



UNIVERSITY OF VIRGINIA
DEPARTMENT OF NUCLEAR ENGINEERING AND ENGINEERING PHYSICS
NUCLEAR REACTOR FACILITY
SCHOOL OF ENGINEERING AND APPLIED SCIENCE
CHARLOTTESVILLE, VA 22901

February 20, 1985

Telephone: 804-924-7136

Director
Office of Inspection and Enforcement
USNRC
Washington, D.C. 20555

SUBJECT: Response to NOTICE OF VIOLATION of January 25, 1985,
addressed to the University of Virginia Reactor Facility,
Docket No. 50-62, License No. R-66, EA 84-111

Gentlemen:

A. Admission or Denial of Alleged Violations

1. Alleged violation of 10 CFR 20.201(b) and 10 CFR 20.105(b).

On November 1, 1984 the licensee filed a Licensee Event Report with the Document Control Desk of the U.S.N.R.C.. In this report the licensee acknowledged that levels of radiation above the applicable 10 CFR limit had been found to exist in an unrestricted area at the Facility for a period of three weeks. The radiation field was localized to a very small area of relatively free access but extremely low occupancy rate. The radiation levels exceeding permissible limits were limited within a distance of about 32 inches from the ground and a radius of about 39 inches away from a point at the base of the reactor building wall.

Contrary to the NRC staff opinion, the licensee does not believe that the radiation "hot spot" was safety significant because:

- a) A significant radiation exposure to an unmonitored person could only have occurred if the individual had crouched against the reactor building wall at precisely the optimum location. As stated, the area is unsuited for traffic and is essentially never occupied, so the overexposure assumption is not credible.
- b) The prior radiation surveys performed by the licensee, which did not reveal the "hot spot", were believed at the time to be adequate and reasonable under the circumstances to evaluate the extent of radiation hazards that could have been present. The "hot spot" would otherwise have been found had it been centered at waist height, where it would have begun to have had potential for whole body exposure. (Since the reported event the licensee has complied with the NRC's interpretation of "adequate" and "reasonable" surveys. Further "corrective" measures are described in following sections.)

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It is probable that the NRC staff's opinion is based on a statement made in the inspector's report which fails to properly address its location.

The licensee has reviewed public documents pertaining to NRC notices of violation served on other licensees, in order to verify consistency in the application of Severity Level III categories. The licensee believes that since this infraction was not of safety significance and was limited to one instance, a Severity Level IV categorization would have been more appropriate. The review of the public documents seems to support this belief.

2. Alleged violation of 10 CFR 71.5 (or 49 CFR 172.504, 49 CFR 172.202 and 49 CFR 170-189)

The last NRC inspector interpreted that the transfers of irradiated material between the Reactor Facility (Dept. of Nuclear Engineering and Engineering Physics) and the Dept. of Chemistry, as well as of low-activity waste between the Facility and the U.Va. Waste Facility, constituted shipping of licensed material outside the confines of its plant, and therefore required compliance with DOT regulations.

Prior to the latest NRC inspection, the licensee assumed that the confines of its plant included all of the U. of Virginia "Grounds" area. Therefore shipping manifests were not used, although transfer papers describing the materials being transferred were used by the Facility. Also, the Facility did not consider itself a shipper in these instances, because the transfer of possession of radioactive materials from the Facility License to the U. of Virginia By-Products License was considered to occur within the Facility just before transfer was begun.

Following the NRC inspection the licensee adopted the NRC viewpoint in regards to these contentions, and is presently using the required shipping manifests. This constitutes acknowledgement of this inadvertent violation.

3. Failure to adhere to UVAR SOP 10.11.C.2(a) and (b),
and UVAR SOP 10.5.C.

(U V A R is the acronym for the University of VA Ractor.)

The NRC inspector did indeed witness a failure to observe SOP 10.11.C.2(a) and (b) by 2 staff members and also did in fact verify that SOP 10.5.C had not been followed in several instances beginning at the time of the inspection.

4. Alleged violation of 10 CFR 20.203(e)

The NRC inspector correctly noted that the locked, below ground, liquid waste holding tank enclosure was not conspicuously posted as a radioactive materials area on its exterior lid.

B. Reasons for Violations

1. 10 CFR 20.201(b) and 10 CFR 20.105(b).

The Licensee Event Report filed by the licensee contains a very detailed description of the occurrence. In summary, the "hot spot" was not found during the licensee's regular radiation surveys because they were performed at waist level with a survey instrument of slow view-meter response. Both the procedure and the instrument were judged by the licensee to be reasonable and adequate up to the date of the last NRC inspection.

2. 10 CFR 71.5

The licensee did not observe 10 CFR 71.5 in the processing of "On-Grounds" transfers of radioactive materials because of its interpretation of the Federal Regulations. The Facility did not consider itself a shipper on occasions when irradiated materials and low activity waste were transferred to other "On-Grounds" facilities, i.e. within the confines of its plant. Also, the relationship between the Reactor Facility's License and the U.Va. By-Products Material License was not interpreted by the licensee in the restrictive sense chosen by the NRC inspector.

3. UVAR SOP's 10.11.C.2(a) and (b) and 10.5.C.

The non-conformities with the Facility's Standard Operating Procedures 10.11.C.2 were a result of staff member carelessness and inattention. In an effort to get the job done quickly, personal health physics working and survey procedures were overlooked. This was due in part to the staff members' belief that an actual risk of contamination did not exist since the area where they were working had been previously decontaminated by the same 2 persons.

