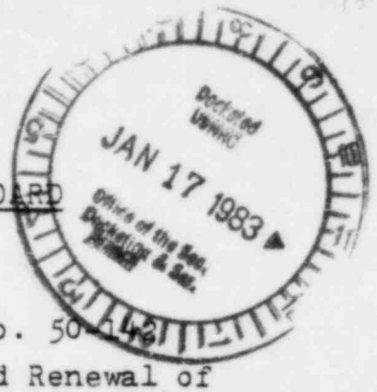
UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD



In the Matter of	
THE REGENTS OF THE UNIVERSITY OF CALIFORNIA	Docket No. 50-142 (Proposed Renewal of Facility License)
(UCLA Research Reactor)	

DECLARATION OF PROFESSOR EDWARD L. COOPERMAN

I, Edward L. Cooperman, do declare as follows:

1. I am Professor of Physics and Chairman of the Radiation Safety Committee at California State University at Fullerton. I am also a member of the Southern California Federation of Scientists. A statement of professional qualifications is attached.

2. I have reviewed a report of a recent NRC inspection of radiation safety practices at the UCLA reactor. The inspection report is dated June 9, 1982.

3. From the point of view of a chairman of a university radiation safety committee, the NRC inspectors' findings are quite serious. I have never before seen such a scathing inspection report. The lapses identified by the inspectors, both the violations cited and the other findings, have safety significance and represent serious breaches of good radiation safety practice, ones that could potentially impact negatively on public health.

4. At my institution, we would have immediately fired the health physicist about whom such findings had been made. Furthermore, we would have looked seriously into the administrative and managerial controls that permitted a man of no prior experience to have been hired, and how someone obviously unfamiliar with

both his duties and ie regulations he was to enforce could have been permitted to run the radiation protection program for a device so potentially hazardous as a reactor. Failure to have calibration procedures for radiation monitors, lack of acceptance criteria, consistent underestimates of actual dose rates, failure to tag malfunctioning portable survey instruments out of service, inadequate record-keeping, and failure of the Lab Director and Radiation Use Committee to, as required, review and approve the calibration procedures, particularly in light of the NRC finding that some of the procedures were seriously deficient and other required procedures didn't exist at all--all these are very serious signs of a radiation protection program not working as it supposed to.

5. The results of such practices can be serious. It is a fundamental principle of radiation protection that monitoring devices must be adequately calibrated and maintained. Improperly calibrated devices, or devices that are malfunctioning but still in use, can provide erroneous readings that can have seriously untoward public health and safety implications. Poor practices such as those detailed in the inspection report raise serious questions about the adequacy of a radiation monitoring program.

6. For training or educational purposes regarding activation analysis, there is no need for a reactor at a university. A neutron generator or howitzer would be sufficient.

7. At my institution, there are two such devices--one producing 10^7 fast neutrons per second, and another producing in the range of 10^{10} n/s.

8. It is my understanding that, in addition to the reactor, the UCLA Nuclear Energy Lab has a neutron generator capable of 10^{11} n/s of 14 Mev. Such a device would be even better than the devices our institution has and could perform all necessary training functions and many research functions associated with activation analysis.

9. Fast neutrons are fine for much neutron activation analysis. For research requiring more exacting analysis, samples can be, as they are at many institutions, sent to one of the commercial firms providing activation analysis services. There is no need to have a reactor on campus for activation analysis--for either training/educational use or research.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Edward L. Cooperman

Executed at Fullerton, California, this 15th day of December, 1982.

Professional Qualifications

PROFESSOR EDWARD L. COOPERMAN

My name is Edward L. Cooperman. I am Professor of Physics and Chairman of the Radiation Safety Committee at the California State University at Fullerton. I am past Chairman of the Physics Department and was for many years Chairman of the Southern California Federation of Scientists, with which I am still associated.

I received my BS degree in physics from Lehigh University and my PhD in physics, with a focus on nuclear physics, from Penn State.

(emphasis added by CBG)

JUN 9 1982

Docket No. 50-142

University of California at Los Angeles
Los Angeles, California 90024

Attention: Walter F. Wegst, PhD
Director, Office of Research & Occupational Safety

Gentlemen:

Subject: NRC Inspection of NEL Research Reactor - UCLA

This refers to the routine inspection conducted by Messrs. M. Cillis and E. Garcia of this office on April 5-9, 1982 of activities authorized by NRC License No. R-71, and to the discussions of our findings held by Messrs. Cillis and Garcia with Dr. Wegst and other members of your staff at the conclusion of the inspection.

The inspection was an examination of the activities conducted under your license as they relate to radiation safety and to compliance with the Commission's rules and regulations and the conditions of your license. The inspection consisted of selective examinations of procedures and representative records, interviews with personnel and observations by the inspector.

Based on the results of this inspection, it appears that certain of your activities were not conducted in full compliance with NRC requirements as set forth in the Notice of Violation, enclosed herewith as Appendix A.

Your response to this notice is to be submitted in accordance with the provisions of 10 CFR 2.201 as stated in Appendix A, Notice of Violation.

In accordance with 10 CFR 2.790(a), a copy of this letter and the enclosures will be placed in the NRC Public Document Room unless you notify this office, by telephone within ten days of the date of this letter and submit written application to withhold information contained therein within thirty days of the date of this letter. Such application must be consistent with the requirements of 2.790(b)(1).

