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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
Guy A. Arlotto, Deputy Director

| | |
|---|---|
| In the Matter of | ) |
| | ) |
| The Applied Radiant Energy Corporation<br>Lynchburg, Virginia | )Docket No. 030-07099<br>)License No. 45-11496-01 |
| | ) |
| | ) (10 C.F.R. 2.206) |

DIRECTOR'S DECISION UNDER 10 C.F.R. SECTION 2.206

## I. INTRODUCTION

By letter dated March 23, 1989 (Petition), the National Coalition to Stop Food Irradiation (NCSFI or Petitioner) requested the Nuclear Regulatory Commission (NRC or Commission) to initiate enforcement action involving The Applied Radiant Energy Corporation (ARECO). NCSFI, specifically, requests that NRC suspend the use of cesium-137 sealed sources by ARECO. The basis asserted for the requested action by NCSFI is that the cesium-137 sealed sources used by ARECO are the same type of sources that have leaked at Radiation Sterilizers, Inc. (RSI) in Decatur, Georgia. The Petition has been treated as a request pursuant to 10 C.F.R. Section 2.206 of the Commission's regulations.

For the reasons stated below, NCSFI's request is denied. My Decision in this matter follows.

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## II. BACKGROUND

One of the peacetime uses of nuclear energy that has evolved since the early 1960's is the use of irradiators to sterilize medical and pharmaceutical disposable supplies. The source of gamma rays used for sterilization is primarily cobalt-60 and, more recently, cesium-137, a byproduct of the fission of uranium-235. There are currently about 40 licensed irradiators in the United States. Of these, only four have been licensed to use cesium-137 sealed sources.

The first commercial facility to use the cesium-137 sealed sources was licensed by NRC on April 8, 1985. The irradiator, owned by Radiation Sterilizers, Inc. (RSI), is located in Westerville, Ohio. A second irradiator (Iotech, Inc.) in Northglenn, Colorado was licensed by the Agreement State* of Colorado for use of the cesium-137 sealed sources on June 14, 1985. At the Iotech facility, the cesium-137 sealed sources are stored in a dry environment. Since that time, two additional facilities were also licensed to use cesium-137 sealed sources in 1986. These are located at RSI in Decatur, Georgia (an Agreement State*) and The Applied Radiant Energy Corporation in Lynchburg, Virginia. In all cases the cesium-137 sealed sources are leased from the U.S. Department of Energy (DOE) for use by these companies.

*Pursuant to subsection 274b of the Atomic Energy Act of 1954, as amended, Colorado is one of twenty-nine (29) States that have entered into effective agreements with NRC, or the former Atomic Energy Commission, which tranfer to these states the authority to license and regulate the possession and use of certain radioactive materials within their borders.

ARECO originally obtained a byproduct material license on January 24, 1966, to use sealed sources in an irradiator for process radiation operations. In September 1985, ARECO requested an amendment to its license to possess and use cesium-137 sealed sources. On July 10, 1986, NRC amended the license to allow the possession and use of the cesium-137 sealed sources. In November 1986, twenty-five (25) of the cesium-137 sealed sources were loaded into the ARECO irradiator pool.

## III. DISCUSSION

The cesium-137 sealed sources have been used at ARECO without incident since November 1986. However, on June 6, 1988, RSI in Decatur notified the Agreement State of Georgia's Department of Human Resources (DHR) that an event had occurred which resulted in the automatic lock-in-place of the source system underwater. Preliminary measurements showed higher than normal radiation levels at the surface of the pool. Samples of pool water were collected and analyzed. The results showed elevated levels of cesium-137 dissolved in the pool water, indicating that one or more of the cesium-137 sealed sources had breached.

Since this was the first recorded instance of a leaking cesium-137 source, a joint federal/state task force consisting of departments from the State of Georgia and the NRC, and later the Food and Drug Administration (FDA) and the U.S. Environmental Protection Agency (EPA), was established. As a result of the task force recommendations and after discussions with RSI, the State of Georgia formally requested that the DOE manage an effort to identify the leaking capsule, develop a plan for its safe removal and oversee the cleanup and recovery activities at RSI. DOE responded to the State of Georgia's request and promptly sent personnel to RSI in Decatur.

Environmental monitoring performed by NRC and the State detected no cesium-137 radioactivity outside the building. Radiation surveys of automobiles, clothing and residences of the RSI employees were conducted by State personnel. These surveys showed that one employee had measurable radioactive contamination in an automobile and that two others had contamination in their residences. The NRC coordinated with the cognizant state radiological health agencies an effort to survey all the packages and the distribution centers in the United States and Canada that were shipped products by RSI. The results showed pinpoint contamination on the exterior surfaces of several shipping containers. These containers were disposed of as radioactive waste.

