the problem of his lack of management control over Health Physics and consequential inability to effectively deal with this problem under the existing organizational structure. *Ibid.* In his letter of June 15, 1987, to Dr. J. Nelson Grace, the Regional Administrator of NRC (GT-9), Dr. Karam explained:

> "As an example of the organizational problems we have, violations A, C.1, C.2, C.3, and C.4 were entered in personal, diary type, logs and I did not know of any of them until Dr. Revsin's inspection. This mode of operation will change from present practices (i.e., entry of violations into "personal log") to a policy of writing brief memos addressed to me and giving details of the violation. Once these memos are in my hands, I will then meet with each person committing the violation and impress on him/her that compliance is a requirement of all. Monday morning meetings of the NNRC staff will also be used to discuss the violations and the non-compliances. The goal is acquire a "culture" under which compliance with procedures becomes routine." GT-9.

27. The reorganization proposed by Dr. Karam was quite controversial. The entire three-man Health Physics staff, which as its Manager Bob Boyd conceded had been until then acting independently and without any supervision by anyone (Boyd, Tr. 2366-2368, 2399), adamantly opposed the reorganization placing them under the managerial control and supervision of the Director. *Boyd*, Tr. 2364-2368; *Karam*, Tr. 2723 Insert, p. 30.

28. Notwithstanding its controversial nature, the "reorganization" was approved by the Acting President of the Georgia Institute of Technology, Henry C. Bourne, Jr., on June 19, 1987, to got into effect on July 1, 1987. On that same date President Bourne appointed Dr. Bernd Kahn to serve as Chairman of the new Nuclear Safeguards Committee. This new committee was formed, as a part of the reorganization, to take the place of two former committees (Nuclear Safeguards and Radiation Protection) which had been causing some confusion as a result of their overlapping jurisdiction. *Karam*, Tr. 2723 Insert, p. 30.

29. Following the July 1, 1987 reorganization, Dr.Karam, who Bob Boyd agreed had not previously been in a position to exercise management control over the

radiation safety staff, was in a position to and did exercise managerial control over the health physics unit. *Boyd*, Tr. 2399. According to Mr. Boyd, Dr. Karam was interested at that time in checking out and attempting to improve procedures. He directed Boyd to write and improve existing Health Physics Procedures,one of the areas where Boyd had previously been functioning independently. *Boyd*, Tr. 2373. Boyd agreed that following reorganization: "We may have started writing things down in a more organized fashion for the full Center or something..." *Id.*, at p. 2372.

VII. Post-Reorganization "Dirty Tricks"

30. Following the July 1, 1987 reorganization, Dr. Karam initially thought it might be working to reduce the level of hostility between the radiation safety staff and operations staff. Starting towards the end of July, however, a number of unpleasant incidents occurred which gave Director Karam second thoughts about whether the personnel situation was improving under the reorganization. *Karam*, Tr. 3723 Insert, p. 31.

31. In late July, Bob Boyd advised Dr. Karam that the Liquid Scintillation Counter, a $24,000 instrument used to determine the amount of radioactivity in water and other liquid substances, had been tampered with and no longer worked. Boyd told Dr. Karam that the tampering appeared to be deliberate, not accidental. *Ibid.*

32. During the first part of August 1987, Boyd reported that some floppy diskettes with important data concerning a campus inventory of radioactive sources had been destroyed by complete erasure, with the diskettes being scratched as well. Later in August, he reported to Dr. Karam that two cases of batteries had been stolen. *Id.* at p. 32.

33. Three incidents occurred around the middle of September. First, what appeared to be human feces in a paper bag was found placed in a refrigerator used by personnel to store lunch. Next, a five-gallon heavy duty plastic container containing algicide was slashed at the bottom, spilling the algicide on the floor. The final, and perhaps most significant of the mid-September incidents, was the smashing of a 500-watt bulb directly above the Cobalt Pool. Glass fragments could have the potential for interferring with the pool's filtration system. *Id.*, at p. 32.

34. Finally, the most serious incident of all occurred towards the end of September 1987. Three safety switches in the Cobalt area were turned off at the same time. Two of the three switches monitored the level of the Zinc Bromide solution in the "hot cell" windows, while the third measured the level of water in the Cobalt Pool. When turned on the switches set off an alarm both in the Center and in the Georgia Tech Police Station if the level of Zinc Bromide solution in the "hot cell" windows, or the level of the water in the Cobalt Pool, fell below a certain level. If the level of either liquid were to fall drastically below this level without setting off an alarm, the Cobalt radiation would have the potential to be life threatening. Dr. Karam viewed this as an extremely serious incident from a safety viewpoint, at the time thinking it to be consistent with sabotage. *Id.*, at pp. 32-33.

VIII. The Polygraph Issue

35. Considering it to be extremely unlikely that all three safety switches could manage to be turned off at the same time by "accident," Director Karam consulted with Chief Vickery of Georgia Tech's Campus Police and

Deputy Chairman of the Nuclear Safeguards Committee. Chief Vickery suggested the use of a polygraph test. *Id.*, at pp. 33-34.

36. Dr. Karam discussed polygraph testing with the Center's entire staff on September 28, 1987. All agreed to taking the test with two exceptions. The two exceptions were the two radiation safety technicians in Bob Boyd's unit. Their response was "see our lawyer." While the idea of polygraph testing was subsequently dropped, the fact that the two radiation safety technicians alone had objected to taking the test adversely affected Dr. Karam's level of confidence and trust in the two. He began to doubt their willingness to work within the reorganized structure of the Center. He began to wonder whether they had indeed been involved in the "post-reorganization incidents" and were actively trying to discredit the reorganization. *Id.* at p. 34.

IX. The Deteriorating Situation in the Fall of 1987

37. During October and November of 1987, it became increasingly apparent to Dr. Karam that from the viewpoint of trying to reduce the level of conflict and animosity between Health Physics and Operations,

the reorganization was not working, and that to the contrary the antagonisms between the two groups were getting worse. Additionally, the work performance of the two radiation safety technicians appeared to Dr. Karam to be declining, in some instances their attitude seeming to him to border on insubordination. Dr. Karam became increasingly uncomfortable with the two technicians. They were, in his opinion, obviously "disgruntled." Dr. Karam viewed this as a negative factor respecting nuclear safety. He spoke to Vice-President Stelson about the matter and Dr. Stelson advised him that what he was saying was consistent with what Dr. Stelson had been hearing about the radiation safety staff from NRC. *Id.*, at p. 35.