IE06

OFFICE ▶	RV/jk						
NAME ▶	CILLIS	GARCIA	WENSLAWSKI	BOOK	SPENCER	Johnson	
DATE ▶	6/7/82	6/7/82	6/8/82	6/9/82	6/9/82	6/9/82	

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Should you have any questions concerning this inspection, we will be glad to discuss them with you.

The responses directed by this letter and the accompanying Notice are not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act 1980, PL96-511.

Sincerely,

ORIGINAL SIGNED BY
G. S. SPENCER

G. S. Spencer
Director, Division of Technical Inspection

Enclosures:
A. Notice of Violation
B. Inspection Report 50-142/82-01

cc w/enclosures:
Dr. I. Catton, Director, NEL, UCLA

bcc: DMB/Document Control Desk (RIDS)

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APPENDIX A

NOTICE OF VIOLATION

University of California at Los Angeles
Nuclear Engineering Laboratory

Docket No. 50-142

As a result of the inspection conducted during the period of April 5 through April 9, 1982, and in accordance with the Enforcement Policy, (10 CFR Part 2, Appendix C), 47 FR 9987 (March 9, 1982), the following violations were identified:

A. Technical Specification, Section VIII.J "Procedures" states in part that, "The facility shall be operated and maintained in accordance with approved written procedures. All procedures and major changes thereto shall be reviewed and approved by the Director of the Nuclear Energy Laboratory prior to being effective. ...The following types of written procedures shall be maintained: ... 3. Radiological control procedures for all facility personnel."

Contrary to the above requirement, at the time of the inspection no approved written procedures existed for the control and calibration of portable radiation survey instruments. In addition, on January 27, 1982 a procedure was used to calibrate the Area Radiation Monitors that had not been reviewed and approved by the Director of the Nuclear Energy Laboratory.

This is a Severity Level IV Violation (Supplement IV).

B. Technical Specification, Section VIII.H requires the Radiation Use Committee to review facility procedures and records for safety considerations and recommend improvements where appropriate.

Contrary to this requirement, at the time of this inspection the procedure mentioned in A above, for the calibration of the Area Radiation Monitors, had not been reviewed by the Radiation Use Committee.

This is a Severity Level V Violation (Supplement IV).

Pursuant to the provisions of 10 CFR 2.201, University of California at Los Angeles is hereby required to submit to this office within thirty days of the date of this Notice, a written statement or explanation in reply, including: (1) the corrective steps which have been taken and the results achieved; (2) corrective steps which will be taken to avoid further items of noncompliance; and (3) the date when full compliance will be achieved. Consideration may be given to extending your response time for good cause shown.

Dated June 9, 1982

F. A. Wenslawski

F. A. Wenslawski, Chief, Reactor Radiation Protection Section

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-142/82-01

Docket No. 50-142 License No. R-71 Safeguards Group _____

Licensee: University of California at Los Angeles

Los Angeles, California 90024

Facility Name: UCLA Research Reactor (Argonaut-100 Kw)

Inspection at: UCLA Campus

Inspection conducted: April 5-9, 1982

Inspectors: E. M. Garcia for M. Cillis, Radiation Specialist — June 7, 1982 Date Signed

E. M. Garcia E. Garcia, Radiation Specialist — June 7, 1982 Date Signed

Approved by: F. A. Wenslawski F. A. Wenslawski, Chief, Reactor Radiation Protection Section — 6/8/82 Date Signed

Approved by: for R. D. Thomas H. E. Book, Chief, Radiological Safety Branch — 6/9/82 Date Signed

Inspection Summary

Inspection on April 5-9, 1982 (Report No. 50-142/82-01)

Areas Inspected: Routine inspection of the radiation protection program including organization, personnel monitoring, posting, surveys, effluent releases, training, instrument calibration, audit of records/reports; emergency planning; radioactive material transportation activities; independent radiation surveys to determine argon-41 dose rates on the roof and a tour of the facility. The inspection involved 74 hours on site inspection effort by two NRC inspectors.

Results: Of the 12 areas examined, two items of noncompliance were identified in one area. (See paragraph 2.f.1 and 2.f.2).

DETAILS

1. Persons Contacted

*R. Reyes, Reactor Health Physicist
*N. Ostrander, Manager, Nuclear Energy Laboratory
*A. Zane, Reactor Supervisor
Professor I. Catton, Director, Nuclear Energy Laboaratory
J. McLauglin, Radiation Safety Officer
*H. Kaufmann, Campus Health Physicist
*C. Ashbaugh, Nuclear Engineer/Security Officer
G. Bell, Reactor Operator
Lt. R. Duncan, Campus Police Department
*W. F. Wegst, Ph.D, Director, Office of Research & Occupational Health

*Denotes those individuals attending the exit interview on April 9, 1982.

In addition to the individuals noted above, the inspectors met with nd interviewed other members of the licensee's staff.

2. Radiation Protection

a. Organization

The reactor health physicist has held the position since March 18, 1981. He reports directly to the Radiation Safety Officer (RSO). The reactor and campus radiation safety programs are under the direction of the Director of Office of Research and Occupational Safety (OR & OS). The RSO who is responsible for managing the reactor and campus radiation protection programs reports directly to the Director.

The current reactor health physicist had assumed this role when the former health physicist was promoted to RSO. The former health physicist subsequently terminated his employment at UCLA and a new RSO, a certified health physicist, was appointed.

Line responsibility for radiological safety at the NEL includes successively, the Campus Radiation Safety Committee, the Office of Research & Occupational Safety, Radiological Safety Office and the resident NEL reactor health physicist.