As a consequence of the leakage of cesium-137 sources at RSI in Decatur, Georgia, NRC obtained appropriate commitments from ARECO and sent a confirmatory action letter on June 13, 1988. This letter confirmed that ARECO would implement further stringent monitoring procedures, including testing of all containers that were removed from the pool; monitoring of all personnel as they exit the pool area for contamination; adjusting the source leak detector to a specific, more sensitive, radiation level alarm point; and collecting and analyzing a pool water sample for contamination on a weekly basis. Further, ARECO agreed to discontinue operation and immediately notify the NRC if any contamination was indicated by any of the above procedures.

Although the ARECO sealed sources have the same design as those used at RSI in Georgia, the cesium-137 sealed sources at RSI are subjected to entirely different conditions than are the sealed sources at ARECO. At RSI, the sealed sources are stored in a pool of water and are moved to open air, above the water, within the irradiation chamber, to irradiate the product.

Once the irradiation time is completed, the sources are quickly dropped into the pool and are cooled very quickly. This up-and-down cycling causes the sealed sources to be cooled when in the pool and to heat up when out of the water. Several thousand of these thermal cycles occurred before there was any indication of a leaking source at the RSI facility.

In contrast, at ARECO the sealed sources are stored and remain in a pool of water at all times. During operation, the product is placed in water-tight canisters and the canisters are lowered into the pool near the sources. Accordingly, the sealed sources at the ARECO facility are not subjected to the extreme changes in operating temperature experienced at the RSI facility. Moreover, the DOE encapsulated about 1500 sealed sources with this design. These sealed sources were stored in a water-filled pool at its Hanford Facility for about 20 years without a reported incident.

Although the evaluation of the leaking sources at the RSI facility is not yet complete, the cause of the source leakage and subsequent contamination at RSI appears to be associated with thermal shock due to movement of the sources in and out of the pool. For this reason, the NRC suspended the use of the cesium-137 sealed sources at RSI in Westerville, Ohio, which conducted operations similar to those of RSI in Georgia. RSI voluntarily suspended its operations at the Decatur, Georgia facility.

DOE is continuing its investigations with regard to the cause of the RSI incident and plans to issue a report on its findings. I believe that continued operation at ARECO during the completion of DOE's investigation presents minimal risk to the public health and safety. The good experience with storage of these sealed sources at the DOE Hanford Facility under conditions similar to those at ARECO indicates a small probability of any sealed source leakage. Further, ARECO has implemented procedures that will immediately identify sealed source

leakage that could result in radioactive contamination of employees or the product. Radiation monitoring at ARECO has been increased to provide early detection of radioactive contaminants in pool water and is sufficient to provide time to take action to mitigate the consequences of any radioactive leakage that might occur. ARECO has demonstrated adequate facilities, equipment and procedures to provide reasonable assurance of protection of the public health and safety.

Due to the significant difference in operating conditions between the ARECO facility and the two RSI facilities, there is no reason to believe that the cesium sources at ARECO will exhibit the leaking which occurred at the RSI facility. Moreover, the additional monitoring and testing by ARECO, confirmed in our June 13, 1988, confirmatory action letter, will provide early detection of a leaking source should one occur for any reason. Consequently, I do not believe that the incident at RSI justifies NCSFI's request. If upon completion of the DOE investigation, the Commission determines that continued use of the cesium-137 sealed sources at ARECO will not provide reasonable assurance that the public health and safety will be protected, appropriate action will be taken.

## IV. CONCLUSION

The petitioner seeks the initiation of a proceeding to suspend the use of the cesium-137 sealed sources by ARECO. The institution of a proceeding pursuant to 10 C.F.R. Section 2.202 is appropriate only where substantial health and safety issues have been raised. See Consolidated Edison Co. of New York (Indian Point, Units 1, 2, and 3), CLI-75-8, 2 NRC 173 (1975), and Washington Public Power Supply System (WPPSS Nuclear Project No. 2), DD-84-7,

19 NRC 899, 923 (1984). This is the standard that I have applied to concerns raised by the Petitioner in this Decision to determine whether the requested action is warranted.

For the reasons discussed above, I conclude that no substantial health and safety issues have been raised by the Petitioner. Accordingly, the Petitioner's request for action pursuant to 10 C.F.R. Section 2.206 is denied. As provided in 10 C.F.R. Section 2.206(c), a copy of this Decision will be filed with the Secretary of the Commission for the Commission's review.

