

18243

LBP-97-7  
DOCKETED  
USNRC

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
ATOMIC SAFETY AND LICENSING BOARD

'97 APR -3 P2:57

Before Administrative Judges:

OFFICE OF SECRETARY  
DOCKETING & SERVICE  
BRANCH

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

SERVED APR -4 1997

In the Matter of

Docket No. 50-160-Ren

GEORGIA INSTITUTE OF  
TECHNOLOGY,  
Atlanta, Georgia

ASLEP No. 95-704-01-Ren

Georgia Tech Research Reactor

(Renewal of Facility License  
No. R-97)

April 3, 1997

INITIAL DECISION

License Renewal

## TABLE OF CONTENTS

A. <u>Background.</u>	2
B. <u>Georgia Tech's Prefatory Comment.</u>	5
C. <u>GANE'S Management Contention.</u>	
1. <u>Historical Record of Management.</u>	8
a. <u>Management Record Leading to Shutdown.</u>	8
(1) <u>Inspection Report 87-01.</u>	8
(2) <u>Inspection Report 87-03.</u>	12
(3) <u>The July 1, 1987 Management Reorganization.</u>	15
(4) <u>Inspection Report 87-08.</u>	21
(5) <u>Shutdown Orders.</u>	27
b. <u>The Cadmium-115 Accident.</u>	30
(1) <u>Summary Description of the Cd-115 Accident.</u>	31
(2) <u>GANE's Claim of Mistreatment of the Safety Officer.</u>	34
2. <u>Management Record After Restart.</u>	37
a. <u>Record of Violations.</u>	37
(1) <u>Inspection Report 89-02.</u>	38
(2) <u>Inspection Report 89-05.</u>	39
(3) <u>Inspection Report 90-02.</u>	39
(4) <u>Inspection Report 91-04.</u>	40
(5) <u>Inspection Report 92-04.</u>	40
(6) <u>Inspection Report 93-02.</u>	41
(7) <u>Inspection Report 93-03.</u>	42
(8) <u>Inspection Report 94-01.</u>	42
(9) <u>Inspection Report 94-02.</u>	43
(10) <u>Inspection Report 94-04.</u>	44
(11) <u>Inspection Report 94-05.</u>	44
(12) <u>Inspection Report 95-01.</u>	44
(13) <u>Inspection Report 95-02.</u>	45
(14) <u>Summary.</u>	46
b. <u>Employment History of William Downs.</u>	46
c. <u>Intrusion by FOX TV Film Crew.</u>	51

d. <u>Hardware Issues.</u>	57
(1) <u>The Bismuth Block.</u>	57
(2) <u>Fuel Element Failure.</u>	59
(3) <u>Environmental Monitoring.</u>	60
3. <u>Georgia Tech's Management Organization Structure.</u>	63
a. <u>Applicable Standards.</u>	63
b. <u>Examples of Organizational Structures.</u>	64
c. <u>GANE's Challenge to the Structure.</u>	72
d. <u>Other Parties' Positions.</u>	76
4. <u>Licensing Board Conclusions.</u>	78
D. <u>Conclusions of Law.</u>	82
E. <u>ORDER.</u>	84

Appendix A--Witnesses (unpublished)

Appendix B--List of Exhibits (unpublished)

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,  
Atlanta, Georgia

Georgia Tech Research Reactor

(Renewal of Facility License  
No. R-97)

Docket No. 50-160-Ren

ASLBP No. 95-704-01-Ren

April 3, 1997

INITIAL DECISION

Appearances

Alfred L. Evans, Jr., Esq., Patricia Guilday, Esq., E. Gail Gunnells, Esq., and Randy A. Nordin, Esq., Atlanta, Georgia, for Georgia Institute of Technology (Georgia Tech or Applicant)

Ms. Glenn Carroll, Decatur, Georgia, Mr. Robert P. Johnson, III, Ms. Carol Stangler, Mr. Alvin Lenoir, and Ms. Danna Smith, Atlanta, Georgia, for Georgians Against Nuclear Energy (GANE or Intervenor)

Sherwin E. Turk, Esq., Colleen P. Woodhead, Esq., and Susan S. Chidakel, Esq., for the NRC Staff

This proceeding involves the application of Georgia Institute of Technology (hereinafter, Georgia Tech or Applicant) to renew its Facility License No. R-97 for the Georgia Tech Research Reactor (GTRR), also known as the Neely Nuclear Research Center (NNRC), located on the Georgia



Tech campus in Atlanta, Georgia. Under the terms of the existing license, the GTRR is a heterogeneous, heavy-water moderated and cooled reactor authorized to operate at power levels up to 5 megawatts (thermal) for research and development activities. GT Exh. 19,<sup>1</sup> Staff Exh. 13. As set forth in the September 19, 1994 Notice of Opportunity for Hearing, 59 Fed. Reg. 49088 (September 26, 1994), the renewal would extend the expiration date of the license for twenty years, until June 6, 2014 (GT Exh. 19; Staff Exh. 13), in accordance with the Applicant's timely application for renewal dated April 19, 1994.<sup>2</sup>

For reasons set forth herein, we are approving the sought license renewal. We are also suggesting that Georgia Tech consider making certain changes in management organizational structure, although we are not imposing any formal conditions to this effect.

A. Background.

In response to a Notice of Opportunity for Hearing on the license-renewal application, published in the Federal Register of September 26, 1994 (59 Fed. Reg. 49088), Georgians Against Nuclear Energy (hereinafter, GANE or

---

<sup>1</sup>Georgia Tech Exhibits will be referenced as GT Exh.

---

<sup>2</sup>By virtue of its timely application for renewal, Georgia Tech in effect extended the expiration date of its current license until the Commission reaches a final determination on the renewal application. 10 C.F.R. § 2.109.

Intervenor) on October 26, 1994 filed a timely petition for leave to intervene. This Licensing Board was established on November 18, 1994 to rule upon GANE's petition and preside over any evidentiary hearing that might result. 59 Fed. Reg. 60849 (November 28, 1994).

By our Memorandum and Order (Intervention Petition), dated November 23, 1994 (unpublished), we outlined applicable standards for both standing to intervene and contentions and, in accordance with 10 C.F.R. § 2.714(a)(3), established a date by which GANE could submit an amended petition. GANE's amended petition was timely filed on December 30, 1994. Georgia Tech and the NRC Staff each opposed GANE's supplemental petition, both as to standing and contentions.

We held a prehearing conference on January 31-February 2, 1995 in Atlanta, Georgia, to consider GANE's standing and its proposed contentions.<sup>3</sup> Following the conference, we issued a Prehearing Conference Order (Ruling on Standing and Contentions), LBP-95-6, 41 NRC 281 (1995). We determined that GANE had established its standing to participate and admitted two of its ten proposed contentions, one dealing with the adequacy of the Applicant's management and the other with physical security of the site during the 1996 Summer Olympic Games held in Atlanta, Georgia.

---

<sup>3</sup>See Notice of Prehearing Conference, dated January 12, 1995, published at 60 Fed. Reg. 3885 (January 19, 1995).

The Applicant and Staff sought Commission review pursuant to 10 C.F.R. § 2.714a of our determination to grant GANE a hearing and admit two contentions. They each contested our admission of the two contentions, and the Applicant in addition challenged our finding of GANE's standing. During the course of that appeal, the Applicant, responding to several Commission inquiries relative to security at the Olympic Games, determined to remove all nuclear fuel from the site prior to the Olympic Games and not to replace it until after the Games. The Commission accordingly remanded the security contention to us for appropriate action (CLI-95-10, 42 NRC 1 (1995)), and we issued a Partial Initial Decision dismissing the contention as moot. LBP-95-19 (corrected), 42 NRC 191 (1995).

The Commission affirmed both our finding of GANE's standing and our admission of the management contention (Contention 9). CLI-95-12, 42 NRC 111 (1995). With respect to that contention, we held 13 days of evidentiary hearings, between May 20, 1996 and June 28, 1996 (Tr. 963-2552; 2614-3545).<sup>4</sup> With the agreement of all parties, the filing of proposed findings of fact and conclusions of law was delayed until after the conclusion of the Olympic Games. Proposed findings of fact and conclusions of law were filed by

---

<sup>4</sup>In accordance with 10 C.F.R. § 2.715(a), we also heard oral limited appearance statements, once during the initial prehearing conference (February 1, 1995) and twice during the hearing sessions (May 20 and 22, 1996).

Georgia Tech, GANE and the NRC Staff.<sup>5</sup> Reply findings and conclusions were thereafter filed by Georgia Tech.<sup>6</sup>

B. Georgia Tech's Prefatory Comment.

Georgia Tech initially takes the position that, based on the bottom-line positions of expert witnesses of all parties to the effect that the operation of the GTRR currently poses no undue risk to the health and safety of the public, no detailed findings of fact need be made by us. App. FOF, at iii-xii. We disagree. The significance of various facts is for us to determine, based on the record, and cannot be delegated to the expert witnesses of the various parties, even if they all agree. We must satisfy ourselves that the conclusions expressed by expert witnesses on significant questions have a solid foundation.

Philadelphia Electric Co. (Limerick Generating Station, Units 1 and 2), ALAB-819, 22 NRC 681, 741 (1985).<sup>7</sup>

---

<sup>5</sup>The Georgia Institute of Technology's Proposed Findings of Fact and Conclusions of Law, dated September 13, 1996 (App. FOF); Georgians Against Nuclear Energy Proposed Findings of Fact In Consideration of Application for Renewal of Facility License, dated October 11, 1996 (GANE FOF); NRC Staff's Proposed Findings of Fact and Conclusions of Law, dated October 25, 1996 (Staff FOF).

<sup>6</sup>The Georgia Institute of Technology's Reply to the Proposed Findings of Fact and Conclusions of Law of (1) GANE, and (2) The NRC Staff, dated November 8, 1996 (App. Reply FOF).

<sup>7</sup>Stated another way, a Licensing Board must do more than act as an "umpire blandly calling balls and strikes for adversaries appearing before it." Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2),

(continued...)

Moreover, the evidentiary record includes more than just expert witnesses' testimony. We must also assess the significance of information obtained from fact witnesses and documentary exhibits.

As another basis for not making detailed findings, Georgia Tech also has claimed that Dr. Ratib A. Karam, Director of the GTRR, is a public official working for a governmental agency and is entitled to a presumption (albeit rebuttable) that public officials are presumed to have performed their official duties in a proper manner. App. FOF, Prefatory Comment at xii, citing United States v. Chemical Foundation, Inc., 272 U.S. 1, 14-15 (1926) and 31A C.J.S. Evidence § 146, at 318-22. This presumption does not apply where, as here, the government official is not operating in a traditional governmental capacity but rather as an official of a regulated entity operated by a governmental unit. Indeed, insofar as relevant here, government entities have the same burdens in proving their cases in NRC licensing proceedings as private entities. See Tennessee Valley Authority (Phipps Bend Nuclear Plant, Units 1 and 2), ALAB-506, 8 NRC 533, 544 (1978), establishing that no different regulatory standards would

---

<sup>7</sup>(...continued)  
LBP-94-35, 40 NRC 180, 192 (1994), citing Scenic Hudson Preservation Conference v. Federal Power Commission, 354 F.2d 608, 620 (2d Cir. 1965).



apply if the GTRR were operated by a private rather than a governmental entity.

We therefore reject Georgia Tech's suggestion that we need not make detailed findings on the many factual issues on which we took evidence. We turn now to our findings on the management contention, the single contention at issue.

C. GANE'S Management Contention.

GANE's Contention 9, as submitted in GANE's Amended Petition for Leave to Intervene, dated December 30, 1994, and as admitted by us in our April 26, 1995 Prehearing Conference Order (Ruling on Standing and Contentions), LBP-95-t 41 NRC 281, reads as follows:

GANE contends that management problems at the GTRR are so great that safety for the public cannot be assured. Safety concerns at the Georgia Tech reactor are the sole responsibility of Dr. R. A. Karam (SAR, Fig. 6.1, p. 157). Dr. Karam is the director who withheld information about a serious accident from the NRC (1987 cadmium-115 accident). 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. 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. Although the safety officer has line to higher-ups than the director, since he/she works for the director on a day-to-day basis, the threat of reprisal would be a huge disincentive to defying the director.

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. (SAR, Sec. 6.1, p. 156-159).

During the course of the hearing, upon a demonstration of good cause for the delay, GANE added several other discreet items as examples of poor management.

The Applicant, Staff and GANE each presented witnesses and each also relied on documentary evidence. We will identify these witnesses and the relevant documentary evidence in conjunction with our discussion of specific aspects of the contention.

1. Historical Record of Management.

In order for us properly to assess GANE's management contention, it is necessary to review the management deficiencies extending at least as far back as early 1987, upon which the contention is based, and the partial and complete shutdowns that occurred in 1987-88. We will then examine the record of management after restart to determine whether, as GANE contends, substantial management deficiencies still persist (see LBP-95-6, 41 NRC at 299) or, as Georgia Tech and the Staff assert, the deficiencies have been adequately remedied.

a. Management Record Leading to Shutdown.

(1) Inspection Report 87-01. Our review of the Applicant's managerial deficiencies that undergird GANE's contention must initially focus upon the NRC Staff's inspection findings in early 1987, as presented by the NRC Staff's Panel A, as well as by NRC Inspector Anne Rebecca



Long, testifying on behalf of GANE.<sup>8</sup> As reflected by the current record, the earliest of those inspections citing management deficiencies was conducted by Inspector Long on February 9-23, 1987 and is documented in Inspection Report (IR) 50-160/87-01<sup>9</sup> (GANE Exh. 21).

Inspector Long testified that, prior to this inspection, the NRC had received allegations concerning the GTRR (to the effect of an unreported power excursion and a report that the reactor had been running without a licensed operator at the controls) and she was instructed by her acting supervisor to include these allegations in her routine inspection but not to reveal to Georgia Tech that the allegations had been received. Tr. 1444, 1446, 1449-50, 1549 (Long). IR 87-01 concluded that the power excursion occurred but was not a violation (GANE Exh. 21, Report Details, at 27-29). The Staff referred the other allegation to Georgia Tech for investigation after determining there

---

<sup>8</sup>Ms. Long was called as a witness by the Staff in response to GANE's request, as directed by this Licensing Board. The Board had determined, in accordance with 10 C.F.R. § 2.720(h)(2), that Ms. Long's "view of the facts . . . can reasonably be expected to differ significantly from views likely to be presented by the inspectors on NRC's witness panels." Third Prehearing Conference Order, LBP-96-8, 43 NRC 178, 181 (1996).

<sup>9</sup>Inspection reports (IRs) related to nuclear reactor licensees are generally issued in numerical sequence each year, designating the facility's docket number followed by the IR number. For simplicity, references in this opinion to NRC IRs will omit the GTRR docket number (50-160) from the IR number.

was a lack of evidence to pursue its own investigation. Tr. 1449-50 (Long); Staff Exh. 9.

Inspector Long documented six Severity Level IV violations<sup>10</sup> in IR 87-01, with numerous examples given for several of the violations. Specifically: (1) failure to provide or utilize procedures (seven examples); (2) failure to control experiments as required by the Technical Specifications (TS) (four examples); (3) failure to perform a weekly heat balance surveillance; (4) failure to receive prior NRC approval for a change made to the facility's Technical Specifications; (5) failure to comply with the requalification program for annually documenting performance of operators under simulated emergency conditions for 1984, 1985, and 1986; and (6) failure of the Nuclear Safeguards Committee (NSC) to perform its review and audit functions as required (four examples).

Following Georgia Tech's responses dated May 25, 1987 and July 15, 1987 to the IR and Notice of Violations (NOVs),

---

<sup>10</sup>At the time, NRC categorized violations in Severity Levels I to V, 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 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 violations are of minor safety or environmental concern. 10 C.F.R. Part 2, Appendix C (revised as of January 1, 1988); Staff Panel A, ff. Tr. 1740, at 12.

the Staff withdrew the last two violations and some examples of the others. Georgia Tech initiated corrective actions for the remaining violations. Staff Panel A, ff. Tr. 1740, at 9, 10-12; GANE Exh. 21, Enclosure 1 (Notice of Violation); GANE Exh. 23.<sup>11</sup>

Beyond the specific violations identified, the Staff advised Georgia Tech that it was "concerned about a programmatic weakness in implementation of Technical Specification requirements." GANE Exh. 21, Letter to Georgia Tech transmitting NOV and IR 87-01, at 1. The Staff testified that, "collectively, the violations provided substantial evidence of a lack of management oversight." Staff Panel A, ff. Tr. 1740, at 13.<sup>12</sup>

Inspector Long brought to the attention of Region II management (specifically, Mr. Albert F. Gibson, Director of the Division of Reactor Safety, Region II, from 1985 to the present, and Mr. Malcom Ernst, then Deputy Regional Administrator of Region II) her dissatisfaction with NRC's withdrawal of two of the violations and portions of two others set forth in IR 87-01. Tr. 1405, 1406-07, 1582

---

<sup>11</sup>Inspector Long would have preferred to escalate the six Level IV violations into more severe Level III violations, but she did not pursue the formal steps to appeal the classification and indicated that she was satisfied with IR 87-01. Tr. 1344-47, 1394-95 (Long).

