

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:
Louis J. Carter, Chairman
Mr. Ernest E. Hill
Dr. David R. Schink



In the Matter of:

ARMED FORCES RADIOBIOLOGY
RESEARCH INSTITUTE

(TRIGA-Type Research Reactor)

Docket No. 50-170

(Renewal of Facility
License No. R-8)

August 31, 1981



SPECIAL PREHEARING CONFERENCE
MEMORANDUM AND ORDER
(Allowing Interventions and Ruling on Contentions)

On April 15, 1981, this Board ordered that a Special Prehearing Conference be held for the purpose of considering contentions which were still in dispute.^{1/}

The conference was held on Friday, May 1, 1981, at the NRC Hearing Room in Bethesda, Maryland, and was attended by members of the public and all parties were present with their attorneys and some of their experts.

As hereinafter set forth we allow the intervention of Citizens for Nuclear Reactor Safety, Inc., and rule on their contentions.

^{1/} Public Notice was given on April 22, 1981, 46 Fed. Reg. 22998.

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I. Allowance of Intervention of CNRS

On December 10, 1980, the Citizens for Nuclear Reactor Safety, Inc. (CNRS) on its own behalf and on behalf of its members petitioned for leave to intervene in this matter. The petition stated that petitioner is a non-stock Maryland corporation whose members are residents of Montgomery County, Maryland, where the reactor, operated by the Armed Forces Radiobiology Research Institute (AFRRI), is situated. The petition alleged that three members of CNRS live within two thirds of a mile of the reactor and that two of the three are parents of a new born infant.

On December 24, 1980, the Defense Nuclear Agency, which operates the Licensee, filed an opposition to the petition for leave to intervene of CNRS averring that the petitioner had failed to establish standing, that the contentions and the petition were outside the scope of the renewal action under consideration, and that the contentions were contrary to the manifest weight of the documented evidence of record on file with the NRC.

The first of the oppositions relates to the fact that none of the members of CNRS - who it was averred lived within two thirds of a mile of the reactor - were identified. The balance of the petition consists primarily of responses to the allegations which aver the contrary and, in fact, constitute arguments on the merits. These points are enumerated in the margin. ^{2/}

2/ The Defense Nuclear Agency opposition filed December 24, 1980, averred inter alia, (1) that the AFRRI Emergency Plan addresses all credible accidents; (2) that emergency response capabilities at AFRRI and the surrounding community meet all NRC regulatory requirements; (3) that routine discharges of radioactive effluents meet all NRC requirements; (4) that radioactive air borne effluents emitted by AFRRI meet NRC regulatory requirements; (5) that water, soil and vegetation monitoring is adequate; (6) that AFRRI has demonstrated that operation of the TRIGA reactor will fully comply with the requirements of safety and law; (7) that the AFRRI site does not constitute a significant hazard to public health and safety; (8) that the aging of the AFRRI TRIGA reactor does not impact upon safety; (9) that AFRRI security plans meet or exceed all NRC requirements;

On December 24, 1980, the Staff filed its response to the petition for leave to intervene alleging that the Petitioner had failed to demonstrate that it possesses standing in its own right and failed to identify at least one member with standing.

On January 16, 1981, Petitioner filed an Amendment to its Petition For Leave To Intervene to establish the identity and interest of several of its members and its authority to represent these individuals. Affidavits from Bruce Moyer, Rebecca Moyer, Bevin Grylack, Irving Stillman, Bernard Phillips, Delores Helman, Elizabeth Entwisle, and Edith Villastrigo were appended to the Amendment. These persons state they live from 0.3 to 4.6 miles from the site of the reactor.

On January 26, 1981, Staff filed its response and noted that the Petitioner's amendment addressed the defects advanced in Staff's original response and that by identifying certain members by name and establishing that their residences are in proximity to the reactor and authorizing CNRS to represent them in this proceeding, these affidavits were, in Staff's view sufficient. Staff stated also that counsel for Licensee authorized Staff to advise the Board that the Licensee concurs in the Staff's conclusion and did not intend to submit a separate response to the amendment. None has been filed.

We find that the Petitioner has cured the defects in its petition concerning the interest and standing requirements and in accordance with the provisions of 10 C.F.R. § 2.714 Petitioner's intervention is allowed.

Footnote 2 (continued)

(10) that management and internal organization at AFRRRI are competent to operate the facility within applicable safety limits; and (11) environmental impact appraisal data submitted by AFRRRI adequately address environmental impacts.

II. Approval of Stipulation of March 31, 1981

A number of meetings were held between the parties at which attempts were made to stipulate admissible contentions. Following these on March 27, 1981, the Staff, Petitioner, and Licensee met, and as a result were able to stipulate as to the admissibility of six of Petitioner's proposed contentions. Agreement was not reached on seven additional contentions. Both sets of contentions were filed with the Board in a stipulation signed by the Parties and the Petitioner on March 31, 1981.