Discussions with the reactor health physicist revealed that he has had no prior experience in the implementation and enforcement of a radiation protection program at an operating research or power reactor. His major related prior experience was as an x-ray technologist. He holds a PhD in education.

The inspectors identified additional items in regard to the reactor health physicist's capabilities. The additional items are based on the inspectors' personal observations, discussions with the NEL staff and reactor health physicist and from the inspection findings discussed in the subsequent sections of this inspection report.

These matters are summarized as follows:

(1) Part VIII.G of the Technical Specifications requires the reactor health physicist to implement and enforce the radiation safety program at the NEL. Discussions held with the reactor health physicist revealed he was not aware of this requirement because he had not read a copy of the Technical Specifications.

(2) The reactor health physicist stated he was not familiar with Titles 10 or 49 of the Code of Federal Regulations. After discussions with the individual the inspector concluded that the reactor health physicist's knowledge of Parts 19 and 20 to Title 10 of the Code of Federal Regulations was minimal.

(3) The RSO had provided the current reactor health physicist with a written list of duties and responsibilities. The reactor health physicist could not locate the list during the inspection and stated he was not sure whether he was fulfilling those duties and responsibilities.

The reactor health physicist's duties, responsibilities and performance were discussed with the RSO and the Director of OR & OS during the inspection and at the exit interview. Emphasized was the need to ensure the individual's qualifications and training are commensurate with the complexity of the facility's operation even though there are no specific regulatory requirements regarding the selection and qualification of the reactor health physicist position.

Two recent memorandums, dated in February 1982, concerning the health physicist's responsibilities were reviewed by the inspector. The memos, which were issued by the RSO, indicated the reactor health physicist's responsibilities were being redirected. The intent of the memorandums was to provide the reactor health physicist the time that is required to adequately support reactor operations and to improve the Radiological Safety Program at the NEL facility.

Both the RSO and Director of OR & OS agreed that the reactor radiation protection program will receive their immediate attention.

No items of noncompliance or deviations were identified.

b. Training

The NEL reactor health physicist and the Nuclear Engineer/ Security Officer conduct training pursuant to 10 CFR 19.12 as needed for individuals requiring use of the reactor facility. An examination is administered to all participants at the end of training. The training course is informal in nature. Handouts which include a copy of the NEL emergency plan are provided to participants. Participants are expected to obtain a passing grade of 80% in order to qualify for a film badge and access to the NEL facility. The reactor health physicist stated the training also includes instructions and a demonstration on the use of portable radiation survey instruments used at the NEL facility. Participants who have obtained a passing grade on the exam are thereby qualified to use the portable survey instruments. Neither the training outline or exam contained any reference to the use of portable survey instruments. The instructions do not include a discussion on the type of surveys that a participant is authorized to perform. The reactor health physicist was also unable to state the types of surveys that participants are authorized to perform. This aspect of the inspection findings is further discussed in paragraph f.(1) below.

The examinations for qualified individuals were reviewed during the inspection. The examinations could not be located for two individuals who were qualified for unescorted access and having keys to the NEL facility. This finding was discussed with the NEL staff and at the exit interview.

No items of noncompliance or deviations were noted.

c. Posting and Labeling

A review of the facility posting was made during a walk through inspection of the NEL. The posting requirement of 10 CFR 19.11 had been fullfilled.

Numerous empty containers and old irradiated sample vials were observed throughout the NEL facility. The items were identified with yellow and magenta tape. A discussion with the reactor health physicist indicated the empty containers were not contaminated and no longer contained radioactive materials. He also stated the irradiated sample vials, which at one time may have contained radioactive material, have since decayed to nondetectable radiation levels and therefore could be released as nonradioactive material. The reactor health physicist added that many of the empty containers had been identified with the yellow and magenta tape to prevent them from being confiscated by personnel. The need to review 10 CFR 20.203(f).A requirements was emphasized during discussions with the reactor health physicist.

The tour revealed inconsistencies in the posting of radiation and high radiation areas pursuant to 10 CFR 20.203. The postings appeared to be conservative (i.e. more restrictive). One area of the high bay had a radiation area posted within an area posted as a high radiation area. Radiation surveys of the area indicated it was a radiation area. Two other areas within the high bay area, which were identified as high radiation areas, actually were only radiation areas.

A sheet metal building (called Equipment Room) located on the third floor roof top directly over the reactor was observed during the facility tour. Access to this facility is controlled because of the existence of radiation levels during reactor operations (see paragraph 2.d). Access to the Equipment Room structure is by way of a locked doorway located in a chain link fence. A posted sign identifying the area as a controlled area and whom to contact for entry was not visible from the normal entrance path. Although the sign was not required by 10 CFR 20, the lack of conspicuous posting was pointed out to the licensee as defeating the reason for posting. Keys for gaining entry to the area are maintained by NEL staff.

The purpose of postings, labels and signs was discussed with the reactor health physicist, NEL staff and at the exit interview. The need for posting, labeling and installation of signs to provide information that is meaningful and is consistent with 10 CFR 20.203 was emphasized.

No items of noncompliance or deviations were identified.

d. Surveys

Weekly radiation, contamination and air sampling surveys are performed in and around the NEL reactor facility. More comprehensive and detailed surveys of the facility, the reactor shield and process area are performed on an annual basis. In addition surveys are made whenever special experimental configurations, new experiments or shielding modifications are made or other conditions warrant such surveys.