FOR THE NUCLEAR REGULATORY COMMISSION

Guy A. Arlotto, Deputy Director
Office of Nuclear Material Safety
and Safeguards

Dated at Rockville, Maryland,
this 24th day of August, 1989

7590-01



NUCLEAR REGULATORY COMMISSION

(DOCKET NO. 030-07099)

THE APPLIED RADIANT ENERGY CORPORATION

(LICENSE NO. 45-11496-01)

ISSUANCE OF DIRECTOR'S DECISION UNDER 10 C.F.R. SECTION 2.206

Notice is hereby given that the Director, Office of Nuclear Material Safety and Safeguards, has taken action with regard to a Petition for action under 10 C.F.R. Section 2.206 received from Ms. Kristen Albrecht, Research Coordinator, National Coalition to Stop Food Irradiation, dated March 23, 1989, with respect to The Applied Radiant Energy Corporation (ARECO). The Petitioner requested that a proceeding be instituted to suspend the use of cesium-137 sealed sources at the ARECO facility.

The Director of the Office of Nuclear Material Safety and Safeguards has determined to deny the Petition. The reasons for this denial are explained in the "Director's Decision under 10 C.F.R. Section 2.206," (DD-89-6) which is available for public inspection in the Commission's Public Document Room, 2120 L Street, NW, Washington, DC 20555. A copy of this decision will be filed with the Secretary for the Commission's review in accordance with 10 C.F.R. Section 2.206(c) of the Commission's regulations. As provided by

this regulation, the Decision will constitute the final action of the Commission twenty-five (25) days after the date of issuance of the decision unless the Commission on its own motion institutes a review of the decision within that time.

Dated at Rockville, Maryland this 24th day of August, 1989.

FOR THE NUCLEAR REGULATORY COMMISSION

Guy A. Arlotto, Deputy Director
Office of Nuclear Material Safety
and Safeguards

Docket No. 030-07099
License No. 45-11496-01

(10 CFR 2.206)

AUG 2 1 1989

Ms. Kristen Albrecht
Research Coordinator
National Coalition to Stop Food
Irradiation
P.O. Box 59-0488
San Francisco, CA 94159

Dear Ms. Albrecht:

This is in response to your letter dated March 23, 1989, requesting that action be taken with respect to the Applied Radiant Energy Corporation in Lynchburg, Virginia.

Your request was referred to the staff for consideration pursuant to 10 CFR 2.206 of the Commission's regulations, and has been considered in the enclosed "Director's Decision under 10 CFR 2.206." For the reasons stated in the Director's Decision, I find no adequate basis in your Petition for taking the action which you have requested.

A copy of this Decision will be filed with the Secretary of the Commission for its review in accordance with 10 CFR 2.206(c) of the Commission's regulations. As provided by this regulation, the Decision will constitute the final action of the Commission twenty-five (25) days after the date of issuance of the decision unless the Commission, on its own motion, institutes a review of the Decision within that time.

A copy of the notice, which is being filed with the Office of the Federal Register for publication, is enclosed.

Sincerely,
Original signed by G. A. Arlotto

Robert M. Bernero, Director
Office of Nuclear Material Safety
and Safeguards

Enclosures: As stated

cc w/encls:
Applied Radiant Energy Corporation

Mr. James J. Myron, Vice President
Safety & Regulatory Affairs
The Applied Radiant Energy Corp.
2432 Lakeside Drive
Lynchburg, Virginia 24501

AUG 2 4 1989

Dear Mr. Myron:

This refers to your July 6, 1989 letter requesting that we deny the National Coalition to Stop Food Irradiation petition. The Petition was referred to the staff for consideration pursuant to 10 CFR 2.206 of the Commission's regulations, and has been considered in the enclosed "Director's Decision under 10 CFR 2.206." For the reasons stated in the Director's Decision, I find no adequate basis in the Petition for taking the action which was requested.

A copy of this Decision will be filed with the Secretary of the Commission for its review in accordance with 10 CFR 2.206(c) of the Commission's regulations. As provided by this regulation, the Decision will constitute the final action of the Commission twenty-five (25) days after the date of issuance of the decision unless the Commission, on its own motion, institutes a review of the Decision within that time.

A copy of the notice, which is being filed with the Office of the Federal Register for publication, is also enclosed.

Sincerely,

Original signed by G. A. Arlotto

Robert M. Bernero, Director
Office of Nuclear Material Safety
and Safeguards

Enclosure: As stated

THE APPLIED RADIANT ENERGY CORP.

