U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-187/82-02

Docket No. 50-187 License No. R-90 Safeguards Group

Licensee: Northrop Corporation - Research and Technology Center

One Research Park

Palos Verdes Peninsula, California 92704

Facility Name: Northrop NOR Reactor (Triga Mark F)

Inspection at: Hawthorne, California

Inspection conducted: October 13-15, 1982 and Telephone calls on October 18, 20, 22 and November 4, 1982

Inspectors: M. Cillis — November 19, 1982
M. Cillis, Radiation Specialist — Date Signed

Date Signed

Approved by: F. A. Wenslawski — 11/23/82
F. A. Wenslawski, Chief, Reactor Radiation Protection Section — Date Signed

Approved by: H. E. Book — 11/23/82
H. E. Book, Chief, Radiological Safety Branch — Date Signed

Date Signed

Summary:

Inspection on October 13-15, 1982 and telephone calls on October 18, 20, 22 and November 4, 1982 (50-187/82-02)

Areas Inspected: Routine unannounced inspection of the radiation protection program including organization, personnel monitoring, posting and labeling, surveys, procedures, effluent releases, instrument calibration, records/reports; emergency preparedness program, radioactive material transportation activities, environmental monitoring program; followup of an item of noncompliance and a tour of the licensee's facilities. The inspection involved 20 hours onsite by one NRC inspector.

Results: Of the 15 areas examined, two items of noncompliance concerning instrument calibration were identified in one area (See Sections 3.f and 7.).

RV Form 219 (2)

DETAILS

1. Persons Contacted

*Mr. D. Avant, Manager, Administrative Services
*Mr. G. Cozens, Reactor Supervisor
Mr. F. Blair, Reactor Operator
*Mr. J. Woods, Reactor Health Physicist Technician
Mr. D. Wood, Trainee (Reactor Operator)

*Denotes those present at the exit interview.

2. Licensee Action on Previous Inspection Findings (Closed) Noncompliance (50-187/80-01-01)

The inspector reviewed the licensee's timely response dated November 6, 1980 to this item of noncompliance which identified that the annual exposure summary reports for the years 1978 and 1979 were not submitted within the first calender quarter of 1979 and 1980 as required by 10 CFR 20.407. The inspection disclosed that the reports were subsequently submitted and the corrective actions taken to avoid further violations appeared to be adequate. This matter is considered closed. (81-01-01)

No items of noncompliance or deviations were identified.

3. Radiation Protection Program

a. Organization

The organizational structure and personnel responsible for reactor operations has been changed from that previously reported. The licensee has hired a reactor operator trainee to replace the Senior Reactor Operator who is planning to retire sometime during the first quarter of 1983. The trainee is currently being trained by the licensee staff.

No items of noncompliance or deviations were identified.

b. Tour of Facility

The inspection included a tour of the licensee's facilities. Independent measurements of the facilities were obtained during the tour. The tour included observations to determine compliance with the following regulatory requirements:

Areas	Requirement
posting of Form NRC-3	10 CFR 19.11
posting of radiation areas, high radiation areas, airborne activity, controlled areas, and radioactive material storage areas	10 CFR 20.203(b), (c), (d), (e)
labeling of containers	10 CFR 20.203(f)
control of radiation and high radiation areas	10 CFR 20.105(b) 1 and 2
engineered controls	10 CFR 20.103(b) 1 and 2

The independent measurements were performed with a NRC Keithley Model 36100 ion chamber survey meter. The instrument's serial number is 11108 and it was calibrated on August 9, 1982. The independent measurements confirmed the licensee's posting and labeling practices. The inspector identified a posted area along the south face of the reactor that was established in an inconspicuous manner. The licensee representative accompanying the inspector took immediate steps to temporarily re-post the area in a conspicuous manner. No high radiation areas were identified during the tour.

A copy of NRC Form-3 which was observed at the entrance to the reactor facility was an old edition. The listed NRC Region V telephone number had been corrected on the form. The inspector provided the licensee with the latest version of the form.