An examination of survey records was conducted. Contamination survey results were in the background range of 7 to 17 cpm. Contamination levels greater than two times background are investigated. Contamination surveys performed in 1981 were negative. The need to report results for contamination and air samples surveys in units that are consistent with 10 CFR 20.401(b), Records for Surveys, Radiation Monitoring and Disposal and 10 CFR 20.5, "Units of Radioactivity" (i.e. uCi, dpm, uCi/ml etc) was discussed with the reactor health physicist and at the exit interview.

Radiation levels inside the reactor high bay area indicated levels in the range of less than 1.0 - 150 mrem/hr combined beta-gamma and neutron radiation. Radiation surveys outside the high bay area were at background levels except for the reactor's roof top area located on the third level. The roof top area (discussed in 2.c above) is a chain link fenced-in area which is maintained locked. Keys to the area are maintained under the strict control of the reactor supervisor. Radiation levels on the roof directly over the top of the reactor (inside of the Equipment Room) ranged from 0.1 - 7.0 mrem/hr. Radiation levels at the roof top fenced-in boundaries were all less than 0.1 mrem/hr while the reactor is operating at 100 KW. Radiation levels inside the Equipment Room and at the fenced-in boundries are nondetectable (background) when the reactor is shut down.

An independent radiation survey was conducted in the reactor high bay area and reactor roof top with an NRC model E520 Eberline survey meter, serial number 1462 and property number NRC-006385 which was calibrated on March 22, 1982. Results of the survey indicated levels that were 10 to 40% higher than what was recorded by the licensee's surveys.

In light of the NRC survey results and the findings of Section 2.f.1 of this report, the need for the licensee to confirm the calibrations of their portable instruments and re-evaluate their current calibration practices for adequacy was discussed at the exit interview.

A review of the reactor operation log indicated that radiation surveys of irradiated samples were being performed prior to shipment from the NEL facility.

No items of noncompliance or deviations were identified.

e. Personnel Monitoring

External radiation exposures are measured using film badges which are issued and processed by the campus radiological safety office. Badges of selected NEL and faculty personnel are changed monthly. Student badges are changed monthly or quarterly dependent on the nature of their activity at the NEL. Self reading pocket dosimeters and neutron dosimetry film are issued when the need is determined by the reactor health physicist. The RSO stated the University was in the process of considering contracting a TLD/film badge service from a private vendor.

Examination of records revealed there was a considerable decrease in exposures received by NEL personnel. Discussions with the NEL staff revealed that this was attributable to reduced reactor usage and an effective ALARA program. Personnel dosimetry records indicated that no personnel exposure was received since the last NRC radiation protection inspection of November 1980. The examination also revealed that the campus activity responsible for maintaining the official copy of personnel exposure records was not clearly established. A member of the radiation safety office stated the reactor health physicist was responsible for maintaining the official records for NEL personnel. The reactor health physicist stated he was not aware of this responsibility.

The examination revealed that the reactor health physicist had not received any exposure since his assignment to the NEL. The exposure records for the previously assigned health physicist disclosed annual exposures of approximately 125 to 425 mrem per year were received by the individual during the period between 1972 and 1980. A reasonable answer with respect to his zero exposure was not apparent to the reactor health physicist when asked by the inspector. His assignments and responsibility are such that some exposure might be expected while providing surveillance of NEL operations. A portion of his responsibilities are to perform bi-annual and annual calibrations of portable survey instruments, perform routine weekly radiation, air and contamination surveys, perform surveys of irradiated samples removed from the NEL, and generally enforce the radiological controls during reactor operations. The inspector discussed the need to investigate the exposures at the exit interview.

The licensee maintains a quarterly bioassay program and whole body counting program for key NEL personnel. Bioassay and whole body counting records examined indicated negative results.

The need to resolve which campus activity has the responsibility for personnel exposure records was discussed at the exit interview.

No items of noncompliance or deviations were identified.

f. Instrument Calibrations

(1) Portable Survey Instruments

The reactor health physicist is assigned the responsibility for ensuring portable survey instruments, hand and foot counters, pocket dosimeters and scalers for counting contamination surveys are maintained operable and routinely checked for calibrations.

The inspector held discussions with the reactor health physicist regarding calibration, use and control of portable survey instruments. In addition a visual inspection of portable survey instruments and examinations of procedures for performing maintenance and calibrations and a review of calibration records were conducted.

The inspection disclosed the following findings:

(a) Procedures for performing calibrations were nonexistent with the exception of manuals which were provided by the vendors. The reactor health physicist stated that written procedures for performing calibrations and maintenance checks were not available and he was not utilizing the vendors manuals for performing these checks.

(b) Acceptance criteria has not been established.

(c) An inventory that listed the types of instruments, their location and their calibration status has not been established. A separate record is used for each instrument; however, the reactor health physicist was not aware if the individual files included all of the instruments located throughout the areas of his responsibility. The inspector noted that a record for an instrument located in the emergency kit was not included in the instrument files. Other records for instruments at the NEL appeared to be missing or misplaced.

(d) A frequency for performing calibrations has not been officially established. The reactor health physicist stated he had established a policy to calibrate the instruments on a bi-annual and annual frequency. A check between calibration records and calibration labels affixed to each instrument indicated they were not in agreement with each other. Some calibration labels have not been changed since August of 1980 although the records indicated calibrations were performed at six month intervals since that time. The inspection did not identify a single calibration label that was in agreement with the licensee's records. The most recent records indicated the portable instruments were calibrated in January and February of 1982; however, none of the instrument calibration labels were changed to reflect this latest calibration. The most recent

calibration label was dated September of 1981. A calibration record for the instrument located in the emergency kit was not included in the individual files. A separate record for this instrument was located in the Emergency Kit. The date on this record was not in agreement with the calibration label affixed to the instrument. Individual calibration records for other instruments observed at the NEL could not be located.