<sup>12</sup>Reflecting the Staff's elevated level of concern, the cover letter was signed by the Director, Division of Reactor Projects, one level of management higher than normal. Staff Panel A, ff. Tr. 1740, at 13-14.

(Long). Mr. Gibson subsequently agreed that the violations should not have been withdrawn. But no further action in this regard was taken against Georgia Tech, inasmuch as, by that time, further inspections had been undertaken, an order modifying the GTRR license had been issued, and an enforcement conference with Georgia Tech had been scheduled. Staff Panel A, ff. Tr. 1740, at 13-14; Staff Exh. 19.<sup>13</sup>

(2) Inspection Report 87-03. The next significant inspection, carried out on April 7-10, 1987 by a Radiation Specialist in the Emergency Preparedness and Radiological Protection Branch, produced many apparent violations, including a failure to label a container of radioactive material, failure to perform radiological surveys (two examples), failure to wear protective clothing as required by procedure (two examples), failure to wear required dosimetry, failure to implement Health Physics (HP) monitoring as required by a Radiation Work Permit, failure to obtain review and approval of experiments (two examples), failure to complete the Experimenter's Checklist as required by procedure (two examples), failure to respond to a criticality alarm, and failure to survey radiation levels during handling of a pneumatic transfer device containing an

---

<sup>13</sup>The next inspection of the GTRR, covering radiation controls and environmental protection, identified two further violations, one Level IV and one Level V. IR 87-02 (GANE Exh. 35). For these violations, the Applicant proposed corrective actions acceptable to the Staff. Staff Panel A, ff. Tr. 1740, at 15.

irradiated sample. Although the Applicant had itself discovered several of these failures, adequate corrective actions were not taken. Id. at 16; IR 87-03 (GANE Exh. 31).

Based on an unusually large number of apparent violations, the Staff held an enforcement conference on May 4, 1987, at which violations identified earlier that year in IRs 87-01 and 87-02 were also addressed. Staff Panel A, ff. Tr. 1740, at 16; Tr. 1764 (Collins); see GANE Exh. 31, at 1; Tr. 1529-30 (Long). At the enforcement conference, documented in IR 87-06 (GANE Exh. 30),<sup>14</sup> Georgia Tech outlined actions to improve management oversight and self-identification of problems, including a possible reorganization to place the radiation protection or health physics (HP) function under the authority and responsibility of the NNRC Director and the possible merger of the campus-wide Radiation Safety Committee with the Nuclear Safeguards Committee (NSC). Staff Panel A, ff. Tr. 1740, at 16-17, 18.

NRC Region II issued five Severity Level IV violations based on IR 87-03. The Staff further noted that these violations, and the violations described in the NOVs accompanying IRs 87-01 and 87-02, raised concerns about the Applicant's management control and involvement in implementation of Georgia Tech's programs for radiation

---

<sup>14</sup>Although the inspection giving rise to IR 87-03 was not conducted by Ms. Long, she was present at the enforcement conference which additionally considered practices uncovered in the inspection that Ms. Long had conducted.



protection, reactor operations, and control of experiments. The Staff asked Georgia Tech to respond in a comprehensive way to the indications of management control problems by indicating the corrective actions it had taken or planned to take, and to describe how it planned to improve the working relations between the HP and reactor operations groups:

. . . 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 propose to correct the programmic deficiencies in the operation of your facility. Particular attention should be given to how you will improve working relations between health physics and operations and adherence to written procedures by personnel at the facility.

GT Exh. 8; GANE Exh. 31 (emphasis supplied); Staff Panel A, ff. Tr. 1740, at 17; Tr. 1767-68 (Collins).

In addition, the Staff noted that the Applicant had inappropriately expressed concern at the enforcement conference that its employees had reported safety concerns directly to the NRC, without providing GTRR managers an opportunity to resolve perceived or actual safety problems. The Staff acknowledged that the most effective way to resolve such issues is to have them brought directly to line management, and encouraged the Applicant to promote the type of working conditions in which employees feel their concerns will be appropriately addressed. However, the Staff reminded Georgia Tech that its employees had the right to provide information directly to the NRC, under Section 210

[211] of the Energy Reorganization Act, as implemented by 10 C.F.R. § 50.7. GANE Exh. 31, at 2; Tr. 1531-32 (Long).

In its June 15, 1987 reply to the NOV, the Applicant identified difficulties in communications and coordination of work activities between the reactor operations and health physics groups at the GTRR, and continuing quarrels between the two groups, as the cause for several of the violations. The Applicant also noted that the HP group had identified problems and violations of NRC requirements but had not communicated them to the Director. The Applicant mentioned a proposed corrective action for these difficulties as a reorganization, under consideration for about a year, that would require the Manager of the Office of Radiation Safety (MORS) to report to the NNRC Director. Staff Panel A, ff. Tr. 1740, at 17.<sup>15</sup>

(3) The July 1, 1987 Management Reorganization.

Historically, the next matter of significance to management<sup>16</sup> was the reorganization that was implemented in July, 1987. Georgia Tech's reasons for the reorganization are described later in this Decision (infra,

---

<sup>15</sup>The NRC Staff later discovered that the Applicant had undertaken a management reorganization without receiving a license amendment or NRC authorization to do so. See IR 87-08 (Staff Exh. 12) and testimony of Staff Panel C, ff. Tr. 3171.

<sup>16</sup>The next inspections, documented as IRs 87-04, 87-05, and 87-07, produced one deviation but nothing of significance to management of the GTRR. (IR 87-06, GT Exh. 7 was a report of the May 4, 1987 enforcement conference referenced above.) Staff Panel A, ff. Tr. 1740, at 18-19.



pp. 76-77). Suffice it to say here that the NOV emanating from IR 87-03 (GT Exh. 8; GANE Exh. 31) issued on May 26, 1987, little more than a month prior to the reorganization (and included five Severity Level IV violations, together with NRC's expression of concern about Georgia Tech's management control and involvement in programs for radiation protection, reactor operations and control of experiments).

Georgia Tech made its reorganization effective July 1, 1987, although it had failed to seek a license amendment from NRC.<sup>17</sup> By letter dated August 6, 1987, however, the Applicant belatedly submitted a license amendment request proposing to amend the GTRR organizational structure. Staff Panel A, ff. Tr. 1740, at 21; Staff Panel C, ff. Tr. 3171, at 12. (This proposed amendment, as well as several which followed, are discussed in greater detail infra, at p. 69.)

Shortly after the July 1987 reorganization, on August 19, 1987, a significant incident occurred at the reactor-- the Cadmium-115 spill (after the irradiation of a topaz crystal). The spill was not discovered by the NRC Staff until a December 16, 1987 inspection by Inspector George B. Kuzo. Staff Panel A, ff. Tr. 1740, at 19. This accident, including any reporting to NRC that might have been required, is discussed in detail infra, at pp. 31-34. We

---

<sup>17</sup>This action was identified as an apparent violation in IR 87-08, but no violation issued because Georgia Tech had previously advised NRC that it was considering a reorganization. Tr. 1792-93 (Collins).

note here only that, contrary to the claim in GANE's contention, the accident occurred after, not before, the management restructuring and thus cannot be viewed as a cause for the restructuring.

The July 1987 reorganization caused considerable animosity and hard feelings at the GTRR, particularly among the HP staff which was then headed by Mr. Robert M. Boyd-- whose title was changed from Radiation Safety Officer (RSO) to Manager, Office of Radiation Safety (MORS), and who thereafter was required to report to Dr. Karam, the NNRC director, in whose hands the responsibility for radiation safety had been placed. GT Exh. 6 (Figure 1); GANE Exhs. 42, 43. Even prior to the reorganization, Dr. Karam, who had become Director in 1983, had attempted to assuage the group animosities by bringing the HP and operations personnel together socially. At his own expense, he invited the entire staff to Christmas luncheons in 1983, 1984, 1985, 1986 and 1987. He also started recognizing birthdays with brief office parties. Karam, ff. Tr. 2723, at 23. However, Dr. Karam opined that, notwithstanding these efforts, the reorganization had produced further problems and had not ameliorated the existing situation. Tr. 2773 (Karam).

Thus, Dr. Karam testified that, within three months of the reorganization, a number of incidents occurred at the NNRC which led him to believe that someone on the GTRR staff was engaged in "dirty tricks" or deliberate acts to damage

the facility or impair its ability to function. These acts included damage to an expensive liquid scintillation counter, the erasure of floppy diskettes containing important data, the theft of two cases of batteries, placement of a bag of human feces in a staff refrigerator, and slashing of a large container of algicide causing the contents to spill on the floor. More significantly, in September 1987, a 500-watt light bulb above the 20-foot deep Cobalt Storage Pool was smashed,<sup>18</sup> causing glass fragments to fall into the pool where they could interfere with the water filtration system; and three safety switches in the cobalt storage area were turned off at the same time, thereby disabling the associated safety alarms which were required under certain conditions to avert human exposure to lethal Cobalt radiation. Karam, ff. Tr. 2723, at 31-33. Although there had been hostilities at the NNRC prior to the reorganization, Dr. Karam characterized these incidents as more serious than any that had occurred previously. Tr. 2785, 2786 (Karam).

Dr. Karam believed that the act of turning off the three Cobalt Pool switches was extremely serious from a safety standpoint, and was consistent with sabotage.

---

<sup>18</sup>Georgia Tech is authorized under its State license to possess a specified quantity of Cobalt-60, which it stores in a "Cobalt Pool" under approximately 20 feet of water. Incidents concerning the Cobalt-60 storage are not within our jurisdiction to resolve, except insofar as they may also pertain to the reactor itself.

Accordingly, he consulted with the Campus Police Chief (who also served as Deputy Chairman of the NSC) who suggested the use of a polygraph test. Dr. Karam then discussed polygraph testing with the entire NNRC staff in late September 1987; all (including Mr. Boyd) agreed to take the test, except for the two HP technicians in Mr. Boyd's unit--whose response was, "see our lawyer." Karam, ff. Tr. 2723, at 33-34; Tr. 2786, 2788 (Karam).

The two HP technicians' resistance to taking the polygraph examination caused Dr. Karam to wonder if they had been involved in these incidents. In the following two months, with hostilities between the HP and operations units continuing, it seemed to Dr. Karam that the two HP technicians' work performance was declining, that they were "disgruntled," that their attitude bordered on insubordination, and that this could affect nuclear safety. Karam, ff. Tr. 2723, at 34-35; Tr. 2789-90 (Karam). Dr. Karam spoke about this situation to Dr. Stelson, who stated that he had heard similar statements about the HP staff from the NRC. Karam, ff. Tr. 2723, at 35; Tr. 2791 (Karam).<sup>19</sup>

---

<sup>19</sup>Dr. Karam also stated that the two HP technicians were adversely affecting Mr. Boyd's decisiveness and effectiveness; and he believed that removing the two HP technicians would help to eliminate the strife at the facility. Tr. 2773-74 (Karam). In contrast, Mr. Boyd believed that the University's reason for replacing the HP staff was vindictiveness on the part of Dr. Stelson, due to Mr. Boyd's having closed down a (State-licensed) hot cell operation in early 1987, causing the loss of a \$4,000 contract. Tr. 2181 (Boyd), Tr. 2474-77 (Karam).

On December 9, 1987, Dr. Karam advised Dr. Stelson that he believed the situation had deteriorated to the point that nuclear safety was involved, and in his opinion the HP staff should be replaced as quickly as possible with interim personnel. Karam, ff. Tr. 2723, at 36; Staff Exh. 25, at 14.<sup>20</sup> Dr. Stelson suggested waiting until January 1988, when a new Associate Director was expected to join the staff. They then agreed to speak to Dr. Bernd Kahn, Chairman of the NSC, about the situation. Dr. Kahn suggested that an assessment be obtained from an industrial psychologist prior to taking the contemplated personnel actions, to which they agreed. Drs. Karam and Stelson then engaged Dr. R. Michael O'Bannon, an industrial psychologist,

---

<sup>20</sup>Dr. Karam's recommendation to replace the two HP technicians was made one week before the commencement of Mr. Kuzo's inspection on December 16, 1987, thus supporting Georgia Tech's assertion that their discharge was based upon the HP-operations conflict and the HP technicians' conduct, rather than on a belief that they had reported problems to the NRC during Mr. Kuzo's inspection. Tr. 3490, 3491 (Karam). See Staff Exh. 25, at 14-15. However, the discharges were not announced or put into effect until after Inspector Kuzo's inspection, lending some credence to GANE's view that the discharges could have been motivated (at least in part) by advice given to NRC rather than Georgia Tech. See OI Report 2-88-003 (GANE Exh. 33), Synopsis, at 6. A Federal District Court apparently agreed, finding that one factor in the discharges was their report to NRC inspectors (in December, 1987) of the August 1987 Cadmium spill. Millspaugh v. Karam, Civil Action No. 1:88-cv-312-ODE (N.D.Ga. 10/31/91 (slip op. at 24-25, 27-28), aff'd per curiam sub nom. Sharpe v. Karam, 976 F.2d 744 (11th Cir. 1992) (Staff Exhs. 25, 26; Tr. 3457-58 (Karam). There is an insufficient record for us to resolve this question and, given its occurrence almost ten years ago, we need not do so.



and asked him to perform this assessment. Karam, ff.

Tr. 2723, at 36; GT Exh. 10, at 1, 4.

(4) Inspection Report 87-08. The NRC inspection that commenced on December 16, 1987, conducted by Inspector George B. Kuzo, led to the identification of numerous violations in the areas of operations and health physics related to the Cadmium spill and resulted in the NRC's issuance of the January 20, 1988, Order suspending reactor experiments. These events further degraded Dr. Karam's confidence in the HP staff--whom he also believed had provided damaging (and arguably inaccurate) information to the NRC (see n. 20, supra, explaining that we have an inadequate record to resolve whether reports to Inspector Kuzo played any part in the proposed discharges of the two HP technicians). Following the NRC's inspection "exit interview" on January 22, 1988, Dr. Karam concluded that removal of the HP staff should be expedited. Karam, ff. Tr. 2723, at 42-43, 44; Staff Exh. 25, at 24-27.

At about the same time, Dr. O'Bannon performed his psychological assessment of the GTRR organization and, in February, 1988, reported to Dr. Karam. GT Exh. 10; Staff Exh. 25 at 17. Dr. O'Bannon concluded that Mr. Boyd's management of the HP unit was weak, that the level of hostility between the HP and operations units was too great and too entrenched to be repaired, that the HP staff showed a defiant attitude with no desire to correct the situation,

and that one of the HP technicians (Mr. Millspaugh) was likely to have been involved in the "dirty tricks" referred to above. Karam, ff. Tr. 2723, at 37-38; Tr. 3197 (Karam).

Dr. O'Bannon recommended that the entire HP staff be removed from the NNRC and assigned elsewhere, and that a new manager of the HP staff be appointed to replace Mr. Boyd. Karam, ff. Tr. 2723, at 37; GT Exh. 10, at [unnumbered] 4. NRC Inspector Kuzo confirmed, based on the number of violations issued for poor performance by the HP group, that the group had problems necessitating some sort of remedial action. Tr. 1898 (Kuzo).

On February 11, 1988, Dr. Karam handed letters to the two HP technicians, Messrs. Paul Sharpe and Steven Millspaugh, advising each that his "employment will be terminated on February 25, 1988." On February 15, 1988, however, prior to the effective date of the proposed discharges, following discussions with counsel, Dr. Stelson "rescinded" the discharges, pending a hearing; and the HP technicians were thereafter reassigned to other duties outside the NNRC. Staff Exh. 25, at 20-21; Tr. 3198 (Karam).<sup>21</sup>

In IR 87-08, Mr. Kuzo identified significant reactor operations and radiation safety issues that required further NRC attention. Therefore, during the period of January 14-

---

<sup>21</sup>At the time of this hearing, Mr. Millspaugh was still working for Georgia Tech (although not at the reactor). Tr. 3200-01 (Karam).