That stipulation is approved. ^{3/}

III. The Unstipulated Contentions - Consideration and Rulings

Contention 1. Accidents I 1) alleges that in the event of a rapid loss of coolant while the reactor is in the pulse mode, there could be a sudden temperature elevation sufficient to cause multiple cladding failure or fission product releases in excess of the limits provided in 10 C.F.R. Part 20.

Staff argues that the reactor cannot be pulsed unless it is critical and it cannot be critical without the water moderator. Thus Staff's position is that there is no basis for a contention which is stated as a physical impossibility. Staff further argues that it would be duplicative of contention 2. Staff asserts that loss of coolant accidents are covered by the stipulated contention.

Licensee also urges the Board to consider this contention as posing a physical impossibility, thus they are at a loss as to know what to defend against.

^{3/} The stipulated contentions are stated in full in Appendix "A". The unstipulated contentions are stated in full in Appendix "B".

Intervenors, on the other hand, allege that they have evidence to support their position, and made an offer of proof to the effect that, inasmuch as a loss of water coolant is a "finite" process, there are competing reactions between thermalization of the fast neutrons occurring in the water and also the heating up of the fuel element moderator and cladding. They further propose to demonstrate that the rates at which these occur will intersect at such a point that a power excursion is possible to produce the kinds of effects about which they are concerned. In other words, what was postulated is not that there is a total absence of water but that the rates at which they occur is critical in permitting a power excursion of the type about which they are concerned.

Clearly the Board is met with a conflict. Doubts, differing opinions and controversy have been and will continue to test men and women in science. Intervenor will be given the opportunity to prove that which Staff and Licensee consider to be an impossibility. ^{4/}

This contention is accepted and is renumbered Contention 1. Appendix I.B. ^{5/}

Contention 1. Accidents I 2) alleges that the Hazard Safety Report (HSR) erroneously concludes that radiation doses would result only from submersion exposure to noble gases released, but Petitioner contends that "individuals" would receive additional exposure due to what is termed

^{4/} Even the eminent British physicist Baron Ernest Rutherford is believed to have said this: "The energy produced by the breaking down of the atom is a very poor kind of thing. Anyone who expects a source of power from the transformation of these atoms is talking moonshine", September 11, 1933.

^{5/} Stipulated Contention 1. Accident I is renumbered Contention 1. Accidents 1.A.

"internal emissions".

Counsel for Petitioner on April 14, 1981, filed a Petition for Waiver of Commission regulations alleging that the facts of this case present "special circumstances" within the meaning of 10 C.F.R. Section 1.758 such that the application of the concentration and dose limits set forth at 10 C.F.R. Part 20 and Appendices B and C would not serve the purpose for which these limits were adopted, i.e., would not adequately protect the public health and safety.

The affidavit attached to the Petition was executed by Petitioner's counsel and in summary avers: (1) that the AFRRRI facility is in close proximity to two hospitals whose patients and staff are exposed, on a daily continuous long term basis to emissions and effluents from the facility; (2) that the facility is in close proximity to many residential dwellings and several schools, including elementary schools, and that elementary school students are particularly vulnerable to the radiological hazards of the AFRRRI emissions and effluents; and (3) that the facility is in close proximity to many businesses and that because it is situated in the midst of a densely populated urban/residential area the population dose that results from routine emissions and effluents is significantly higher than would be the case if the facility were more remotely sited.

Petitioner's point appears to be that there are both more people, and people who are more susceptible to health hazards from radiation in the middle of Bethesda, Maryland, than contemplated by the regulations and that this demography, including close proximity to hospitals and elementary

schools, presents a "special circumstance" so as to permit an attack on the validity of the Commission's regulations under 10 C.F.R. Section 2.758.

Intervenor admitted at the Special Prehearing Conference that "the affidavit is inartfully phrased . . ." Tr. 25. It further appeared that the Petitioner is, essentially, trying to present the issue of whether sick people would be more susceptible to what it terms "internal emissions" or inhalation as opposed to submersion. Petitioner asserts it has several reports and studies done by reputable scientists to support that proposition and is prepared to submit them at hearing.

Petitioner further asserts that there is a regulatory void in that Part 20 concerns itself only with submersion doses. Petitioner does not ask that the Commission waive application of Part 20. It merely wishes the Commission to consider that in the absence of any standards applicable to research reactors the Board must consider the specific facts of this case due to the proximity of sick people and young people, specifically those of elementary and pre-school age. Tr. 28.