38. In December 1987, Dr. Karam told Vice-President Stelson that in his opinion the situation had deteriorated to the point where nuclear safety was involved, and that the staff should be replaced as quickly as possible with interim personnel. *Id.*, at p. 36.

39. Vice-President Stelson's response was a suggestion that they wait until January when a new Associate Director was expected to join the staff. Dr. Karam

requested, and Vice-Presidnet Stelson agreed, to consult with the Chairman of the Nuclear Safeguards Committee about the matter. When this was done, Dr. Bernd Kahn suggested an assessment of the situation by an industrial psychologist prior to the contemplated personnel actions. Vice-President Stelson and Director Karam agreed. Dr. O'Bannon, an organizational psychologist was contacted and said he would be willing to make a psychological assessment. *Id.*, at p. 36.

X. The O'Bannon Report

40. Dr. O'Bannon, following his psychoilogical assessment of the situation, reported orally to Dr. Karam in early February, and then in writing (i.e. GT-10) around the middle of February 1988. Echoing what NRC Investigator Dr. Betty Revsin said to Dr. Karam almost a year earlier (in April 1987), Dr. O'Bannon concluded that Mr. Boyd's management of the Radiation Safety Unit was weak and that he was not exercizing normal managerial control or setting guidelines for appropriate behavior on the part of the two staff members. Dr. O'Bannon told Dr. Karam that in his opinion the level of hostility between Radiation

Safety and Operations was too great and too entrenched to be repaired, and that in his (Dr. O'Bannon's) opinion the entire Health Physics staff needed to be removed from the Center and assigned elsewhere, with a new manager for the Unit appointed. He found the Radiation Safety staff to reflect a defiant attitude, indicating that it had no desire to do anything to correct the situation. While he said that he had no conclusive information as to the incidents or "dirty tricks" following reorganization, he surmised that they were very likely done by someone on the Radiation Safety staff, and that he suspected one particular member. Id., at pp. 37-38.

XI. The Cadmium Spill

41. On August 19, 1987, Bob Boyd reported to Dr. Karam that one of the part-time student employees had discovered a slight degree of contamination while conducting a daily wiping survey. While Boyd described it as minor, Dr. Karam told him to go back and look into it. Boyd returned later and said that contamination on the top of the reactor was 20 mr per hour, a level wihch would have been about the dose of an x-ray if a person were to stand on the spot for

several hours. At about this time an operator, Bill Downs, told the Director that he had poured radioactive topaz out of an aluminum container and into a glass beaker on the top of the reactor the day before (August 18, 1987). The topaz had been in a double capsule, and the inner cadmium container was found to have partially decomposed. *Karam*, Tr. 2723, Insert, p. 39.

42. The Daily Masslinn Survey Report of the student who found the contamination (i.e. GT-11) indicated that it was highly localized, confined in essence to a very small area of the containment building near the reactor. Several days later, on August 24, 1987, however, one of the two Radiation Safety technicians wrote Dr. Karam a memorandum (GT-12) which in detailing the locations of decontamination efforts, implied that the contaimination had become airborne and was widespread through the containment building. Dr. Karam was some months later to discover that this report implying widespread contamination was either deliberately or inadvertently erroneous. *Id.*, at p. 40.

43. While Dr. Karam views any spill as a matter of concern, in view of the fact that a person would have had to have stood on the contamination for several hours in order to receive the equivalence of a chest x-ray, he did not view the cadmium spill to involve any significant health risk. It appeared to him that decontamination efforts would be neither difficult nor extended in time. He did report the "spill" to Dr. Kahn, Chairman of the Nuclear Safeguards Committee, who was at the time also *ex-officio* Radiation Safety Officer. Neither Dr. Karam nor Dr. Kahn considered the spill to be sufficiently serious to make it an event which was reportable to NRC, an assessment with which Bob Boyd agreed. *Id.*, at pp. 40-41; *Boyd*, Tr. 2436. NRC inspectors inquiring into the matter during the course of an inspection of GTRR starting on December 16, 1987, agreed that the cadmium spill was not itself a reportable incident. *NRC Staff, Panel "A,"* Tr. Insert, p. 24; Tr. 1784, 1786.

XII. The 1988 Shut-Down Orders

44. During the period of April 7 to April 10, 1987, an NRC inspection documented in Inspection Report 87-03 (Staff-11), identified numerous apparent violations of

NRC requirements. These apparent violations included (1) a failure to label a container of radioactive material, (2) failure to perform radiological surveys (two examples), (3) failure to wear protective clothing as required by procedure (two examples), (4) failure to wear required dosimetry, (5) failure to implement Health Physics monitoring as required by a Radiation Work Permit, (6) failure to obtain review and approval of experiments (two examples), (7) failure to complete the Experimenter's Checklist as required by procedure (two examples), (8) failure to respond to a criticality alarm and (9) failure to survey radiation levels during handling of a pneumatic transfer device containing an irradiated sample. Staff-11. While several of these failures had been self-identified by GTRR, adequate corrective action had not, in the opinion of the NRC staff, been taken. *See NRC Staff, Panel "A,"* Tr. 1740 Insert, p. 16.

45. The findings in Inspection 87-03 (Staff-11) were considered for escalated enforcement action by NRC, and accordingly an enforcement conference was held with the Licensee management on May 4, 1987, to discuss the inspection findings. At the enforcement conference the GTRR outlined its contemplated actions

to improve management oversight and self-identification of problems, including the proposed reorganization to place the radiation protection function under the authority of the Director of the Neely Nuclear Research Center, along with the possible merger of the campus-wide Radiation Safety Committee with the Nuclear Safeguards Committee. *Id.*, at pp. 16-17.