(e) The reactor health physicist was unaware of ANSI-N323, 1978, "Radiation Protection Instrumentation Test and Calibration." The contents of this standard were discussed with the reactor health physicist.

(f) A review of the records revealed that the linear responses of survey instruments were not checked over the full range of the instrument. The checks only considered selected points between 0 and 50% of full scale in lieu of the recommended guidelines of 25%, 50% and 75% of full scale.

(g) The reactor health physicist had identified three portable survey instruments that he determined to be malfunctioning and were therefore considered to be unreliable for use. Two of the instruments, an Eberline E510 and Technical Associates Model TBM-3, were located in his office and the third a Teletector Model 6112 was located near the entrance to the reactor Hi-Bay Area. None of the instruments were tagged out of service, nor did the calibration records identify that they were malfunctioning. The reactor supervisor stated he thought the Teletector was functioning properly and would not hesitate to use it for performing surveys. The other two, although locked in the reactor health physicist's office, were accessible to selected NEL personnel having master keys to the area.

The Technical Associates instrument had a calibration label affixed to it that indicated the calibration frequency was at 1 1/2 year intervals. The reactor health physicist stated the vendor's calibration label had not been changed on this instrument since it was purchased. The reactor health physicist was unable to provide the inspector with a reasonable response as to why he did not take positive action to remove the malfunctioning instruments from service nor was it apparent to him the safety consideration that could result if an individual used a defective instrument.

(h) The reactor health physicist was not aware of how to check the condition of a 90 volt battery supply installed in a Victoreen, Model 470A radiation survey instrument assigned at the NEL. The procedure for performing this check is discussed in the vendors operating manual. The inspector showed the reactor health physicist how to perform the check recommending it be checked during each calibration as a minimum.

The discussions also revealed that the NEL staff and workers who are authorized entry to the NEL facilities are instructed in the use of portable survey instruments. The instructions are provided by the reactor health physicist. Procedures for the use, issue, control, and types of surveys authorized to be taken by the users were not available. The training outline for qualifying NEL users did not include a discussion on this subject.

Failure to provide procedures for the calibration and control of portable radiation detection instruments represents noncompliance with Technical Specifications, Part VIII.J.3 which states in part that radiological control procedures for all facility personnel be written and maintained. (82-01-01).

(2) Fixed Area Radiation Monitors

The inspectors reviewed the procedures for performing calibration of Area Radiation Monitors required by Section V.A of the Technical Specifications. The inspection also included an examination of the calibration records for the period January 1981 through March 1982.

The NEL facility is continuously monitored by four Area Radiation Monitors. Three monitors are located in the high bay reactor room and the fourth monitor is located in the radioactive material storage area. All monitors are capable of audibly warning personnel of high radiation levels. One of the three monitors in the high bay reactor room is capable of providing a warning signal at the Campus Police Department of radiation levels in excess of 25 mr/hr. This monitor is located on the north wall of the reactor room. Only two of the four monitors are required by the Technical Specification. They are located on the east and west walls of the high bay reactor room. The output of these monitors is continuously displayed in the control room.

The examination revealed that the calibrations were conducted at the frequencies identified in Technical Specifications. The examination of calibration records revealed the following:

On January 27, 1982 a calibration was performed using a procedure entitled "Area Radiation Monitors". The inspector noted several deficiencies. The procedure lacked an "acceptance criteria" for any of the twenty-three numerical values that are checked during the calibration. In two cases the recorded values were accepted by the technician performing the calibration even though the results were off by as much as 35% of the expected values. Some of the instruments have a maximum value of 1,000 mr/hr; however, the technician had noted the response to be 1000+. Thus the extent of the discrepancy could not be determined. The procedure did not require that the calibration results be reviewed and approved by the reactor supervisor (the individual having the responsibility for accomplishing the calibrations).

The inspector asked the reactor supervisor if he felt the procedure had safety significance. The reactor supervisor stated that he felt it did and added that he would not have accepted the results if he had reviewed them. The inspector then asked if the reactor supervisor felt the procedure was adequate. The reactor supervisor felt that it was not adequate.

When the manager of the Nuclear Engineering Laboratory was asked similar questions he stated that the calibration of the area monitors had safety significance and that the lack of an acceptance criteria made the procedure inadequate.

It was determined that the procedure had not been reviewed and approved by the Director of the Nuclear Engineering Laboratory or by the Radiation Use Committee.

Failure to have the Director of the NEL review and approve the area radiation monitor calibration procedure represents noncompliance with Technical Specifications, Section VIII.J which states in part, "The facility shall be operated and maintained in accordance with approved written procedures. All procedures and major changes thereto shall be reviewed and approved by the Director of the Nuclear Energy Laboratory prior to being effective... The following types of written procedures shall be maintained... 3. Radiological control procedures for all facility personnel." (82-01-02)

Failure to have a procedure for the calibration of area radiation monitors, a safety significant procedure, reviewed by the Radiation Use Committee is in noncompliance with Technical Specification, Section VIII.H which requires the Radiation Use Committee to review facility procedures and records for safety considerations and recommend improvement where appropriate. (82-01-03)

3. Emergency Planning

a. Tests and Drills

The inspector verified by discussions with licensee representatives and an examination of records that evacuation drills were conducted at the frequency specified in paragraph VIII.J. 4 of the Technical Specifications. A critique was held at the end of each drill by the Reactor Supervisor and Manager of NEL. Three drills had been conducted since the last inspection. All problems identified in the critique minutes had been corrected by the time of this inspection.