This Board reserves decision on this contention pending receipt from the Petitioner within fifteen (15) days of the service of this Order of a more specific affidavit concerning whether "special circumstances exist to permit this Board to entertain Petitioner's attack on the validity of the Commission's regulations", 10 C.F.R. Section 2.758.

If on the basis of the Petition, the revised affidavit, and any response thereto, we determine that a prima facie showing has been made, we shall, before ruling on the merits, certify directly to the Commission

for determination, the matter of whether the application of Part 20 and Appendix should be "waived or an exception made" 10 C.F.R. Section 2.758. ^{6/}

Contention 2. Accidents II 1) concerning the N-16 diffuser system has been withdrawn by Petitioner.

Contention 2. Accidents II 2) a) concerns the effect of a power excursion accident with reduction in the thermalizing effect of hydrogen with a resulting explosive zirconium steam reaction. Both of the said accidents it is alleged would result in a multiple cladding failure.

Staff opposes the admission of this contention, as stated, averring it lacks an adequate basis and raises an issue which is neither concrete nor litigable. Staff's position with regard to the zirconium interaction is that the zirconium hydride (which is the fuel with uranium) is stable and simply does not have any explosive reaction with either steam or air. Staff argues that the responses supplied by the Petitioner do not support the Petition. Staff further argues that the explosive reaction contention should not be allowed as it is merely a multiple cladding failure accident produced by either a power excursion or loss of coolant, and thus identical to stipulated Contention 2. Accidents II-4).

Petitioner insists that the concern is the explosive zirconium reactions based on the work of Dr. Earl A. Gulbransen, ^{7/} Petitioner had

^{6/} This is renumbered Contention 1. Accidents I-B-2.

^{7/} Research Professor, Department of Metallurgical and Materials Engineering at the University of Pittsburg, Pennsylvania.

provided Staff with copies of letters from Dr. Gulbransen addressing this question. Staff argues that neither letter addressed a TRIGA reactor nor uranium-zirconium hydride, but referred to the tin zirconium alloy, zircaloy, which is used as fuel cladding in commercial power reactors but not in the TRIGA reactor. There is no scientific basis for an alleged event that cannot happen, Staff asserts, basing this belief on the research and tests of which it has knowledge and the fact that uranium zirconium hydride is extremely stable and a non-reactive substance.

It is the opinion of the Board that the matters to which reference has been made clearly show a factual disagreement which is best resolved at hearing unless disposed of prior thereto. This contention is allowed.

Contention 2. Accidents II 2)b) alleges a loss of coolant accident with the same reaction as in the prior contention and is allowed.

Contention 3. Testing Facility. Petitioner contends that the AFRRRI facility is a testing facility within the meaning of Sections 31.a(3) and 104(c) of the Atomic Energy Act of 1954, as amended and Sections 50.21(c) and 50.2(r) of 10 C.F.R. Part 50. This contention is rejected on the clear wording of the regulations. Petitioner states the issue to be:

"Whether the determining mode of operation for the AFRRRI reactor is, or should be, its steady state mode or its pulsing mode. If it is the latter, the AFRRRI power level exceeds 10 MWT and the reactor falls within the definition of a testing reactor."

Petitioner cites in support of its position the case of Trustees of Columbia University (Docket No. 50-208, ALAB-3, May 26, 1970, 4 AEC 349).

Petitioner has misread the decision of the Appeal Board which, in our view, clearly holds that the thermal power is to be determined by operation in the steady-state mode, rather than the pulsed mode.

More particularly, that decision explains the issue fully when it says:

As previously stated, the Columbia reactor would be authorized to operate steady-state power levels no greater than 250 kilowatts thermal. The question then became whether, in terms of the potential for releases of radioactivity, operation in the pulsing mode with maximum pulse peaks of up to 250,000 kilowatts involves hazards considerations essentially equivalent to or greater than those associated with steady-state operation at 10 megawatts thermal, which level is the criterion specified in Section 50.2(r)(1).

The record here is clear that, when the subject reactor is pulsed, the power rises to the maximum pulse height and then drops after a fraction of a second. The pulse is limited in height and duration by an inherent prompt negative temperature coefficient of reactivity. In this TRIGA reactor the cycle for pulsing can, at a maximum, occur only once every 6 minutes. Even with the maximum pulse height reached for the fraction of a second during each pulse, the reactor, during the pulsing cycles, would be operating at an average power level considerably less than its authorized steady-state power level. Therefore, even if the reactor were to be pulsed as often as possible, the total energy generated would be substantially less than if the reactor had been operated continuously at its steady-state full power limit of 250 kilowatts thermal; and the resultant fission product inventory would be correspondingly lower. Viewing this in the context of our earlier statements as to the intended reach of Section 50.2(r), we think it manifest that the determining mode of operation here for purposes of Section 50.2(r)(1) is the steady-state mode, which mode would produce the greater fission product inventory. The steady-state full power limit for the subject facility is, of course, far below the 10 megawatt thermal level specified in Section 50.2(r)(1).