With regards to 10.5.C, inexperience was a basic cause for the infraction. The pond water pre-release activity data had never before exceeded the SOP limit requiring performance of the "additional analysis". The SOP's did not define what was meant by this additional analysis. A prior theoretical evaluation which may be considered to be the required additional analysis had indicated that among the isotopes requiring identification (I-129, Ra-226 and Ra-228), I-129 could not possibly be present in effluent from our reactor, without the prior

appearance of I-131 in the weekly reactor pool samples. The Ra-226 and 228 isotopes are related to uranium mining operations and are therefore not present in the Facility's effluent. They are, however, naturally present in our pond water at concentration levels below minimum detection limits of 10^{-6} $\mu\text{Ci/ml}$.

4. 10 CFR 20.203(e)

Historically, the exterior of the enclosed underground locked liquid waste tanks have never been posted with the radioactive materials sign. Since the tank itself is inconspicuously located out of traffic areas, this non-compliance was never realized by anyone at the Facility.

C. Corrective Steps

Despite differences of opinion with the NRC staff regarding the characterization and seriousness of some of the alleged violations, the management of the U.Va. Reactor Facility has taken corrective steps necessary to achieve full compliance and to avoid further violations. The main specific steps which were taken are outlined below.

1. 10 CFR 20.201(b) and 10 CFR 20.105(b)

- After the NRC inspector discovered the "hot spot", the experiment causing the radiation field was immediately relocated to a more suitably shielded area.
- The event was thoroughly studied for the extent and nature of the radiation field, its duration, its cause, and remedial actions made necessary to prevent re-occurrence, i.e. sealing of the experiment pipe shields sunk into the reactor floor next to the external wall.
- The event was documented and reported to the NRC.
- The event was thoroughly discussed at all staff and management levels.
- Radiation survey procedures were modified to include the search for hazards at levels other than waist level.
- An audible rate indicating survey meter has been purchased to replace the previous survey meter.

2. 10 CFR 71.5

- The licensee has adopted the 49 CFR 172.202 and DOT required shipping manifest for its transfers within the "U.Va. Grounds".
- Transfers of Yellow Label III radioactive materials are now being made with placarded vehicles as per 49 CFR 172.504.
- Transfers of low activity wastes are following manifest, labelling and placarding requirements described in 49 CFR Parts 170-189.

3. UVAR SOP 10.11.C.2(a) and (b)

- The 2 persons involved in the HP infractions were reprimanded.
- The same 2 staff members were required to attend a Health Physics short-course administered by the U.Va. Radiation Safety Officer.
- The controlled area within the Reactor Room has been more clearly demarcated with physical barriers and now has a single access point.
- Tools and protective work clothing have been provided at the sole entry point into the controlled area within the Reactor Room.
- The survey instrument to be used on leaving the controlled area has been relocated to a position farther from the reactor, and is now more obvious to staff leaving the controlled area. It has been shielded to increase its sensitivity.
- Cautionary and instruction signs have been placed where necessary to remind staff of proper procedures for a) entering and exiting a controlled area, b) entering and exiting a contaminated area, c) donning appropriate work clothing and, d) proper frisking requirements following exit of the controlled area and the Reactor Room.
- Students and Faculty members with regular access to the Reactor Room have been instructed in required HP practices.
- An HP training program for all frequent occupants of the Reactor Facility (which houses the Department of Nuclear Engineering & Engineering Physics) has been formalized and strengthened.
- Dilution of pond water with rainfall and fire hydrant water has brought down its activity to levels below the point where "additional analysis" is necessary.
- A new form controlling pond and waste water sampling procedures, sample data documentation and release authorization has been added to SOP 10.5.C.
- Samples of waste tank water and hold-up-pond water were sent for independent analysis to "Control for Environmental Pollution Inc." of Santa Fe, New Mexico. The results indicate that, as theoretically expected, I-129, Ra-226 and Ra-228 can not be found above minimum detectable limits of 10^{-9} μ ci/ml.

4. 10 CFR 20.203 (e)

- The underground tank enclosure lid was conspicuously posted with the radioactive materials area sign.
- All areas of the Facility were checked for compliance with this and other Federal Regulations.

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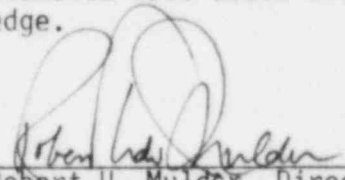
D. Date of Full Compliance

- The licensee is presently in full compliance with the NRC and Federal Regulations. The licensee made a good faith effort to return to compliance on all issues identified by the NRC inspector and achieved this in most cases by the time the inspector had left the Facility.

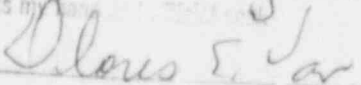
E. Oath

I affirm under oath that the statements made above are true and correct, to the best of my knowledge.

Date February 20, 1985


Robert U. Mulder, Director
U.Va. Nuclear Reactor Facility

cc: Mr. James P. O'Reilly, USNRC
Regional Adm., Region II

Sworn to and subscribed before me this 20th
day of February 19 85
Witness my hand and seal

Notary Public

My Commission Expires October 14, 1985