The inspector observed that the licensee had byproduct material stored within the facility. The byproduct sources, consisting of Cesium 137 and Cobalt 60 were stored in appropriately labeled and shielded containers. The source quantities ranging from approximately 10 curies to as much as 20,000 curies are licensed by the State of California under license number 006-70. Discussions held with the reactor supervisor and a review of the licensee's radioactive material transportation and accountability records revealed that the sources are being stored and handled by the licensee for J. L. Shepard Company of Glendale, California. The inspector questioned whether a safety evaluation consistent with the intent of 10 CFR 50.59, "Changes, tests and experiments," had been performed. It would appear appropriate to determine the affects of accidents such as dropping a heavy

shielded cask or losing shielding of a large source might have on reactor operations. During the onsite inspection, licensee personnel were not aware of any 10 CFR 50.59 type reviews of this matter. It was noted that the licensee has a policy prohibiting the movement of sources over the reactor with the overhead crane; however, there were no written procedural restrictions to this effect. After the onsite portion of the inspection, the inspector reviewed the "Final Safeguards Report" and concluded that the coincidental handling of large byproduct material sources with reactor operations was not discussed as part of the original safety evaluation. In following telephone discussions, the licensee informed the inspector that his review of facility records dating back to 1962 failed to identify a review pursuant to 10 CFR 50.59. The licensee has been storing sources of this type since the late 1960's. During a telephone discussion on November 4, 1982 the licensee agreed to perform an evaluation consistent with the intent of 10 CFR 50.59.

During the tour the inspector observed that the licensee staff and visitors exiting the reactor facility did not perform a full body survey (frisk) as required by posted instructions. This observation was discussed with the licensee staff and at the exit interview.

No items of noncompliance or deviations were identified.

c. Training

The licensee's training program provided to non-licensed personnel and visitors to show compliance with 10 CFR 19.12, "Instructions to Workers" was examined. Discussions with the reactor supervisor revealed that visitors are required to be under the constant surveillance of a qualified escort and are not provided any formal instructions. A semi-formal training program has been established for remaining non-licensed personnel who are authorized to work in the licensee's facility without an escort. Such personnel are provided with a tour of the facility by a qualified individual. Upon completion of the tour, the individual is asked to read and sign a Temporary Work Assignment (TWA) instruction sheet. The TWA instructions include both routine and emergency procedures that the individual is expected to follow.

The training program requires individuals to read Regulatory Guide 8.13, "Instruction Concerning Prenatal Radiation Exposure" and an informal discussion of R. G. 8.29, "Instruction Concerning Risks from Occupational Radiation Exposure" is included in the training.

The inspector observed that the licensee does not maintain records of the training that is provided to workers. This observation was discussed at the exit interview.

No items of noncompliance or deviations were identified.

d. Portable Instrument Calibration

10 CFR 20.201, "Surveys", requires that the licensee perform evaluations of the radiation hazard that may be present. Further it requires that when appropriate such evaluations include measurements of levels of radiation. Although there are no specific regulatory requirements, good practice suggests that instruments used for measurements be calibrated. ANSI N-323, 1979 "Radiation Protection Instrumentation Test and Calibration" provides guidelines and recommendations for a calibration program. A description of the licensee's calibration program was provided to the inspector by the reactor supervisor and reactor health physics technician. The inspection disclosed that the licensee has established an instrument calibration program that is consistent with the suppliers (vendor) manual. Calibrations are scheduled to be conducted at quarterly intervals. The results of each calibration are recorded on calibration data sheets. A calibration label is affixed on the instrument after each calibration. The inspector noted that the calibration due date for three portable instruments had expired at the time of this inspection. It was also noted that the licensee staff was continuing to use the instruments to support reactor operations. The inspection further revealed:

1. Calibration data for some of the instruments varied by as much as 40 percent.

2. Calibration data are not reviewed for acceptability.

3. Calibration acceptance criteria have not been established.

4. Inconsistencies in the method for recording the calibration data were noted.

5. The licensee is not certain whether the calibration sources are traceable to the National Bureau of Standards (NBS) as recommended by ANSI N-323, 1979 and the vendors manual.