No items of noncompliance or deviations were identified.

b. Emergency Equipment and Kits

The inspector examined the contents of the emergency kit specified in the emergency plan. The emergency kit in the control room was complete. The kit contained a survey instrument with a calibration label attached that indicated it had not been calibrated since September of 1980 although a calibration record for the instrument which was also located in the kit, indicated it was last calibrated in April of 1981 and was due for recalibration in April of 1982. The kit also contained a half mask air purifying respirator for particulates. The inspector informed the licensee representative that the half-mask would only provide limited protection in the event of a real radiological emergency. The inspector discussed the importance for updating the calibration labels affixed to survey instruments and maintaining calibration records in a central filing area at the exit interview.

No items of noncompliance or deviations were identified.

c. Emergency Procedures

The licensee is currently using a two page emergency procedure dated 14 October 1980. The plan includes a Reactor Emergency Call list. The call list provides the telephone numbers for key NEL personnel, campus emergency response activities and outside agencies. The inspector recommended that the call list should include radio pager numbers for key NEL personnel. The licensee was in agreement.

The inspector was provided with a copy of a revised emergency plan dated March 1982 that has been submitted to the NRC for approval pursuant to 10 CFR 50.54(r) to show compliance with Appendix E of Part 50. Implementing procedures for the revised plan are currently being developed by the licensee staff. Implementation of the revised plan is expected to become effective at the time of license renewal.

No items of noncompliance or deviations were identified.

d. Familiarization Tours

The licensee provides familarization tours of the reactor facility for the Campus Police Department and for local Fire Department Inspectors. The inspector verified by discussions with NEL and Campus Police Department representatives and examination of records that the tours were provided in December of 1981.

The inspector also noted that copies of the emergency plan were conspicuously posted throughout the NEL facility and at the Campus Police Department.

All licensed reactor operators and senior reactor operators are retrained to the emergency plan on an annual basis. Remaining personnel are provided with emergency plan training at the time they are authorized access to the NEL facilities.

No items of noncompliance or deviations were identified.

e. Support Groups

A visit was made to the Campus Police Department. A discussion was held with Lt. Duncan regarding emergency response procedures and the radiation area monitor alarm associated with the reactor facility. As a result of the discussion, it was determined that the campus police were aware of the NEL Emergency Plan and the significance of the reactor's radiation area monitor alarm.

No items of noncompliance or deviations were identified.

4. Waste Disposal

a. Liquid Waste Releases

An examination of the liquid waste releases for 1981 to April 1982 indicated one release to the sanitary sewer was made on August 26, 1981. The release consisted of 335 gallons having a concentration

of 2.6 E-7 uCi/ml, Zinc-63. The total activity of the release was 3.27E-1 microcuries. The release was within 10 CFR 20 limits.

No items of noncompliance or deviation were identified.

b. Solid Waste

Licensee representatives reported that there was no solid waste generated from reactor operations since the last inspection.

No items of noncompliance or deviations were identified.

5. Effluent Releases

An examination of the weekly air particulate stack sample records for the period January 1, 1981 to April 1, 1982 indicated activity averaged approximately 2 X 10^{-12} uCi/ml. All sampling data results were within Appendix B, 10 CFR 20 limits.

Records of gaseous releases for the period of January 1, 1981 through April 1, 1982 were examined to determine compliance with paragraph D and E of Part V to the Technical Specifications. Paragraphs D and E of Part V require that releases of radioactivity be kept as low a level as practical and the concentration of Argon-41 released to the atmosphere shall not exceed the limits of 10 CFR 20, Appendix B, Table II, Column 1 with a reduction factor of 460 which is defined as the product of (1) a reactor use factor, (2) an occupancy factor and (3) a dilution factor.

Gaseous releases of Argon-41 are monitored continuously by the stack gas monitor which draws a sample of the gaseous effluent from the facility exhaust duct. During reactor operations the output of the stack monitor is continuously recorded on a strip chart.

The total Argon-41 releases for the periods of January 1 through December 31, 1981 and January 1 through 26 March 1982 are 42.98 and 12.7 curies, respectively. These values represent a substantial decrease from the values released (58 to 83 curies) during the previous three years. Peak concentrations as indicated by the Argon-41 monitor have been maintained below the limits imposed by the Technical Specifications, Section V.E.

The inspection revealed that the continuous monitoring of radioactive gases and the semi-annual calibrations of the effluent monitor required by Section V.B. and V.C. of the Technical Specifications are conducted by the licensee as required.

The inspector verified from an examination of records, discussions with personnel and from personal observations that the reactor use factor and the roof occupancy factor have been maintained below the basis of the limits imposed by Section V.E. of the Technical Specifications. The reactor use factor and occupancy factor are discussed in IE Inspection Report

50-142/79-04. The roof area containing the facility stack is maintained as a restricted area as discussed in inspection report 79-04. Access to the roof area is under the strict control of the NEL reactor staff. The inspectors spent a considerable amount of time on the roof top during which time it was noted the door to the roof area containing the facility stack was constantly locked and the adjacent roof tops to the north and south were unoccupied.

The inspection disclosed that the licensee has conducted several experiments for the purpose of determining methods to further reduce Argon-41 releases. The new methods being developed include such things as controlled throttling of discharge valves, sealing of voids to reduce air spaces and the purging of air spaces with a nitrogen blanket. These experiments which appear to be promising have not yet been completed. Implementation of the new methods will depend on the results of further licensee experiments which are still in progress.