IMNS

2432 LAKESIDE DRIVE
LYNCHBURG, VIRGINIA 24501
(804) 525-5252
Telefax #(804) 525-7437
Telex #TWX7108711514

TELEFAX TRANSMITTAL

DATE: July 6, 1989 TIME: 1:20 6 - A-4

TRANSMITTAL SENT TO: Mr. Robert M. Bernero, Director
Office of Nuclear Material Safety; Safeguards
U.S. Nuclear Reg. Commission
Washington, DC 20555

TRANSMITTAL SENT FROM:

J. Myers
Vice-President
Safety & Reg. Affairs

TELEFAX NUMBER: 301-492-0260

Number of Pages sent (including this page) ~~6~~ 5

THE APPLIED RADIANT ENERGY CORP.

2432 LAKESIDE DRIVE
LYNCHBURG, VIRGINIA 24501
(804) 525-5252

July 6, 1989

Mr. Robert M. Bernero, Director
Office of Nuclear Material Safety & Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Sir:

We, The Applied Radiant Energy Corporation, (ARECO), hereby ask that the petition by the National Coalition to Stop Food Irradiation (NCSFI) to suspend our use of sealed Cesium 137 sources be summarily denied. The notice of this petition against ARECO was published on page 23552 of the June 1, 1989 issue of the Federal Register (FR doc. 89-12999). The "basis" for this completely unwarranted request is that we have in our possession Cesium capsules of the same type that are involved in a recent leakage incident at an irradiator facility in Decatur, Georgia.

Before stating the supporting factors for our position, a brief background on our company and its goals and operations is in order.

COMPANY HISTORY: ARECO (then named American Novawood Corporation) first obtained a USAEC By Product Materials License on January 24, 1962, and began to use sealed radioactive Cobalt 60 gamma ray sources shortly thereafter for pilot-plant process radiation operations. The underlying company philosophy and goals were to use sealed radioactive sources for profitably processing materials and products to change their physical, chemical, biological or mechanical properties in ways that would contribute to the good of the general public. Employee and community safety and the absence of any environmental impact were fundamental commitments during all operations. Over 20+ years a myriad of radiation processes were successfully and safely carried out, including sterilization, biodurden reduction of medical products. However, the ARECO name is most closely linked to its line of acrylic/wood flooring for commercial and residential use. This flooring was the very first consumer product to be manufactured on an industrial scale by radiation in the world. Its long history notwithstanding, the demand for this product increases annually such that at present the company provides employment for more than 70 people.

COMPANY SAFETY RECORD: For more than two decades ARECO's management has provided a safe working environment for its workers manufacturing a useful commodity while always operating within the rules and regulations of the AEC or the NRC as evidenced by its inspection and safety record. In its entire history no company employee has received a radiation dose that even came close to being required to be reported to the licensing agency. In the most recent complete reporting year of 1988, the 200+ film badges worn by radiation workers all were analyzed to have received less than detectable amounts of radiation by an NRC approved dosimetry service (Tech/Ops Landauer, Inc. of Glenwood, IL). Furthermore, no reportable incidents involving the use of the irradiator have occurred and no radioactive contamination of workers, facility, or the environment has occurred.

This enviable record of safety and compliance has been achieved partly by the diligence of management and workers and partly by the simple safe design and operating mode of the irradiator (the assembly of sealed radioactive sources) itself. The majority of large commercial gamma irradiators are of the Category IV type, i.e. panoramic, wet source storage gamma irradiators - American National Standard N43-10. With this type of design the radioactive isotope(s) must be raised from its storage pool and irradiation takes place in air. This irradiation chamber must be completely shielded and connected to a separate control room by a carefully monitored interconnecting passageway. Obviously, this relatively complex arrangement requires intricate safety systems with a concomitant increase in the possibility for radiation related "incidents" compared to irradiators of simpler design.

ARECO has one of the few irradiators large enough to be considered a commercial irradiator that is of the Category III type. A Category III gamma irradiator is defined as a self-contained, wet source storage gamma irradiator - American National Standard N43-15. This means that the radioactive materials remain at all times under sufficient water shielding.

CESIUM POSSESSION: ARECO's experience and safety record in the handling and use of sealed radioactive materials were undoubtedly factors in the D.O.E.'s decision to grant an allocation of 1.25 megacuries of Cesium-137 contained in twenty five WESF capsules to be leased by the company from that agency in 1986. The decision by ARECO to utilize the Cesium-137 WESF capsules instead of the more conventional Cobalt-60 sources was made for several reasons, among them being the advantage of longer half life. These reasons also included non-technical considerations such as utilizing radioactive sources that were produced in this country rather than by a foreign supplier of Cobalt-60 that has a virtual monopoly on this isotope in North America as well as many other western and third world countries. Also, the utilization of WESF capsules would tap the energy from unavoidable waste nuclear products for

constructive purposes benefiting the general public rather than leaving them in storage to no benefit other than consolidation of nuclear waste.

