

Dr

Mr. William E. Todd, Manager
Health Physics Services
SIEMENS Gammasonics, Inc.
2000 Nuclear Drive
Des Plaines, Illinois 60018

AUG 3 1984

Dear Mr. Todd,

The Nuclear Regulatory Commission has received a report under 10 CFR Part 21 from Washington State University (WSU) concerning potentially defective personnel neutron dosimeters. The reported problem dosimeters were supplied to Washington State University as part of a service contract with your company. As stated in the enclosed copy of the 10 CFR 21 report, the neutron dosimeters evidently failed to respond to varying magnitudes of applied neutron dose during the WSU dosimetry acceptance/performance test program. A dosimeter of this type (CR-39 track detector) should be expected to respond to the test's applied neutron energies and all absorbed dose levels greater than about 30-40 mrem. Thus, a review of the available information points strongly towards either defective dosimeter material and/or faulty processing.

As Mr. James Wigginton of my branch discussed in June with Mr. Robert Pollack of your company, my branch's responsibility is to identify and resolve potentially generic industry problems. When appropriate, this responsibility also includes notifying industry via a notice or other document. If validated, the reported neutron dosimeter deficiency would have generic implications. We would like your company to review the data provided and attempt to resolve this issue.

Assuming that you verify that a problem existed with the neutron detectors, we would want to know: (1) resolution of problem, (2) plans to disseminate information to potentially affected customers, and (3) steps planned or taken to prevent a recurrence. In cases such as this, when the vendor's resolution is reasonable, successful and thorough, we typically do not issue a notice to industry, thus avoiding duplication of efforts.

If you have any questions during your review effort, please call James Wigginton (301-492-4967) or me (301-492-478C).

Sincerely,

Robert L. Baer, Chief
Engineering and Generic
Communications Branch
Division of Emergency Preparedness
and Engineering Response
Office of Inspection and Enforcement

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Robert L. Baer, Chief
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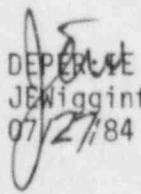
William E. Todd

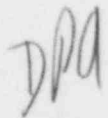
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If you have any questions during your review effort, please call Jim Wigginton (301-492-5608) or me.

Robert L. Baer, Chief
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Communications Branch
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and Engineering Response
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WASHINGTON STATE UNIVERSITY

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NUCLEAR RADIATION CENTER

EW 312 FGCB
11-7-4957

March 16, 1984

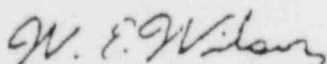
Mr. Ross A. Scarano, Director
Division of Radiological Safety
and Safeguards Programs
U.S. Nuclear Regulatory Commission
Region 5
1450 Maria Lane, Suite 210
Walnut Creek, California 94596

Dear Mr. Scarano:

In accordance with the requirements of 10 CFR 21, notification is herewith submitted relating to the failure of Siemens Health Physics Services solid state neutron dosimeters to measure fast neutrons. Washington State University has contracted with Siemens to provide the university with personnel dosimetry service for the measurement of beta-gamma radiation and neutrons. Siemens shifted from NTA film to track etch-type detectors for neutron dosimetry about 8 to 10 months ago. In order to insure that the numbers reported by Siemens were accurate, the university instituted a test program about 8 months ago. A description of the neutron exposure tests and the results obtained are described on the attached memorandum.

The results of our tests on Siemens neutron badges indicated that either our test procedure was invalid or Siemens neutron dosimeters did not function at all. Tests using two other vendors' dosimeters resulted in reasonable results that substantiated the validity of our test procedure. The final conclusion is that Siemens' new solid state neutron dosimeters and the associated processing are defective and simply do not detect fast neutron exposure.

Sincerely,



W. E. Wilson
Associate Director

WEW:efz
enclosures

~~8404030318~~

M E M O R A N D U M

TO: Bill Wilson, Associate Director
FROM: Jerry Neidiger, Reactor Supervisor *J.N. 17,*
DATE: March 20, 1984
SUBJECT: Evaluation of Siemens Gamma and Neutron Dosimetry Badges

Attached is the evaluation of Siemens film badges worn by personnel at WSU, including personnel at the Nuclear Radiation Center. All badges were placed at the same distance from the source and various dose levels were a function of time only. The gamma film badges were exposed to an NBS calibrated 94 millicurie Cs¹³⁷ source. The neutron badges were exposed to a 1 curie PuBe source, No. M-134, which has a neutron emission rate of 1.58×10^6 n/sec. As of this date, the Siemens neutron badges have failed to record any dose level of neutrons.

Table I gives the test results of neutron exposure for the last six months. These badges were given calibrated neutron doses, then returned to the vendor as part of the building badging account each month. The vendor was unaware these were test badges. When the monthly test badges failed to record any dose, I requested ten additional test badges. I informed Siemens these would be given calibrated doses of radiation and returned to them for evaluation. Table II gives the results of these additional 10 test badges, which was performed in February. Again the neutron badges failed to record any dose of neutrons. As a check of my exposure methods, I requested 10 test dosimetry badges each from two other vendors. As it turned out, one vendor supplied me with two different types of neutron dosimeters for a total of 20

badges, while the other vendor supplied me with three different types of neutron dosimeters for a total of 15 badges. These badges were given identical doses in the identical manner as the Siemens badges and all 35 badges recorded neutron doses within 50% of the expected values.

I believe the Siemens neutron badges to be defective and I have turned my test results over to the Radiation Safety Supervisor for further action with Siemens.

JAN:efm

Table II

Results of Special Test Evaluation
on Siemens Neutron Badges Performed on
February 15, 1984

<u>Badge No.</u>	<u>Dose Given</u>	<u>Dose Reported</u>	<u>% Error</u>
091	10	-	Note #1
092	10	-	Note #1
093	25	-	Note #1
094	25	-	Note #1
095	100	0	-100%
096	100	0	-100%
097	250	0	-100%
098	250	0	-100%
099	500	0	-100%
100	500	0	-100%

NOTE #1: Dose given below minimum detectable dose of 30 mrem

Table 1

Evaluation of Siemens Neutron Badges for the
Period of July 1, 1983 through December 31, 1983
(all doses in millirem)

<u>Month</u>	<u>Badge No.</u>	<u>Dose Given</u>	<u>Dose Reported</u>	<u>% Error</u>
July	84	30	not read	-
	85	635	not read	-
August	84	40	0	-100%
	85	409	0	-100%
September	84	50	0	-100%
	85	200	0	-100%
October	84	124	0	-100%
	85	396	0	-100%
November	84	180	0	-100%
	85	1323	0	-100%
December	84	200	0	-100%
	85	400	0	-100%