22, 1988, Region II management dispatched a special inspection team (which included Inspector Kuzo) to review selected GTRR program areas. The inspection team found numerous examples of failures to follow or to have adequate procedures to implement the Technical Specifications (TS), and/or violations of 10 C.F.R. Part 20 health physics requirements associated with the August 1987 experiment and the resulting Cd-115 contamination event. Staff Panel A, ff. Tr. 1740, at 19-20; OI Report No. 2-88-003 (GANE Exh. 33). These deficiencies involved both operational and health physics issues related to the pre-experiment review and calculation of dose rate levels for the topaz and cadmium container, as well as HP issues related to post-accident radiation surveys and evaluation of personal exposures. Tr. 1778 (Kuzo).

In general, the inspection findings identified continuing poor performance by Georgia Tech personnel regarding routine operations and HP activities. Details of these findings will be reviewed later, in connection with the Cadmium-115 accident description, but particularly noteworthy was Georgia Tech's failure, by the time of the inspection (some four months after the accident), to have conducted a complete and thorough evaluation of the Cadmium-115 contamination incident or to have implemented corrective measures to prevent recurrence during future experiments. Staff Panel A, ff. Tr. 1740, at 20.

Georgia Tech's failure to evaluate the incident and to implement corrective actions by the time of the inspection were perceived to indicate a lack of management involvement and control of operations and HP activities--which had been consolidated under the Director's control in the July 1987 reorganization. Id. at 20-21; Tr. 1835 (Fredrickson), 3219-20 (Karam). The lack of management involvement and control identified in IR 87-08 was considered by the NRC Staff to be detrimental to the safety of the facility. Tr. 1782 (Collins, Fredrickson, Gibson, Kuzo).

During this inspection, NRC Staff members also determined that working attitudes between HP and operations had continued to deteriorate, and informal training rather than procedures were used for many routine tasks. Operations personnel appeared satisfied with the NNRC Director's management efforts, but HP personnel indicated that the Director was involved too much in day-to-day health physics activities to the detriment of those HP activities. (At the same time, the Applicant added an NNRC Deputy Director, which NRC Region II viewed as a positive development because the individual selected had an operations background and had not been involved in the prior conflict between the HP and operations staffs; and because establishment of this position would assist the Applicant in improving its procedures and training. Staff Panel A, ff.

Tr. 1740, at 21; Tr. 1888-91 (Fredrickson).)<sup>22</sup> IR 87-08 concluded that there had been no significant improvement in the Applicant's performance since the May 1987 enforcement conference and that the management control problem continued. Staff Panel A, ff. Tr. 1740, at 21; Staff Exh. 12, at 1-2.<sup>23</sup>

Particularly troubling to the NRC Staff were certain findings it reached concerning the surveys and bioassay performed by Georgia Tech HP personnel in response to the Cadmium-115 contamination event. (These findings are reviewed, infra, in our discussion of the accident.<sup>24</sup>)

---

<sup>22</sup>The Staff was not concerned that this individual later resigned from the facility, or that the position has been vacant from April 1992 until the present, because (a) there has been no degradation in Georgia Tech's performance since the Deputy Director resigned; (b) the position was most needed to assist in resolving the problems which existed at that time (involving revisions to procedures, programs to ensure regulatory compliance, and the functioning of the organization), and those problems have since been resolved; and (c) there was no licensing or TS requirement for the position. Tr. 1891 (Fredrickson), Tr. 2981-84 (McAlpine).

<sup>23</sup>This inspection also raised concerns over the Applicant's proposed organizational change which, the NRC inspectors learned during this inspection, had been implemented on July 1, 1987, without the prior issuance of a license amendment. Staff Panel A, ff. Tr. 1740, at 21; Tr. 1792-94 (Collins), 1839 (Fredrickson). See p. 16, supra.

<sup>24</sup>At the hearing, there was considerable difference of opinion between the Staff and Georgia Tech concerning whether there had been adequate sampling of the contamination from the Cadmium-115 incident and whether adequate records were available to evaluate the extent and levels of contamination. Cf. Staff Panel A, ff. Tr. 1740, at 22-24, and Tr. 1796-97, 1799, 1800, 1802, 1803-05, 1884, 1885-86, 1906 (Kuzo) with Karam, ff. Tr. 2723, at 40, 43-45, (continued...)

Technical inadequacies also were identified in this inspection regarding personal contamination surveys and bioassays performed for the operator (Mr. William Downs) involved in the contamination event. Staff Panel A, ff. Tr. 1740, at 23-24; Tr. 1800, 1802, 1803-05 (Kuzo). (These inadequacies are addressed, infra, in our discussion of Mr. Downs.)

In IR 87-08, the Staff also determined that the Applicant had not conducted adequate surveys and analyses of possible air-borne contamination in August 1987, after the incident occurred. Staff Exh. 12, at 7, 9; Tr. 1884, 1885-86. The survey results reviewed by the NRC included the August 24, 1987 memorandum to Dr. Karam from HP technician Paul Sharpe, who had served as the Decontamination Supervisor. Staff Panel A, ff. Tr. 1740, at 22-23. As we will review under the Cadmium-115 incident, infra, that memorandum is not pertinent to our decision here, except to the extent that it may relate to Georgia Tech's current policy concerning reports to the NRC.

In IR 87-08, the NRC Staff rejected Dr. Karam's reliance on the August 1987 air sample analysis. Staff Exh. 12 (Report Details, at 9). The Staff also questioned the

---

<sup>24</sup>(...continued)  
and Tr. 3206, 3433, 3439 (Karam). We need not resolve these questions here, however, inasmuch as the Applicant eventually took steps to improve its sampling procedures and techniques and the Staff has accepted the current procedures as adequate. Tr. 1791 (Fredrickson).

reliability of Dr. Karam's January 1988 analysis of air filter samples. GT Exh. 11; Staff Exhs. 27, 28; Tr. 2511-12 (Boyd), Tr. 3423-25, 3441, 3444-50, 3465, 3472-74 (Karam). Again, we need not resolve this dispute. We recognize that there were certain deficiencies in the sampling techniques and procedures used in 1987-88 but, as discussed later, those techniques and procedures do not persist, and those used today appear to be adequate. (For further elaboration of these matters, and to the extent relevant to our determination here, see our description of the Cd-115 accident infra.)

(5) Shutdown Orders. On January 20, 1988, the NRC issued an "Order Modifying License, Effective Immediately," which suspended all further irradiation experiments. Staff Exh. 13; Staff Panel A, ff. Tr. 1740, at 25. The Order stated that the Applicant's actions after the May 1987 enforcement conference had not been sufficient to address the management control problems, which continued. The Order described the specific operations and health physics violations related to the August 1987 contamination event, and it stated that Georgia Tech had failed to complete a thorough review of the event regarding its cause(s) and had not taken any corrective measures to prevent recurrence during future experiments. The Order required Georgia Tech to cease utilization of the reactor



facility for any irradiation experiments until the following requirements were met:

- (1) assessment of management controls over facility operations;
- (2) review of records for similar occurrences and identification of root causes;
- (3) assessment of personnel exposures during the contamination and decontamination;
- (4) review of facility health physics and operating procedures for inadequacies;
- (5) identification and scheduling of corrective actions;
- (6) development and implementation of a training program; and
- (7) submission of the results of these assessments and reviews to the NRC for review.

Staff Panel A, ff. Tr. 1740, at 25.

On February 15, 1988, the President of Georgia Tech directed the immediate suspension of all reactor operations pending adequate resolution of all safety questions. Karam, ff. Tr. 2723, at 45-46. An NRC enforcement conference was held with Georgia Tech management on February 23, 1988. During this conference, the NRC representatives presented their view that a serious management problem existed at the NNRC, which was not limited to the facility's health physics organization. These representatives also expressed concern as to whether certain recent changes made at the facility, involving the replacement of HP personnel and the addition

of an operator, would really solve the principal problems; and they stated that Georgia Tech management needed to provide an expectation of excellence by direction and example. Staff Panel A, ff. Tr. 1740, at 25-26; Tr. 1806 (Fredrickson). The NRC representatives also criticized the Applicant's failure to coordinate survey data collection related to the Cadmium incident and to thoroughly investigate the incident and evaluate its seriousness. Georgia Tech was advised that its lack of regulatory sensitivity and its communications with the NRC did not compare favorably with other major research reactors located in NRC Region II. Staff Panel A, ff. Tr. 1740, at 26.

During the enforcement conference, Georgia Tech's President stated that he had decided the reactor would not restart until the Applicant and the NRC were both convinced that operations and health physics activities could be safely conducted. The Applicant also presented an NNRC action plan to the NRC. Id.

On March 17, 1988, based on Georgia Tech's self-initiated shutdown of the facility and its commitment to conduct an independent evaluation of the nuclear reactor program, the NRC Staff issued a Confirmatory Order Modifying License (Staff Exh. 14). This Order set out additional conditions that had to be met prior to restart of the reactor--specifically, (a) Georgia Tech was to submit a written identification of the root causes of problems that



could impact safe operations of the reactor, and (b) the President of Georgia Tech was to submit to the NRC a written description of the corrective actions taken to resolve the problems, as well as the reasons he believed the facility should be allowed to restart. Staff Panel A, ff. Tr. 1740, at 26-27; Staff Exh. 14 (GT Exh. 15).

b. The Cadmium-115 Accident.

In our review of the management history leading to shutdown, we referred to the Cadmium-115 incident that occurred in August 1987 but was not discovered by the NRC Staff until December 1987. This was mentioned by GANE in both its contention and its FOF as a primary example of mismanagement. We now turn to this accident in detail.

As set forth earlier, GANE's management contention asserts in part that Dr. Karam is the Director who withheld information about a serious accident from the NRC--the 1987 Cd-115 accident. According to GANE, the NRC allegedly was advised of the accident by the RSO at that time (Mr. Boyd) who was later demoted and left the GTRR operation claiming harrasment. We decide here whether the Director in fact withheld information from the NRC or retaliated against the RSO for reporting information to the NRC about the Cd-115 accident.

The Cd-115 accident occurred at the GTRR in August 1987, almost ten years ago. When the Staff learned of the accident (in December 1987), it responded vigorously by

conducting special inspections at GTRR, issuing orders to Georgia Tech, and finally issuing a civil penalty in November 1988.<sup>25</sup> We do not adjudicate the correctness of the Staff findings or actions in dealing with the incident in the 1987-88 time period. The basic facts of the incident and Staff responses are undisputed. Some details not now material to license renewal remain in dispute between the Staff and Georgia Tech but they are not essential to our decision and we do not resolve them.

The event itself is material to license renewal at GTRR now only because the Director of the GTRR (Dr. Karam) at the time of the event remains Director now. At the hearing we permitted GANE the opportunity to demonstrate that the Director's actions taken at the time of the Cd-115 accident were not conducive to safety at the time and were part of a pattern of unsafe behavior which continues to the present day. We earlier made clear to GANE that, even if the Director made mistakes in the past, that would not be material to license renewal unless the behavior went substantially uncorrected to the present. Tr. 1521-22.

(1) Summary Description of the Cd-115 Accident.

On August 18, 1987, Mr. William Downs, a Senior Reactor

---

<sup>25</sup>Four violations were evaluated collectively as Severity Level III. A \$5000 civil penalty was imposed--a base penalty of \$2000 that was escalated 100% (i.e., doubled) because of Georgia Tech's prior poor performance and failures to take prompt corrective action to deal with the management control problems. Staff Panel A, ff. Tr. 1740, at 35-36; Tr. 1852-53, 1855 (Fredrickson, Collins).

Operator (SRO) at the GTRR, transferred an irradiated topaz crystal from a Cadmium-lined aluminum container to a glass beaker on the top of the reactor. During the irradiation the Cadmium liner had become radioactive by neutron capture. Several isotopes of Cadmium including Cd-115 and Cd-109 were formed. Unknown to the operator, however, the Cadmium metal liner had partially disintegrated during the irradiation, possibly because of heat exposure in the reactor. When he poured the topaz from the container into the glass beaker, radioactive Cadmium particles from the partly decomposed Cadmium liner escaped and were spilled on the top of the reactor. Karam, ff. Tr. 2723 at 39-40; Tr. 3201-04, 3429, 3437 (Karam).

Subsequently, radioactive particles were carried either by air currents or gravity from the top of the reactor to the reactor containment floor below. Whether radioactive particles were transported to other parts of the reactor building is a matter in dispute between the Applicant and the Staff. Records that could resolve the matter are non-existent. Karam, ff. Tr. 2723, at 40; Tr. 2256, 2503 (Boyd), 3432-33 (Karam); Staff Panel A, ff. Tr. 1740, at 22.

A small amount of radioactive Cd-115 was found on the containment building floor in a routine survey the next day, August 19, 1987. Subsequent investigation on the same day showed radioactive contamination measured at 20 millirem per hour at the top of the reactor where the topaz transfer was

conducted. Karam, ff. Tr. 2723, at 39-40; GT Exh. 11; Staff Exh. 25 at 9; Staff Exh. 27, 28; Tr. 2255-56 (Boyd), 3420-21, 3423-24 (Karam). Decontamination efforts were initiated under the direction of the MORS (Mr. Boyd) who, in turn, delegated operational responsibility for assessment and decontamination to a health physics technician. Tr. 3421 (Karam). On August 24 the HP technician reported in a memorandum to the Director (GT Exh. 12) that decontamination efforts were concentrated on several specific locations in the reactor building.

The wording suggested that contamination was found at each of the locations that were decontaminated. Karam, ff. Tr. 2723 at 40; GT Exh. 12 at 1; Tr. 3432 (Karam). The Director suspected that the memo was deliberately misleading and that there was no contamination beyond the locations where it was first identified. Tr. 3205-06 (Karam). However, survey records which could settle the issue were inadequate. Staff Panel A, ff. Tr. 1740, at 22; Tr. 2503 (Boyd); Tr. 3206 (Karam). Subsequent surveys showed no contamination, although limited hot spots remained which were later decontaminated. Tr. 3207 (Karam).

The Director reported the radioactive release to the Georgia Tech Nuclear Safegaurds Committee (NSC) whose chairman was the ex-officio RSO. Neither the Director nor the RSO thought it should be reported to NRC because they had concluded that the accident lacked sufficient safety

significance to be reportable. The MORS (Mr. Boyd) agreed that the event was not reportable but urged his management to report to the NRC anyway as a matter of prudence. Karam, ff. Tr. 2723, at 40-41; Tr. 2198-99, 2253, 2259, 2436-37 (Boyd). His advice was not followed. Later, the NRC Staff investigated the event and after some uncertainty because of incomplete records concluded that the accident was not a reportable event under Georgia Tech's Technical Specifications or 10 C.F.R. Part 20. Staff Panel A, ff. Tr. 1740, at 24; Tr. 1784-86 (Kuzo).

GANE did not pursue this aspect of its contention in its FOF. Neither did it direct our attention to any facts of record which contradict or suggest a substantially different view of events summarized above. Our review of the record did not reveal any conflicting information.

Accordingly, the Board finds that, contrary to the contention, the Director of GTRR did not wrongfully withhold information from the NRC concerning a serious accident (the 1987 Cadmium-115 accident). The accident did not create a serious radiation hazard and was not required to be reported to the NRC under either the reactor technical specifications or 10 C.F.R. Part 20.

(2) GANE's Claim of Mistreatment of the Safety Officer.

GANE's contention on the Cd-115 accident also suggests that the safety officer suffered retaliation from his management after informing the NRC of the accident.



Although it is somewhat ambiguous, we assume that GANE initially intended this part to refer to the MORS. However, GANE did not pursue this allegation in its FOF and the other parties did not discuss it either.

