

JAN 27 1966

**R. G. Page, Chief, Enforcement Branch
Division of State and Licensee Relations, HQ**

**R. S. Cleveland, Radiation Specialist (Review)
Region I, Division of Compliance**

**WESTINGHOUSE ELECTRIC CORPORATION
ASTRONUCLEAR LABORATORY
LARGO, PENNSYLVANIA
LICENSE NO.: 37-9442-2**

CO:I:JEN

Transmitted herewith for your information is a copy of an investigation report on subject licensee.

In the course of a routine inspection, it was learned that the licensee's leaking Sr-90 sealed source reported to AEC by letter dated May 25, 1964 also involved an injury to an employee resulting in a contaminated wound. Since necessary additional details were not available at the time of the inspection, it was decided to make this matter the subject of a separate investigation, the results of which are set forth in the accompanying investigation report.

It is the opinion of this office that [REDACTED] the licensee employee involved in the accident, was not exposed to radiation in excess of regulatory limits and that this matter can now be considered closed. No items of noncompliance were felt to have been established by the investigation.

Some disagreement by the licensee on inspection findings has developed since the inspection, and this is to be the subject of a supplementary visit to the licensee before processing the inspection report.

Enclosure:

1 cy Investigation Rpt, w/Exhibits A thru D

cc: CO:HQ, w/orig Investigation Rpt

E/5

COMPLIANCE INVESTIGATION REPORT

DIVISION OF COMPLIANCE

Region I

Subject: WESTINGHOUSE ELECTRIC CORPORATION
Pittsburgh, Pennsylvania 15230

Place of Use: Westinghouse Astronuclear Laboratory
Largo, Pennsylvania

License No.: 57-9442-2

Contaminated Wound: During a manipulation with a
Sr-90 sealed source, the source
was punctured and the employee's
hand injured, resulting in some
contamination to the wound.

Period of Investigation: November 3 - 23, 1965

Investigator:

James E. Hyder,
Radiation Specialist

JAN 17 1966

Date

Reviewer:

RCC
R. S. Cleveland,
Radiation Specialist
(Review)

1/17/66
Date

REASON FOR INVESTIGATION

Westinghouse Electric Corporation informed the Commission, by letter dated May 25, 1964, that a 5 mc Sr-90 sealed source was damaged on May 20, 1964. The letter stated that appropriate evaluations of the contamination and possible radiation exposures were made and that the person performing the work did not receive any significant radiation exposure. During a routine inspection of this facility on September 28 - 30, 1965, a COI inspector obtained a copy of a report describing this incident, in which an employee had cut himself, resulting in contamination of the wound. This report stated that the wound had been bandaged without complete decontamination. This report indicated a possible contamination of 0.1 uc of Sr-90. Due to the conflict in the above reports and lack of clear information on the extent of the problem, an investigation was conducted by COI to determine the magnitude of the exposure due to the contaminated wound and to determine the current status of the contaminated wound.

SUMMARY OF FACTS

On May 20, 1964, a 5 mc Sr-90 sealed source was damaged in an accident that resulted in contamination of a wound on the finger of a technician working with the source. The licensee's original evaluation was that no more than 0.1 uc of Sr-90 was present in the wound. No items of noncompliance are considered to have contributed to, or have been associated with, this incident.

The wound had subsequently been excised on May 25, 1965 and all evidence of contamination had been removed. The tissue removed showed a total activity of 0.003 uc. Urine samples collected through May 27, 1964 showed no detectable Sr-90.

Persons Contacted:

Mr. Morris Beebe, Manager, Industrial Hygiene
Mr. William Geiger, Health Physicist
Dr. Al Spritzer, Facility Physician

Persons Accompanying Inspector:

None - Pennsylvania State Department of Health Notified

DETAILS

1. By letter dated May 25, 1964, addressed to the attention of Mr. E. R. Price, Westinghouse Electric Corporation informed the Commission that on May 20, 1964 a 5 mc Sr-90 sealed source had been damaged and that appropriate evaluations of the contamination and possible radiation exposures had been made. The letter stated, "It was determined that the person performing the work did not receive any significant radiation exposure, even though he had a minor cut on one finger." A copy of this letter is attached as Exhibit A.
2. During a routine inspection of this facility conducted on September 28 - 30, 1965, the GSI inspector obtained a copy of an incident report entitled "Exposure Incident as Described to F. J. Bradley by [redacted] (the exposed person), Mr. Donagan, Technical Director, and Mr. Manning, Industrial Hygiene Manager, Astronuclear". This report described an incident in which an employee's finger had been cut by a contaminated knife. This report indicates that the contamination to the wound might be as much as 0.1 mc Sr-90. This report states that the wound was bandaged without complete decontamination. The report states that urine and feces were to be collected and analyzed and that a radiation measurement was to be made daily of the wound. A copy of this report is appended as Exhibit B. EX 6
3. On November 3, 1965 the above incident involving the damaged source and the employee's injury and the resulting wound contamination was discussed with Mr. Morris Beebe, Mr. W. Geiger, and Dr. Al Spritzer. Mr. Beebe stated that this incident had occurred before he assumed his responsibilities at this facility. Mr. Geiger stated that, although he had been associated with the health physics program, at that time he had not been directly involved in the incident or its follow-up. Dr. Spritzer stated that at the time of the incident he had been out of town, but upon his return had made the decision to excise the wound to remove any possible contamination.
4. Mr. Beebe stated that he had carefully searched through all possible files and had found no detailed report prepared by Westinghouse employees of this particular incident. However, several documents pertaining to this incident were located. Mr. Beebe stated that all personnel associated with the project were no longer with the Westinghouse Astronuclear facility at Large, Pennsylvania. The equipment involved has been removed to the Cheswick, Pennsylvania site and the employee involved, [redacted] had left Westinghouse Electric Company employment on June 11, 1965. Beebe stated that he did not know if gloves had been worn at the time of the incident, but if gloves had not been used, [redacted] had violated the Westinghouse procedures for the use of this equipment. EX 6
5. Dr. Spritzer stated that all injuries are monitored for contamination when the individual reports to the dispensary. Upon reviewing medical records, Dr. Spritzer stated that in this case it had been determined that [redacted] injury was contam-

inated and an effort had been made to remove the activity. The nurse at the dispensary had not been able to remove the contamination, and [redacted] was then taken to the emergency room at Presbyterian - University Hospital in Pittsburgh, where he was seen by Dr. Wechsler. Here, [redacted] was surveyed by F. Bradley, a health physicist at the University of Pittsburgh, and the wound was treated by Dr. Wechsler. A bioassay program was initiated with both urine and feces samples being analyzed by Nuclear Science and Engineering Corporation. Dr. Spritzer stated that, upon his return and discovery that the radiation level from the wound had not decreased, he had requested that the surgeon excise the wound to remove any radioactive material remaining. Dr. Spritzer's records indicate that the wound had been excised on May 25, 1964 by R. C. Wilde, M. D. These records also indicate that the wound was surveyed after this surgery with no activity being detected. Spritzer's records indicate that the tissue had been analyzed at the Graduate School of Public Health, University of Pittsburgh, where it was determined that the activity was 0.003 us. The contaminated tissue was then turned over to F. Sherman, M.D., Pathologist of Children's Hospital, Pittsburgh. An auto-radiograph of this tissue sample was performed by Dr. Sherman. This auto-radiograph did not detect any particular particle of activity. It was, therefore, assumed by Spritzer that the wound was likely contaminated with dust from the surface of the microspheres, which were used to prepare this particular source. Dr. Sherman's report is attached as Exhibit C. Exhibit D is COI's dose calculation.

6. Urine samples were collected through May 27, 1964. However, analyses for gross beta activity and for potassium indicated that all beta activity could be attributed to the natural K-40 activity. In addition, urine samples were collected from all employees on July 16, 1964 and were analyzed by Controls for Radiation on July 31, 1964. A 10 ml sample for [redacted] was reported as 1024 ± 952 dpm/l (gross beta corrected for K-40).
7. None of the above individuals interviewed was able to explain exactly how or why the letter dated May 25, 1964 and signed by Mr. C. P. Skillern had been written so as to obscure the injury involving contamination with Sr-90. On November 23, 1965, this letter was discussed via telephone with Mr. E. Barnes, Corporate Director of Radiation Protection. Barnes stated that he could not, at this time, remember the exact thinking when the letter was prepared, but that there was no intent to play down or obscure the fact that a wound had resulted from manipulation of byproduct material and that the wound had been contaminated. However, as all activity had been removed from the wound, he did not feel that the incident was reportable and, consequently, had not supplied in the letter details concerning this portion of the incident.
- EX6



W. J. Ryan
P. J. Cleveland
G. H. Hobson
sk
Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh 30, Pa.

May 23, 1964

**U. S. Atomic Energy Commission
Division of State & Licensee Relations
Washington, D. C. 20545**

Attention: Mr. E. R. Price, Director

Subject: Source Damage - License No. 37-9442-2 (I65)

Gentlemen:

A source positioning rod, which holds a 5 mc Sr⁹⁰ sealed source, was broken during operation of a beta back-scatter gauge. The sealed source was not damaged as a result of this broken positioning rod.