Accordingly, our response to the Board's first question is that the Applicant's reactor is not a "testing facility" as defined in Section 50.2(r). We note, in this connection,

the Staff's statement in the comments submitted to us that the Commission has licensed approximately 20 similar facilities over the past dozen years as research reactors, even though those reactors could pulse to power levels far in excess of 10 megawatts thermal; and that no TRIGA facility has been licensed as a "testing facility".

Clearly the matter presented is a legal issue. Licensee urges that since the Board is required to follow the decisions of the Atomic Safety and Licensing Appeal Board the testing facility contention does not warrant further consideration. See Consumers Power Company (Palisades Plant), Docket No. 50-255, ALAB 014, September 25, 1970, 4 AEC 418 at 423. The Board for the reasons stated holds that the contention is denied.

Contention 4. Siting. Petitioner contends that the reactor is a "testing reactor" and therefore Part 100 requirements apply as to which reasonable assurance cannot be given that Applicant's Emergency Plan is adequate.

This contention is rejected inasmuch as we have determined that this is not a "testing reactor". See our ruling on Contention 3 above. Given that determination, further consideration of this contention would be tantamount to a challenge to existing regulations which is proscribed in 10 C.F.R. Section 2.758(a).

Contention 5. Routine Emissions I. Petitioner here avers that actual and probable violations have taken place which demonstrate that applicant will not maintain operations so as to comply with Part 20 requirements.

Petitioner alleges (1) that from 1962 to 1979 releases resulted in whole body doses in excess of EPA's limit of 25 MREM; (2) that contaminated solid wastes were incinerated; (3) that released data indicates a high

probability that doses to the public were in excess of 0.5 REM and thus violated the principle that emissions from Applicant's operation be kept as low as is reasonably achievable (the ALARA principle); ^{8/}(4) that the 1971 Environmental Report indicates rates as high as 1-5 mRad/hr. where 50 to 60 percent of the area within one mile is residential; and that it is highly probable that the dose limit was exceeded thus violating the ALARA principle.

Parts (1) and (2) are not necessary to consider as part of the wording of a contention. They are in the nature of supporting bases and as such may possibly be used as part of the evidentiary presentation, subject, of course, to all applicable rules of evidence.

Parts (3) and (4) are allowed. NEPA mandates our study of the environmental consequences "to the fullest extent possible" 42 USC 4332. It is an essential element of our decision-making process.

Though the data referred to by Intervenor may be somewhat stale, a factual basis has, none the less, been stated, which this Board finds sufficient for admissibility, although greater particularization would be helpful. The contention is marginally admissible. The Board expects these issues to be more fully explored and elucidated prior to hearing leaving open the possibility of better specification prior to the next pre-hearing conference.

^{8/} Since 1975 the Commission has substituted "as low as is reasonably achievable" (ALARA) for "as low as practicable" (ALAP). See In the Rulemaking C-1-75-5, 1 NRC 277, 278 (1975).

Contention 6. Routine Emissions II alleges that "special circumstances" within the meaning of 10 C.F.R. Section 2.758 warrant the Board's consideration of whether the off-site air and waterborne release limits set forth at 10 C.F.R. Part 20, and Appendices B and C thereto, are adequate to protect the public health and safety of the population in the vicinity of the AFRRRI reactor.

Intervenor submitted an affidavit as part of its Petition for Waiver, but as we stated above in our consideration of Consideration 1. Accidents I-2), we reserve decision pending receipt of a more specific affidavit with regard to "special circumstances" which are alleged to exist.

Contention 7. Security contains a recitation of five categories of past violations and avers that neither the physical security plan nor the history of security violations demonstrate that the controlled areas can be protected from sabotage or diversion of special nuclear material according to the standards set forth at 10 C.F.R. Part 73.

It is the Board's opinion that the security contention should be allowed; however, it is limited to Building #42, which houses the reactor, and not the entire National Naval Medical Center on whose grounds the AFRRRI site is located. ^{9/}

Intervenor's difficulty in being more specific is obvious. Significant specification is clearly not possible prior to access to confidential security information. In the Board's opinion, Licensee has sufficient basis to be on notice as to what must be defended. Discovery, limited as above,

^{9/} The building is described in the AFRRRI Reactor Facility Safety Analysis Report, May 1981.

will permit early re-examination of the security issues.