We heard testimony from the former MORS (Mr. Boyd) where he could have but did not make the claim that his reporting concerning the Cd-115 incident resulted in his later removal from duty at the reactor and his reassignment to work elsewhere in the University system. He concurred with his management that the accident was not reportable to the NRC. The former MORS has many grievances against the Director for other reasons and he harbors hard feelings to the present time for actions taken against him. Tr. 2233-47 (Boyd). The hard feelings are based on his demotion prior to the Cd-115 spill and his perception that management unfairly blamed him and his HP staff for the Cd-115 incident when, in fact, the original release of Cd-115 was due to the carelessness of the SRO. In this he apparently misunderstood the significance of the accident, which did not create a serious health risk to anyone but did reveal to the NRC that there were serious deficiencies in management and HP procedures and practice at the reactor. The Board would take a serious view of a substantiated attempt by management to limit the flow of information about reactor operations to the NRC, as alleged by the contention. However, the disgruntlement of the former MORS based on

disagreement with management decisions is not an important factor in the licensing decision before us even if the Director was biased or unfair to the employee at the time.

We find that, contrary to the contention, the Director did not retaliate against the MORS (Mr. Boyd) for passing information on the Cd-115 accident to the NRC.<sup>26</sup> Job actions taken against the MORS were related to the Director's adverse perception of job performance by the MORS and the HP staff. This view was formed in an ongoing process that both unfolded before the Cd-115 incident and was exacerbated by the HP staff performance in the wake of the incident.

The contention also claims that management was restructured to give the Director more control over the MORS after the Cd-115 incident. Although it is true and undisputed that management was restructured and that the responsibilities of the MORS were reduced--see discussion at

---

<sup>26</sup>The Board interprets the contention to mean "MORS" where it refers to "the safety officer" and we have structured the decision accordingly. We heard extensive testimony on the personnel problems that were rampant at the reactor at the time and are aware that the NRC Office of Investigations concluded that there were allegations of retaliation against two HP technicians who were supervised by the MORS for giving information to the NRC but that there were no intentional, contrived violations of regulations and licensing requirements. Staff Panel A, ff. Tr. 1740, at 29-30; OI Report 2-88-03, GANE Exh. 33. See n. 20, supra. The thrust of the OI Report, however, was that there was severe mismanagement at the reactor, a fact not in dispute in this licensing action. Although these were serious matters at the time they unfolded, they are not material to the licensing decision now before us without additional evidence that the mismanagement has continued to the present day.

pp. 15-16, 76-77 of this Decision--this occurred in July of 1987, before the accident in August. Thus the restructuring was not linked in any manner to the Cd-115 incident and it could not have been motivated by retaliation of the Director against the MORS stemming from the Cd-115 incident.

Our findings in this section are narrowly constructed to respond to GANE's admitted contention. The contention as filed reflected considerable initial misunderstanding on the part of GANE. Contrary to the assertions in the contention, we find that the Cd-115 accident was not treated by the NRC as an accident having serious health and safety implications. The Director was not required to report it to NRC. The MORS was not demoted or removed from duty by reason of information he reported to NRC about the accident. The management restructuring at GTRR happened before the incident and was not linked to it. Nor is there any evidence that the incident in any way resulted from the restructuring.

2. Management Record After Restart.

a. Record of Violations. Restart of the reactor was authorized by the NRC Staff on November 15, 1988. Staff Panel A, ff. Tr. 1740, at 39-40; Staff Exh. 16. GANE relies on various Staff inspection reports following restart to demonstrate that managerial problems persist and, accordingly, that Georgia Tech's license should not be renewed. We here consider the management record after

restart as reflected in pertinent Staff inspection reports from the restart date until the close of the record.

From January 1989 through April 1996, 31 inspections were performed by the NRC Staff to review numerous aspects of the Applicant's operation and management of the facility. The areas inspected include operational and maintenance activities, design change functions, operator licenses, regualification and medical activities, procedures, fuel movement, surveillance, experiments, effluent and environmental monitoring, emergency preparedness, radiation protection, safeguards and security, as well as the Applicant's organizational structure and review/audit functions. Among these 31 inspections, no violations were found in 18 inspections; and 17 cited violations (Severity Levels IV and V) and seven non-cited violations were found and documented in the remaining 13 inspections. Staff Panel B, ff. Tr. 2813. A brief description of these violations is given below.

(1) Inspection Report 89-02. An operations inspection was conducted in July and August, 1989, and was documented in Inspection Report 89-02 (GANE Exh. 61). Two Severity Level IV violations were identified:

1. failure to perform leak-rate testing in accordance with commitments, and
2. inadequate procedure to assure that any shim blade not fully inserted was withdrawn sufficiently to cause a negative trip when released into the core.

Staff Panel B, ff. Tr. 2813. at 14. Adequate corrective actions were taken by the Applicant, and this matter was closed by the Staff. Id. at 14-15.

(2) Inspection Report 89-05. A security inspection was conducted during September 1989, as documented in IR 89-05 (GANE Exh. 64). The following six Severity Level IV violations were identified:

1. failure to maintain assessment equipment in operable condition and failure to properly position assessment equipment,
2. failure to secure a controlled access barrier,
3. failure to maintain the alarm system in operable condition,
4. failure to change keys as committed,
5. failure to control keys as committed, and
6. failure to establish and maintain a safeguards event log.

Id. at 15. This excessively large number of violations caused the Staff to be concerned about weaknesses in the Applicant's procedures used to implement its physical security program, and escalated enforcement action was considered by the Staff. GANE Exh. 64, at 1; Tr. 3046-47, 3162-63 (McAlpine). Corrective actions were taken by the Applicant to address these violations, and they were found to be acceptable by the Staff. Staff Panel B, ff. Tr. 2813, at 15-17.

(3) Inspection Report 90-02. A health physics inspection was performed during June 1990, and was



documented in IR 90-02 (GANE Exh. 55). One Severity Level IV violation and one non-cited violation were identified:

1. failure to maintain a high radiation area locked as required in 10 C.F.R. § 20.203(c)(2), and
2. failure to perform a personal survey at the exit to a controlled area. (Non-cited violation.)

Staff Panel B, ff. Tr. 2813, at 17. Appropriate corrective actions, which included procedural revisions, counselling and training the individuals involved, were taken by Georgia Tech to address these matters. Id., at 17-18; Tr. 2822, 2825, 2827-28, 2995-97 (Bassett, Mendonca).

(4) Inspection Report 91-04. An emergency planning inspection was conducted during September 1991 and was documented in IR 91-04 (GANE Exh. 58). Although various emergency planning exercise strengths were observed, GANE Exh. 58 (Summary, at 1-2), Tr. 3143-44 (McAlpine), two non-cited violations were noted:

1. Inadequate procedure for implementing the Emergency Plan notification requirements, and
2. Failure to perform a biennial review of the Emergency Plan as required.

Staff Panel B, ff. Tr. 2813, at 18. The Staff found that the Applicant took appropriate corrective actions concerning these violations. Id., at 19.

(5) Inspection Report 92-04. An emergency planning inspection was conducted during November 1992 and was documented in IR 92-04 (GANE Exh. 57). One Severity Level V violation was noted during this inspection: failure

to have an adequate procedure for implementing certain emergency planning notification requirements (a repeat of the non-cited violation noted in Inspection Report 91-04). Staff Panel B, ff. Tr. 2813, at 19. Appropriate corrective actions were taken by Georgia Tech to address this violation. Id., at 19-20.

(6) Inspection Report 93-02. A combined operations and health physics inspection was performed in September 1993 and documented in Inspection Report 93-02 (GANE Exh. 60). Three Severity Level IV violations were cited as a result of this inspection:

1. failure of the Nuclear Safeguards Committee (NSC) to conduct the biennial audit of the licensed operator regualification program as required by Technical Specifications (the Manager of the Office of Radiation Safety performed the audit; he was not a member of the NSC).
2. failure to follow procedures for conducting neutron surveys, for completing certain twice-weekly contamination control surveys, and for completing survey forms required for shipping radioactive material, and
3. failure to comply with 49 C.F.R. Part 172 requirements concerning the description of radioactive material being shipped and indicating a 24-hour emergency response telephone number on shipping documents.

Staff Panel B, ff. Tr. 2813, at 20. Appropriate corrective actions were taken by the Applicant concerning these matters, including a commitment that the NSC would thereafter perform the required audits, procedural revisions and revision of the shipping forms. Id. at 20-21.

(7) Inspection Report 93-03. An emergency planning inspection was conducted during November 1993 and was documented in IR 93-03. One non-cited violation was noted: failure to perform periodic testing of the criticality alarm system in accordance with procedure. The required monthly tests of the system were not performed during May, June, and July, 1993. Appropriate corrective actions were taken by the Applicant concerning this matter. Staff Panel B, ff. Tr. 2813, at 21-22.

(8) Inspection Report 94-01. An unscheduled inspection was conducted during March 1994, to follow up on an incident involving the failure of a Senior Reactor Operator (SRO), William Downs, to follow procedures that resulted in two disabled reactor scram functions. Id. at 22; Tr. 2860-61 (Mendonca), Tr. 2865 (McAlpine). This inspection was documented in IR 94-01 (GANE 7xh. 59). One non-cited violation with two examples was identified:

1. failure to complete the actions required by the checklist for startup of the reactor on February 15, 1994 (a fuse was not replaced after it had been removed during a training session, as the checklist required), and
2. failure to complete the actions required by the checklist during shutdown of the reactor on February 11, 1994 (three electrical jumpers had not been removed).

Staff Panel B, ff. Tr. 2813, at 22; Tr. 2862 (Bassett, Mendonca). These incidents were classified as non-cited violations because the disabled scram functions were not required under the Technical Specifications (TS) for safe

operation of the reactor, since they generally provide equipment protective functions, and credit is not taken for them in accident mitigation in the Final Safety Analysis Report. Staff Panel B, ff. Tr. 2813, at 22; Tr. 2863-64, 3155 (McAlpine, Bassett).

Following the incident, the Applicant took corrective actions which included reviewing the incident, temporarily suspending the SRO's reactor operating duties, and establishing a panel to further investigate the incident and the SRO's operating history to recommend what further actions should be taken. The Applicant's panel evaluated the technical performance of the SRO with respect to the incident of February 15, 1994, as well as the SRO's historical performance, and determined that, because of the SRO's lack of diligence to safety and poor past performance, the suspension of the SRO should remain in effect until there was an obvious change in attitude and a commitment to follow procedures. The SRO subsequently terminated employment at the facility in June 1994. Staff Panel B, ff. Tr. 2813, at 22-23; Tr. 2800-02, 2804 (Karam); Tr. 2865-66 (McAlpine). See further discussion of Mr. Downs, infra, pp. 46-51.

(9) Inspection Report 94-02. A health physics inspection was conducted during August 1994 and was documented in IR 94-02 (GANE Exh. 56). One violation (Severity Level IV) was cited: failure of the Applicant to

make a proper evaluation of the extent of the radiation present following the annual neutron radiation survey performed August 11, 1994, which was required by procedure. Staff Panel B, ff. Tr. 2813, at 23. The Applicant subsequently took appropriate corrective actions concerning this matter. Id., at 23-24.

(10) Inspection Report 94-04. An emergency planning inspection was performed during October 1994 and was documented in Inspection Report 94-04. One non-cited violation was noted: failure to submit emergency procedure changes to the NRC in accordance with § 10.4 of the Emergency Plan. Id., at 24. Adequate corrective actions were taken by the Applicant with respect to this matter. Id.

(11) Inspection Report 94-05. An operations inspection was conducted during December 1994 and was documented in Inspection Report 94-05 (GANE Exh. 63). One non-cited violation was noted: failure to replace the charcoal cartridges every two weeks as required by Technical Specification 6.4.b(6). Staff Panel B, ff. Tr. 2813, at 24-25. Appropriate corrective actions were taken by Georgia Tech with respect to this matter. Id. at 25.

(12) Inspection Report 95-01. A health physics inspection was performed during February and March, 1995 and the inspection results were documented in IR 95-01 (GANE



Exh. 66). Two violations (one Severity Level IV and one Severity Level V) were identified:

1. reporting failures, by: (a) omission of some of the required data and providing inaccurate data in annual reports concerning liquid and gaseous radioactive effluents to the NRC for the years 1983, 1986, and 1988 through 1993, and (b) providing inaccurate information to the NRC in the 1994 Safety Analysis Report concerning continuous, automatic measurement and recording of meteorological data, and
2. failure to have a Nuclear Safeguards Committee (NSC) approved procedure to calibrate and operate the alpha/beta proportional counter.

Staff Panel B, ff. Tr. 2813, at 25. Appropriate corrective actions were taken by the Applicant with respect to the inaccurate reporting data, including the creation of a computer data base for gaseous and liquid discharges, and the correction of the inaccurate portions of the annual reports and FSAR. Id. at 25-26. Appropriate corrective actions also appeared to have been taken with respect to the failure to have an NSC-approved procedure, although verification of these corrective actions had not yet been completed and documented by the NRC Staff prior to the commencement of hearings in this proceeding. Id. at 26.

(13) Inspection Report 95-02. A security inspection was conducted during May 1995 and was documented in IR 95-02. One violation (Severity Level V) was identified: failure to submit material status reports within 30 days of March 31 and September 30 of each year as required by 10 C.F.R. § 74.13(a)(1). Id.; GANE Exh. 69; Tr.

3097 (Mendonca). Appropriate corrective actions were taken by the Applicant to resolve this matter. Staff Panel B, ff. Tr. 2813, at 26-27.

(14) Summary. As stated earlier, none of these violations identified by the Staff in the period following restart was more serious than Severity Level IV, and the corrective actions taken by the Applicant were assessed to be adequate by the Staff. In addition, in none of the inspections from May 1995 through April 1996 were any violations identified, at least as reflected by the record herein. The Staff explicitly indicated that the decreasing frequency of violations with the passage of time was a factor it took into account in assessing the adequacy of management. Tr. 3151 (McAlpine, Mendonca). Therefore, collectively, the identified violations together with other inspection findings do not present a picture of serious management deficiency during the January 1989 through April 1996 period.

b. Employment history of William Downs.

One matter stressed by GANE as an example of poor management by Georgia Tech--"a glaring problem"--is the failure to take any action until 1994 against Mr. William Downs, a SRO at the GTRR from 1976 until June 1994. GANE FOF, at 8. Mr. Downs was involved in several serious incidents at the reactor, two of which we have previously alluded to (i.e., the Cadmium-115 incident of August 1987

and the disabled scram functions of March 1994). GANE claims that his employment history raises questions as to the adequacy of personnel management during this period of time.

Specifically, to rehearse the incidents involving Mr. Downs:

- (a) February, 1985 Striking of Hot Cell Window with a wrench while manipulations were in progress. Mr. Downs explained that he struck the window accidentally during horseplay. Staff Exh. 22, Enclosure 2 at 1.
- (b) January, 1986- Failure to isolate sample line per  
February, 1987 procedure when performing monthly surveillance. IR 87-02. Mr. Downs explained that this procedure had little safety significance and that he violated it for convenience sake. However, he claims that, as of June, 1988, he was strictly adhering to the procedure. Staff Exh. 22, Enclosure 2 at 1.
- (c) 1986 Failure to fill out or complete Experiment Schedule Forms or Experimenter's Checklists. IR 87-01. Mr. Downs admitted his error. He was counseled by the NNRC Director on procedural adherence after the NRC violation was issued. Staff Exh. 22, Enclosure 2, at 2.
- (d) March, 1986- Failure to wear dosimetry and  
November, 1986 protective clothing in areas requiring their use. IR 87-03. Mr. Downs could not recall any failure to wear dosimetry or protective clothing when they were required. Staff Exh. 22, Enclosure 2, at 2; Enclosure 3, at Event 5.
- (e) 1986 Failure to log Initial Conditions and Equilibrium Conditions per Procedure 2000, "Reactor Operation" on frequent occasions, as well as

numerous missing/incomplete log entries. IR 87-01. Mr. Downs responded that, during 1986, there were 3 instances where the Initial Critical Data (ICD) stamp was not completely filled out. On two of these occasions, a reactor scram occurred within 2 minutes of reaching power, and he had no opportunity to fill out the log. On the other occasion, he put the ICD stamp in the logbook out of sequence and forgot to go back and cross it out after completing his log entries. The ICD stamp was filled out after being restamped at the proper time. Mr. Downs stated that he would pay more attention to this procedure in the future but would also bring to management's attention a deficiency in the procedure. Staff Exh. 22, Enclosure 3, at Event 6.

