



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406

Laure

JUN 30 1988

MEMORANDUM FOR: John R. McGrath, Regional State Agreements Officer
THRU: *W.S. Salou*
Glen D. Sjoberg, Acting Director, Division of Radiation
Safety and Safeguards
JH James H. Joyner, Chief, Nuclear Material Safety Branch
JDK John D. Kinneman, Chief, Nuclear Material Safety Section B
FROM: *JFK* Laurence F. Friedman, Senior Health Physicist, Nuclear Mate-
rial Safety Section B

SUBJECT: ASSISTANCE TO STATE OF MARYLAND RE: NEUTRON PRODUCTS, INC. (NPI)

The attached report summarizes my observations during my assistance to the State of Maryland on June 24, 1988. The issue was the suspected contamination of workers' homes, cars, and personal effects with cobalt-60 carried home from the NPI facility.

This report deals only with my own observations, and does not include information on other contacts between the NRC and the State of Maryland which took place at the same time, except to the extent that these contacts directly affected my activities.

Laurence F. Friedman
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Information in this record was deleted in
accordance with the Freedom of Information Act.
Exemptions 9
FOIA/PA 2008-0145

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DETAILS

1. Persons Contacted

State of Maryland

Roland G. Fletcher, Administrator, Center for Radiological Health
Raymond E. Manley, Health Physicist (Team Leader)
Carl Trump, Health Physicist

Neutron Products Incorporated

Jackson Ransohof, President
Wayne J. Costley, Vice President, Radiation Safety Officer for Hot Cell Program
Frank Schwoerer, Vice President

2. Description of Problem

During a visit by (b)(6) to the Ginna Nuclear Power Plant on May 25, 1988, to deliver a lecture, utility workers discovered cobalt-60 contamination of (b)(6) briefcase, which was estimated to be approximately 43 nCi. (b)(6) had not been inside the power plant. Region I notified the state of Maryland on May 26, 1988. The contamination was traced to the NPI facility.

The problem appeared to originate in the area where workers survey themselves for contamination upon leaving the hot cell area. The background in this area was reported to be high enough to obscure quantities of contamination on workers' clothing and persons.

State of Maryland personnel performed surveys for cobalt-60 contamination in offices and other unrestricted areas at NPI. Contamination was found in (b)(6) office, on his chair, and on some of his clothing at home. Contamination was also found in one worker's car.

On June 23, the State of Maryland requested that Region I provide assistance to survey several workers' homes that might be contaminated.

3. Actions by the State of Maryland

On June 24, 1988, the State of Maryland issued an Order, requiring NPI to investigate the contamination incident and to report the results to the State. The Order also required NPI to perform surveys of workers' houses "immediately." A copy of the Order is attached.

On June 24, 1988, the State dispatched a team of four Health Physicists to the NPI site, accompanied by one NRC Senior Health Physicist. The departure was preceded by a discussion, at the Baltimore offices of the Center for Radiological Health, of appropriate instrumentation for the

survey, the setting of action limits, and other subjects pertinent to the conduct of the survey. The team arrived at NPI at 10:45 a.m. The Order had been transmitted to the licensee by facsimile while the team was enroute.

The team confirmed their understanding of events thus far with licensee representatives. The team also asked for a list of names and addresses of all workers who worked in the hot cell area (the supposed source of contamination) or who entered the area in the course of their duties. The team asked that the list be ready by the end of business that day, and also asked the licensee to arrange for access to the homes for the purpose of performing surveys. The licensee set up a meeting of workers for that afternoon, at which workers were informed of the problem and asked to cooperate with the survey. Cars of some of the workers were also surveyed. No contamination was found in any of the cars surveyed.

State representatives indicated that they would begin surveys of homes on June 27, 1988.

4. Tour of the Facility

At the request of the State, the NRC Senior Health Physicist toured the hot cell area and the personnel contamination survey area. Radiation levels as high as 30 mR/hr were measured in the hot cell area, using an Eberline Model RO-4D ionization chamber. Throughout the controlled area, "Caution-Radiation Area" signs were posted at approximately the 10 mR/hr line. The 5 mR/hr line was approximately eight feet further from the source of radiation than the sign. Licensee personnel stated that daily radiation level surveys were done in the area.

The NRC Senior Health Physicist measured the radiation levels in the personnel contamination survey area. The levels were 45-50 uR/hr, measured with an Eberline ESP-2 and a SPA-3 2"x2" NaI(Tl) probe calibrated by Eberline. It should be noted that it is very difficult to calibrate instruments at dose rates close to background. The instrument used here typically reads lower than the Ludlum micro-R meters calibrated by Brookhaven National Laboratories at low dose rates. Both instruments read the same in a 1 mR/hr field.

The Senior Health Physicist noted that the portal monitor used for these surveys appeared to be homemade, and was mounted in a standard door frame. This placed the detectors at some distance from the person being surveyed, reducing sensitivity. The personal survey instrument was a Ludlum Model 44-2 1"x1" NaI(Tl) probe connected to a Ludlum Model 177 meter (similar to an Eberline RM-14). NPI had just purchased pancake probes to use for contamination surveys and was in the process of adjusting the high voltage on the Model 177's to operate the probes properly.

Upon return to the Region I office, the Senior Health Physicist measured the efficiency of a Ludlum Model 44-2 probe for cobalt-60. The probe was

connected to a Ludlum Model 16 ratemeter, set on a slow time constant (11 seconds). The cobalt-60 source was held approximately one inch from the end of the detector, approximately the geometry of a personnel contamination survey. The background was 900 cpm, the efficiency was 3%, which gave an MDA (defined as the level at which one has 95% confidence of having neither a false positive nor a false negative) of 7700 dpm. Connected to the Ludlum Model 177, which has a "slow" time constant of 22 seconds, the efficiency would be the same, and the MDA would be 5500 dpm. In a higher background area, such as existed at NPI, the MDA would be higher by the square root of the ratio of the backgrounds.

The Senior Health Physicist noted that most of the licensee's equipment was jury-rigged, second hand, or both.

The Senior Health Physicist noted that licensee representatives discussed both measurements of radiation background and radioactive contamination in "counts per minute." When questioned, they were unable to express their results in meaningful terms (i.e., dpm, microcuries, etc.). There was other, less tangible, evidence of a deficiency in licensee knowledge of radiological measurements and instrumentation.