46. Following the enforcement conference, NRC Region II identified five Severity Level IV violations based on the inspection's findings. In addition, the NRC staff requested that the Licensee, in responding to the violations, address the "root cause" of the violations, which NRC viewed as being due to inadequate management control of Operations and Health Physics (*NRC Staff, Panel "A,"* Tr. 1767), and considered being detrimental to the safety component of the facility's operation. *NRC Staff, Panel "A,"* Tr. 1782. *See also NRC Staff Panel "A,"* Tr. 1740 Insert, p. 17. The NRC staff specifically asked GTRR to describe how it planned to improve the working relationships between the Health Physics and reactor Operations staffs. *Ibid.*

47. In replying to the violations identified in Inspection Report 87-03 (Staff-11), Dr. Karam outlined the difficulties in communication and coordination of work activities between the hostile reactor Operations and Health Physics groups, pointing out the problem of Health Physics not communicating problems and violations of NRC requirements to the Director of the Center. Dr. Karam spoke of the proposed reorganization as a step which would help correct GTRR's management control problem. *Id.*, at p. 17 and GT-9.

48. While he was at GTRR on December 16, 1987, to review and evaluate allegations received by NRC Region II regarding the recent management reorganization and other matters, Senior NRC Radiation Specialist George B. Kuzo was informed of the Cadimum 115 spill which had occurred in August 1987, about a month after the July 1 reorganization had gone into effect. *Id.*, at p. 19. He found that descriptions and evaluations of the event were not available. During a later portion of his inspection conducted on January 4-5, 1988, he reviewed and evaluated GTRR Operations and Health Physics technical radiation protection activities relating to the Cadimum spill, and as a result

identifed what he viewed as multiple significant reactor operations and radiation protection safety issues which he thought required NRC attention. *Id.*, at p. 19. For this reason, and in view of the poor performance of GTRR in the pre-reorganization inspections during the Spring of 1987, NRC Region II management expanded the inspection effort and dispatched a special team to review selected GTRR program areas. This was the period of January 14-22, 1988. The expanded inspection reviewed operations, health physics and management issues, and found numerous examples of failure to follow procedures, or to have adequate procedures, to implement the Center's Technical Specifications, plus other violations of 10 C.F.R. Part 20 Health Physics Requirements associated with the August spill and contamination. *Id.*, at pp. 19-20. The NRC concluded that as of January 1988 the actions taken to correct the matters discussed at the May 4, 1987 enforcement conference (e.g. the July 1, 1987 reorganization) had not been fully successful, and that management control problems continued. Staff 13, p. 2. Director Karam agreed with the accuracy of NRC's assessment that the July 1, 1987 reorganization had not achieved its purpose when it came to the unsatisfactory working relationships between

Operations and Health Physics, and that the situation had instead continued to deteriorate to the point where in Dr. Karam's own professional opinion, nuclear safety at the Center was being compromised. *Karam*, Tr. 2723 Insert, p. 35. He had, of course, already recommended removal of the Health Physics staff from the Center in early December, this *before* the NRC inspection and almost a month and a half *before* NRC's issuance of its partial "shut-down" Order of January 20, 1988. *Id.* at 36.

50. Following its detailed inspection and review of GTRR's operations, the NRC, on January 20, 1988, issued a partial "shut-down" Order, requiring Georgia Tech to cease its utilization of the reactor facility for irradiation experiments until various conditions were met, and until NRC approved in writing the resumption of irradiation experiments. GT-13, p. 5; *see also Karam*, Tr. 2723, Insert, pp. 41-42. The seven conditions specified prior to a resumption of the use of the reactor facility for irradiation experiments were as follows:

"1. Management controls over facility operation, including irradiation experiments, are assessed to identify weaknesses.

2. A formal review is conducted, including record reviews and in-depth personnel interviews, to determine (a) if other

occurrences similar to the August 1987 incident have occurred, and (b) the principal root causes of the August 1987 incident and any other similar incidents.

3. An assessment of internal exposure, external whole body, extremity, and skin doses to personnel involved in the August 1987 incident (any other identified incidents) and/or decontamination activities is conducted.

4. The GTRR health physics and operating procedures are reviewed to identify inadequacies which contributed to the August 1987 contamination event (and any other identified events).

5. Corrective actions are identified and a schedule established for implementing the corrective actions, including the necessary changes in management controls, operations and procedures.

6. A training program addressing all changes to management controls, operations, and procedures is developed and implemented.

7. The Licensee's reviews and assessments of the above matter are documented and a summary of those reviews and assessments, including corrective actions and appropriate schedules, are submitted in writing to the NRC for review and approval." GT-13, pp. 6-7.

51. The NRC partial shut-down Order of January 20, 1988 had the effect of speeding up the removal of the two radiation-safety technicians. During an "exit interview" or conference between NRC and Georgia Tech officials, including Dr. Karam, on the morning of January 22, 1988, the unacceptably high level of conflict between the radiation staff and operations

was discussed at length. *Karam*, Tr. 2723 Insert, p. 43. One NRC official told Dr. Karam that the radiation safety staff was 25 years behind the times, and Dr. Karam was now of the opinion that the removal of the staff he had recommended in early December needed to be expedited. *Ibid.* NRC was advised that there were going to be personnel changes. *Ibid.* NRC Senior Radiation Specialist Kuzo agreed that there were a number of violations in the Health Physics area and that "something had to be done in that area." *Kuzo*, Tr. 1898.

52. From the conference it also occurred to Dr. Karam that NRC might have been viewing the contamination from the Cadmium Spill to be more wide spread and perhaps somewhat more serious than he viewed it to be. This came about when he found out that very day, January 22, 1988, that the radiation safety staff had failed to show the NRC inspectors the contemporaneous survey report which had uncovered the Cadmium Spill. *Karam*, Tr. 2723 Insert, p. 44. This survey (GT-11) indicated that the contamination from the Cadmium Spill had <u>not</u> been widespread or airborne as the subsequent memo report of one of the two radiation safety technicians (GT-12) implied. *Ibid.* The <u>survey</u> showed that the

spill had in fact been confined to a very small area of the containment building. *Ibid.* Compare also GT-11 and GT-12.

