ohmart
CORPORATION

March 28, 1980

Region III Office of Inspection & Enforcement
U.S. Nuclear Regulatory Commission
Glen Ellyn, IL 60137

Attnetion: James G. Keppler, Director

Gentlemen:

The following report is filed pursuant to the requirements of 10CFR 20.405.

I. GENERAL

On Wednesday, February 20, 1980, one of the plant personnel, [redacted] in drilling through a steel source housing, inadvertently ruptured a radioactive source containing 100 millicuries of insoluable radioactive Cs-137 in the form of 3M microspheres 25-75 micron. This incident was noted promptly by the source room supervisor [redacted] and the area radiation detector.

II. LEVELS OF ACCESSIBLE RADIATION AND RADIOACTIVE CONTAMINATION

Abnormal levels of radiation and contamination were confined to the relatively small area of the source room and the source loading area. There was no exposure to other plant personnel or the general public to any abnormal levels of radiation or radioactive contamination.

III. DETAILS OF THE INCIDENT

[redacted] under the supervision of [redacted] was attempting to remove the sealed source capsule from the sourceholder for re-use.

The normal procedure is to remove the source from the front opening through which it was originally loaded. When it is necessary to drill through lead, a flat faced drill incapable of piercing the source is used. In this instance however, the tube in which the source is contained appears to have been corroded. [redacted] unable to remove the source in the normal manner attempted to drill through the rear of the sourceholder in order to "poke out" the source with a steel rod. It was during this drilling that the source capsule was pierced.

IV. LEVELS OF EXPOSURE AND RADIOACTIVE CONTAMINATION RECEIVED BY OHMART PERSONNEL

A. Exposure to external radiation

1) [redacted] the source room supervisor who was assisting in the operation, received no abnormal exposure due to the incident. The following table lists his exposure for the month of February, 1980 and for the preceeding 4 months.

MAR 3 1 1980

February 1980	40 millirem
January 1980	50 millirem
December 1979	40 millirem
November 1979	50 millirem
October 1979	50 millirem

(Landauer type Gl Filmbadge)

2) [redacted] film badge was contaminated and therefore could not be analyzed. At the time [redacted] removed his contaminated clothing he read his pocket dosimeter which indicated a dose of 20 millirem. [redacted] received negligible additional whole body radiation after removing his clothing. The following table lists [redacted] recent exposure history.

February 1980	Contaminated, disposed of.
January 1980	90 millirem
December 1979	60 millirem
November 1979	minimal
October 1979	50 millirem

(Landauer type G-1 film badge)

The Ohmart Isotopes Committee decided to place the maximum allowable quarterly dose (1.25 rem) in [redacted] permanent exposure record, although this is many times the actual dose he received. Based upon this conservative estimate, [redacted] will not be permitted to enter the source room area for the remainder of the first quarter of 1980.

In addition to the whole body dose listed above, [redacted] received an estimated skin dose of 300 millirem to the hands and a skin dose of 50 millirem to the left side of the head.

B. Levels of contamination

See the attached report of Eugene L. Saenger, MD, the University of Cincinnati Hospital. (See Exhibit #1)

V. ACTIONS TAKEN BY OHMART (CHRONOLOGICAL)

The first indication of the incident was an increase in the reading of a survey instrument at the work place and the sounding of the area radiation alarm. A source wipe was immediately taken which confirmed that the source had been punctured.

The area was roped off and the factory supervisor, Paul Houillion, was called for. Mr. Houillion notified the Vice President of Manufacturing, Paul Sieck, who in turn, notified the Radiation Safety Officer, Fred Dirling.

Mr. Houillion entered the area to evaluate the situation. When wipe tests indicated that [redacted] was not contimated he was permitted to leave the area. [redacted] of course, was contaminated and was required to remain.

Dr. Saenger of the University of Cincinnati Hospital was called for assistance.

Decontamination of which consisted of repeated washings with soap and water was begun and continued until after the arrival of Dr. Saenger, Dr. Kereiakes and Mr. Ken Fritz, Radiation Safety Officer of the University of Cincinnati. The final stages of decontamination was conducted under the supervision of Dr. Saenger.