IV. Subject to the determinations set forth above, the following schedule shall be followed by all parties:

(a) thirty (30) days after the date this order issues the first set of interrogatories shall be filed;

(b) thirty (30) days thereafter, the answers to the first set of interrogatories shall be filed;

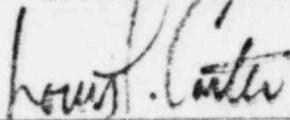
(c) twenty (20) days thereafter, the second set of interrogatories shall be filed;

(d) twenty (20) days thereafter, the answers to the second set of interrogatories shall be filed; and

(e) not later than forty-five (45) days thereafter, all Motions for Summary Disposition shall be filed.

IT IS SO ORDERED.

FOR THE ATOMIC SAFETY AND
LICENSING BOARD



Louis J. Carter, Chairman
ADMINISTRATIVE JUDGE

Dated at Bethesda, Maryland
this 31st day of August 1981.

APPENDIX "A"

STIPULATED CONTENTIONS

1. Accidents I

The analysis of the "Fuel Element Clad Failure Accident", one of the two design basis accidents (DBAs) within Applicant's Hazard Summary Report (HSR) is faulty in that:

The analysis of the "Fuel Element Clad Failure Accident" erroneously assumes that cladding failure during a pulse operation or inadvertant transient would occur at a peak fuel element temperature of less than 100°C.

Petitioner contends that such cladding failure would be much more likely to occur at elevated fuel temperatures (in excess of 400°C), resulting in far greater gap activity and fission product releases than the HSR postulates.

2. Accidents II

Accidents can be expected to occur at the AFRRRI reactor of a different kind and greater severity than those described in the HSR. Such accidents should be more properly designated DBA's to ensure that such accidents would not result in releases in excess of regulatory limits.

1) Fuel element storage rack failure. The HSR does not provide reasonable assurance that such an accident cannot occur in that: a) it fails to publish the calculations from which it concludes that a contact configuration of the twelve elements stored in Applicant's pool would not

result in a critical mass; b) it does not cite the source for its statement that experience shows it takes approximately 67 closely packed fuel elements to achieve criticality.

2) Failure of an experiment. Applicant has failed to show that several instances of malfunctions of confinement safeguards at AFRI could not recur during an experiment failure, resulting in the release of radiation in excess of occupational and offsite limits. Such malfunctions include:

- a) a breach of containment caused by missing rubber gasket sealing material on the double doors to the corridor behind the reactor control room, in violation of Applicant's Technical Specification, § I.A.4. (See, Notice of Violation, App. A, NRC Inspection Report Docket No. 50-170, 10/13/78);
- b) failure of the reactor room ventilation dampers to close on August 26, 1975 when the Continuous Air Monitor was alarmed (see, DNA Abnormal Occurrence Report to Directorate of Reactor Licensing, dated September 3, 1975, Docket No. 50-170, 9/10/75.);
- c) failure of the lead shielding doors to stop opening at the fully opened position (see DNA Abnormal Occurrence Report, dated July 27, 1976, Docket No. 50-170, 8/16/76);
- d) reactor core position safety interlock malfunction on February 1, 1973 (not recorded in Docket No. 50-170).

Petitioner contends that human error coupled with failure of built-in safeguards could lead to a series of events resulting in releases of radioactivity in excess of regulatory limits and cites the following past malfunctions at AFRI as evidence that such failures could occur there in the future: a) malfunction of Safety Channel One on March 15, 1980. An NRC inspection on March 17, 1980 "revealed that Safety Channel One would

not initiate a scram in accordance with [Applicant's] Technical Specifications"; b) reactor exhaust system malfunction on August 9, 1979 caused by an electrical fire in the EF-1 cubicle of the motor control center, in turn caused by a power surge due to a faulty transformer; c) malfunction of the fuel element temperature sensing circuit caused by a "floating signal ground", reported by DNA on August 1, 1979; d) malfunction of the pool water level sensing float switch caused by wear on the jacketing around the wires leading to the switch, reported by DNA on July 31, 1979; e) malfunction of Radiation Monitoring System caused by two loose wires in the control box and resulting in a failure of the reactor room ventilation dampers to close (on August 26, 1975 (referred to in Contention 2b), Accidents II, supra); f) malfunction of the Fuel Temperature - Automatic Scram System on January 29, 1974, caused by a build-up of high resistance material on the mechanical contacts of the TZ output meter; g) malfunction of the Reactor Core Position Safety Interlock System on February 1, 1973, caused by a faulty de-energizing relay (referred to in Contention 2d), Accidents II, supra).

Applicant has not shown that the TRIGA reactor's negative temperature coefficient will automatically shut down the reactor in accident situations with damaged fuel elements, where the moderating effect of the hydrogen nuclei in the U-Zr-Hx alloy may be significantly reduced and the value of the negative temperature coefficient is changed.