53. In an attempt to ascertain which version was correct, Dr. Karam immediately initiated an investigation which included the cut-out of air filter samples in the ventilation system, as well as the examination of dead air spaces in the ducts. *Ibid.* All showed that there was no trace of air borne contamination from the August spill. *Ibid.* This was technically possible to ascertain in January 1988 respecting the five-months earlier spill since one of the Cadmium isotopes which would have been present (Cadmium 109) has a 453 day half-life. *Id.* at pp. 44-45. It appeared to Dr. Karam at this point that the radiation staff, or at least some members of it, might have deliberately exaggerated the spill to NRC to disadvantage the Center by giving NRC the memo report but not the survey. *Id.*, at pp. 44-45; *see also Karam*, Tr. 3207-3209.

54. Dr. Karam advised NRC as to the survey results which he thought it might not have known about, mentioning in his cover letter that in response to his inquiry to Bob Boyd as to why the survey results were not given

to NRC, was told, by Bob Boyd, that Mr. Kuzo had been informed about the survey but did not specifically ask for it. *Id.*, at p. 45. George Kuzo expressly denied that Boyd had mentioned the Masslinn Survey (GT-11) to him and he hadn't asked to see it. *Kuzo*, Tr. 1882.

55. At an enforcement conference on February 23, 1988, the NRC Staff expressed its view that while a number of the violations during and after the August 1987 event related to Health Physics, the management problem perceived by NRC at GTRR was not limited to the facility's health physics unit. *NRC Staff, Panel "A"*, Tr. 1740, Insert, pp. 25-26. During the course of the enforcement conference, the President of Georgia Tech stated that he had decided that the reactor would not restart until both GTRR and NRC were convinced that both operations and health physics activities could be safely conducted. *Id.*, at p. 26. Following the conference, and based upon Georgia Tech's self-initiated shut down of its facility and commitment to conduct an independent evaluation of its nuclear reactor program, a Confirmatory Order modifying the License was issued by NRC on March 17, 1988. GT-15. This Order set out additional conditions that had to be met prior to restart of the

reactor. They were: (a) the Licensee was to submit a written identification of the root causes of the problems that could impact upon the safe operations of the reactor, and (b) the President of Georgia Tech would submit to NRC a written description of the corrective actions taken to resolve the problem as well as the reasons he believed the facility should be allowed to restart. *Id.*, at pp. 26-27; see also GT-15 (dated March 17, 1988).

56. In response to the "shut-down" of irradiation experiments in January, and all reactor operations in February 1988, GTRR undertook a complete overhaul of its entire operation. *Karam*, Tr. 2723 Insert, p. 46. The personnel action contemplated respecting the two radiation safety technicians was expedited. *Ibid.* They were replaced first on a temporary basis by qualified Health Physicists from Georgia Power Company, and later by permanent Health Physicists with formal education in the area. *Ibid.* Both of current full-time Health Physicists, for example, are highly qualified with masters degrees in Health Physics. *Ibid.* Mr. Boyd, who was nearing retirement age, was transferred to a position where he was working primarily with Georgia State University. *Ibid.* In

his place Georgia Tech employed the NRC Inspector, Dr. Betty Revsin, who had identified violations during her April 1987 inspection of the Center and who had discussed the unsatisfactory relations between the radiation safety technicians and the operations staff with Dr. Karam. *Id.* at pp. 46-47. Dr. Karam believed that being intimately familiar with NRC procedures and requirements, Dr. Revsin would be in a position to provide the Center with the Health Physics leadership needed to correct the situation which everyone agreed was wholly unsatisfactory. *Id.* at p. 47. Dr. Revsin served at the Center for about four years, resigning for personal reasons in 1992. *Id.*, at pp. 46-47. The current Manager of the Office of Radiation Safety, Dr. Rodney D. Ice, who has been at the Center since 1992, is also extraordinary well qualified to head the Health Physics staff. *Ibid.* He has his Ph.D. in Health Physics, and is also a registered pharmacist with some twenty-nine years of experience in Health Physics and the biological effects of radiation, including nuclear pharmacy. In Dr. Karam's opinion the ability, competency and quality of the current Health Physics manager and his staff is light years beyond that of the unit he had recommended be replaced in December 1987, and which was replaced in early 1988. *Id.*, at p. 47.

57. On the operations side, all personnel were thoroughly trained and retrained as to correct procedures with emphasis on strict adherence to detailed written procedures. *Id.*, at p. 48.

XIII. Resumption of Reactor Operations

58. Following the NRC's Confirmatory Order of March 17, 1988, outlining additional conditions that had to be met prior to restart of the reactor, there were a number of communications and meetings between NRC members and GTRR management in connection to the corrective actions which needed to be implemented by the facility to resolve its problems. *NRC Staff, Panel "A"*, Tr. 1740 Insert, pp. 26-33. NRC identified numerous concerns about the lack of adequate health physics procedures and the improper radiation protection practices associated with the HP staff's surveys and bioassays in response to the August 1987 Cadmium Spill. These identified items formed the basis for the majority of the violations issued by NRC for failure to have adequate procedures, and failure to follow procedures for surveying and evaluating potential radiological hazards associated with the

event and subsequent decontamination activities (*Id.*, p. 22). Bob Boyd, the former Manager of the Health Physics Unit, had formed the impression from his contacts with NRC officials that what NRC was saying was that it was the radiation safety group which was causing most of the problems. *Boyd*, Tr. 2499. NRC stressed and admonished GTRR, however, that it did not view the management problem as being confined to Health Physics, and that the problems with Health Physics personnel, and failure to remedy the Health Physics/Operations conflict (which had not been corrected and had indeed gotten worse following the reorganization) were manifestations of management control problems at the higher level which also needed to be the subject of the Center's correct action. *NRC Staff, Panel "A"*, pp. 26-33.

59. On August 19, 1988, Georgia Tech's President sent NRC a letter which stated that progress had been made on the Neely Nuclear Research Center's Action Plan to the extent that he concluded that the issues raised in the "Order Modifying License" had been adequately addressed and resolved, requesting that a resumption of reactor operations and irradiation experiments be approved. *NRC Staff, Panel "A"* Insert 1740, p. 33.