When was decontaminated, both he and were taken to the University of Cincinnati Hospital for examination. (See Exhibit #1)

Dr. Kereiakes, Mr. Fritz and Mr. Paul Houillion began decontamination of the roped off area around the source room. This was accomplished by first vacuuming the area with a unit equipped with a 3 micron filter. Another filter was placed on the exhaust hose of the vacuum cleaner and periodically tested to assure that the vacuum cleaner was not "spreading contamination."

Then the area was washed with soap and water. Between each washing a wipe test of the area was taken and recorded. This was continued until the levels of contamination were well below the allowable levels. (See Exhibit #2)

The contaminated area of the sourceholder was covered with a plastic coating and placed in a drum for disposal along with the contaminated tools, clothing, film badge, dosimeter and miscellaneous contaminated articles such as rags used for cleanup and the wipe tests.

A record of wipe tests taken is on file at the Ohmart Corporation.

Fred Dirling reported the incident to J. Paglearo of Region III of the NRC by telephone, following up this report with a confirming mailgram.

On March 18, 1980, Paul Houillion, Factory Supervisor, was given a whole body count. This disclosed no apparent contamination. (See attachment #1)

VI. CONCLUSIONS AND CORRECTIVE ACTION

The incident was caused by the use of a drill capable of piercing the source capsule. While this was not the proper procedure it was not expressly forbidden.

New procedures have been developed to eliminate the possibility of a recurrence of this incident. (See Exhibit #3)

In addition, source room supervisors and source handlers have been given additional training which re-emphasizes our standing policy of "Safety First", doing everything in such a manner as to reduce personnel hazard to the smallest degree possible.

All necessary equipment and supplies needed during this incident were on hand. These have been replaced and gathered together into an emergency kit which is to be stored in a locked cabinet near the source handling area. The key to this cabinet will be in the possession of the source room supervisor. (See Exhibit #4)

Prior to the date on which this report was required, Fred Dirling of Ohmart contacted J. Pagliaro of Region III of the U.S. Nuclear Regulatory Commission, requesting an extention in time. Mr. Pagliaro extended the due date for this report to March 28, 1980.

Sincerely,

THE OHMART CORPORATION

Frederick N. Dirling
Radiation Safety Officer

FND/pa
Enclosures
cc: Director of Inspection & Enforcement
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Ohmart Isotopes Committee Members

EXHIBIT #1

ersity of Cincinnati
dical Center

University of Cincinnati Hospital
Cincinnati General Division

234 Goodman Street
Cincinnati, Ohio 45267

Eugene L. Saenger Radioisotope Laborat
TELEPHONE (513) 872-4282

March 13, 1980

Cesium-137 Incident at the Ohmart Corporation
On February 20, 1980

Report of Eugene L. Saenger, M.D.

At about 10:30 AM on February 20, 1980 [redacted] (Subject 1, S-1), drilled through a source housing rupturing a sealed ^{137}Cs source of about 100 mCi containing microspheres of 25-75 micron diameter. [redacted] (Subject 2, S-2) was monitoring the procedure. Immediately upon rupture the survey meter and area monitor indicated the release. Both men evacuated and the room was sealed.

S-1 was obviously contaminated. He removed his clothing, put on a paper suit and was decontaminated by washing with bar soap and water. The various readings and their change with washes are detailed in other reports of the plant and of Dr. J.G. Kereiakes. The activity dropped from over 300 mr/hr to 10-18 mr/hr after 3-4 washing of hands and head.

For S-1, wipes of the nasal cavities and mouth showed 3-14 c/m in a well counter at the plant and were considered to be unimportant. There were 702 c/m on the left ear. This area was cleaned with soap and water and the level dropped somewhat.

S-2 showed no activity above the ambient backgrounds and his nasal and mouth swabs showed only 6-15 c/min.

Both men were brought to the Decontamination Center at General Hospital for further evaluation.

S-2 showed no activity above normal background as compared to an unexposed individual. The episode was reviewed with him and he was released with no recommendations for additional treatment. A copy of his whole body scan is attached.