4) Multiple fuel element cladding failure accidents have not been considered in the HSR. Such accidents could result from: a) defects in the material integrity of the fuel elements themselves; b) an uncontrolled

power excursion in the reactor core; c) LOCA; d) sabotage, aircraft collision or natural ("act of God") accident.

3. Emergency Plan

The Emergency Plan prepared by Applicant in conjunction with its license renewal application does not comply with the standards set forth at 10 CFR Part 50, Appendix E, in that it fails to provide reasonable assurance that appropriate measures will be taken to protect the public health and safety in the event of offsite releases following a major accident such as those described in Accidents I and II, supra. The following elements required by Appendix E are missing from the Plan:

A. Organization

- 1) Description of the normal plant operating organization.
- 2) Detailed discussion of plant staff emergency assignments and duties of an onsite emergency coordinator in charge of exchanging information with offsite emergency authorities.
- 3) Description of Applicant's headquarters personnel who will be sent to the plant to augment the onsite emergency organization.
- 4) Identification of and methods used by Applicant's personnel responsible for making offsite dose projections and transmitting the results to State and local authorities, NRC and other appropriate governmental entities.
- 5) Identification of Applicant's employees and consultants with special qualifications for coping with emergency conditions.

- 6) Description of local offsite emergency support services.
- 7) Identification of, and assistance expected from State, local and Federal agencies with emergency responsibilities.
- 8) Identification of State and local officials responsible for planning protective actions, including evacuations.

B. Assessment Actions

- 1) Description of offsite monitoring methods for determining the magnitude and continually assessing the impact of radioactive releases.

C. Activation of Emergency Organization

- 1) Description of emergency action levels for notifying offsite agencies and notation that a message authentication scheme exists for such agencies.

D. Notification Procedures

- 1) Description of means for notifying and agreements reached with local, State and Federal officials and agencies for the prompt notification and evacuation of, and other protective measures for, the public.
- 2) Identification of the State and local government agencies within Applicant's Emergency Planning Zone (EPZ).
- 3) Description of provisions for yearly dissemination to the public within the plume pathway EPZ of information on emergency planning, nature and effects of radiation, and a listing of local broadcast stations.
- 4) Demonstration that the State/local officials can make a public notification decision promptly on being informed of an emergency.

E. Emergency Facilities and Equipment

1) Description of arrangements for transporting contaminated individuals to identified treatment facilities outside the site boundary (i.e., facilities other than the National Naval Medical Center).

2) Description of arrangements for treatment of said individuals at said facilities.

3) Description of a near-site emergency operations facility and offsite communications systems with a backup power source.

F. Training

1) Description of provisions for conducting a radiological orientation training program for local Civil Defense, law enforcement, and news media personnel.

G. Recovery

1) Description of criteria for determining when Applicant's facility may be re-entered or its operation may be resumed.

4. Routine Emissions I

Applicant has not demonstrated that airborne and waterborne radioactive emissions from routine operations and disposal of solid wastes will be maintained within the limits of 10 CFR Part 20 in that actual and probable violations of these regulatory limits have taken place on the occasions listed below and Applicant's radiation monitoring methods and corrective actions are inadequate to detect and prevent their recurrence.

1) Applicant's equipment, methods, and reporting system for measuring releases into the Montgomery County sanitary sewerage system and at its perimeter and offsite monitoring stations do not provide reasonable assurance that violations of regulatory limits have in all instances been or will be detected.

Environmental monitoring is inadequate to determine radiation doses to the public due to inhalation or ingestion because:

- a) film dosimetry detects only external gamma radiation.
- b) the particulate radioactivity monitor for airborne effluents (i.e. a pancake-probe C-M counter) is not isokinetic, and therefore cannot be used for meaningful evaluations. Applicant's only other stack effluent monitoring system, the radioactive gas monitor, is likewise not reliable for particulate sampling. (See, Environmental Release Report issued 12/14/71, covering period 1/1/70 - 9/30/71, and Inspection Report No. 50-170/77-01-03.)
- c) Applicant was cited by the NRC for a violation of environmental sampling and analysis procedures. The Violation Notice of Gross Beta Effluent Analysis, based on an NRC Inspection conducted January 12-14, 1977, cited Applicant for calculational omissions, methods for preparing and analyzing samples, and instrumentation used. The gross beta measurements were made without the use of a beta self-absorption correction in the presence of significant amounts of suspended solid material. (see NRC Inspection Reports No. 50-170/77-01-02 and 50-170/77-01-03.) Moreover, Applicant's "Environmental Sampling and Analysis" program does not provide adequate information on how quarterly environmental samples of water, soil

and vegetation are prepared and analyzed, nor does it provide the raw data collected over the past ten years.

d) The "concentric cylinder set model" used by Applicant to derive its dose assessments to the environment, and from which it concludes its effluents are within regulatory limits, is an unrealistic model.