An inspection conducted by NRC at the end of August and in early September 1988 in response found that while GTRR had added experienced staff, upgraded operating procedures, and retrained the operators, not all of the actions directed by the *two* Orders had been completed. The NRC identified additional issues which also needed to be addressed prior to restart. *Ibid.* The new issues which NRC viewed as requiring further action had to do mainly with the revision or development of adequate "procedures." *Id.*, at pp. 33-34.

60. On November 15, 1988, the NRC, based upon its inspection reports of the preceding December and early January, as well as based upon the ensuing investigation during the Spring of 1988 of the six months earlier Cadmium Spill and related activities at the Center in August 1987, determined the violations involved in (1) failure to follow approved procedures and failure to have adequate procedures for conduct and control of experiments and for radiological safety activities, and in (2) failing to conduct adequate surveys to evaluate the extent of radiological hazards which may been preset, to be categorized as a Severity

Level III violation. *See* "Notice of Violation and Proposed Imposition of Civil Penalty (NRC Inspection Report No. 50-160/87-08 and NRC OI Investigation Report 2-88-003)" [GT-16]. The failure to resolve the management control problems identified in April and May of 1987 was also noted and a civil penalty of $5,000 was proposed. *Karam*, Tr. 2723 Insert, pp. 48-49; GT-16.

61. Review of the multiple violations and examples of violations in Section A, B, C and D at pp. 1-4 of the "Notice of Violation" was consistent with the NRC admonishment during the preceding Spring of 1988 that the problem was not exclusively one of the Health Physics staff. Of the 14 identified violations or examples of violations, three were said by ex-manager Bob Boyd to have been attributable to Operations, ten were conceded by him to have been attributable to the Health Physics staff, with one being viewed by him as a joint failure. *Boyd*, Tr. 2439-24151 and GT-16.

62. The cover or transmittal letter respecting the "Notice of Violation and Proposed Imposition of Civil Penalty" (GT-16) did note that the management issues at the root of the problem had been the subject of

discussions between NRC and Georgia Tech officials in February, March, May and September of 1988, and that Georgia Tech had provided responses detailing the actions it was taking to correct these problems which had beenidentified by both NRC and Georgia Tech. The cover letter stated:

> "We note that you have instituted extensive personnel, procedural, training and organizational changes and have also increased the direct management attention to the NRC program. We conducted inspections in August and November, 1988 to assess the effectiveness of your corrective actions and believe your actions address our concerns." GT-16, Cover letter, at pp. 2-3 and *Karam*, *supra* at p. 49.

63. On the same date of November 15, 1988, NRC also notified Georgia Tech of its "Authorization to Resume Reactor Operations and Experiments." The "Authorization," (GT-17), stated in part as follows:

> "we inspected not only the specific requirements of the Orders but also other actions you have taken to enhance management controls at the GTRR. We believe that the training of reactor operators and Health Physics personnel as well as augmentation of the staff in those areas appear satisfactory for the restart of the facility. The procedure enhancement in both these functional areas appears adequate to control the conduct of experiments and routine radiological controls of routine operations. More importantly, the regulatory sensitivity training of the entire GTRR staff should lead to improved adherence to procedures and expected improvement in the safety performance of the GTRR.

> Our observation of the conduct of Nuclear Safeguards Committee (NSC) indicates sufficient depth and breadth of reviews to assure adequate third party oversight. In our interviews with NSC members confirmed their awareness of the additional functional responsibilities detailed in Amendment No. 7 to the Technical Specifications which was changed by the NRC on July 12, 1988. In addition, the organizational change associated with the Chairman, NSC, reporting directly to the President should improve management involvement in facility operation.
>
> We believe that monitoring of operations and management controls of the facility will be enhanced by the recent appoints of the Vice-President for Interdisciplinary Programs (Acting Vice-President for Research) with direct responsibility over the GTRR and a new Manager of the Office of Radiation Safety, and the augmentation of the Office of the Director with an Associate Director early in 1988.
>
> In view of the above we have determined that the actions taken by Georgia Tech are sufficient to permit the resatrt of the reactor and the resumption of irradiation experiments." See GT-17, p. 1; *Karam*, supra at pp. 49-50.

64. The experienced senior NRC Staff members who were directly involved both in the enforcement actions taken by NRC against Georgia Tech in connection with its Neely Nuclear Research Center in 1988, and the subsequent restart authorization in November 1988, expressly disagreed with GANE's contention that those events occurring in 1987 and 1988 demonstrate that Georgia Tech's management of its Center *presently* fails to provide reasonably assurance of adequate

protection of the public health and safety, giving the following explanation of their rejection of GANE's contention:

> "Based upon our knowledge of the facts and events which led to the Staff's determination to take enforcement actions against the Licensee in 1988, the Licensee's corrective actions, various enforcement conferences which were held with the Licensee and the NRC Staff's subsequent inspection efforts, we believe the events in 1987-1988 were appropriately dispositioned by the Licensee and that management problems which had been identified prior to restart were satisfactorily resolved. Accordingly, at the time the NRC Staff determined to allow restart of the GTRR in November 1988, the Staff was satisfied that the Licensee's management of the facility provided reasonable assurance that the public health and safety would be adequately protected in the future. The bases for this conclusion are largely reflected in the NRC inspection and enforcement history of the GTRR during 1988, which documents the NRC Staff's review, assessment, and conclusions regarding the Licensee's actions to meet the requirements of the January and March Orders." *NRC Staff, Panel "A"*, p. 8.

XIV. Post-Restart and Current GTRR Operations

65. In the more than seven years which have elapsed since the reactor's restart authorization in November 1988, GTRR has not experienced any violation of a Level I, Level II, or Level III category. *Karam*, Tr. 2723 Insert, p. 50.