S-1 was counted both in the stationary whole body counter using the standard chair position and in the scanning whole body counter in the supine and prone positions. Studies were carried out on February 20,21,25,28, March 6 and 10.

The results of these studies are tabulated in the attached report. The scanning counter revealed no activity in the thorax or abdomen indicating no inhalation or ingestion of the ^{137}Cs microspheres. Activity was confined to the hands and left ear. These levels have been falling steadily. As of March 10 the activity is about 300 nanocuries.

S-1 was given castor oil on February 20. Stool assay on February 22 revealed a small ^{137}Cs peak. No activity was noted in the urine.

The allowable oral limit of intake (ALI) of cesium-137 for one year as determined by ICRP Publication 30 Part 1 "Limits for Intake of Radionuclides by Workers", Annals of the International Commission on Radiological Protection (ICRP) 2: 93, 1979 is 108 μCi (4×10^6 Bq). This patient had no significant intake as measured by whole body counting. The fecal level was insignificant.

As of the present time the two areas on the epidermis of the hands and external left ear represent at a maximum about a total dose of 14 mrad. This activity will probably be eliminated over a period of the next 2-4 weeks,

Eugene L. Saenger

Eugene L. Saenger, M.D.

ELS/sck

enclosures

RADIOISOTOPE LABORATORY

UNIVERSITY OF CINCINNATI • COLLEGE OF MEDICINE
CINCINNATI GENERAL HOSPITAL CINCINNATI, OHIO 45229
TELEPHONE 372-4282

BIOMET

NAME | MIDDLE INITIAL | DATE | RIL

ADDRESS | PHONE NO | DATE OF B — MO. DAY

HOSPITAL | ROOM & BOARD | HOSPITAL NO. | SOCIAL SECURIT

REFERRING PHYSICIAN | ADDRESS | PHONE NO.

RADIOPHARMACEUTICAL | ACTIVITY | ROUTE | DATE AD — MO. DA

PLACE ADMINISTERED | PROCEDURE PERFORMED | INSTRUM

REPORT:

THE EXPECTED PHOTOPEAK OF 40K IS NOTED IN THE GAMMA SPECTRUM.
THERE ARE NO OTHER GAMMA EMITTING RADIONUCLIDES EVIDENT IN THE SPECTRU

E. L. Saenger

SIGNATURE: E.L. SAENGER, M.D.

REPORT SENT BY _____ BY _____ SIGNED _____

UNIVERSITY OF CINCINNATI • COLLEGE ...
CINCINNATI GENERAL HOSPITAL CINCINNATI, OHIO
TELEPHONE 872-4282

RIL NO.

DATE: MO. DAY YR.

LAST / FIRST / MIDDLE INITIAL

DATE OF BIRTH: MO. DAY YR.

...SS / PHONE NO.

SOC. SECURITY NO.

...TAL / ROOM & BOARD / HOSPITAL NO.

...RRING PHYSICIAN / ADDRESS / PHONE NO.

...art Corp.

...IOPHARMACEUTICAL / ACTIVITY / ROUTE / DATE ADMIN. MO. DAY YR.

...ACE ADMINISTERED / PROCEDURE PERFORMED: Whole Body Count / INSTRUMENT

...EPORT:

The expected photopeak of K-40 is noted in the gamma spectrum. There are other gamma emitting radionuclides evident in the spectrum, namely ^{137}Cs. The ^{137}Cs values listed below were calculated by the Standard Program used to determine the Whole Body ^{137}Cs burden. This calculation is based on a standard phantom distribution rather than the localized distribution evident for this patient. However, the values compare favorably with the quantitative results provided by the Nuclear Medicine Laboratory Whole Body Scanner.

Date	CGS W.B.C.	NML W.B.S.
2-20-80	1.89 uCi	2.6 uCi (2-5)
2-21-80	0.87 uCi	.5 uCi (.4-1)
2-25-80	0.26 uCi	.3 uCi (.2 - .45)
2-28-80	0.29 uCi	

DATE ____ SIGNED ____

REPORT Nishiyama, M.D.
SENT BY:

RADIOISOTOPE LABORATORY

UNIVERSITY OF CINCINNATI • COLLEGE OF MEDICINE
CINCINNATI GENERAL HOSPITAL CINCINNATI, OHIO 45229
TELEPHONE 872-4282

NAME [redacted] LAST [redacted] FIRST [redacted] MIDDLE INITIAL

DATE [redacted] MO. DAY YR.