No items of noncompliance or deviations were identified.

6. Annual Reports

An examination was conducted to determine the status of the routine 1981 annual report required by Part VIII.M.3 of the Technical Specifications. Submittal of this report for the past three years has ranged from 3 months to approximately 10 months after each of the 12 month periods. The 1980 report was submitted September 21, 1981. A review of the 1980 annual report was conducted. The data reviewed revealed no obvious mistakes or anomalous measurements results.

The examination revealed that the report for 1981 is still in the preparation stage. The need for attempting to submit these reports in a more timely fashion was stressed with the NEL staff and at the exit interview.

No items of noncompliance or deviations were identified.

7. Special Survey of Argon-41 releases

The inspectors conducted a special survey of the NEL facilities during reactor operations to determine the dose rate resulting from the Argon-41 releases. The survey was conducted by utilizing a NRC Reuter-Stokes RSS-111 Environmental Radiation Monitor. The RSS-111 is a pressurized ion chamber designed to detect gamma rays in the energy range of 0.1 to 5 Mev at a gamma flux range of 1 to 500 ur/hr. Serial number of the unit used is Z-3999 and NRC property number 009282. The unit was last calibrated on June 10, 1981, and it is due for calibration on June 10, 1982.

Measurements were taken at three locations: (1) the roof of the Math Science addition, (2) inside the reactor exhaust stack plenum, and (3) inside the ventilation inlet plenum of the Math Science addition at the eighth floor. A background measurement was made prior to each reactor operation. The measurements were made on April 6 to 8, 1982. The survey data collected are included as Table 1 and are discussed below.

a. Measurements taken on the roof of the Mathematical Sciences Addition on April 6, 1982, are as follows. The background was counted for 319 minutes; the accumulated dose for that period was 53 ur. Thus the average background rate was 10.0 ur/hr. Using an energy response correction factor of 0.98 the resulting corrected average background rate is 9.8 ur/hr. The reactor operated at full power (100 KW) for 2 hours. The dose was integrated from the time the reactor went critical until the instantaneous dose rate had returned to background. The total time for this measurement was 254 minutes. The integrated dose for the sample time was 48 ur, resulting in a corrected average dose rate for the total sample time of 11.1 ur/hr. The maximum corrected instantaneous dose rates recorded for background and sample times were 12.5 and 14.0 ur/hr, respectively.

   A more useful value would be the average total exposure (less background) per hour of full power operation; i.e. the total exposure contribution from startup, full power operation, shutdown and return to background averaged over only the time the reactor was at full power. This value would allow exposure projections based on effective full power hours regardless of occupancy times and represents a "worse case" situation. This measured value was 2.8 ur/hr for each hour of full power operation. For the 437 full power hours of operation authorized per year, this exposure rate would result in an individual receiving an annual dose of 1.24 mrem or approximately 1.4% above background. This value is based on the meteorological conditions existing during the time of the measurement, i.e. wind of approximately 5 mph in the direction from the stack to the Math Sciences building air intake structure. In actuality, any real dose would be somewhat less because of occasional occupancy and varied wind direction. The measurements confirm the calculations used to support amendment number 10 to the license and confirm that the dose on the Math Sciences building roof resulting from the reactor operation is insignificant.

b. Measurements taken inside the reactor exhaust stack plenum on April 7, 1982 are as follows: The background was measured for 51 minutes and the integrated dose for that period was 9 ur. The resulting corrected average background dose rate was 10.4 ur/hr. The reactor operated at full power for four hours. The dose was integrated during this period and after shutdown for a total of 531 minutes; resulting in an integrated dose of 345 ur. The corrected average dose rate during the sample period was 38.2 ur/hr. The instantaneous corrected maximum dose rates recorded were 12.5 and 73.5 ur/hr for background and sample time respectively.

The average total exposure rate per hour of full power operation is 61.6 ur/hr. This would result in dose of 26.9 mrem above background for 437 hours of full power operation in one year. This value is an increase of 29.6% above background.

c. The following are measurements taken on April 8, 1982 inside the intake plenum for the Mathematical Sciences Addition. The wind was not blowing from the stack toward the intake plenum on the date of these measurements, they are included for background reference only. Background was measured for 55 minutes, the integrated dose recorded was 11 ur with a resulting corrected average background dose rate of 11.8 ur/hr. The difference in this background rate as compared to that measured on the roof (9.8 ur/hr) is as would be expected due to the accumulation of natural radionuclides in the filter medium inside the plenum. During full power reactor operation the dose was measured for 143 minutes with a recorded integrated dose of 28 ur. The corrected average dose rate for this period is 11.5 ur/hr.

The results of all the measurements taken by the inspectors indicate that the projected doses would not represent a hazard to any individual frequenting surrounding facilities.

No items of noncompliance or deviations were identified.