66. The lower-level (Level IV) violations, which given the human condition cannot reasonably be expected to be eliminated altogether (*Copcutt*, Tr. 1140-1141, 1162-1163; *Karam*, Tr. 2723, Insert, p. 19.), have been greatly reduced at the Center. NRC enforcement history found that in contrast to the approximate 20 violations identified by NRC during the two-year period of 1987-1988, there were only 17 violations over the period of over seven years between January 1989 and the late Spring of 1996. *NRC Staff, Panel "B"*, Tr. 2813 Insert, pp. 28-29. The NRC Staff also observed by way of analysis that the post-restart violations have not in general involved significant health and safety issues and were not of the sort which would demonstrate the breakdown of management controls and programs as opposed to individual error. *Id.*, at p. 28. An example of this sort of individual error as opposed to management control or programmic error was the Level IV violation identified in Inspection Report 95-01. The violation stemmed from calculation errors in the tabulation of data for annual reports. *NRC Staff, Panel "B"*, Tr. 3083-3086. The Annual Reports contained extensive data and the arithmetic was in error on a relatively small fraction of the total information provided. *Id.*, at p. 3086.

67. From a qualitative viewpoint, Georgia Tech compares favorably to other university research reactors. Comparing Georgia Tech with the University of Virginia, the Massachusetts Institute of Technology, the University of Michigan, the University of Missouri at Columbia, we have the following for the period between June 1990 through early 1996 (*NRC Staff, Panel "B"*, Tr. 2984-2986):

Universities	Levels of Violations						Total
	I	II	III	IV	V	NCV	TOTAL
Virginia	0	2	0	1	2	6	11
M.I.T.	0	0	0	4	0	1	5
Michigan	0	0	2	3	0	6	10
Missouri	0	2	3	2	0	0	8
Ga Tech	0	0	0	6	2	7	15

Viewed in the qualitative sense of a comparison based upon the seriousness of reported violations (Levels I, II, and III), Georgia Tech and the Massachusetts Institute of Technology were alone in the total absence of any violations at this level (i.e. Levels I, II or III violations). The University of Virginia and the University of Michigan had two of these more serious violations each, and the University of Missouri-Columbia had five violations above Level IV.

68. NRC Staff members involved in the regulatory supervision and enforcement of GTRR uniformly evaluated Georgia Tech's compliance as one of continuous improvement since the restart of its reactor facility. Marvin M. Mendonca, who has been involved in the program since about June of 1990, stated that from his review and participation he has seen:

> "a steady concerted effort to improve, that procedures have gotten more and more detailed and specific, staffing has been concentrated on to bring in a quality of staff that is going to assure and have capability to understand problems and ensure safety is provided. They have had their problems also. Again, we have talked about the different levels and numbers yesterday. I think somebody on our panel admitted that nobody was infallible and I don't think that any of us are infallible, of course, but the

point being is that the Licensee is showing improvement, continues to have problems and I think has a structure and a management that is diligent and will continue to try to solve their problems and correct them." *Mendonca*, Tr. 3149-3150.

Edward J. McAlpine similarily opined that:

"what we have seen over our tenure has been good improvement programs at Georgia Tech." *McAlpine*, Tr. 3150.

Craig H. Bassett agreed with what had already been said, noting that there have been improvements in staff, and in his view "a constant improvement, continuing improvement." These same Senior NRC Staff members viewed both Director Karam and the facility in general as making diligent and acceptable efforts to comply with federal regulatory requirements. *Id.*, at 3148.

69. Based upon their knowledge of the NRC Staff's inspection and licensing efforts during the period commencing with the restart authorization in 1988 to date, these three senior staff members agreed that as presently constituted, and viewing the improvements made, there was no merit to GANE's contention about managerial inadequacy to provide reasonable assurance of the public health and safety. All agreed that:

"In the period following the November 1988 authorization of restart, we have found that

> the cooperation between and functioning of the radiation safety and operations groups has improved considerably from their descriptions by other NRC personnel who were involved with GTRR in 1988. The functioning of the radiation safety and operations organizations in this regard has been acceptable. Further, based upon our inspection and review of the Licensee's management and organizational structure, we have concluded that the Licensee's management of the GTRR since November 1988 has complied with NRC regulatory requirements.... Based on our inspections of the facility and our reviews of these matters, we have concluded that the corrective actions taken and other improvements made by the Licensee acceptably resolved the Licensee's previous management and organizational problems. Accordingly, we have concluded that the present organization and management of the GTRR provides reasonable assurance that the public health and safety, as well as the health and safety of GTRR employees, will be protected in the event that license renewal is authorized." *NRC Staff, Panel "B"*, Tr. 2813 Insert, pp. 6-7.

XV. The Public Interest

70. Following a notice from NRC concerning the scheduled expiration of its license and the necessity of filing an application for license renewal if this was Georgia Tech's desire, the Georgia Institute of Technology, on April 19, 1994, applied for a renewal of its operating license (No. R-97) for another 20 years. It submitted the requisite documentary materials along with its application letter. *Karam*, Tr. 2723 Insert, p. 51; *See also* GT-19.

71. Dr. Rodney D. Ice, Manager of the Office of Radiation Safety at the Georgia Institute of Technology, is a pharmacist in addition to holding a Ph.D. in Health Physics. In his opinion, the Georgia Tech reactor offers important research possibilities, particularly in the area of medical research, including cancer research when surgical intervention is for one reason or another not a viable option. *Ice*, Tr. 1992 Insert, pp. 5-6, 21. More specifically, Dr. Ice testified that he believed the reactor at Georgia Tech to be unique, a special device specially modified, with special capabilities for boron neutron capture therapy, not limited to brain tumors but possibly open (it is in the trial phase currently) for a variety of tumors. *Id.*, at p. 2006. Dr. Ice thought that when all of the research reactors in the United States were evaluated by the Department of Energy about three years ago, the Georgia Tech Research Reactor "came out No. 1 as the most appropriate device" for boron neutron capture therapy. Id., at p. 2026. Dr. Ice said that he was working closely with Emory University on the development of new molecular probes containing boron which could serve as delivery vehicles that would tag specific DNA and fundamental basic research

involving delivery of a chlorinated pharmaceutical to the reactor. He testified that he needed a neutron beam to test it and that to accomplish this he needed the reactor to go back into operation. *Id.*, at pp. 2027-2028.