A major amendment to our original materials license was required from the NRC - Nuclear Materials Safety Section - Region II, Atlanta, Georgia to allow the possession of Cesium-137. The amendment was requested in September of 1985. After supplying additional detailed information on facility, operational and safety equipment, procedures and necessary changes thereto as requested by Region II, the amendment was granted July 10, 1986, and WESF capsules were received without incident at our facility in November of 1986 in the presence of two NRC observers from Region II. It should be noted that when the WESF capsules were initially situated under their water shielding they received no more thermal shocks as would be experienced if they were being used in the mode of a Category IV irradiator in which thermal cycling is a feature of operations on a daily basis.

NCSFI Petition: The basis for NCSFI's petition is an alleged leaking WESF capsule in an irradiation facility in Decatur, Georgia. This facility used their WESF capsules in a Category IV type irradiator and they received several thousand thermal cycles (shocks) before there was any indication of a leaking source. Despite the leakage, no person received a reportable absorbed radiation dose. The contamination has been contained and is being cleaned up with no effects on the general public. In all, more than 1,500 of these capsules has been fabricated and stored in the Waste Encapsulation and Storage Facility pool in Hanford, Washington. Capsules have been stored in this pool for 15 years and there has been no evidence of a leaking capsule under the prevailing conditions of very little or no thermal cycling. It should be noted that Cobalt-60 leakers are not unknown. During the past few decades a number of sealed Cobalt sources have failed causing contamination problems at various gamma irradiators. Thus, the WESF capsules are not unique in this regard and a logical extension of the NCSFI's petition would be the suspension of use of Cobalt-60 sealed source models whose cladding integrity has failed for whatever reason. This would effectively eliminate the radiation processing industry in the United States which would include the very valuable radiation sterilization industry. At present more than 40% of all medical disposables are sterilized by radiation and the loss of this capability would create a problem of national proportions.

LEAKER PREVENTION: The possibility of preventing a doubly encapsulated radioactive source from leaking is very largely dependent upon the manner in which the sources are used and the conditions under which they are used and stored. Of extreme importance when dealing with high activity sources, such as the WESF capsules, is the avoidance of thermal shock. Also vital is the purity of the water in which sources are stored when this medium is used as a shielding material. To this end [illegible]

is pertinent to repeat the extreme difference in the operational mode of the WESF capsules at ARECO and at the above mentioned Decatur facility. At the latter site, several thousand thermal cycles were experienced by the capsules, at our irradiator the capsules are stored at all times under chemically pure water with inconsequential temperature variation. The word "stored" can almost replace the word "used" when describing WESF capsules in the Category III irradiator at ARECO. They would be in essentially the same environment as if they were in their original storage pool at Hanford. In addition, every effort is made to maintain the pool water in a state to minimize the possibility of corrosion of the sealed sources. In a meeting with D.O.E. personnel from Oak Ridge National Laboratory in August of 1988 a series of pool water controls were recommended for storing Cesium capsules. These included specifications for pool water temperature, conductivity, pH, concentration of chloride and fluoride ion, etc. Most of their recommended controls were already in effect and being monitored prior to the Decatur incident. For instance, the advisability of maintaining low pool temperatures had already been recognized by us and a large pool chiller had been in operation before the meeting with the D.O.E. Other parameters such as pH and conductivity were kept within the recommended ranges as a matter of course from the earliest days of the company's operation. Regular analysis for chloride and fluoride ion by a state approved analytical lab has been put in effect since the recommendations were presented.

POOL WATER PURITY: An important feature of ARECO's water treatment and monitoring is the fact that the pool water is always (except for short maintenance periods) circulated through deionizing and filtration systems, i.e. 24 hours a day - 7 days a week, to sustain maximum water quality. The consequence of ARECO's efforts to provide a non-corrosive medium for sealed radioactive sources is demonstrated by an analysis performed by ORNL in samples taken from our pool in August of 1988. The results showed "the water to be of very high purity." A copy of the findings is enclosed. In the past year, pool water samples were also taken and analyzed for radioactive contamination by an NRC Region II Inspector. No evidence of contamination was found.

LEAK DETECTION: The continuous flow of pool water through the cation bed of the demineralizer affords an excellent method of detecting a leaking capsule at the earliest stages of failure. A Geiger-Mueller probe is affixed to the outside of the cation resin container at a height where any dissolved Cesium would be first collected. This probe is connected to an Eberline Smart Alarm whose activation point is set just far enough above background to avoid false alarms due to natural statistical fluctuations in background radiation level. This system, coupled with a water "sipping" technique, would allow the quick identification of a leaker when suspected so that the identification procedure is performed when contamination levels are low. After identification, the offending

looker can be placed in a capsule isolation chamber for return to D.O.E. facilities as soon as a suitable cask is available.