RIL NO. [redacted]

ADDRESS [redacted]

PHONE NO. [redacted]

DATE OF BIRTH [redacted] MO. - DAY YR.

HOSPITAL

ROOM & BOARD

HOSPITAL NO.

SOC. SECURITY NO. [redacted]

REFERRING PHYSICIAN Ohmart

ADDRESS

PHONE NO.

RADIOPHARMACEUTICAL

ACTIVITY

ROUTE

DATE ADMIN. — — MO. DAY YR.

PLACE ADMINISTERED

PROCEDURE PERFORMED Whole Body Count

INSTRUMENT

REPORT:

The expected photopeak of K-40 is noted in the gamma spectrum. There are no other gamma emitting radionuclides evident in the spectrum.

H. Nishiyama, M.D. H. Nishiyama

REPORT SENT BY _____ DATE _____ SIGNED _____

EXHIBIT #2

March 9, 1980

872-5476

Mr. Lou Cook
Ohmart Corporation
4241 Allendorf Drive
Cincinnati, Ohio 45209

Subject: Results of Surface Area Wipes made in Source Handling Area (Ohmart Corporation)

Technique: surface areas (100 cm^2) wiped with cotton applicator; applicator placed in test tube; tube counted using Picker Well Counter and Spectroscaler 4; PHA window-independent; 0-2 MeV; LL = 020; UL = 1000; hi-voltage 370 (910 volts); background 150 cpm; efficiency (cesium-137) = 30%; minimum detectable activity (MDA) = 2.5×10^{-5} µCi (5 minute counting time).

Wipe Location	net cpm	$\frac{dpm}{100\ cm^2}$
inside room fllor-right side	5	16
inside room floor-left side	42	140
outside room floor-right side	27	90
turntable	20	66
TV camera	27	90
inside room floor-left side (CLEANED AND REWIPED)	7	23

James G. Kereiakes, Ph.D.
Radiological Physicist

EXHIBIT #3

SOURCE HANDLING PREPARATIONS

1. Both Supervisor and Source Handler have ring and wrist badges on proper hand and wrist, and are wearing their film badges and dosimeter.

2. All parts of source holder to be loaded have been checked to insure parts will fit together properly.

3. Source handling procedure for the job to be done has been read by both Supervisor and Source Handler.

4. Source room is entered with survey meter, area inside room should not be over 100 $mR/_{HR}$. If it is, stop work, close and lock source room. Notify Factory Superintendent and V. P. of Manufacturing.

5. Area around source storage and where work is to be done must be clear with plenty of room to work.

6. Source to be loaded is located on source storage records. Refer to Procedures.

7. From time to time it may be advisable to reclaim a source from an old source holder. In general, the procedure will be the reverse of the loading procedure. If, because of corrosion or other obstruction it becomes necessary to drill out lead shielding, there is to be no drilling in the vicinity of the source capsule with anything other than a flat face drill.

   If it is necessary to use any other kind of drill for any purpose only the Factory Superintendent can authorize such action and must personally supervise its use.

EXHIBIT #4

DECONTAMINATION KIT

INVENTORY 3-27-80

6		COVERALLS
200		PLASTIC GLOVES
100		PLASTIC BOOTS
10		HOODS
2		GOGGLES
2		RESPIRATORS
1		EYE WASH
2	bars	HAND SOAP
4		SCRUB BRUSHES
12		PAILS
6	boxes	PAPER TOWELS
2		RADIACWASH SPRAY FOAM
1	gal.	ISOCLEAN CONCENTRATE
1	gal.	ATOMPEEL (Strippable Coating)
20		PLASTIC BAGS 9" x 12"
10		PLASTIC BAGS 8" x 12" x 24"
10		PLASTIC BAGS 22" x 16" x 60"
100		BAG TWIST TIES
1,000		3" COTTON TIPPED APPLICATORS
300		6" COTTON TIPPED APPLICATORS
400		COIN ENVELOPES
100		SOURCE WIPE VIALS W/CAPS
1	roll	ABSORBANT PAPER
1	roll	DUCT TAPE
1	roll	MASKING TAPE
200	ft.	BANNER GUARD
6		RADIATION AREA SIGNS
1		PR. SCISSORS
1		UTILITY KNIFE
100		RUBBER BANDS
5		VACUUM CLEANER FILTER BAGS
1		NOTEBOOK
2		PENS
2		PENCILS