To repair the positioning rod, it was placed in a dry box and soldered on May 20, 1964. After completion of the repair to the rod and prior to its removal from the dry box, some contamination was noted and it was determined that the sealed source had become slightly damaged during the rod repair operation. Appropriate evaluations of the contamination and possible radiation exposures were made. It was determined that the person performing the work did not receive any significant radiation exposure, even though he had a minor cut on one finger. Urinalysis and detailed surveys were made to assure this.

The dry box containing the rod and source was immediately placed in a 55 gallon drum and sealed. It will be disposed of as contaminated waste. It will be packaged and shipped in accordance with ICC Regulations to a licensed burial ground.

Very truly yours,

C. P. Skillern

C. P. Skillern
License Administrator

cc: Mr. Robert W. Kirkman
Division of Compliance
U.S. Atomic Energy Commission
376 Hudson St.

EXHIBIT • "A"

EXHIBIT ~~2~~

Dr. Spryger

Exposure incident as described to F. J. Bradley by [redacted] (exposed person), Mr. Donagan, Technical Director, and Mr. Manning, Industrial Hygiene Manager at Astronuclear.

Ex 6

In a lucite box with a removal lucite cover a specialized beta ray thickness gage is housed. This device uses Minnesota Mining and Manufacturing microspheres of $Sr^{90}TiO_3$ sealed in a reset in an Al block by a "Ni flash" as a source of beta rays. The $Sr^{90}TiO_3$ microspheres were also flashed with Ni. The Al block cracked and [redacted] resoldered it with Al solder. In this phase of the operation he held the part of the Al block with Sr^{90} with tweezers wrapped with tape and used a surgical type knife to cut the tape. In handling the knife, he cut himself on the middle finger of his left hand between 1st and 2nd knuckle. The gash was about $3/4$ " long x $1/8$ " deep and very clean. At this stage no portable monitoring instruments or HP personnel were present. [redacted] went to dispensary for cut and as a routine procedure they checked him for contamination and found his cut to be contaminated. Sixty-five minutes of cleaning in the dispensary did not reduce the activity in the wound.

Ex 6

Ex 6

At about 1810/20 May 1964, he was seen in the Presbyterian-University Hospital by Dr. H. Wechsler. A check for external and internal contamination was made by F. Bradley and A. Brodsky by end window GM survey meter Ludlum scintillation survey meter smear and nostril swab. The cut finger gave a reading of 0.26 $\mu r/hr$ on the end window GM meter which is equivalent to approximately 0.0026 μc (^{2.6}~~26~~ nc). Correcting for a wound depth of $1/8$ inch might indicate activity of 93 nc Sr^{90} . The results of the smear and nose swabs are given on accompanying diagrams.

EXHIBIT "B"

Dr. Wechsler attempted to decontaminate the wound by swabs but following eight swabbings the activity gave approximately the same reading on survey meter. Dr. Wechsler therefore bandaged the cut without further attempts at decontamination.

All urine and feces post-incident are to be collected. A reading over wound is to be taken everyday by Mr. Manning, Astro. Ind. Hygiene Engineer.

Specifications of source as obtained from Mr. Kunz and Mr. Hall of JN; smear test on spheres must give less than $0.005 \mu\text{c}$ (11,100 dpm) and they are considered clear.

Source was composed of approximately 3000 microspheres; diameter 60-100 microns; spheres were $\text{Sr}^{90}\text{TlO}_3$ crystals coated with Hf; activity of each sphere was estimated to be $1.8 \mu\text{c/sphere}$ ($2.2 \times 10^6 \text{ dpm/sphere}$) for a total of 5.4 mc in beta ray gage.

Preliminary urine output data as of 1700/22 May 1964 as telephoned to F. Bradley by Carl Wilson, Nuclear Science and Engineering Corporation:

Date of Urine Sample ¹	Activity (Uncorrected for K^{40} in urine)
1000/21 May 1964	3.2 dpm/ml ²
1400/21 May 1964	1.5 dpm/ml ²
2300/21 May 1964	6.9 dpm/ml ²
0715/22 May 1964	3.9 dpm/ml ²

¹One urine output not collected by [redacted]