Inspections: ARECO's excellent safety and NRC-inspection record has not suffered during since the company's utilization of the WESF capsules. Despite the added complexities of equipment and more stringent monitoring requirements, all NRC inspections of our facility have shown no violations of NRC rules and regulations. The most recent inspection was performed on May 24, 1989. A copy of the findings is enclosed.

Confirmation of Action Letter: As a consequence of the Decatur incident, the company received a confirmation of action letter from the NRC dated June 13, 1988. It directed ARECO to implement further stringent monitoring procedures. These included swab testing of all target material containers that were removed from the pool, contamination monitoring of all radiation personnel as they exited the pool room, adjusting the source leak detector to a recommended alarm point setting and collecting and analyzing pool water samples for radioactive contamination on a weekly basis and discontinuing operations and immediately notifying the NRC if source leakage is indicated by the preceding procedures. All directives of the letter were complied within timely fashion and continue to be in effect.

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To summarize, our company's position re the safety of using WESF capsules in our gamma irradiator is as follows:

ARECO uses the capsules under very benign conditions. That is, the capsules are always kept under water shielding whose temperature is confined to a relatively narrow range (75°F to 120°F) at all times. The water in the pool is kept chemically pure by constant circulation through demineralizers and diatomaceous earth filters. They are thus located in an environment that is very similar to, and in fact (due to water purity) may be superior to, that in which they were stored at the Hanford facility in Washington for many years with no incidents. By means of numerous discussions and examination of the data on Cesium chloride capsules that were available to us at the time, we assured ourselves of the maintenance of capsule integrity under our present operating conditions at the time we petitioned the NRC to possess and use Cesium-137. Despite the problems that have arisen at the facility in Decatur, we find the operating conditions to be so different that we are confident of our ability to safely use this type of source.

Given the mode of operation, the stringent company monitoring procedures, the results of NRC and D.O.E. inspections, and the results of various pool water analyses, ARECO can see no valid reason why the NRC should comply with the NCSFI request. It was obviously made without

detailed knowledge of AREOO's operational conditions and the understanding of how the WESF capsules are used at our facility.

Yours truly,

THE APPLIED RADIANT ENERGY CORP.

James J. Myron

James J. Myron
Vice President
Safety & Regulatory Affairs

JJM:doo

Enclosures (2)

**Department of Energy**
Oak Ridge Operations
P.O. Box 2001
Oak Ridge, Tennessee 37831-8611

April 26, 1989

Mr. Lawrence G. Barrett, President
The Applied Radiant Energy Corportation
2432 Lakeside Drive
Lynchburg, Virginia 24501

**ANALYSIS OF POOL WATER SAMPLES FROM THE APPLIED RADIANT ENERGY CORPORATION (ARECO)**

Enclosed is the pool water analysis performed by Oak Ridge National Laboratory (ORNL) on samples taken from the ARECO facility on August 24, 1988. As you can see, ORNL found the water to be of very high purity.

We hope this information is useful to you. If you should have further questions, please call me at (615) 576-0716.

Sincerely,

Bryan D. Walker
ORO Project Manager for
RSI Recovery Activity

Enclosure

cc w/enclosure:
John E. Baublitz, NE-20, HQ/GTN
E. Newman, ORNL

MARTIN MARIETTA

9-30-88

Correspondence

MARTIN MARIETTA ENERGY SYSTEMS, INC.

September 28, 1988

J. R. Hightower

Report on Analyses of Pool Water Samples from ARECO

As you requested, we have collected and analyzed pool water samples from the Applied Radiation Energy Corporation (ARECO) irradiation facility in Lynchburg, VA. This memo is to report our findings.

Samples were taken at the ARECO facility on August 24. Mr. Norman Teasley of our staff worked with Dr. James Myron of ARECO to schedule the sampling and to take the samples. Six separate samples were taken from the pool; three samples were acidified immediately for preservation, and three samples were untreated. All samples were stored in clean plastic bottles, kept cool in an ice chest, and transported to ORNL. On arrival at ORNL on the afternoon of August 24, samples were distributed for analysis. Two samples (one acidified, one untreated) were sent to International Technology Corporation (IT), Knoxville, TN; two samples were analyzed by ORNL Analytical Chemistry Division; and two samples were archived. Metal and radionuclide analyses were made on the acidified sample, and all other analyses were made on the untreated sample.

Results for the samples are shown on the attached table. For most analyses, there is good agreement between IT and ORNL results, considering the very low concentration level of constituents in the samples. Metal analyses were made by inductively coupled plasma (ICP) spectrometry by both ORNL and IT. Because the two labs use different instrumentation, there are some differences in detection limits and the specific metals that were determined. Small quantities (low ppm levels) of calcium, potassium, lead, zinc, and silicon were found by ICP. Anion concentrations were below detection limits. There was no evidence of any gamma-ray emitting radionuclides in the sample.