The inspector discussed the above findings at the exit interview. Emphasized was the importance of evaluating their current procedures to control the calibration and use of portable instruments and the need to establish a calibration acceptance criteria. The licensee agreed to evaluate the inspector's findings for the purpose of improving their current instrument calibration program.

No items of noncompliance or deviations were identified.

e. Personnel Dosimetry

Personnel dosimetry is accomplished by means of film badges and pocket dosimeters. The dosimetry program for reactor personnel and users is overviewed by the reactor supervisor. Monthly film badges are used to measure x-ray, beta and gamma exposures and NTA film is for used neutron exposures. The dosimetry service is provided by a contractor, Radiation Detection Company. The inspector examined dosimetry records for the period between January 1981 and August 1982. No whole body exposures in excess of 300 mrem per quarter had been recorded. The exposure records appeared to be consistent with those reported in the licensee's 1981 annual report dated March 5, 1982. Radiation exposures of reactor visitors are measured with the use of pocket dosimeters. A review of pocket dosimeter records disclosed exposures that ranged from zero to a few mrem per individual. The average exposure received by visitors was less than one mrem per day. The licensee's dosimetry program appeared to be consistent with 10 CFR 20.102 and 10 CFR 20.202.

No items of noncompliance or deviations were identified.

f. Fixed Instrumentation Calibration

The Northrop Corporation license requires that the reactor be operated in accordance with the Technical Specifications (TS) appended to the license. Section F.1.2.3 of the TS requires that during reactor operations: 1) the radiation levels be monitored by at least one area radiation monitor (ARM), 2) a continuous air monitor be operable in the reactor room and 3) a gas radiation monitoring system be operable to continuously monitor the radioactivity discharged to the atmosphere via the stack. Section F.4 of the TS requires that the alarm set points for the above radiation monitoring equipment be verified weekly. Section F.4 also requires that this instrumentation shall be calibrated at least once a year.

The inspector examined the following records with respect to performing calibrations and verifying of alarm set points:

1. Startup and Shutdown Check List

2. Northrop Reactor Checklist

3. Calibration Curves for the a) Stack Monitor RM-1, b) Pool Monitor RM-2, c) Truck Monitor RM-3 and d) Bridge Area Monitor RM-4.

It should be noted that the Pool Monitor RM-2 and Truck Monitor RM-3 are capable of measuring for both gaseous and airborne particulate radioactivity. RM-2 and RM-3 are commonly referred to as Constant Air Monitors (CAMs). Discussions were also held with the staff with respect to the calibration of the fixed instrumentation discussed herein.

The inspection disclosed that only 8 of the 12 ARMs that were originally installed are still utilized for reactor operations. Four of these monitors read out in milliamps and the remaining four read out in milliroentgens per hour. The range of these monitors vary between 0.001 to 1000 r/hr. A reading of approximately 1 milliamp corresponds to a value of 50 mr/hr on the four monitors that read out in milliamps. The alarm set points for the ARMs, continuous air monitor and stack monitor are checked during each startup of the reactor. Additionally, the alarm set points of the ARMs are checked on a monthly basis with an external source. The monthly check only consists of verifying the alarm set points which are set at 50 mr/hr. The data obtained from these checks are recorded on the Northrop reactor monthly checklist and Startup and shutdown checklist. Checklists for the period of June 1981 to August disclosed numerous errors, omissions, inconsistencies and questionable data. The check list used for recording the monthly alarm set point check of the ARMs does not define the units (e.g., milliamps or mr/hr) recorded. It was noted that a reading of 50 was recorded for some of the ARMs which have a readout in milliamps when in fact the actual value expected should have been 1 milliamp at most. Similar inconsistencies were noted on the startup checklists, e.g., some of the data included the instruments background countrate and some data did not. The review of the checklist data disclosed a large variance in the readings recorded. In some cases the data varied in excess of 40 percent. Discussions with the reactor supervisor revealed that "acceptance criteria" have not been established. The discussions also revealed that the checklists are not reviewed for acceptability. The review of records and discussions also disclosed that the licensee does not conduct the annual calibration of the ARMs nor fully calibrate the continuous air monitor as required by the TS. The continuous air monitor is only calibrated to measure gaseous effluents. The reactor supervisor stated that neither he or his staff were aware of how to calibrate the instrument for measuring airborne particulates and do not recall when it was last calibrated to measure for airborne particulates. The discussions further revealed that the licensee was not sure when the ARMs were last calibrated over their entire range. The only check currently performed on the ARMs is the one point check (50 mr/hr) discussed herein. Failure to fully calibrate the air monitor and the one point check of the ARM do not constitute a calibration as defined in