- (f) February, 1987 Power Excursion from 300 KW to approximately 2 MW while power was supposed to be stabilized during conduct of Beam Port operations. IR 87-01. Mr. Downs asserted that he believed he reacted in a safe manner, in that the time between the power excursion and his actions was not excessive. He blamed the event on a stuck power level indicator. However, the Staff observed that there were other indicators and the event took place over a period of approximately 10 minutes and was not terminated until radiation monitors alarmed. Staff Exh. 22, Enclosure 2, at 2.
- (g) August, 1987- Inadequate log keeping and control  
February, 1988 of an experiment resulting in the overexposure of a topaz experiment. Subsequent contamination event was due to poor HP practices and inadequate communications with facility management. Inconsistent information was provided to the NRC regarding post-spill activities, in particular the radiation monitoring

of his residence. IR 87-08. This is the Cadmium-115 incident that we have reviewed elsewhere in this Decision (see pp. 30-34, supra.)

- (h) February, 1994 Failure to follow procedures that resulted in two disabled reactor scram functions. IR 94-01 (GANE Exh. 59). (See pp. 42-43, supra.)

The foregoing history of events indicates that, during the early years of Mr. Downs' service, there were a number of events that might have warranted personnel action against him and which motivated the Staff to have an enforcement conference with him on May 20, 1988. Following the conference, the Staff determined to take no enforcement action with respect to Mr. Downs' SRO license but advised him of its concern "over your lack of adherence to procedures, your lack of diligence in recording information in operating logs and experiment forms, and your casual attitude displayed during the August 1987 contamination incident." Staff Exh. 22, letter to Mr. Downs from J. Nelson Grace, Regional Administrator, Region II, dated June 17, 1988.

Mr. Boyd blamed Mr. Downs (at least in part) for the 1987 HP-Operations hostilities, which we have described earlier in this Decision. Mr. Boyd believed that the HP technicians were being unfairly singled out for the conflict, instead of Mr. Downs. He regarded Mr. Downs as demonstrating a hostile attitude toward health physics or to anyone telling him what to do, as showing a total neglect



for complying with procedures, and as being subject to repeated bursts of anger. Tr. 2165-68 (Boyd).

Mr. Boyd recommended to Dr. Karam that Mr. Downs' services be terminated following the Cadmium-115 incident. Dr. Karam agreed. He testified that Mr. Downs had been asked to take a geiger counter home to his apartment to check on radioactivity from the Cadmium-115 incident but could not remember whether he (Downs) had done so. Tr. 2798-99 (Karam). Dr. Karam believed that Mr. Downs "somehow didn't forget, he was playing games" (Tr. 2799) and accordingly requested to Dr. Stelson that Mr. Downs be terminated. Apparently, Dr. Stelson believed that people forget many things and instead recommended a psychological examination, which Mr. Downs passed. Id.

Mr. Downs served satisfactorily until the incident involving disabled reactor scram functions occurred in February, 1994. Tr. 2800 (Karam), 2866 (McAlpine). Following the incident, the Applicant took corrective actions, which we have earlier described (see p. 43, supra), leading to Mr. Downs' suspension<sup>26</sup> and his subsequent termination of employment at the facility in June 1994.

---

<sup>26</sup>The 1994 incident raised concern in NRC Region II over Mr. Downs' lack of diligence and caused the Staff to consider whether Mr. Downs' SRO license should be suspended or revoked. Tr. 2869 (McAlpine), 2872 (Mendonca). The Staff, however, considered Georgia Tech's suspension of Mr. Downs to be responsible and appropriate. Accordingly, the Staff took no action on its own, pending the outcome of the Applicant's evaluation. Tr. 2872 (Mendonca).

Staff Panel B, ff. Tr. 2813, at 23; Tr. 2800-02, 2804 (Karam).

Our evaluation of Mr. Downs' service indicates, as Mr. Boyd suggested, that his horseplay incident in February, 1985, and the attitude it reflected, may have warranted the immediate termination of Mr. Downs' services as a reactor operator. Several later incidents, including the Cadmium-115 incident, also may have warranted his termination, as Dr. Karam recommended. Management's failure to take action against Mr. Downs until February 1994 perhaps reflects poorly upon it (although not on Dr. Karam).

But the failure to take action earlier is not sufficient to disqualify management from acting under a renewed license. This is particularly so when the current Director of the facility sought (unsuccessfully) to take action following the Cadmium-115 incident. Furthermore, none of the evidence--except perhaps a surmise by Mr. Boyd (Tr. 2169)--supports GANE's claim that Mr. Downs was not discharged because the reactor would have lacked sufficient personnel to operate and produce a monetary return. Dr. Karam had responsibility for producing a monetary return, and he in fact sought to terminate Mr. Downs' employment.

c. Intrusion by Fox TV Film Crew.

One example of alleged mismanagement relied on by GANE was based on events occurring after the initiation of this proceeding. In early October 1995 (Tr. 2621 (Carroll)), a

film crew from the television series "A Current Affair" visited the Georgia Tech site and, with its camera rolling, made its way into the administration building which adjoins the reactor containment building. A filmed record of their "intrusion" or "incursion" (Tr. 2621 (Carroll))(i.e., entry) into the reactor complex was broadcast by Fox Television on November 15, 1995, and personally videotaped from the broadcast by Ms. Glenn Carroll, GANE's representative in this proceeding. Tr. 2620-22 (Carroll), 2653.

On November 10, 1995, after the "intrusion" although prior to the broadcast, GANE sought to introduce a new contention concerning security of the facility based on the incident. We preliminarily considered this proposed new contention at a prehearing conference held in Atlanta, Georgia on November 15, 1995 (the same day as the broadcast). GANE offered to submit a videotape of the program in support of the new contention. At the conference, GANE also described the incident as having management implications (Tr. 520). We dismissed the new contention without prejudice to its being refiled along with a discussion of the factors relevant to late-filed contentions. Second Prehearing Conference Order, dated November 29, 1995 (unpublished).

On January 1, 1996, GANE provided the videotape to the parties and resubmitted the incident as part of its management contention. By our Memorandum and Order

(Telephone Conference Call, 5/15/96), dated May 16, 1996, LBP-96-10, 43 NRC 231, 233, and as reiterated at the hearing (Tr. 2617), we determined that the tape was relevant to the management contention. Thereafter, we admitted into evidence the video portion of the tape (GANE Exh. 54), along with limited portions of a transcript of the broadcast (GANE Exh. 53). Tr. 2677-98.<sup>27</sup>

GANE contends that the film crew's ability to intrude, unimpeded, into the reactor complex demonstrates inadequate ("sloppy") management on the part of the Applicant. See, e.g., Tr. 2669-70 (Carroll). Although Ms. Carroll was not present at the site during the film crew's entry into the reactor complex, she had been informed that members of the film crew were dressed like students and that a small, concealed hand-held camera was used in the filming. Tr. 2651, 2654-56. Ms. Carroll stated that the film crew tried to open certain doors but found them to be locked, and that they did not get into the room where the radioactive Cobalt is stored or into the reactor containment. Tr. 2656-57, 2658 (Carroll). She pointed out a sign they had filmed, indicating the presence of radioactive materials--however, she did not know if entry had been made

---

<sup>27</sup>We determined that the part of the audio that was descriptive of various events on screen was relevant but that other comments of the narrator that attempted to characterize the events or to provide interpretive comments were inappropriate, at least in the absence of the narrator who could be cross-examined. Tr. 2617.

into areas containing radioactive materials, or if the facility's security plan was breached;<sup>28</sup> and she did not identify any violation of a regulatory requirement.

Tr. 2649-50, 2657-59, 2660-61 (Carroll).<sup>29</sup>

Upon receiving a report of this event, an NRC Region II safeguards inspector conducted an inspection of the facility on October 31-November 3, 1995; the results of that inspection are summarized in Inspection Report 95-04. No violations or deviations were identified in this inspection. GANE Exh. 65 (Summary at 2; Report Details at 1, 3). The inspector determined that the film crew toured interior and exterior areas of the NNRC that are not subject to control under the GTRR security plan--including hallways in the administration building, a stairwell leading to the visitors' observation window, the roof of the administration building, and a fenced storage yard. GANE Exh. 65 (Summary

---

<sup>28</sup>In contrast, Dr. Karam stated that the signs which appear in the videotape are located outside secured areas in which radioactive materials were present, and that the film crew only entered a public building which was open to students who come and go to classes there. Tr. 3511-12.

<sup>29</sup>GANE was not permitted to have access to the security plan, although earlier it had sought such access. Ms. Carroll offered a "common sense" opinion that the facility security plan should utilize fences and barbed wire. Tr. 2661, 2665. Ms. Carroll's education and experience (consisting of a Bachelor of Arts degree in visual arts, and experience as an artist, typesetter and graphics designer, Tr. 2665-67) do not qualify her to render an expert opinion on this subject. Moreover, undoubtedly because she would have had no reason to be granted access, Ms. Carroll has never seen a security plan for any nuclear reactor, and she did not know (nor could have known) what security measures are in place at any other research reactor. Tr. 2667-68.



at 2; Report Details at 1). The film crew was videotaped challenging two security doors, which remained locked. No breach of security or the security plan was identified; and there was no indication that the television crew had unauthorized access to protected or radiation-controlled areas. GANE Exh. 65 (Summary at 1-2; Report Details at 1-2); Tr. 3058 (Mendonca); see Tr. 3511-12 (Karam).

The NRC safeguards inspector spoke with Georgia Tech personnel concerning this event, and verified that access controls, barriers, alarms, assessment capabilities and response to alarms were in accordance with the GTRR security plan. The inspector subsequently viewed the television broadcast of the event on November 15, 1995, and determined that it contained no indication that the television crew had unauthorized access to protected or radiation-controlled areas. GANE Exh. 65 (Report Details at 2-3); Tr. 3061-62 (McAlpine). The videotape did not lead to the identification of any weaknesses in the Applicant's security program. Tr. 3068 (Mendonca).<sup>30</sup>

After the event occurred, the facility director discussed it with all NNRC staff and students. Notwithstanding the fact that no violations or deviations

---

<sup>30</sup> The videotape showed that one individual (whom GANE identified as a reactor operator) allowed the film crew to continue in its intrusion into the administration building, unimpeded. This individual was not remiss in this regard, since there is no requirement for him to have done anything to limit their access to that area. Tr. 3068 (Mendonca).

were identified as a result of this event, the Applicant subsequently revised its security measures, by restricting access to the NNRC to require use of an existing coded key card reader or the presence of an authorized individual to open the front entrance to the facility;<sup>31</sup> also, additional patrols by the campus police, whose office is located across the street from the reactor facility, were put into effect. GANE Exh. 65 (Report Details at 3); Tr. 3263-64, 3513 (Karam).<sup>32</sup> Georgia Tech's voluntary institution of these additional security measures was over and above NRC requirements. The Staff would not have required the Applicant to take these actions. Tr. 3054-56 (McAlpine), Tr. 3069-70 (Mendonca, McAlpine).

Upon review of the evidence on this event, we agree with the Staff (Staff FOF, at 108) that the Fox Television film crew's intrusion into the reactor complex does not reflect inadequate management by the Applicant.<sup>33</sup> To the contrary, the security plan appears to have worked as

---

<sup>31</sup> The key card reader at the front door was in place previously, but was only used when the door was locked (i.e., from 5:00 p.m. to 8:00 a.m.). Tr. 3522, 3530 (Karam).

<sup>32</sup> In addition, a new fence has been installed at the facility, with an alarm that activates at the NNRC and the campus police station if the fence is cut, climbed or shaken. Tr. 3513. This fence was installed in connection with the advent of the 1996 Olympic Games, but Dr. Karam indicated that Georgia Tech intends to keep it in place after the Games have concluded. Tr. 3522-23, 3525.

<sup>33</sup> Georgia Tech submitted no proposed findings regarding this event.

intended, in compliance with applicable regulatory requirements. Further, as observed by the Staff (id.), the Applicant's subsequent decision to upgrade its security measures beyond the requirements of the security plan may be viewed as demonstrating good managerial judgment. Thus, this matter does not provide grounds for denying or conditioning the license renewal application.

d. Hardware Issues.

As part of its claim of poor management, GANE asserted that the GTRR had operated for extended periods of time using equipment that needed repair. We turn to an analysis of these claims.

(1) The Bismuth Block. Gane asserted that the continued existence of a water leak in the bismuth block is evidence of inadequate management at the reactor. GANE did not pursue its concerns in its proposed findings of fact and did not direct our attention to any part of the record that could support its assertion. Neither did Georgia Tech address the matter in its proposed findings. We therefore find that this is a matter no longer in controversy between Georgia Tech and GANE and, accordingly, adopt the proposed findings of the NRC Staff on this matter, as summarized below. Staff FOF, §§ 2.4.2.1-2.4.2.5, at 99-102. We set forth below a brief summary of the testimony on the bismuth block and find that leaking coolant has no safety significance, and is not material to license renewal.

The bismuth block is part of a shield within a biomedical beam port at the reactor. Its purpose is to attenuate gamma rays and permit neutrons to pass through for use in experiments. The bismuth block is cooled by a water source independent of any source in the reactor. The cooling system is not part of an accident mitigation system at the reactor. In August 1983, heavy water was found leaking from the bismuth block. Water drained to the basement of the reactor building. The wet area was posted as potentially contaminated and the reactor was shut down. After analysis, the leak was sealed with a commercial radiator stop leak compound and reactor operations resumed. The bismuth block coolant was converted from heavy water to ordinary light water in 1983.

The seal was successful until 1989, when the leak reappeared. An attempted repair using "stop leak" and epoxy compounds did not succeed. The leak did not interfere with the block cooling function and radioactivity levels remained below regulatory limits. Rather than attempting further repairs of the leak, the Applicant installed an NRC-approved collection system to catch and store the leaking water. The collection system is now functioning and no running water has been observed, although the basement area is damp. The bismuth block leak has no health and safety implications. Since there is no safety function, the Applicant is permitted by NRC to use the bismuth block in its current

condition. The bismuth block leak raises no concerns with respect to the license-renewal application.

We have reviewed the record and find no contrary evidence to that cited by the Staff and summarized above. Accordingly, the Board finds that the water leak in the bismuth block is not evidence of poor management at the reactor and is not material to our decision on license renewal.

(2) Fuel Element Failure. GANE has asserted that a fuel element weld failure is evidence of inadequate management at GTRR because of failure to notify NRC. Neither GANE nor the Applicant addressed the matter in their proposed findings and the Board considers the matter no longer in controversy. The NRC Staff's uncontested Findings of Fact state that the Staff was notified both in writing and by telephone in September 1992. The weld failure was not a violation of NRC regulations or of the GTRR license. The affected fuel element was removed from the reactor and was placed in storage in the fuel pool. Staff FOF, §§ 2.4.3.1, 2.4.3.2, at 102. We find that this event has no public health and safety significance and does not present a concern with respect to license renewal.



(3) Environmental Monitoring.

GANE asserts in its proposed findings that it "remains concerned about Neely management's ability to contain radiation from the environment and their ability to monitor the contamination that is occurring." GANE FOF, at 10. GANE claims that Georgia Tech has been cited by NRC for errors and omissions in environmental monitoring data over a 10-year period from 1983 to 1993. The asserted errors include errors in math, gaps or blanks in data, absence of meteorological monitoring equipment for ten years and submission of the same windrose diagram repeatedly. Id.; IR 95-01 (GANE Exh. 66).

GANE asserts that in 1996 the Applicant was cited for failure to calibrate the GM gas monitor in timely fashion. It cites in support NRC IR 96-02 (apparently not offered into evidence). Although we cannot confirm that the NRC inspection report has been admitted to the record, nevertheless we find reference to calibration of a GM gas monitor cited in NRC IR 95-01 (GANE Exh. 66). It was left as an open item in that report (id. at 21). Thus, GANE's calibration assertion cannot be substantiated.

We note also that GANE cross-examined at length on issues related to environmental monitoring around the reactor using film badges and thermoluminescent dosimeters (TLDs). Tr. 2903-25. It did not pursue these matters further in its proposed findings of fact.

GANE's licensing concern appears to stem from reports of radiation levels above background, set forth in IR 93-02 (GANE Exh. 60). GANE asserts that there is lack of reliable data as to what (radiation) the environment has received from operations at the NNRC and that it may never be known what the risk to the population is. GANE urges the Board to deny the license renewal to prevent the reactor from operating in its "broken-down, slip-shod fashion for another 20 years." GANE FOF, at 10.

On review of IR 93-02, the Board finds that the Applicant was cited for violations as asserted in GANE's proposed findings. The inspection report, however, shows that no citation for a violation was more serious than Severity Level IV.