There is an appreciable difference in the measured solution conductivity between ORNL and IT; the ORNL result is about 15 times lower than the IT result. I have talked with our chemists and believe that the ORNL value is the better number. If you think it is justified, we can do further checking on the conductivity differences. At any rate, the conductivity of the solution is very low, indicative of an electrolyte concentration at the micromolar concentration level.

Differences between ORNL and IT results for alkalinity are insignificant and probably reflect differences in absorption of carbon dioxide from the atmosphere by the samples.

Overall, we find that the pool water from the ARECO facility contains very few constituents and those that are present are common metals at concentrations in the low ppm range.

Please let me know if you have questions about this work, need additional information, or would like any other analyses performed. We are holding on to the archive sample for a few weeks in case anything else needs to be done.

J. R. Stokely, Section Head
Analytical Chemistry Division

JRS:sdc

Attachment

cc: J. C. Price
N. A. Teasley
J. W. Wade

IT and ORNL Analytical
Results on Pool Water from
Applied Radiation Energy Corp.
(Lynchburg, VA)*

| Analysis Type | IT Results | ORNL Results |
|---|---|---|
| Total Organic Carbon | <1 | <0.1 |
| Alkalinity (as $CaCO_3$) | 4 | 1.3 |
| Conductivity | 60 μmho/cm | 4.1 μmho/cm |
| pH | 6.0 | 6.4 |
| Chloride | <0.5 | <1 |
| Fluoride | <0.5 | <1 |
| Nitrate | <0.5 | <5 |
| Phosphate | <1.0 | <5 |
| Sulfate | <1.5 | <5 |
| Al | <0.04 | <0.05 |
| Sb | <0.03 | <0.05 |
| As | <0.03 | <0.06 |
| Ba | <0.002 | <0.001 |
| Be | <0.001 | <0.0004 |
| Cd | <0.005 | <0.001 |
| Ca | 0.5 | 0.7 |
| Cr | <0.01 | <0.005 |
| Co | <0.02 | <0.002 |
| Cu | <0.02 | <0.01 |
| Fe | <0.02 | <0.02 |
| Pb | 0.12 | 0.15 |
| Mg | <0.03 | <0.01 |
| Mn | <0.002 | <0.005 |
| Ni | <0.02 | <0.006 |
| K | 2.7 | |
| Se | <0.06 | <0.05 |
| Ag | <0.005 | <0.006 |
| Na | <0.2 | <0.2 |
| Tl | <0.03 | |
| V | <0.01 | <0.004 |
| Zn | 0.026 | 0.038 |
| Ag | | <0.006 |
| B | | <0.08 |
| Ga | | <0.3 |
| Li | | <0.2 |
| Mo | | <0.04 |
| P | | <0.3 |
| Si | | 16 |
| Sr | | <0.005 |
| Ti | | <0.02 |
| Zr | | <0.02 |
| $^{137}Cs$ | | <0.1 Bq/L |
| $^{60}Co$ | | <0.1 Bq/L |

* All results are in ppm except as noted.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

JUN 14 1989

Docket No. 030-07099
License No. 45-11496-01

Applied Radiant Energy
ATTN: James Myron, Ph.D, RSO
2432 Lakeside Drive
Lynchburg, Virginia 24501

Gentlemen:

SUBJECT: NRC INSPECTION REPORT NOS. 45-11496-01/89-01

This refers to the Nuclear Regulatory Commission (NRC) inspection conducted by M. Elliott on May 24, 1989. At the conclusion of the inspection, the findings were discussed with you.

The inspection was an examination of activities conducted under your license with respect to radiation safety and compliance with NRC regulations and the conditions of your license. It included selective examinations of procedures and representative records, interviews with personnel, and direct observations by the inspector.

Within the scope of the inspection, no violations or deviations were identified.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter will be placed in the NRC Public Document Room.

Should you have any questions concerning this letter, please contact us.

Sincerely,

William E. Cline, Chief
Nuclear Materials Safety and
Safeguards Branch
Division of Radiation Safety
and Safeguards

Enclosure:
NRC Inspection Report

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

Report No.: 45-11496-01/89-01

Licensee: Applied Radiant Energy
2432 Lakeside Drive
Lynchburg, Virginia 24501

Docket No.: 030-07099 License No.: 45-11496-01

Facility Name: Applied Radiant Energy

Inspection Conducted: May 24, 1989

Inspector: M. P. Elliott 6/8/89
M. P. Elliott, Health Physicist Date Signed

Approved by: T R Decker 6/9/89
T. R. Decker, Chief Date Signed
Radiation Safety Projects Section
Nuclear Materials Safety and Safeguards Branch
Division of Radiation Safety and Safeguards

## SUMMARY

Scope: This routine, unannounced inspection of activities conducted under License No. 45-11496-01 included a review of the organization and administration of the licensed program; scope of the program; training; radiation protection; materials, facilities, and instruments; receipt, transfer and disposal of material; personnel radiation protection; notifications; postings; transportation; and matters pertaining to WESF capsule concerns.