Section A.8 of the TS. Section A.8 defines calibration as follows:..."Calibration is the adjustment of an instrument or system such that its output responds, within acceptable range and accuracy to known values of the parameter which the instrument or system measures."

The findings discussed in this Section were discussed at the exit interview. Personnel in attendance were in agreement with the findings. The inspector emphasized the need for the licensee to: 1) establish acceptance criteria, 2) conduct audits/review of records and (3) to accomplish the calibrations required by the TS.

Failure to accomplish the annual calibrations of the ARMs and continuous air monitor represents noncompliance with Technical Specification, Section "F" which states in part that such instrumentation shall be calibrated annually. (82-02-01).

g. Surveys

The inspector examined the licensee's survey program. The examination of this program revealed that the licensee conducts routine contamination and radiation surveys. Additionally, the licensee conducts special contamination and radiation surveys of reactor operations and upon receipt and/or shipment of radioactive material. Controlled film badges are also located at various locations around the reactor and are changed monthly. The results of the above survey program were verified to be consistent with what is discussed in the licensee's annual report for 1980, 1981 and 1982. Routine contamination surveys are performed on a monthly bases and radiation surveys, which include a check of beta-gamma and neutron levels, are performed whenever the reactor power levels exceed 250 Kw. There was no evidence of an uncontrolled spread of contamination or unidentified radiation area.

It was noted that the licensee has not specifically considered the need to perform airborne radioactivity measurements. This was called to the licensee's attention during the exit interview.

No items of noncompliance or deviations were identified.

h. Ventilation System

A review of the reactor Startup and Shutdown checklists revealed that the licensee routinely records the operating status of the facility's ventilation system. The data recorded on the checklist include the differential pressure (DP) readings accross the High Efficiency Particulate Activity (HEPA) filters.

Discussions with the licensee staff revealed that the HEPA filters are routinely changed on a six month interval regardless of the measured DP accross the HEPA filters. An acceptance criterion for the HEPA filter DP has not been established by the licensee. The inspector emphasized that the DP readings should be used to determine if HEPA filters are clogged and need to be replaced sooner than a six month schedule. From a review of data it appeared that the filters were being changed at a greater frequency than was actually necessary.

The inspector's observations with respect to this item were discussed at the exit interview.

No items of noncompliance or deviations were identified.

i. General Observations

A general observation was noted by the inspector that: (1) little or no attention is given to the results of data that are recorded on the Startup Checklist, Monthly Checklists and instrument calibration records and (2) the reactor staff members are not provided instructions on when to inform supervision/management of abnormal conditions based on the results of values that are recorded on the checklists and calibration records. The observation disclosed that the checklists and calibration records appear to serve little or no purpose. The inspector discussed this observation with the reactor supervisor and at the exit interview.

No items of noncompliance or deviations were identified.

4. Emergency Planning

The inspector reviewed the licensee's Emergency Planning procedures. The review disclosed that the current Emergency Plan was in the process of being revised pursuant to 10 CFR 50.54(r) requirements. The revision is expected to be completed by November of 1982. During the interim period the licensee is maintaining its current emergency procedures in effect.

Discussions with the reactor supervisor revealed that the licensee periodically verifies the telephone numbers of response personnel and activities listed on their emergency call out list. The inspection also disclosed that the Northrop Security force is provided with periodic tours of the reactor facility; however, the reactor supervisor could not recall when the Northrop Fire Department or Medical Department personnel were provided with tours or given any instructions to the existing Emergency Plan.