We adopt the NRC Staff's uncontested proposed findings on issues related to film badges and TLDs in this decision. Staff FOF, §§ 2.4.4.1-2.4.4.4, at 103-04, to the effect that GANE's concern for environmental monitoring using film badges and TLDs does not involve possible violations of NRC regulations, inasmuch as Georgia Tech is not required by regulation or license condition to perform such monitoring. It does so under a commitment starting in 1966 in the SAR to place 30 monitoring devices in the environment around the reactor. Tr. 2915 (Mendonca). Georgia Tech used film badges for monitoring for many years but converted to TLDs in 1994 or 1995. Id.; Tr. 2919 (Mendonca). The use of film

badges or TLDs is equally acceptable to the Staff and its approval of the Georgia Tech application is not dependant on which was chosen. Tr. 2924 (Bassett).

GANE expressed concern that environmental monitoring had unacceptable uncertainty because some film badges in the past showed false radiation doses which were attributable to physical damage from rain and heat. Tr. 2906 (Mendonca). This concern is laid to rest, however, by Applicant's testimony that all the badges were not affected and that the plant has other monitoring devices plus monitors required by technical specifications in place. Furthermore, the TLDs now in use are not subject to damage from heat and moisture. Tr. 2908 (McAlpine).

The Board concludes that even though some film badges in the past showed false positive radiation readings, there was sufficient redundancy in monitoring devices to preclude uncertainty in radiation measurements large enough to be significant to public health and safety. Our confidence is enhanced by the fact that the errors asserted by GANE result in false positive readings in which the monitoring device appears to detect radiation when none is detectable by unaffected devices. This type of error attracts notice and requires analysis. Tr. 2910-11. (Bassett). Thus, there is little likelihood that false positive error could lead to a failure to detect radiation emissions to the environment, if any actually occurred. The Board accordingly concludes that

GANE's concerns for environmental monitoring based on the Applicant's use of either film badges or TLDs is not well founded and does not present a concern for licensing.

3. Georgia Tech's Management Organization Structure.

At the heart of GANE's concerns over Georgia Tech's management is the organizational structure of that management. As described by GANE:

The most unique aspect of the management of the Neely Nuclear Research Center at Georgia Tech, and the one that caused us the most trepidation about the facility to begin with, is the management structure which places the Director of the facility over the Manager of the Office of Radiation Safety [GANE FOF, at 3].

a. Applicable Standards. The acceptability of a managerial organizational structure depends, in part, on the independence of operational functions and safety functions. NRC regulations prescribe no particular managerial structure, either for power reactors or research reactors. Staff Panel C, ff. Tr. 3171, at 9. With respect to power reactors, however, interpretations of quality assurance requirements have led to a mandatory separation of operational and safety functions. 10 C.F.R. Part 50, Appendix B.I; see, e.g., Consumers Power Co. (Midland Plant, Units 1 and 2), ALAB-152, 6 AEC 816, 817 ("those charged with the function of assuring the quality of particular work must be independent of the individual or group having direct responsibility for performing that work"). Given the absence of regulatory requirements for any particular

organization or management structure for non-power reactors, those structures vary considerably, so long as some form of independent safety review is maintained.

b. Examples of Organizational Structures.

Although some variations among types of managerial structures for research reactors exist, essentially two forms of organization are considered acceptable.

The first, recommended by Georgia Tech consultant Dr. Nicholas Tsoulfanidis, by the current MORS, Dr. Rodney D. Ice, as well as by several GANE witnesses, is comparable to the organizational model for power reactors. The operational Director reports to a high-level official--the Dean of Engineering--whereas the Radiation Safety Officer reports to another high-level official--the Vice Provost for Research. Both the Dean of Engineering and the Vice Provost for Research in turn report to a higher level, the Office of the President. Tsoulfanidis, prepared testimony, ff. Tr. 1939, at Exh. GT-2. See Figure 1, p. 65, infra. See also GANE Exh. 42 (GTRR Organization Chart Before 7/1/87). This model is essentially what Georgia Tech utilized prior to the 1987-88 reorganization.



Proposed Administrative Structure

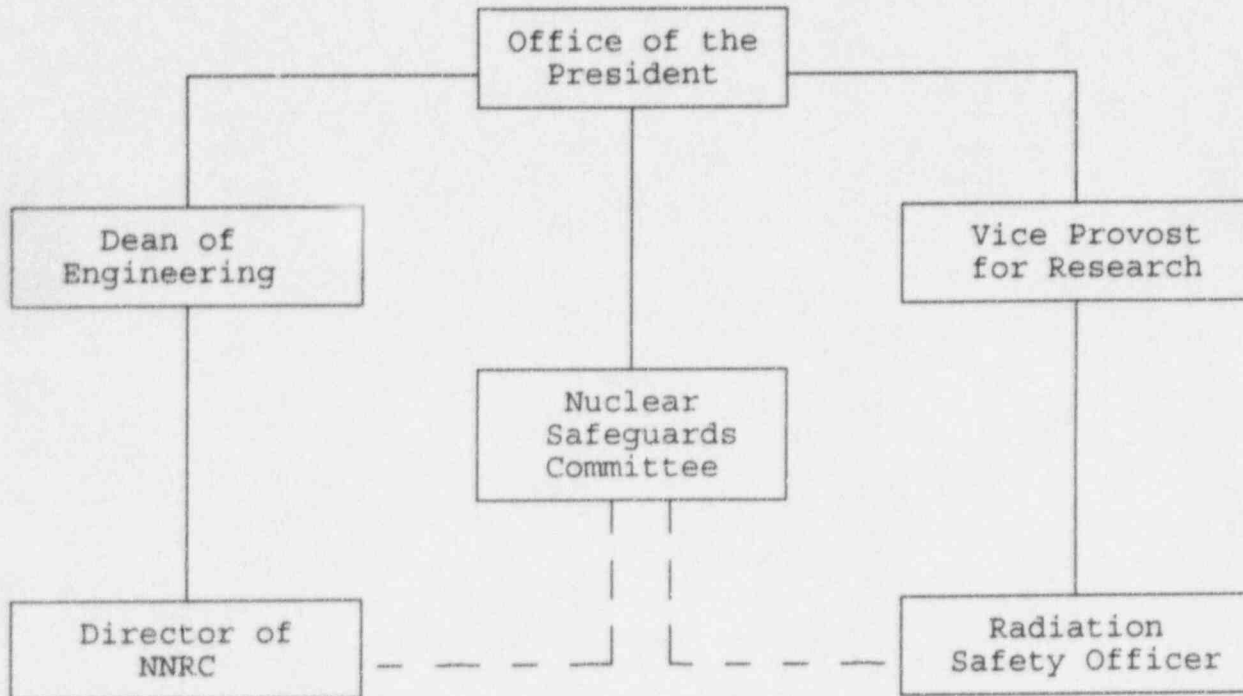


Figure 1, derived from Tsoulfanidis, ff. Tr. 1939, at Exh. GT-2.

The second, relied on by the Staff, is based upon the "American National Standard for the Development of Technical Specifications for Research Reactors," ANSI/ANS-15.1, which includes a section on administrative controls. That version, initially set forth in 1982 as ANSI/ANS-15.1-1982, includes a level 1 unit or organizational head; a level 2 reactor facility director or administrator reporting to level 1; a level 3 reactor or shift supervisor reporting to level 2; and a level 4 that consists of the operating staff reporting to level 3. Review and audit functions are performed at a level above the facility director and report to level 1 management. Radiation safety personnel report either to level 2 (the director/administrator of the facility) or to level 1 (unit or organizational head).

This type of organizational structure permits the Radiation Safety Officer to report either to a level above the operational director--in effect like the first plan recommended by Dr. Tsoulfanidis--or to the Director. If reporting to the Director, safety review functions are overseen by entities outside the line of operational functions, although the direct reporting remains within that line. A chart of the ANSI-approved structure, as revised in 1990, is set forth as Figure 2 on p. 67, infra.

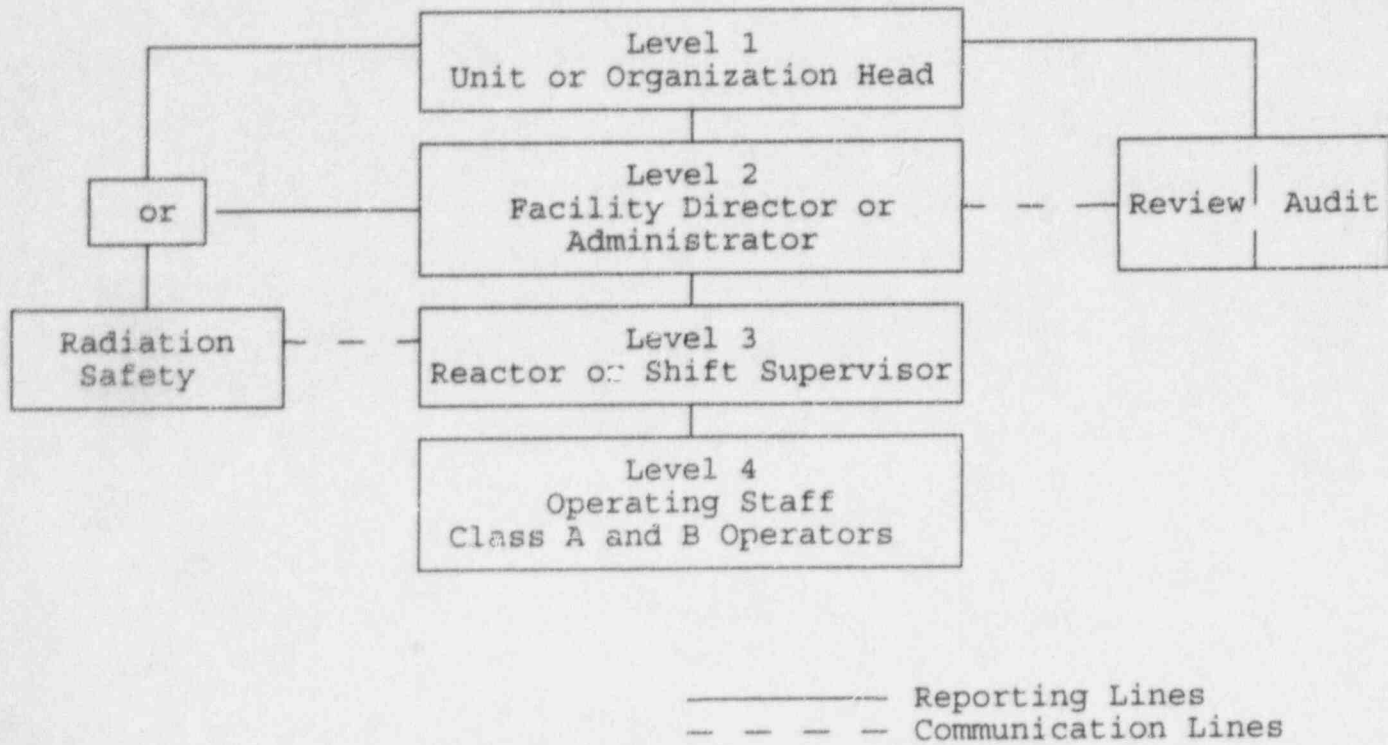


Figure 2. ANSI/ANS-15.1-1990, derived from Attachment 2 to testimony of Staff Panel C, ff. Tr. 3171.

Although the ANSI standards referenced above do not constitute regulatory requirements, the NRC Staff participated in their development and has encouraged research reactors to follow them, at least in general outline. The two witnesses who comprised the Staff's Panel C, which dealt with this subject, were Messrs. Alexander A. Adams and Marvin M. Mendonca, former and current project managers for the GTRR.

Mr. Adams serves as the NRC's alternate representative to American Nuclear Society (ANS) Consensus Committee N-17, "Research Reactors, Reactor Physics and Radiation Shielding," is the NRC's representative to ANS subcommittee ANS-15, "Operation of Research Reactors," and represents the NRC on the working group for several individual American National Standards Institute (ANSI)/ANS standards pertaining to research reactors, including the working group for ANSI/ANS-15.1, "The Development of Technical Specifications for Research Reactors," which includes guidance on organizational issues. For his part, Mr. Mendonca has conducted training courses on research reactor inspection and regulation issues related, inter alia, to organizational, review, and audit functions, and serves as the NRC's representative on various standards committees associated with research reactors. Panel C, ff. Tr. 3171, at 1-6, 9, 12. We find Messrs. Adams and Mendonca to be well qualified to address the differing management

structures in use at research reactors and the adequacy of the management structure currently used by Georgia Tech.

Under the 1987-88 reorganization, Georgia Tech abolished the Office of Radiological Safety and established a new Office of Radiation Safety as a unit of the NNRC. Mr. Robert M. Boyd (the former RSO) became the MORS and commenced reporting to the facility director, Dr. Karam, as did operational personnel. In turn, the organization chart indicated the Director would report to the Vice President for Research, who would report to the President. At the same time, Dr. Bourne (the interim President) appointed Dr. Kahn to serve as the Chairman of the new Nuclear Safeguards Committee (NSC), which replaced two former committees (Nuclear Safeguards and Radiation Protection). Staff Panel C, ff. Tr. 3171, at 12-13; Tr. 2178, 2215 (Boyd).

In addition, Georgia Tech requested changes to the Technical Specifications for the NSC, including changes in the requirements for membership, quorum, areas of expertise, maximum number of members permitted to be from the GTRR staff, and the scope of the NSC's review and approval responsibilities. The proposal showed that the NSC (with the NSC Chairman also holding the title of RSO) would report



to the NNRC Director, with communication to the Office of the President. Staff Panel C, ff. Tr. 3171, at 12-14.<sup>34</sup>

The NRC Staff performed an initial review of the amendment request after it was submitted, and found certain aspects of Georgia Tech's proposal to be problematic; the Staff then communicated several questions to the Applicant. Id., at 14. The more significant issues related to the proposal's failure to conform to the recommendations contained in ANSI/ANS-15.1,<sup>35</sup> by (1) having the NSC report to the facility Director rather than to level 1 management, (2) providing too few review and audit functions for the NSC, (3) not specifying the minimum number of NSC members, and (4) not prohibiting NNRC staff members from being a majority of the required quorum of the NSC. Id., at 14-15.

The Applicant then submitted a revised organizational chart for the GTRR TS, which addressed the Staff's questions. In the revised organization, the NSC would report to level 1 management (Office of the President) and would communicate with the NNRC Director. Also, the MORS

---

<sup>34</sup>An organizational flow chart prepared at that time showed arrows leading to Dr. Karam (the Director) from the NSC, the MORS, and the President, creating the impression that the President and NSC would henceforth report to Dr. Karam. Tr. 2484-85 (Boyd). The flow chart's indication that the NSC and President would report to Dr. Karam was disapproved by the NRC Staff, and was revised by the University President. The unrevised version was also adversely commented upon by Mr. Boyd in this proceeding. Tr. 2484-85.

<sup>35</sup>See discussion at p. 78, infra.

would report to the NNRC Director for supervision and administrative reporting but would report to the NSC on safety and safety policy matters. Id. at 15.<sup>36</sup> In addition, the Applicant revised its proposed amendment to expand the scope of the review and audit responsibilities of the NSC to activities generally suggested by ANSI/ANS-15.1, and it withdrew its proposal to delete the requirement that no more than a minority of the NSC members would be from the GTRR staff. Id. at 15-17, 18.

The management structure adopted following the reorganization in 1987-88, and similar to that currently in place at the GTRR, is similar to the second model, with the MORS reporting directly to the Director of the GTRR, although also reporting safety concerns to the Nuclear Safeguards Committee (NSC). As set forth in Figure 3, page 72, infra:

---

<sup>36</sup>Mr. Boyd similarly noted that certain aspects of the July reorganization were clarified by the University President in February 1988, in a memorandum and general faculty meeting. First, the President indicated that the NSC was to report to the University President; second, the MORS was responsible, under a revised organizational chart, to report safety problems to the NSC (as well as to the facility director)--and if the MORS was not satisfied with how safety problems were being treated by others, he was to inform the President or Vice President for Research of those matters. GANE Exh. 47, at 1; GANE Exh. 46. This latter statement responded to Mr. Boyd's concern that his reporting line to the NSC had been eliminated under the July reorganization. Tr. 2259, 2277, 2403-06, 2410-11 (Boyd); GANE Exhs. 46, 47.