2) An NRC inspection conducted January 10-12, 1979 revealed that, contrary to Applicant's Technical Specifications governing discharge of airborne radionuclides, Argon-41 and other radionuclides were discharged at ground level outside the reactor building for several months through a leak in the ventilation exhaust stack drain line (see NRC Inspection Report No. 50-170/79-01). It is highly probable that this resulted in releases in excess of the maximum permissible concentrations set forth at 10 CFR Part 20, Appendix B.

3) Applicant's Airborne Release Reports for 1962, 1963, and 1964 and AEC Inspection Reports for the same years (Docket No. 50-170) reveal that releases of Argon-41 from Applicant's stack exceeded the maximum permissible concentration for unrestricted areas listed at 10 CFR Part 20, Appendix B, during those years. (Also see letter from AEC to National Naval Medical Center (NNMC) dated October 6, 1961, Docket No. 50-170).

4) Applicant's Environmental Release Data and Perimeter Monitoring Reports, Docket No. 50-170 (5/27/66 report and 9/20/66 report), show that emissions from the AFRR1 facility in 1962 and 1963 resulted in annual whole body doses in unrestricted areas in excess of the NRC's regulatory limit of 0.5 rem.

5. NEPA I

The NRC Staff has not prepared an environmental impact statement (EIS) addressing the proposed licensing action.

In view of the foregoing contentions which, in their sum, establish that emissions from routine operations and postulated accidents at the AFRRRI facility present a significant threat to the public health and safety, Petitioner contends that the proposed licensing action is a major Federal action with significant environmental effects. As such, NEPA requires preparation of a site-specific EIS.

6. NEPA II

The NRC Staff's environmental impact appraisal does not adequately consider the impacts associated with operating the AFRRRI facility for another twenty years, nor does it adequately consider alternatives to re-licensing the facility, including the no-action alternative, relocating the reactor, or doing the research at other reactors as required by 10 CFR Part 51.

APPENDIX "B"

Contention 1

Accidents I

The analysis of the loss of coolant accident (LOCA) and the two design basis accidents (DBAs) within Applicant's Hazard Summary Report (HSR) is faulty in that:

1) It erroneously concludes that in event of an accident described therein as "Loss of Shielding and Cooling Water", air convection cooling would be sufficient to prevent cladding failure and significant fission product release.

Petitioner contends that in the event of a rapid loss of coolant while the reactor core is in the pulse mode, there could be a sudden temperature elevation sufficient to cause multiple cladding failures and fission product releases in excess of the limits provided in 10 CFR Part 20;

2) Both of the DBA analyses in the HSR ("Fuel Element Drop Accident" and "Fuel Element Clad Failure Accident") erroneously consider only those radiation doses to humans that would result from submersion exposure to the noble gases released.

Petitioner contends that if such accidents were to occur, individuals would receive additional exposure due to internal emissions of the noble gases, sustaining injuries far greater than those predicted in the HSR.

Contention 2

Accidents II

Accidents can be expected to occur at the AFRRRI reactor of a different kind and greater severity than those described in the HSR. Such accidents would result in significant offsite releases and include:

1) Failure of the N-16 diffuser system. Petitioner contends that in the event of such failure, N-16 bubbles would accumulate along the surface of the fuel element cladding causing: a) insulation of the fuel elements from the water coolant resulting in rapid temperature elevation of the elements and possible multiple clad failures, and loss of water shielding; and b) production and release of the gaseous radionuclide N-16 with its powerful gamma ray.

2) Two maximum credible accidents (MCAs) beyond the design basis of the reactor (Class 9 accidents): a) power excursion accident (PEA) resulting in multiple cladding failures at an elevated temperature with reduction in the thermalizing effect of hydrogen, followed by an explosive zirconium-steam interaction; and b) LOCA resulting in multiple cladding failures at an elevated temperature, followed by an explosive zirconium-air interaction.

APPENDIX "B"

Contention 3

Testing Facility

Petitioner contends that the AFRRRI facility is a testing facility within the meaning of §31.a(3) and §104(c) of the Atomic Energy Act of 1954, as amended, and §50.21(c) and §50.2(r) of 10 CFR Part 50.

[AFFIDAVIT TO BE SUBMITTED AT THE TIME OF FILING OF STATEMENTS OF POSITION]

Contention 4

Siting

Applicant has failed to demonstrate that the AFRRRI facility satisfies the siting criteria set forth at 10 CFR Part 100.

Petitioner contends the AFRRRI reactor falls within the scope of Part 100 siting criteria either as a testing reactor or a research reactor and cites for the latter case the Memorandum from Vollmer (Director, Division of Engineering, NRR), to Eisenhut (Director, Division of Licensing, NRR).