THE OHMART CORP
4241 ALLENDORF DR
CINCINNATI OH 45209

ACCOUNT NO.	SERIES CODE
70174	

RADIATION DOSIMETRY REPORT

RECEIVED
NOV 19 1979
OHMART CORP.
CINCINNATI, OHIO

EXPOSURE PERIOD	PROCESS NO.	PREPARATION DATE	QUARTERLY SUMMARY PLAN* (1. CAL. QUARTER TO DATE; 2. NO SUMMARY; 3. COMB. 1 AND 3 ABOVE)	NO. COP
TWO WKS A	K4304	111579	2	2 S

R. S. Landauer, Jr. & Co.
Division of Technical Operations, Incorporated

Glenwood Science Park
Glenwood, Illinois 60425
Telephone (312)755-7000

PR

FOR EXPOSURE PERIOD 09/24/79 TO 10/07/79 0702 1007 1979

Participant Ident. No.	Participant Name	Social Security No.	Badge	Gamma & X-Ray	Beta	Fast Neutron	Total	Energy Range	Calendar Quarter or 13 Weeks	Year-to-Date	Permanent	Adjustments	Permissible Accumulated Dose (in millirems)	Unused Part of Permissible Accumulated Dose (in millirems)	Sex	Birth Date
			P1	M		M	M		20	140	840	D			M	
			P1	M		M	M		M	M	M				M	
			P1	M		M	M		M	30	230				M	
			P1	M		M	M		20	60	60				M	
			P1	M		M	M		30	30	30				M	

PERIOD 10/08/79 TO 10/21/79 1008 0113 1979

Participant Ident. No.	Participant Name	Social Security No.	Badge	Gamma & X-Ray	Beta	Fast Neutron	Total	Energy Range	Calendar Quarter or 13 Weeks	Year-to-Date	Permanent	Adjustments	Permissible Accumulated Dose (in millirems)	Unused Part of Permissible Accumulated Dose (in millirems)	Sex	Birth Date
			P1	M		M	M		M	M	790	F	125000	124210	M	
			P1	M		M	M		M	140	840	D			M	
			P1	M		M	M		M	M	260	D			M	
			P1	10		M	10		10	300	590	D			M	
			P1	M		M	M		M	M	M				M	
			P1	M		M	M		M	20	690				M	
			2	M		M	M		M	20	800				M	
			P1	M		M	M		M	40	190				M	
			P1	20		M	20		20	50	250				M	
			P1	M		M	M		M	540	700				M	
			P1	M		M	M		M	60	60				M	
			P1	M		M	M		M	M	M				M	
			P1	M		M	M		M	170	170				M	

ACCOUNT NO.	SERIES CODE
70174	

EXPOSURE PERIOD	PROCESS NO.	PREPARATION DATE	QUARTERLY SUMMARY PLAN *	NO CON
TWO WKS A	K4482	112779	2. CAL. QUARTER TO DATE 3. NO SUMMARY 8. COMB. 2 AND 3 ABOVE 2	2