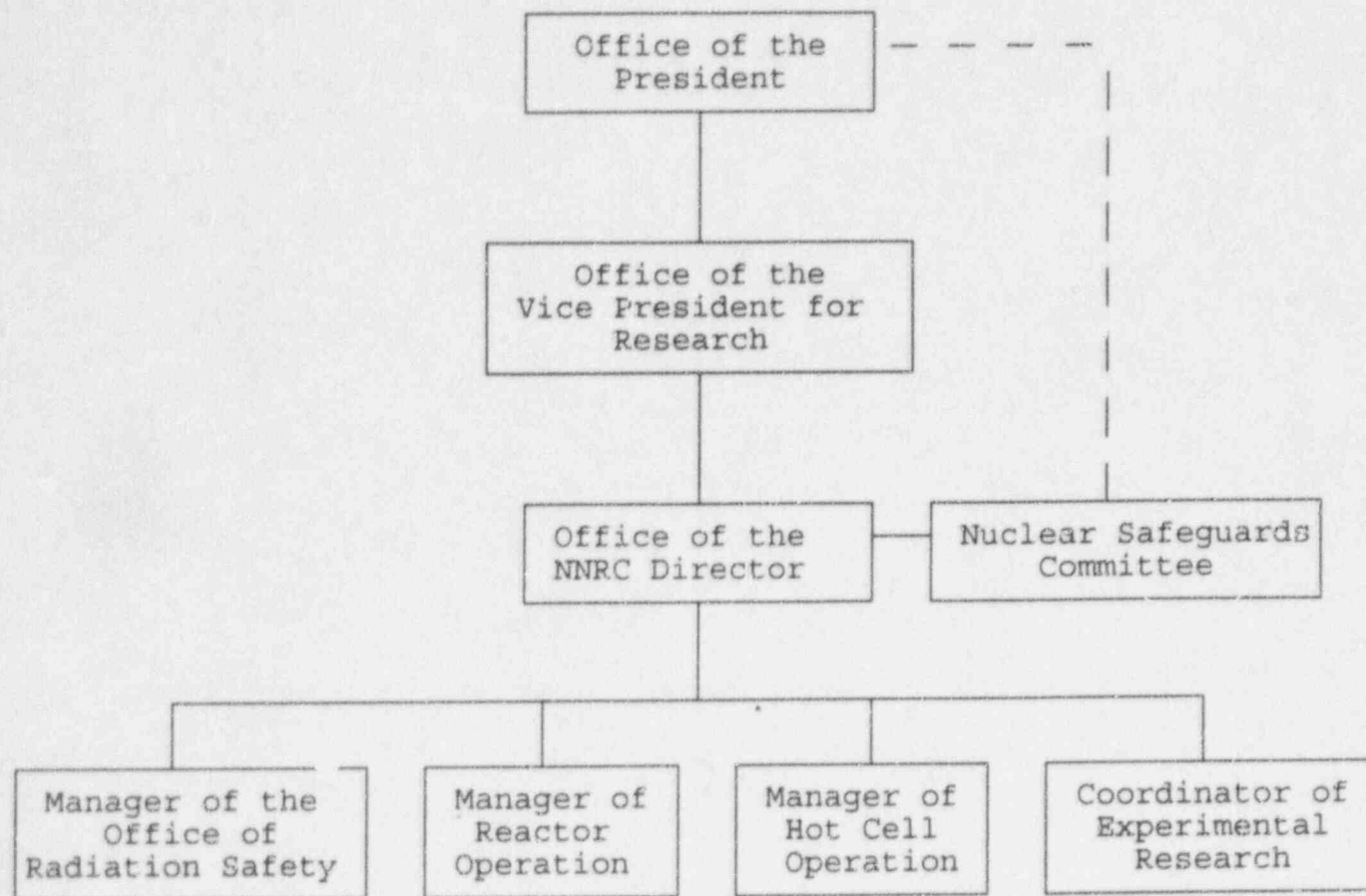


Figure 3, derived from GT Exh. 6, NNRC Reorganization Chart.

According to the Staff, both organizational forms work, with about 35 percent of research reactors having the radiation safety functions reporting directly to the facility director (like the GTRR) and the others reporting either to a higher level or to a different chain of command. Tr. 3175 (Mendonca).

c. GANE's Challenge to the Structure.

GANE claims that, under a structure where the MORS reports directly to the Director, (1) the MORS lacks

sufficient independence to conduct his duties, (2) the NSC has an inadequate concern for safety, and (3) too much authority is concentrated in the Director (currently Dr. Karam). GANE in particular relies for these claims upon two of its witnesses who had been former radiation safety officers at the GTRR--Dr. Brian Copcutt and Mr. Robert Boyd. But in support of the superiority of an organization that has separate chains of command for the director and the radiation safety officer, GANE also points to the opinions of Dr. Rodney Ice, the current MORS, and Dr. Nicholas Tsoulfanidis, an expert witness presented by Georgia Tech.

Specifically, Dr. Copcutt served as MORS from July 1990 to November 2, 1990 (GANE Exhs. 1, 13). His letter of resignation to Dr. Karam, dated October 8, 1990 (GANE Exh. 13), cited extensively by GANE (GANE FOF, at 4), states that it is "impossible for me to work effectively within the structure of the radiation safety program at Georgia Tech." Dr. Copcutt goes on to state in the letter that the MORS "lacks sufficient operational freedom to adequately conduct the radiation safety program" and that the health physics staff (which nominally reports to the MORS) appears to be "under the dual control" of the MORS and the facility Associate Director. He concludes that "I cannot, in good conscience, take responsibility for a program whose

priorities I cannot set and in which I must compromise my professional judgments."<sup>37</sup>

Mr. Robert M. Boyd, who served as Radiological Safety Officer at Georgia Tech from 1973 until the reorganization in 1987, as MORS from 1987-1988, and who served (simultaneously) as Radiological Safety Officer at Georgia State University from 1973 until his retirement in 1995 (Boyd, Professional Experience, ff. Tr. 2122, at 1-2), even more strongly stressed in his testimony the superiority of dual reporting chains. He characterized the current form of organization, with the MORS reporting to the facility Director, as "the fox guarding the hen house" and called the decision to change to such a structure "a mistake--it was a mistake in my view, improper" (Tr. 2175 (Boyd)).

Mr. Boyd conceded, however, that the management structure in place was "not so serious as to say that the safety of the public cannot be assured" (Tr. 2396 (Boyd)). He added that he "did not consider the present organizational structure to constitute an immediate health hazard" (id.)

Dr. Ice, who has been MORS since 1992, with over 29 years of practical experience and published research in health physics and who is a health physicist and a teacher

---

<sup>37</sup>The letter also objects to alleged suggestions from the Director and Associate Director that he should not, in the future, "document observed regulatory violations or proposed program improvements." We have dealt with these allegations elsewhere in this Decision.



and advisor on radiation safety (Ice, ff. 1992, at 2, 5), also favored having the MORS not subject to the supervisory control of the Director. He explained:

I think in an effective organization . . . r radiation safety, executive management should be involved in the oversight in the scenario, so I think there should be a clear path between the radiation safety officer and executive management. . . . organizationally, and from an operational standpoint, I would love to see a cleaner relationship between safety and operations, a pure distinction between the two.

Tr. 2000-2001 (Ice).

Finally, Dr. Tsoulfanidis, a consultant for the Applicant and, since 1975, the Radiation Safety Officer for the University of Missouri-Rolla (where he also serves as a professor of Nuclear Engineering and the Assistant Dean for Research in the School of Mines and Metallurgy (Tsoulfanidis, ff. Tr. 1939, at 2)), expressed the view that the present administrative structure of the Radiation Safety Program "seems to work fine and there is no evidence of any kind that safety is compromised." He recommended a structure with dual lines of authority (set forth as Figure 1, above) for the following reasons:

[T]he present reporting method has the potential for errors, omissions and abuse, particularly if the current Director is replaced and the new one is not so safety conscious. . . . There is no evidence that the current Director either made mistakes or abused the system. However, whenever a program or activity is controlled by a single person the possibility of error or omission of action is possible.

Tsoulfinidis, ff. Tr. 1939, Exh. GT-2, at 6. Dr.

Tsoulfinidis stressed that separate budgets should be set up

for the Director (for operational purposes) and for the RSO.  
Id. at 7.

d. Other parties' positions.

The Applicant strongly favors the current organizational structure, where the MORS reports to the Director. Dr. Karam, who was appointed Director on December 5, 1983 (prior to the reorganization), expressed his belief that inasmuch as his responsibilities as Director covered overall operation of the reactor (including radiation safety), and inasmuch as the radiation safety staff did not report administratively to him but operated independently, he was extremely uncomfortable about being held responsible for the work of a unit over which he had virtually no control. He also believed that he could better deal with the hostilities between HP and operations personnel if he had managerial control over both. Karam, ff. Tr. 2723, at 24-25; Tr. 2769 (Karam).

Thus, prior to the reorganization, the manager of the safety unit nominally reported to Vice President Stelson, to whom Dr. Karam also reported. But in actual practice, the manager of the HP unit (Mr. Boyd) was instructed "to run that thing and don't bother [Dr. Stelson]". He was "essentially unsupervised by anybody" (Tr. 2366-67 (Boyd)): Mr. Boyd added, however, that he felt the Chairman of the then Radiation Protection Committee and the Chairman of the

Nuclear Safeguards Committee were "essentially [his] boss as far as safety concerns" (Tr. 2367-68 (Boyd)).

Prior to the reorganization, there had been extreme hostility between the health physics and operational staffs. This history of hostility, which among other things led to a shutdown of reactor operations by NRC, is reviewed in greater detail earlier in this opinion. One of the purposes of the reorganization where the RSO reports directly to the Director was to lessen the hostility. Initially following the reorganization the hostility actually increased. Thereafter, Dr. Karam replaced the entire health physics staff with persons with greater academic qualifications. The end result, according to Dr. Karam, was a better-qualified health physics staff and a diminution of the hostility between the two groups. As a result, Dr. Karam strongly supported the existing chains of command.

The Staff would have found either method of organization equally acceptable--both are sanctioned by the ANSI standards, and either would be acceptable under NRC regulations (Tr. 3175, 3182-83 (Adams, Mendonca)). "[E]ither can work." Tr. 1895 (Gibson); Tr. 1894-95 (Collins). But the Staff appeared to prefer the current form of organization on the basis of its success at the GTRR in terms of resulting in fewer and less severe violations than the previous unacceptable level that in part caused the Staff to have the reactor shut down.

4. Licensing Board Conclusions.

Having carefully considered the various views of organizational format expressed by witnesses of all parties, we conclude that, in our opinion, the separation of functions inherent in having the MORS and other health physics personnel report to a person other than the operational director of the facility would be preferable to having him or her report to the Director, as is currently the practice at the GTRR. Because either form of organization is legally acceptable, however, we would need a strong record establishing the performance superiority of separate reporting chains (and safety deficiencies attributable to a single reporting chain) in order for us to mandate such a change for the GTRR.

Such a record is not here present. Even witnesses who favored the separate chains of command indicated that the present system at GTRR presents no threat to the public health and safety. Part of the rationale for this view stemmed from those witnesses' knowledge of the technical competence and dedication of the current Director, Dr. Ratib Karam. Dr. Karam is planning to retire within the next few months, however, effective June 30, 1997 (Tr. 2709-10, 3404 (Karam)). When that happens, Georgia Tech may wish to consider what organizational format it will utilize. But we will impose no license condition requiring any modification.

Apart from organizational format, GANE also seeks to

deny license renewal on the basis of a continuing series of regulatory violations. The most serious occurred before (and in part caused) the reactor shutdown in 1988. Since restart, the numbers of violations/year has been decreasing over the years (Tr. 3149-50, 3151 (Mendonca, McAlpine, Bassett)), and none has been found by the Staff to be more serious than Severity Level IV. We decide herein whether the GTRR license renewal application should be denied or conditioned on the basis of events and violations of that severity cited by GANE from NRC inspection reports.

At the time of those citations, NRC's enforcement policy in 10 C.F.R. Part 2, Appendix C, defined Severity Level IV violations as of "more than minor concern, i.e., if left uncorrected they could lead to a more serious concern."<sup>38</sup> Table 2 of the enforcement policy indicates Commission policy to consider license suspension or revocation only for more serious violations at Severity Levels III, II, or I.<sup>39</sup> There is no indication in the

---

<sup>38</sup>See n. 10, supra, for a definition of each of the severity levels in effect at the time of the citations. Effective June 30, 1995, the Enforcement Policy was removed from 10 C.F.R. Part 2 and published as NUREG-1600. 60 Fed. Reg. 34380 (June 30, 1995). At the time, Severity Level V violations were eliminated. Id., at 34381.

<sup>39</sup>The NRC is authorized under the Atomic Energy Act to revoke licenses under the same conditions that would have warranted refusal of a license on an original application. 10 C.F.R. Part 2, Appendix C, § II (1995 ed.); NUREG-1600, § VI.C(e). The Board would only refuse to authorize a renewed license under the enforcement policy for reasons that were as serious as those that could lead to revocation.



enforcement policy (either that in effect in early 1995 or at present) that the Commission would suspend, revoke or deny a license to operate on the basis of several Severity Level IV violations.

It is evident from the policy that the appropriate sanction for Severity Level IV violations is for the Applicant to be required to correct the cited deficiencies. The NRC Staff is now satisfied that Georgia Tech has recovered from management deficiencies of the past and that its performance now is generally satisfactory. Thus, although GANE calls for the Board to refuse to authorize license renewal on the basis of several Severity Level IV violations, we decline to do so. Under all but the most exceptional circumstances not relevant here, Severity Level IV violations do not rise to the level of significance that would place license renewal in jeopardy. GANE may well hold the view that reactor licensees should be held by the NRC to a standard of error-free performance. Although conceptually appealing, that is not the regulatory scheme. As evident from the enforcement policy, NRC takes account of the severity of violations and not just their occurrence when it decides what enforcement action to take.

One further matter warrants some brief comment. In its findings of fact, GANE claims that "Georgia Tech has denied GANE the respect due to ordinary citizens who are simply exercising their democratic right to due process. Up to and

including their latest submission [i.e., Georgia Tech's proposed findings], we have been treated as a nuisance not worthy of their time and this attitude is not only rude, it does not speak well of the nuclear industry's willingness to act in good faith as a community citizen." GANE FOF, at 3.

GANE provides no specific references to this alleged treatment, and our examination of Georgia Tech's findings of fact does not reveal any such disrespect. Suffice it to say, however, that this Board views GANE's efforts in this proceeding with great respect. Even though GANE did not succeed in its efforts to deny renewal of the Applicant's license, or to require a different management organization, it brought to light many aspects of Georgia Tech's operation that could lead to an operation in the future providing enhanced protection to the public health and safety. GANE's efforts therefore deserve commendation.

D. Conclusions of Law.

The Licensing Board has considered all of the evidence presented by the parties on the admitted contention concerning the adequacy of the Applicant's management of the Georgia Tech Research Reactor. Based upon a review of the entire record in this proceeding and the proposed findings of fact and conclusions of law submitted by the parties, and based upon the findings of fact set forth herein, which are supported by reliable, probative and substantial evidence in the record, the Board has decided all matters in controversy pertinent to management of the GTRR and reaches the following conclusions:

1. The Applicant's performance in the post-restart period, although not entirely satisfactory, has substantially improved since the shutdown of the reactor in 1988. Further, Georgia Tech's performance in the post-restart period does not support GANE's assertion that management of the GTRR is inadequate and that the license renewal application should therefore be denied. Nor has GANE met its burden of demonstrating that "substantial management deficiencies persist." LBP-95-6, 41 NRC 281, 299 (1995).

2. The Board has further examined the evidence in light of the guidance provided by the Commission at the start of this proceeding. We conclude that GANE has not demonstrated "management improprieties or poor 'integrity'

. . . [that] relate directly to the proposed licensing action," or that "the GTRR as presently organized and staffed [fails to] provide reasonable assurance of candor and willingness to follow NRC regulations." Moreover, the evidence supports findings that "the facility's current management encourages a safety-conscious attitude, and provides an environment in which employees feel they can freely voice safety concerns," and there is "reasonable assurance that the GTRR facility can be safely operated" in that "the GTRR's current management [n]either is unfit [n]or structured unacceptably." CLI-95-12, 42 NRC 111, 120-21 (1995).

3. The Applicant's management of the Georgia Tech Research Reactor complies with all applicable regulatory requirements, and provides reasonable assurance that its management of the GTRR facility, upon the renewal of License No. R-97, will not be inimical to the common defense and security or to the health and safety of the public.