CONCLUSIONS OF LAW

It is the Policy of the United States of America, enunciated by the Congress in the Atomic Energy Act of 1954, as amended, to "*encourage*" (not discourage) nuclear research. *See* 42 U.S.C. § 2013(a) and (d). Consistent with this Policy, the Nuclear Regulatory Commission, which under the Energy Reorganization Act of 1974 is the transferee of all of the licensing and regulatory functions of the former Atomic Energy Commission), see 42 U.S.C. § 5841(f)), is charged as follows:

> "The Commission is authorized to issue licenses to persons applying therefor for utilization and production facilities useful in the conduct of research and development activities of the types specified in section 2051 of this title and which are not facilities of the type specified in subsection (b) of this section. The Commission is directed to impose only such minimum amount of regulation of the licensee as the Commission finds will permit the Commission to fulfill its obligations under this chapter to promote the common defense and security and to protect the health and

> safety of the public *and will permit the conduct of widespread and diverse research and development*. 42 U.S.C. § 2134 (c) [Emphasis added].

Georgians Against Nuclear Energy (GANE) is a loose association or organization which as its name implies is opposed to this public policy as declared by the Congress of the United States. It opposes the use of nuclear energy for any purpose, research, power, or otherwise. It has consequently intervened in this license renewal application proceeding initiated by the Georgia Institute of Technology (Georgia Tech), which is seeking to renew its license for the operation of its research reactor for an another twenty years.

Of the original ten contentions urged by GANE in opposition to the renewal of Georgia Tech's license, only one has survived to this point, and it is currently before this Board for decision. That contention, stated in terms of the issue it presents is: WHETHER MANAGEMENT PROBLEMS AT THE GEORGIA TECH RESEARCH REACTOR ARE SO GREAT THAT PUBLIC SAFETY CANNOT BE ASSURED. *See e.g. Commission Memorandum and Order* CLI-95-12, docketed October 12, 1995, p. 11; *GANE amended Petition for Leave to Amend* (filed December 30, 1994), p. 10.

It is axiomatic that legal proceedings must be decided on evidence as opposed to the mere assertions, contentions, and allegations of the parties. It is equally axiomatic that speculation and conjecture is not an acceptable substitute for factual evidence. As a corollary of these fundamental legal

propositions, *uncontroverted* evidence on a fact in issue, must ordinarily be accepted by the fact-finder as conclusive. As stated by the Supreme Court of the United States over one hundred years ago in Quock Ting v. United States, 140 U.S. 417, 420 (1891):

> "Undoubtedly as a general rule, positive testimony as to a particular fact, uncontradicted by anyone, should control the decision of the court."

See generally 32A C.J.S. *Evidence* § 1038, pp. 728-729. Stated another way, evidence which is not contradicted simply cannot be arbitrarily disregarded or rejected by the fact-finder. 32A C.J.S. *Evidence* § 1038, p. 729.

Here we have no less than thirteen witnesses, qualified as experts by virtue of their education, experience, or both, giving precisely the same answer to the ultimate issue which is presented to this Board for disposition. Each and every one of the thirteen, including the two called by GANE, have concluded that there is no factual basis or evidence to support GANE's position. In prefatory comment concerning the want of any necessity for detailed findings of fact in this case because the *direct* testimonial evidence on the matter is *uncontroverted*, we have already set forth the testimony of the experts in some detail, and we here refer to the same so as to avoid the redundancy of once more setting it forth in full.

While we recognize that exceptions to the general rule do exist (for example where the testimony is inherently not credible), we find no rational basis for finding that the

uniform view of thirteen individuals possessed of varying degrees of expertise in the field can be dismissed or disregarded in this particular case. We think that for this reason alone, GANE's contention must be rejected as contrary to the entirely credible and wholly uncontroverted expert opinion of the thirteen diverse witnesses testifying on the matter.

Moreover, even were we to go into the lesser assertions urged by GANE in support of its ultimate contention, the result would be same. These subordinate assertions are likewise without merit for the following reasons:

1. Safety concerns at the Georgia Tech reactor are the sole responsibility of Dr. R.A. Karam.

This is simply not the case. The evidence uncontrovertedly shows that while the Director has overall administrative responsibility for the direction and operation of the reactor facility, including safeguarding the general public and facility personnel from radiation exposure, and inclusive of both the reactor operation and health safety functions, his nuclear safety responsibilities are shared with others. These "others" include the Manager of the Office of Radiation Safety and the Nuclear Safeguards Committee. It is a system which provides inherent checks and balances to insure that safety matters are properly considered. The Manager of the Office Radiation Safety is obligated to report safety concerns both to the Director of the Center and to the Nuclear Safeguards

Committee, and beyond that has a direct line of communication to the President of the Georgia Institute of Technology. Moreover, the Manager (currently Dr. Ice) testified that he was fully authorized to suspend any campus activity involving radiation, including activities at the Neely Nuclear Research Center, without the Director's or anyone else's permission, if in his professional judgment it was unsafe to proceed. *Ice*, Tr. 1996. The Director has no authority to countermand a "shut-down" the Manager of the Office of Radiation Safety has directed. The suspension remains in effect until the matter is reviewed and resolved by the Nuclear Safeguards Committee. *Ice*, Tr. 1992, Insert, pp. 12-13. Dr. Ice attends all meetings of, and makes his own independent reports to, the Nuclear Safeguards Committee. *Id.*, at pp. 13-14.

2. Dr. Karam is the director who withheld information about a serious accident from the NRC (1987 cadmium 115 accident).

GANE's use of he word "withheld" is inappropriate and misleading, and the word "serious" to describe the August 1987 cadmium-spill is wrong. All of the parties expressing their views on the matter, including NRC Staff members, are in agreement that the cadmium-spill in and of itself was not of sufficient significance to cause it to be a "reportable" event. (e.g. *Kuzo*, Tr. 1784-1786; *NRC Staff (Panel "A)*, Tr. 1740, Insert, p. 24; *Karam*, Tr. 2723, Insert, pp. 40-41. If the

information is not "reportable," the failure to report it cannot logically be equated with a "withholding" of the information (implying wrongdoing).