The inspection also revealed that the licensee does not currently have a portable instrument that is calibrated to measure for alpha activity or have a method for determining the particulate airborne concentrations inside the reactor facility in the event of a radiological accident (See Sections 3 of this report). Discussions with the reactor supervisor and reactor health physics technician revealed that a Hi-Volume, Type TF 1A Staplex Air Sampler for obtaining grab air samples and portable instruments capable of measuring alpha activity are available, however:

a. The equipment has not been used for quite some time and therefore has not been checked for calibration or to determine if they are operable.

b. The reactor health physics technician has not received any training in the use of this equipment although he is listed on the licensee's Emergency Callout List.

c. A continuous air monitor located in the licensee's emergency response truck which has the capabilities for measuring gaseous and particulate airborne radioactivity has not been calibrated to measure for particulate airborne activity.

d. Drills are not conducted nor are they considered or discussed in the Emergency Plan.

The inspection included observations of the licensee's emergency equipment specified in the Emergency Plan. The dedicated equipment appeared to be adequate; however, from discussions with the staff it appears that emergency response personnel have not received any training and are not given medical exams or qualified in the use of respiratory equipment which is included in the licensee's emergency equipment.

The findings identified in this section were discussed at the exit interview. The licensee agreed with the findings and agreed to resolve them.

No items of noncompliance or deviations were identified.

5. Radioactive Wastes

a. Solids

A small volume of slightly activated or possibly contaminated waste is generated in the course of reactor operations at the facility. The wastes are collected and stored in labeled containers, packaged and stored for transfer to a commercial waste disposal contractor. The inspection revealed that no shipments have been made since the last inspection in 1980.

No items of noncompliance or deviations were identified.

b. Liquids

Liquid Effluents

Liquid wastes generated are collected in a waste holdup tank and stored for decay prior to sampling and release or transfer for disposal. Sampling and analysis records indicated levels ranging from 1.5×10^{-8} uCi/ml to 7.0×10^{-9} uCi/ml. The last release of the holdup tank was conducted in December of 1980 at which time 4525 gallons of liquids having a concentration of 4×10^{-9} uCi/ml were released. The release was consistent with 10 CFR 20 requirements.

No items of noncompliance or deviations were identified.

c. Gaseous Effluents

Gaseous effluents consisting of Argon-41 releases are monitored continuously during reactor operations. Releases are recorded for all reactor operations and averaged on a monthly basis. Included in the average calculation is a dilution factor of 165 which takes credit for dilution to the boundary of the restricted area. Records of concentrations of Argon 41 releases were reviewed for the period of January 1981 through July 1982. Average concentrations for this period ranged from 3×10^{-10} to 5×10^{-11} uCi/ml. The review of records and discussions held with the reactor supervisor disclosed that the monthly averages are based on the continuous operation of the facilities 20,000 CFM exhaust ventilation system (e.g., 24 hours per day, 7 days per week, 365 days per year). The record review and discussions further revealed that the ventilation system is normally secured during nonworking hours, holidays, weekends and for periods when the reactor is not scheduled to operate. The inspector informed the licensee that the method for determining the average calculations for Argon-41 releases should be based on the actual time that the ventilation system is operating. The inspector performed a calculation to determine the differences in the average release values. The calculation indicated the values currently reported would increase by a factor of 4 to 6 if the averaging only considered the time that the ventilation system was in operation. This increase would still maintain the Argon-41 releases well below the limit of 4×10^{-8} uCi/ml specified in 10 CFR 20, Appendix B.

The inspection revealed that monthly releases of Argon-41 are in the millicurie range. Annual releases for 1980, 1981 and 1982 to date were: 2.501, 3.681 and 2.962 curies respectively.

The above finding with respect to the method for calculating the average Argon-41 releases was discussed at the exit interview. The licensee stated that all future Argon-41 release calculations would be based on the actual time that the ventilation system is operating.