4. All issues, arguments or proposed findings presented by the parties but not addressed herein have been found to be without merit or unnecessary for this decision.

E. ORDER.

1. Pursuant to 10 C.F.R. §§ 2.760 and 50.57, as applicable, the Director, Office of Nuclear Reactor Regulation, hereby is authorized to issue to the Georgia Institute of Technology, upon making requisite findings with respect to matters not embraced within this Initial Decision, a renewal of Operating License No. R-97, in accordance with Georgia Tech's application for such license renewal.

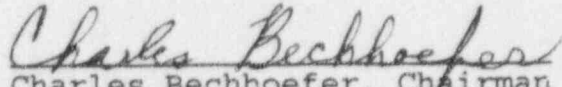
2. This Initial Decision shall become effective and constitute the final action of the Commission forty (40) days after the date of its issuance, subject to any review pursuant to the Commission's regulations.


3. In accordance with 10 C.F.R. § 2.786, any petition for review of this Initial Decision must be filed within fifteen (15) days after service of the decision. Any other party may file, within ten (10) days after service of a petition for review, an answer in support of, or in opposition to, the petition for review. The petition for review may be granted or denied in the discretion of the

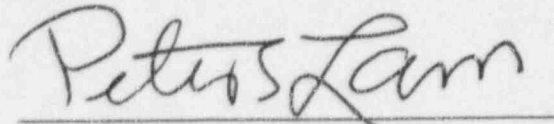


Commission, giving weight to the considerations of 10 C.F.R.  
§ 2.786(b)(4).

THE ATOMIC SAFETY AND  
LICENSING BOARD

  
Charles Bechhoefer, Chairman  
ADMINISTRATIVE JUDGE

  
Dr. Jerry R. Kline  
ADMINISTRATIVE JUDGE

  
Dr. Peter S. Lam  
ADMINISTRATIVE JUDGE

Rockville, Maryland  
April 3, 1997

## APPENDIX A

### List of Witnesses and Prefiled Testimony

<u>Witness</u>	<u>Cited As</u>
Adams, Alexander, Jr.	Staff Panel C, ff. Tr. 3171
Bassett, Craig H.	Staff Panel B, ff. Tr. 2813
Boyd, Robert M.	Tr. 2120 (Boyd) (no prefiled testimony, except Statement of Qualifications, cited as Boyd, ff. Tr. 2122)
Carroll, Ms. Glenn	Tr. 2620 (Carroll) (no prefiled testimony, as such testimony was struck in its entirety)
Collins, Douglas M.	Staff Panel A, ff. Tr. 1740
Copcutt, Dr. Brian	Tr. 1000 (Copcutt) (no prefiled testimony)
Fredrickson, Paul E.	Staff Panel A, ff. Tr. 1740
Galloway, John Harding	Tr. 2068 (Galloway) (prefiled testimony struck at Tr. 2340 and not physically bound into record)
Gibson, Albert F.	Staff Panel A, ff. Tr. 1740
Ice, Dr. Rodney D.	Ice, ff. Tr. 1992
Karam, Dr. Ratib A.	Karam, ff. Tr. 2723
Kuzo, George B.	Staff Panel A, ff. Tr. 1740
Long, Ms. Anne Rebecca	Tr. 1314 (Long) (no prefiled testimony)
McAlpine, Edward J.	Staff Panel B, ff. Tr. 2813
Mendonca, Marvin M.	Staff Panel B, ff. Tr. 2813
	Staff Panel C, ff. Tr. 3171
Tsoulfanidis, Dr. Nich.	Tsoulfanidis, ff. Tr. 1939

# APPENDIX B

## LIST OF EXHIBITS

<u>No.</u>	<u>Description</u>	<u>Date</u>	<u>Admitted</u> <u>(Rejected)</u>	
			<u>Ident. (Withdrawn)</u>	
			<u>At Tr.</u>	<u>At Tr.</u>
<u>Georgia Tech Exhibits:</u>				
1	Vitae, Dr. N. Tsoulfanidis	4/ /96	1929	1939
2	Rept, GT Mgmt Structure and Safety Issues	1/3/96	1929	1939
3	Vitae, Dr. Rodney D. Ice	1/ /94	1989	1992
4	Resume, Dr. Ratib A. Karam		2723	2723
5	Karam to Stelson, Reorganization	1/26/87	2723	2723
6	Karam to Stelson, Reorganization	5/6/87	2723	2723
7	IR 87-06, Enforcement Conference	5/15/87	2723	2723
8	NOV, IR 87-03	5/26/87	2723	2723
9	Karam to NRC, resp. to IR 87-03	6/15/87	2723	2723
10	O'Bannon Report	2/18/88	2454	2723
11	Daily Masslinn Survey Rept	8/87	2723	2723
12	Sharpe to Karam, Cd-115 Decontam	8/24/87	2723	2723
13	NRC Order Modifying License	1/20/88	2723	2723
14	Karam to Fredrickson (NRC)	1/22/88	2723	2723
15	Confirm Order Modifying License	3/17/88	2723	2723
16	NOV and Proposed Civil Penalty	11/15/88	2437	2723
17	Auth to Resume Reactor Op/Exper	11/15/88	2723	2723
18	NRC to GT, Prop Renew of OL R-97	4/2/93	2723	2723
19	Applic to renew Op Lic R-97	4/19/94	2723	2723
20	IR 96-01	4/19/96	2723	2723
21	Karam to File, Copcutt Perform. (same as GANE Exh. 12)	10/5/90	1112	1131
22	Copcutt to Karam, resignation (same as GANE Exh. 13)	10/8/90	1131	1135
23	Copcutt to Karam, high rad areas	7/26/90	1131	1135
24	Diagrams		1131	1135
25	Karam to Copcutt, high rad areas (same as GANE Exh. 8)	7/30/90	1131	1135
26	Copcutt to Karam, contamination in Cherry Emerson Bldg. (same as GANE Exh. 9)	8/3/90	1131	1135
27	Oscar DiMiranda (NRC) telecon re: Potential Discrimination	10/25/90	1131	1171
28	GT Rad. Safety Manual (excerpt)	4/24/96	2114	2115
29	GT SAR, § 6.0	9/21/95	2116	2116
30	Tech Spec excerpts		2117	2119
31	Transcript of Boyd tape recording		2427	2497

Exhibits (continued)  
NRC Staff Exhibits:

<u>No.</u>	<u>Description</u>	<u>Date</u>	<u>Admitted</u> <u>(Rejected)</u>	
			<u>Ident. (Withdrawn)</u> <u>At Tr.</u>	<u>At Tr.</u>
1	Oscar DiMiranda (NRC) telecon re: Potential Discrimination	10/25/90	1171	1171
2	NSC Minutes	7/19/90	1178	1178
3	NSC Minutes	8/30/90	1181	1182
4	NSC Minutes	9/27/90	1185	1185
5	Organization Chart, Amendment 7		1188	1191
6	Organization Chart, Amendment 8		1216	1217
7	GT License Amendment Request (for Amendment 8)	2/5/91	1276	1277
8	NOV (IR 87-01) (2 pp.)	4/14/87	1539	1540
9	Memo, Herdt to DeMiranda	4/14/87	1542	1543
10	IR 87-01 (Same as GANE Exh. 21)	8/31/87	1572	1573
11	IR 87-03	4/27/87	1742	1742
12	IR 87-08	2/10/88	1742	1742
13	NRC Order Modifying License	1/20/88	1743	1743
14	Confirm. Order Modifying License	3/17/88	1743	1743
15	NOV and Proposed Civil Penalty (IR 87-08 and OI Rept 2-88-003)	11/15/88	1744	1744
16	Auth to Resume Op and Expermnts	11/15/88	1744	1744
17	Compl. of Requirements of OM	9/18/90	1745	1745
18	NOV and IR 88-02	12/29/88	1745	1745
19	Memo, Gibson to Ernst	2/12/88	1752	1753
20	NOV and IR 87-02 (Includes material in GANE Exh. 35)	3/9/87	1909	1909
21	Letter, Grace to Downs	4/28/88	1926	1926
22	Letter, Grace to Downs	6/17/88	1926	1926
23	Amendment 7 to License R-97	7/12/88	3172	3172
24	Amendment 11 to License R-97	9/20/95	3172	3172
25	US District Ct Order	10/31/91	3454	3458
26	US Court of Appeals Decision	9/30/92	3461	3461
27	Reactor Bldg First Floor Plan	4/ /94	3471	3474
28	Reactor Bldg Second Floor Plan	4/ /94	3472	3474
29	Karam to Staff, "Personal" Logs	7/29/87	3531	3532

GANE Exhibits:

1	Resume of Dr. Brian Copcutt		1002	1004
2	Copcutt Board Certification		1002	1004
3	Letter, GT to Dr. Copcutt	3/31/89	1005	
4	Letter, GT to Dr. Copcutt	3/15/90	1005	
5	Copcutt letter of acceptance	4/6/90	1006	1006
6	Memo, Copcutt to Karam, re: replacmnt of monitor detector	7/24/90	1010	1015
7	Copcutt to Karam, high rad areas	7/26/90	1010	1015
8	Karam to Copcutt, high rad areas	7/30/90	1010	1015

Exhibits (continued)  
GANE Exhibits

<u>No.</u>	<u>Description</u>	<u>Date</u>	<u>Ident. (Withdrawn)</u>		<u>Admitted</u>
			<u>At</u>	<u>Tr.</u>	<u>(Rejected)</u>
9	Copcutt to Karam, contamination in Cherry Emerson Bldg. (same as GT Exh. 26)	8/3/90	1010		1015
10	Revsin to Karam, Off. of Rad Saf.	9/28/90	1024		1038
11	Copcutt to Invest., Training	10/4/90	1028		1038
12	Karam to File, Copcutt Perform. (same as GT Exh. 21)	10/5/90	1028		1038
13	Copcutt to Karam, resignation (same as GT Exh. 22)	10/8/90	1036		1038
14	Karam to NSC, Copcutt resig.	10/10/90	1047		1061
15	Revsin to Karam, Copcutt resig.	10/18/90	1047		1061
16	Letter, Mulder (UVA) to Carroll	5/6/96	1047		1061
17	Newspaper article re: A.R. Long	12/27/93	1320		reject (1483)
18	Fax re newspaper transcript of interview of A.R. Long	12/26/93	1335		w/drn (1484)
19	Memo, Mulley (OIG) to File 88-08	3/29/90	1338		1485
20	Inspection Rept 87-01 (marked cy)	4/14/87	1327		w/drn (1487)
21	Inspection Report 87-01 (same as Staff Exh. 10)	4/14/87	1327		1487
22	Draft NOV		1328		1488
23	NRC to GT re response to NOV	8/31/87	1329		1489
24	Part of drft resp to GT	7/15/87	1331		w/drn (1490)
25	Memo, A.R. Long to A.F. Gibson	1/27/88	1332		1493
26	Letter, A.R. Long to J. Zimring	3/8/88	1333		w/drn (1496)
27	Note, M.L. Ernst to A.F. Gibson	2/8/88	1334		1499
28	Newspaper article	2/11/88	1374		w/drn (1503)
29	Newspaper article	1988	1374		w/drn (1503)
30	Inspection Report 87-06 (Enforcement Conference Summary)	5/ /87	1525		1535
31	NOV (IR 87-03)	5/26/87	1525		1535
32	OI Report 2-88-003 (exec summary)	2/14/88	1769		w/drn (1774)
33	OI Report 2-88-003	2/14/88	1770		1774
34	GT License Amendment Request	3/1/88	1866		
35	IR 87-02 (summary and rept details) (Material included in Staff Exh. 20)	3/9/87	1875		1877
36	Order Modifying License (Same as Staff Exh. 13)	11/20/88	1877		w/drn (1878)
37	Broad Scope Licenses		2140		
38	Board of Directors		2140		
39	Typical Health Physics		2141		



Exhibits (continued)GANE Exhibits

No.	Description	Date	Admitted (Rejected)	
			Ident. (Withdrawn)	
			At Tr.	At Tr.
40	Memo, R. M. Boyd to ORS Staff	7/17/86	2141	2275
41	Letter, J.M. Pettit to R.M. Boyd	7/23/86	2141	2275
42	Before 7/1/87 Organization Chart		2142	2278
43	After 7/1/87 Organization Chart		2147	2278
44	NSC Minutes	various	2960	reject (3384)
45	Memo, Boyd to File, Crecine mtg	2/18/88	2143	2281
46	Memo, Crecine to Int Parties, NSC	2/19/88	2143	2279
47	Boyd impression of Crecine Address	2/26/88	2143	2283
48	Memo, Boyd to NSC, re Hot Cell	2/29/88	2144	reject (2329)
49	Memo, Stelson to VPs, etc.	3/25/88	2144	2331
50	Boyd notes		2144	reject (2332)
51	Boyd, "The Wrong Way to Handle Radiation Safety"	1988	2145	2338
52	Letter, Crecine to Grace (NRC)	8/19/88	2202	2251
53	Tape transcription	11/15/95	2676	
54	Videotape		2676	2676
55	NOV and IR 90-02	7/11/90	2820	2846
56	NOV and IR 94-02	9/20/94	2836	2846
57	NOV and IR 92-04	12/10/92	2846	2902
58	IR 91-04 (incl non-cited viol)	11/05/91	2847	2902
59	IR 94-01 (incl non-cited viol)	3/31/94	2856	2902
60	NOV and IR 93-02	11/01/93	2871	2902
61	IR 89-02 (incomplete copy)	11/16/89	2926	2957
62	GT Inspection by State	12/11-13/95	2948	reject (3252)
63	IR 94-05	1/13/95	3034	3038
64	NOV and IR 89-05	10/26/89	3041	3051
65	IR 95-04	11/29/95	3051	3070
66	NOV and IR 95-01	6/21/95	3077	3094
67	Attachment to IR 95-01	7/26/95	3077	3094
68	ORISE re sewer analysis	4/21/95	3088	reject (3095)
69	NOV and IR 95-02	6/27/95	3096	3099
70	NSC Minutes	2/16/88	3543	3543
71	NSC Minutes	10/26/89	3543	3543
72	NSC Minutes	2/15/90	3543	3543
73	NSC Minutes	3/22/90	3543	3543
74	NSC Minutes	7/19/90	3543	3543
75	NSC Minutes	1/31/91	3543	3543
76	NSC Minutes	5/09/91	3543	3543
77	NSC Minutes	6/27/91	3543	3543
78	NSC Minutes	8/01/91	3543	3543
79	NSC Minutes	9/26/91	3543	3543

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the Matter of

GEORGIA INSTITUTE OF TECHNOLOGY  
ATLANTA, GEORGIA

Docket No.(s) 50-160-REN

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing LB INITIAL DECISION DTD 4/3/97 have been served upon the following persons by U.S. mail, first class, except as otherwise noted and in accordance with the requirements of 10 CFR Sec. 2.712.

Office of Commission Appellate  
Adjudication  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Administrative Judge  
Jerry R. Kline  
Atomic Safety and Licensing Board  
Mail Stop - T-3 F23  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Sherwin E. Turk, Esq.  
Office of the General Counsel  
Mail Stop - O-15 B18  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Randy A. Nordin, Esq.  
E. Gail Gunnells, Esq.  
Georgia Institute of Technology  
400 10th Street, N.W.  
Atlanta, GA 30332

Administrative Judge  
Charles Bechhoefer, Chairman  
Atomic Safety and Licensing Board  
Mail Stop - T-3 F23  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Administrative Judge  
Peter S. Lam  
Atomic Safety and Licensing Board  
Mail Stop - T-3 F23  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Glenn Carroll  
139 Kings Highway  
Decatur, GA 30030

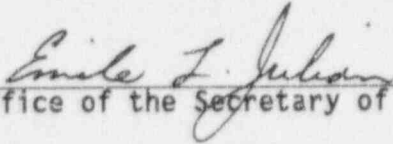
Patricia Guilday, Esq.  
Alfred L. Evans, Jr., Esq.  
Georgia Department of Law  
40 Capitol Square SW  
Atlanta, GA 30334

Docket No.(s)50-160-REN  
LB INITIAL DECISION DTD 4/3/97

Glenn Carroll  
Georgians Against Nuclear Energy  
P.O. Box 8574  
Atlanta, GA 30306

Pamela Blockey-O'Brien  
D23 Golden Valley  
Douglasville, GA 30134

Dated at Rockville, Md. this  
4 day of April 1997

  
Office of the Secretary of the Commission