Petitioner contends that because of the density and residential nature of the population in the plume exposure EPZ, the inadequacy and inaccessibility of highways, the inadequacy of Applicant's Emergency Plan, and meteorological, geological and hydrological conditions of the area surrounding the facility, Applicant cannot provide reasonable assurance that Part 100 offsite dose limits would not be exceeded in the event of a maximum credible accident.

APPENDIX "B"

Contention 5

As Amended May 5, 1981

Routine Emissions I

Applicant has not demonstrated that airborne and waterborne radioactive emissions from routine operations and disposal of solid wastes will be maintained within the limits of 10 C.F.R. Part 20 in that actual and probable violations of these regulatory limits have taken place on the occasions listed below and Applicant's radiation monitoring methods and corrective actions are inadequate to detect and prevent their recurrence.

1) The [redacted] stated in 4) of the stipulated contention. (Routine Emissions I) and Applicant's written response to Petitioner's question submitted in the winter of 1979, "[w]hat is the highest total exposure measures over [redacted] year at any one of the reactor environmental monitoring stations, for the [years 1975-1979]", demonstrated that releases measured at these stations from 1962 through 1965, 2978 and 1979 resulted in average annual whole body doses to members of the public in excess of EPA's limit of 25 mrem.

2) Applicant's incineration of 160 boxes of contaminated solid waste, cited in NRC Inspection Reports for 1965, Docket No. 50-170, resulted in the release of radioactive gases and particulates in excess of the limits set forth at 10 C.F.R. Part 20 and Appendices thereto.

3) Since Applicant's Environmental Impact Appraisal (EIA), submitted in conjunction with its license renewal application, admits that the highest average unrestricted area exposure rate from airborne releases (set forth in the EIA) extends to residential areas, it is highly probable that such exposures have resulted and continue to result in doses to the public in excess of 0.5 rem and, violate the principle that emissions from Applicant's operation be kept as low as is reasonably achievable (the ALARA principle).

Petitioner bases this conclusion on (1) the AFRRRI Environmental Release Data and Perimeter Monitoring Reports, Docket No. 50-170 (including but not limited to the 5/27/66 report, 9/20/66 report, and 12/14/77 report), and (2) AFRRRI's written response to Mr. Joe Miller's (from Citizens for Nuclear Reactor Safety, Inc.) question #11, Autumn 1979. (The written questions and responses are in Petitioner's possession.)

4) Applicant's Environmental Release Report, issued 12/14/71, indicate that between 1/1/70 and 1/1/71 exposure rates in several unrestricted areas were as high as 1-5 mRad/hr. At this rate, any person who lived or worked in these areas 500 hours in a year, or about 10 hours a week, would receive an annual whole body dose in excess of the NRC's limit of 0.5 rem/hr. Since 50-60% of the area within a one mile radius of the AFRRRI stack is residential, it is highly probable that the population dose limit was exceeded during this period. This is a violation of the ALARA principle. Because these measurements are taken only a few times a year, it must be assumed, in the absence of more complete data, that these dose rates represent the average dose rates to unrestricted areas over long durations of time.

APPENDIX "B"

Contention 6

Routine Emissions II

10 CFR Part 20 limits are inadequate to protect the health and safety of the population in the vicinity of the AFRRRI reactor.

This proceeding presents "special circumstances" within the meaning of 10 CFR §2.758 that warrant the Board's consideration of whether the offsite air-and waterborne release limits set forth at 10 CFR Part 20 and Appendices B and C thereto are adequate to protect the public health and safety.

[AFFIDAVIT TO BE SUBMITTED AT TIME OF FILING
OF STATEMENT OF POSITION]

Contention 7

Security

Neither the Physical Security Plan for the facility nor Applicant's history of security violations and substandard management and operating procedures demonstrate that the controlled access areas can be protected from sabotage or diversion of special nuclear material according to the standards set forth at 10 CFR Part 73.

The Draft Audit Report of the AFRRRI facility prepared by the Defense Audit Service in 1979 cites frequent instances of security and management violations; including:

- 1) Eighteen activations of the facility alarm system during a 34-day period, caused by personnel leaving work after normal duty hours from unauthorized exits. Auditors were told by AFRRRI security personnel and other AFRRRI officials that investigations were not made of the activations and that not enough security people were on duty to investigate each time the alarm went off;
- 2) unauthorized people entering the facility by following employees in who used their magnetic cards to unlock the door;
- 3) failure to escort visitors attending weekly seminars and provide them with dosimeters;
- 4) failure of employees entering and exiting the building after hours to sign a log showing their time of arrival and departure;
- 5) violations of Applicant's accounting and dispensing procedures for controlled substances such as narcotics.