Results: Within the scope of this inspection, no violations were identified.

## REPORT DETAILS

1. Persons Contacted

   Licensee Employees

   *James Myron, Ph.D, RSO
   Rodney Bell, Assistant RSO

   *Attended exit interview

2. Licensee Action on Previous Enforcement (92701)

   NRC Byproduct Material License No. 45-11496-01 was last inspected on February 25, 1988, at which time no violations were identified.

3. Organization (87100)

   Lawrence Barrett, President
   Lee Stocks, CEO
   James Myron, Vice President of Safety and Regulatory Affairs, RSO
   Rodney Bell, Assistant RSO, Designated User

4. Materials Program (87100)

   The licensee's material program effectiveness was assessed by reviewing management controls and structure, operation, training, facility layout and use areas, receipt, transfer and disposal of material, required postings and notifications. The program was effective with respect to meeting the safety objectives of the program. Violations or deviations were not identified in the review of this program area.

5. Radiation Protection (83822)

   Selected records and procedures demonstrations were reviewed during this inspection. Program areas reviewed included operating and emergency procedures, instrument calibrations, personnel dosimetry records, and radiation/contamination survey results. The findings in this area appeared to indicate improving performance since the previous inspection. Violations or deviations were not identified in the review of this program area.

7. Exit Interview (30703)

   The inspection scope and findings were summarized on May 24, 1989 with those persons indicated in paragraph 1. Dissenting comments were not received from the licensee.

   Proprietary information is not contained in this report.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

JUN 14 1989

Docket No. 030-07099
License No. 45-11496-01

Applied Radiant Energy
ATTN: James Myron, Ph.D, RSO
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Sincerely,

William E. Cline, Chief
Nuclear Materials Safety and
Safeguards Branch
Division of Radiation Safety
and Safeguards

Enclosure:
NRC Inspection Report

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101 MARIETTA STREET, N.W.
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Report No.: 45-11496-01/89-01

Licensee: Applied Radiant Energy
2432 Lakeside Drive
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Facility Name: Applied Radiant Energy

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Inspector: M. P. Elliott 6/9/89
M. P. Elliott, Health Physicist Date Signed

Approved by: T R Decker 6/8/89
T. R. Decker, Chief Date Signed
Radiation Safety Projects Section
Nuclear Materials Safety and Safeguards Branch
Division of Radiation Safety and Safeguards

## SUMMARY

Scope: This routine, unannounced inspection of activities conducted under License No. 45-11496-01 included a review of the organization and administration of the licensed program; scope of the program; training; radiation protection; materials, facilities, and instruments; receipt, transfer and disposal of material; personnel radiation protection; notifications; postings; transportation; and matters pertaining to WESF capsule concerns.

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REPORT DETAILS

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Licensee Employees

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Rodney Bell, Assistant RSO

*Attended exit interview

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Lee Stocks, CEO
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Proprietary information is not contained in this report.

NCSFI INC.
NATIONAL COALITION TO STOP FOOD IRRADIATION

P.O. Box 59-0488, San Francisco, CA 94159

Phone: (415) 626-2734
March 23,1989

Mr. Charles Hosey
USNRC
101 Marietta Street N.W. Suite 2900
Atlanta, Georgia 30323

Dear Mr. Hosey,

I am writing you in regards to your irradiation facility, Applied Radiant Energy Corportion in Lynchberg, Virginia. On 3/22/89 I had a conversation with Mr. Earl Wright regarding our concerns with the continued operation of that facility in light of what has happened at Radiation Sterilizers Inc. in Decatur, Georgia. Our main concern is Applied Radiant Energy Corportion uses the same Cesium rods encapsulated by the Department of Energy that leaked in Decatur in June of 1988. We do not feel these rods can be proven safe by the Department of Energy. We believe you must suspend the use of these rods to protect the public health and safely. If you do not feel these rods should be taken out of use, please give us documentation that prove their safety and your reasons for not removing them.

I would also like a copy of Applied Radiant Energy Corporations license and the additional instructions added to the license since the Decatur accident.

Sincerely, Kristine Albrecht
Kristine Albrecht
Research Coordinator-NCSFI



IE0---064387