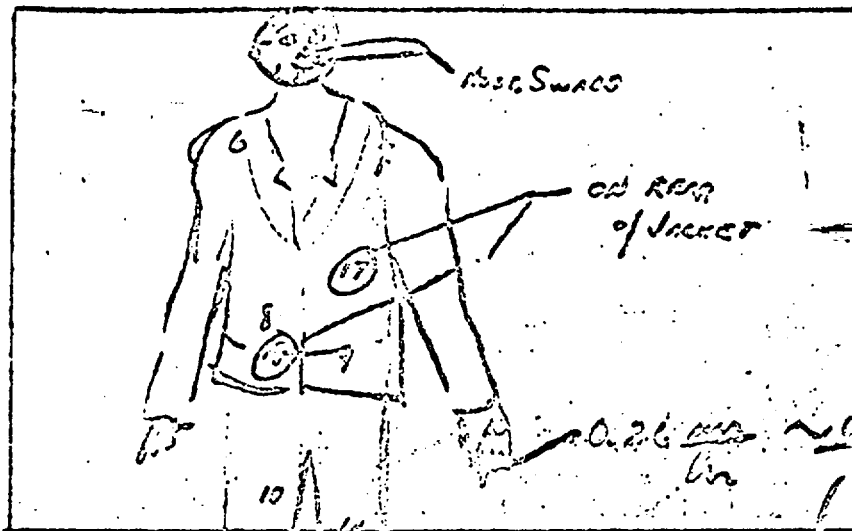
² K^{40} activity normally avg. 10-12 dpm/ml.

21 May 1964 feces

710 dpm/total sample (320p)

646

Contamination Survey Record



SURVEYED
 Date 20 May 1964 By ASTRONUC Report to Dr. 2600
 DATE COUNTED 20 May 1964
 Principal Isotopes 54 Counting rate 42 cps. ~ 0.005
 Bldg & Rm _____

All smears above twice the background counting rate are indicative of contamination and are encircled in red.

Smear No.	c/m (- background)	Smear No.	c/m (- background)
1	53 - 42 = 14	11	36 - 42 = -
2	47 - 42 = 5	12	43 - 42 = 1
3	42 - 42 = -	13	39 - 42 = -
4	40 - 42 = -	14	33 - 42 = -
5	42 - 42 = -	15	36 - 42 = -
6	34 - 42 = -	16	36 - 42 = -
7	43 - 42 = 1	17	40 - 42 = -
8	43 - 42 = 1	18	47 - 42 = 2
9	34 - 42 = -	19	
10	40 - 42 = -	20	

CHILDREN'S HOSPITAL OF PITTSBURGH
REPORT OF TISSUE EXAMINATION

Date May 25, 1964 Room 92 Age _____ Unit No. _____ Lab No. CS-966-64
Name MR. X Service Hall Ward, H. O.
Specimen Excision third finger, left hand, dorsum
Clinical Information Cut contaminated with Cr⁹⁰ titanate (not a radiological hazard)

HEALING INCISED WOUND OF SKIN

130-411

GROSS:

TUSCO a fusiform piece of skin 4.0 mm. wide at the greatest width and tapering to a point at each end. The specimen is 2.2 cm. long and 2.0 mm. in depth. The white skin contains a superficial, sharply incised wound running its length. There is a small amount of subcutaneous fat attached to the skin. Six blocks, A through F are made as diagrammed, for H & E and autoradiography, after gross autoradiography on a dental film.

GROSS AUTORADIOGRAM:

The tissue was placed on a piece of dental x-ray film and left over overnight. There appears to be two areas of concentration in the middle portion of the specimen. One at section B and the other between sections D and E.

MICROSCOPIC:

The epidermis is intact in all sections, but is depressed, crease-like, centrally. Beneath the depression is some slight chronic exudate in the upper cutis. Foreign material cannot be definitely identified as strontium. Some brown, granular debris is noted on the surface of the wound in block C. Polarization reveals some intra-cutaneous granules sparsely disseminated in the cutis near the epidermis and in small cells.

Autoradiographs exposed 24 hours failed to blacken the emulsion. When exposed 5 days nonspecific blackening had taken place.

Frank E. Sherman, M. D.

ES:yc

EXHIBIT "C"

GO:1 Dose Calculations

Sr-90 + Y-90 in equilibrium

1 uc releases energy at the rate of $0.7 + 2.65 \text{ erg/min} = 3.4 \text{ erg/min}$

0.003 uc releases 0.01 erg/min

Assuming irradiated tissue to be volume removed

$22 \text{ mm} \times 2 \text{ mm} \times 3 \text{ mm} = 125 \text{ mm}^3$

125 mm^3 of tissue = .125 gm

Dose Rate = $\frac{0.01 \text{ erg/min}}{0.125 \text{ gm}}$

= $\frac{0.08 \text{ erg/gm}}{\text{min}}$

= 0.8 mrad/min

= 48 mrad/hr

5 day = 120 hr

Total dose to tissue of finger $48 \text{ mrad/hr} \times 120 \text{ hr} = 5.76 \text{ rad}$

EXHIBIT "D"