TABLE 1

Location	Type	Interaction Time	Integrated dose	Average Dose Rate	Energy Correction Factor	Corrected Average Dose Rate	Corrected Average Net Dose Rate	Hours of Full Power Reactor Operation	Corrected Average Net Dose per hour of Full Power Operation	Full Power Reactor Operations hours per year	Dose Above Background Per Year	Yearly Background	% Increase
		min	ur	ur/hr		ur/hr	ur/hr	hrs	ur/hr	hrs	mr/yr	mr/yr	%inc
A	B	C	D	E	F	G	H	I	J	K	L	M	N
(a)	b	319	53	10.00	0.98	9.8							
	s	254	48	11.3	0.98	11.1	1.3	2	2.8	437	1.24	85.8	1.4
(b)	b	51	9	10.6	0.98	10.4							
	s	531	345	39.0	0.98	38.2	27.8	4	61.6	437	26.98	91.1	29.6
(c)	b	55	11	12.0	0.98	11.8							
	s	143	28	11.7	0.98	11.5							

$E = (D/C)X60$ $G = EXF$ $H = G_s - G_b$ $J = (D_s - ((D_b/C_b)\ C_s))/I)\ X\ F$

$L = KxF$ $M = G_b x24x365$ $N = (L/M)x100$

b: background
s: sample

8. Audits

The inspection included an examination of the licensees records of annual in-depth reviews which are required to be performed pursuant to Part VIII.H.3 of the T.S.. The annual in-depth review reports for 1979 and 1980 were examined. The annual in-depth review for 1981 has not yet been accomplished. The licensee was in the process of determining who should perform the 1981 review prior to scheduling it to be accomplished. An attempt is being made to select an independent group not directly associated with NEL operations to perform the in-depth review. The practice of selecting an independent group for performing the reviews was first started in 1981 for the reporting period 1980. Prior to this time the review was conducted by the previous reactor health physicist. The need for accomplishing in-depth reviews by inpartial independent group was stressed during discussions with the NEL staff and at the exit interview.

The 1980 in-depth review, which was performed by an independent group in September of 1981, was described by members of the Radiation Use Committee to be the most thorough review conducted in history of the NEL. The findings and recommendations of the review had been accepted by the NEL Radiation Use Committee on September 30, 1981.

Findings similar to those discussed in this report concerning instrument calibration, radiological control procedures and operating procedures were identified in the latest in-depth review report. The examination revealed that although the in-depth review was adequate; actions to correct the identified deficiencies had not been implemented to date. The licensee had decided to delay implementation of corrective actions pending their license renewal.

The need to implement an effective audit program and to correct deficient items as they are identified was discussed with the NEL staff and at the exit interview.

No items of noncompliance or deviations were identified.

9. Radioactive Material Transfers

Examination of records of irradiations and of transfers of radioactive material for the period July 1981 to March 1982 was conducted during the inspection. All transfers are made to or through the University's state license for subsequent disposal at approved burial grounds. The transfers are normally approved by the reactor health physicist or RSO. Transfer records appeared to be consistent with appropriate 10 CFR 71 and 49 CFR 173 regulations.

No items of noncompliance or deviations were identified

10. Exit Interview

The inspectors met with the licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on April 9, 1982. The inspectors summarized the scope of the inspection and the findings. The results of the special survey were summarized.

The inspectors emphasized that although none of the findings represented a specific health or safety problem, there appeared to be a degradation of the radiation protection program as noted from previous inspections. Discussed at great length were the two items of noncompliance identified in Section 2.f of this report.

Also discussed were the need to improve:

a. Posting and labeling practices.

b. Maintenance of personnel exposure records.

c. Maintenance and recording of survey results.

d. Correcting audit findings as they are identified.

e. Removal of defective or nonoperable equipment from use and need to schedule its immediate repair or replacement.

f. The reactor health physicist's responsibility for implementation and enforcement of the radiological control program.

CONTENTION

1. "The maximum credible accident at the UCLA research reactor would produce doses within the reactor room of less than 2 rem whole body and 43 rems to the thyroid."

DISPUTED

(Aftergood as to VIII, P26; Beyea, P3,5-6; Kaku, P83-84; Morton P26)

2. "The gaseous effluent dose from normal operation of the UCLA reactor is 1.4 mrem.year."

DISPUTED

(Foster, P3-26; Lyon, P17; the TLD data; Application II/A-6)

3. "The dose monitored inside the UCLA reactor room during full power operation is 1 mrem/hour."

DISPUTED

(Foster, P24-25; Application, III/2-5)

4. "Only one 700 gm spent fuel shipment has been made by UCLA since obtaining its license in 1960."

NOT DISPUTED

counter facts:

a. That shipment was highly contaminated with Co-60, UCLA failed to detect the contamination in its radiation monitoring before releasing the shipment from its control, and the shipment resulted in substantial potential risk to public health and the environment.

(Hirsch P4-5 + attachment; Monosson, P20; Davis, P28; Plotkin for III, P9)

5. "Low level solid waste created at the UCLA facility is less than .5 m^3 annually."

NOT DISPUTED

6. "Low level waste at the UCLA facility is monitored and passed through a 225 gallon 10 minute delay tank and released to city sewer or storm drains in concentrations less than 10 CFR Part 20, Appendix B limits."

DISPUTED

(Plotkin for XII, P 19; attachment thereto, Radiation Use Committee minutes, p. 3, last paragraph)

7. "Secondary coolant discharges are not more than 30° above the city water supply temperatures."

NOT DISPUTED

8. "The UCLA research reactor operates a maximum 8.5 hours per week."

DISPUTED.

(Technical Specification 3.8.3.C)

9. "The UCLA research reactor is licensed to operate at power levels up to 100 kw."

NOT DISPUTED

10. "No new construction is proposed by the UCLA application for license renewal."

DISPUTED

(Davis, P27; UCLA Long Range Development Plan--Fusion Lab Expansion)

11. "About 60,000 gallons of city water per month is used by UCLA for the reactor."

NOT DISPUTED.

12. "The amount of U^{235} used by UCLA since 1960 was 700 gm."

NOT DISPUTED.