3. The NRC was advised of the 1987 cadmium-115 accident by the safety officer at that time who was later demoted and left the GTRR operation claiming harassment.

There is no evidence showing that the Manager of the Radiation Safety Unit, Bob Boyd (or for that matter any one else on his radiation safety staff) informed NRC of the August 1987 cadmium-spill "at that time." To the contrary, Bob Boyd testified that he too viewed the spill as not being a reportable event. Also, the testimony is uncontroverted that NRC did not know of the August spill before being advised of it during a December inspection some four months later. Moreover, that inspection and the transmission of information of the cadmium-spill to NRC during the December inspection, came long after, not before, Dr. Karam had first discussed the desirability of obtaining a new manager to head the unit, someone possessed of doctoral level training in Health Physics (*Id.*, at pp. 28-29), and had subsequently, although still before the NRC December inspection, advised Vice-President Stelson that in his opinion the health physics personnel situation had deteriorated to the point where nuclear safety was involved and that in his opinion the staff should be replaced as quickly as possible with interim personnel. *Id.*, at p. 36.

It is true that the former Manager of the Radiation Safety Unit Bob Boyd, was transferred out of the Center in May 1988 (*Boyd*, Tr. 2354), and that his departure from the Center was not on a friendly basis with the Center's management. Mr. Boyd does view his removal from his former position as involving harassment and other ill treatment at the Center from Georgia Tech management, including Georgia Tech's President, Vice-President for Financial Affairs, Dr. Karam, and others. *Boyd*, Tr. 2358-2364. Former Manager Boyd was the witness who tended to somewhat depreciate the significance of having and adhering to the sort of detailed health physics procedures which NRC and Dr. Karam were insisting upon. He maintained that simply because you comply with the regulations doesn't mean that you know how to handle "serious" radiation problems. *Id.*, at 2426. He conceded that a successor manager of the Health Physics Unit, Dr. Betty Revsin, knew her rules and regulations, based upon her experience with NRC, but he didn't think that she was a very "practical" Health Physicist as far as making good judgment "on the spot on real serious Health Physics or things like that." *Id.*, at p. 2426. Mr. Boyd recognized that the O'Bannon Report concerning the situation at the Center was talking about him in his conclusion of an absence of first line management activity of a constructive nature in Health Physics, and further understood the Report's recommendation that an experienced manager be sought for direct supervision for the Health Physics group, was talking about his removal. *Id.*, at pp. 2464-2466.

4. Since the incident, management has been restructured giving the Director (Dr. Karam) increased authority, including increased authority over the Manager of the Office of Radiation Safety.

This is true. The very purpose of the reorganization was to correct the prior situation where Mr. Boyd, by his own admission, had been wholly unsupervised by anyone, which meant the complete absence of effective managerial control by the Director of the facility over the Health Physics Unit as would have been needed for any effective attempt to remedy the intolerable level of animosity and conflict between that group and the operations staff. It was a bad situation which was in and of itself creating a safety problem in the eyes of both NRC and the reactor's management. A corollary of the saying: "if it ain't broke, don't fix it," is that when something is frightfully broken and leading to very bad results, it needs (and in this case needed) to be "fixed"--hence, the reorganization in question.

5. The Nuclear Safeguards Committee which has theoretical oversight of the GTRR operations has a distinct flaw in having no concern with health issues. The Office of Radiation Safety Manager is sought for its knowledge of law more than its knowledge of health physics.

There is no evidence to support, and an abundance of evidence to refute, both sentences. The current Manager of Health Physics, Dr. Rodney Ice, has his Ph.D. in Health Physics, and even Bob Boyd, with all of his hostility toward

the reorganization and admitted grudge against the Center, conceded that Dr. Ice is an excellent Manager for the Office of Radiation Safety. Boyd conceded that Dr. Ice, with a Ph.D. in Health Physics, definitely had better educational credentials than his own; although, still maintaining that he (Bob Boyd) had more "practical experience." *Boyd*, Tr. 2355.

Both NRC Staff members and the independent expert, Dr. Nicholas Tsoulfanidis viewed the Nuclear Safeguards Committee as properly performing its work, as is well substantiated by a review of the Committee minutes which GANE for unfathomable reasons put into evidence.

For all of the reasons stated, the uncontroverted direct expert testimonial evidence as to the ultimate issue, which in the opinion of the Board is sufficient in and of itself to call for a rejection of GANE's management contention as a matter of law, is equally supported by the total want of evidentiary support for the subordinate assertions which GANE has urged in support of its management contention and resulting ultimate issue in the case.

Based upon this totality of the evidence, the Board finds and concludes that there is no evidentiary basis to support GANE's "management" contention, and it is for this reason Ordered and Adjudged that GANE's intervention in the instant application of the Georgia Institute of Technology be, and the same hereby is dismissed.

Respectfully submitted,

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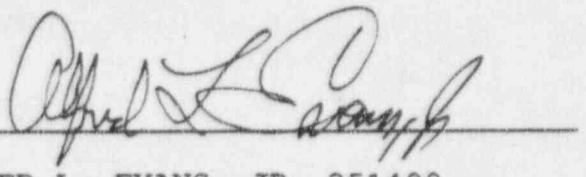

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Charles Bechhoefer, Chairman
Dr. Jerry R. Kline
Dr. Peter S. Lam

In the Matter of	)	
GEORGIA INSTITUTE OF TECHNOLOGY	)	Docket No. 50-160-Ren
Atlanta, Georgia	)	ASLBP NO. 95-710-01-Ren
Georgia Tech Research Reactor	)	
Renewal of License No. R-97	)	

CERTIFICATE OF SERVICE

I do hereby certify that copies of the foregoing Findings of Fact and Conclusions of Law have been served upon the following persons by U.S. Mail, except as otherwise noted and in accordance with the requirement of 10 C.F.R. Sec. 2.712:

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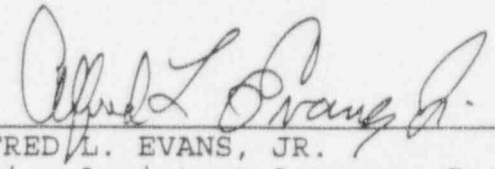

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