No items of noncompliance or deviations were identified.

6. Environmental Monitoring

The licensee maintains an extensive environmental monitoring program that involves monthly sampling at twelve locations around the reactor site. Soil, vegetation, drinking and rain water, and air samples are taken, processed and then checked for gross alpha and beta-gamma activity. Environmental sample analysis results for the last year were reviewed and found to be consistent with what is reported in licensee's annual environmental report. The activity levels in all cases are in the range of normal background and give no evidence of change due to reactor operations.

No items of noncompliance or deviations were identified.

7. Procedures

Technical Specification, Section H.3 "Operating Procedures" requires that certain written instructions shall be in effect to support reactor operations. Section H.3.a of the TS requires written instructions be in effect for "Testing and calibration of reactor operating instrumentation and control systems, control rod drives, area radiation monitors and air particulate monitors. Discussions with the licensee staff and a review of existing procedures disclosed the licensee does not have written instructions in effect for testing and calibration of ARMs and air particulate monitors (See Section 3) as required by Section H.3.a of the TS. The inspector discussed this finding at the exit interview. The inspector emphasized the need for the licensee to review Section H.3 in its entirety to ensure that all specified instructions are in effect. The reactor supervisor stated that the licensee did not have the vendor's manual for accomplishing the calibration for the air particulate monitor. The air particulate monitor was only calibrated for measuring gaseous effluents even though it is capable of detecting concentrations of airborne particulates if properly calibrated.

Failure to have written instructions for accomplishing the testing and calibration of ARMs and air particulate monitors represents noncompliance with Technical Specification, Section H.3 which states,in part,that written instruction for this purpose shall be in effect. (81-02-02).

8. Radioactive Material Transfers

An examination of records of irradiations and transfers of radioactive materials during the period January 1981 through September 1982 was conducted. The examination revealed that the licensee's radioactive material transfer program was well documented. All transfers are made to or through the licensee's State license. The program appeared to be consistent with appropriate 10 CFR 20, 10 CFR 71 and 49 CFR 173 regulatory requirements.

No items of noncompliance or deviations were identified.

9. Review and Audit

The inspector examined the minutes of the Corporate Radiation Committee (CRC) and Reactor Safeguards Subcommittee (RSS) meetings conducted since June of 1980. The review included consideration of meeting frequency, membership, and contents of the minutes. The inspector noted that the minutes do not contain any discussions with respect to internal audits conducted by either committee. The inspector discussed this item at the exit interview emphasizing the importance and need for conducting audits to identify and correct problems similar to those identified in this report. The discussions disclosed that audits are routinely conducted by an independent group; however, documentation of the audit needs to be improved. The licensee is in the process of revising their administrative instructions. The revision is expected to clarify the audit and review functions of the CRC and RSS described in Section H.2 of the TS.

No items of noncompliance or deviations were identified.

10. Exit Interview

The inspector met with the licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on October 15, 1982. The inspector summarized the scope and findings of the inspection. The licensee was informed that the inspection would conclude upon resolution of item (e) below which is discussed in section 3.b of the report. This item was subsequently resolved as discussed in Section 3.b by telephone calls ending on November 4, 1982. Discussed, were the two items of noncompliance identified in Section(s) 3.f and 7. Also discussed was the need to improve:

a. Radiation area posting practices.

b. Emergency preparedness training of response personnel.

c. Establishing a formal training program and documentation of training provided to show compliance with 10 CFR 19.12.

d. Enforcement of personnel frisking requirements.

e. Ensuring the safety evaluation consistent with the intent of 10 CFR 50.59 for handling of byproduct materials is properly documented as discussed in section 3.b.

f. Improvement of CRC/RSS audits in identifying and correcting different conditions.

g. Modify the current method for determining annual averages for Argon-41 releases.

h. Establishing acceptance criteria for calibration of portable and fixed instrumentation.

i. Modify reactor operating checklists to include appropriate units, e.g., mr/hr, milliamps.

j. Establishing acceptance criteria for determining when to change HEPA filters.