FTC CHMART CORP
4224 ALLENDORF CR
CINCINNATI OH 45209

RECEIVED
NOV 30 1979
OHMART CORP.
CINCINNATI, OHIO

RADIATION DOSIMETRY REPORT

R. S. Landauer, Jr. & Co.
Division of Technical Operations, Incorporated

Glenwood Science Park
Glenwood, Illinois 60425
Telephone (312)755-7000

PARTICIPANT IDENT. NO.	PARTICIPANT NAME	SOCIAL SECURITY NO.	ROLE (SEE RESPONSE CODES)	BADGE TYPE	BADGE NO.	EXPOSURE TO BADGE (IN MILLIREMS) FOR THE PERIOD OR PERIODS INDICATED BELOW: GAMMA OR X-RAY	BETA (INCIDENT RADIATION)	FAST NEUTRON	TOTAL	ENERGY RANGE	CUMULATIVE TOTALS* - IN MILLIREMS: CALENDAR QUARTER OR 13 WEEKS	YEAR-TO-DATE	PERMANENT	ADJUSTMENTS	PERMISSIBLE ACCUMULATED DOSE (IN MILLIREMS)	UNUSED PART OF PERMISSIBLE ACCUMULATED DOSE (IN MILLIREMS)	SEX	BIRTH DATE: MO.	DAY
	NO DATE																		
		ID	U	3					30				NOTOTAL						
	FOR EXPOSURE PERIOD	09/24/79	TO	10/07/79		0702	1007	1979											
			P1		M			M	M			M	20	1640	D			M	
	PERIOD	10/08/79	TO	10/21/79		1008	0113	1979											
			P1		M			M	M			M	20	1640	D			M	
	PERIOD	10/22/79	TO	11/04/79		1008	0113	1979											
			P1		M			M	M			M	20	1640	D			M	
			P1		M			M	M			M	140	840	D			M	
			P1		M			M	M			M	40	190				M	
			P1		M			M	M		20		50	250				M	
	DU				1870			M	1870		1870	2410	2570					N	
			P1		M			M	M			M	60	60				M	
			P1		M			M	M			M	30	30				M	
	PERIOD	11/05/79	TO	11/18/79		1008	0113	1973											
			P1		M			M	M			M	M	M					
									M			M	M	M					
									40		40	380	1470	D				M	
			P		M		M	M	M			M	140	620	D			M	
					M			M	M			M	M	730					
									50		50	490	2970	D					
							M	M	M			M	100	1770	E				
					M		M	M	M			M	30	14690	G	110000	95310		
					M		M		M			M	30	18060	G				
									M			M	50	400	A				

(1) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19)

* QUARTERLY REPORT BETA DOSAGE AND THERMAL NEUTRON DOSAGE

EXPLANATION AND REMARKS CONCERNING THE REPORT

QUALITATIVE RANGE COVERED

Exposures reported in millirems from gamma and x-rays 18 KEV to 20 MEV, beta over 1.5 MEV, neutrons: 1 MEV to 10 MEV. Dosage beyond these limits is recorded but not necessarily in millirems unless arrangements were made for calibration at other energy ranges. DEX-RAY™ badge 10 KVP to 90 KVP.

MINIMUM DOSAGES REPORTED

Exposures below minimum quantity measurable are recorded "M". "M" in current period columns equals less than 10 millirems X or gamma, 40 millirems hard beta, 20 millirems fast neutron, or 10 millirems thermal neutron. For special dental X-Ray badge (DEX-RAY™) "M" equals less than 5 millirems. "M" in cumulative total columns means all previous current exposures have been minimal, unless adjustments to these totals have been made at customer's request.

DETERMINATION OF CUMULATIVE DATA

Cumulative totals equal sum of non-minimal readings for badges returned for processing and reported to date. Minimal exposures are added as zero. If other than weekly reporting periods are used the 13 week summary will be the nearest interval of greater duration. Calendar quarters are selected to most nearly conform to NRC and state recording requirements considering starting date and length of monitoring periods chosen.

SKIN DOSE TOTALS

Total and cumulative skin dose values given are the sum of both the low penetrating radiation and the high penetrating radiation. (Thus they will be the sum of all previous skin dose plus total body exposures listed).

ADJUSTMENTS TO CUMULATIVE DATA

To aid in proper presentation of information for records required by the NRC and other regulatory bodies, amendments to the cumulative totals (columns 13, 14 and 15) may have been made increasing or decreasing the totals from those originally reported. Such amendments are made at the request of an authorized representative of the client and are only to reflect supplementary data demonstrating that the film badge exposure originally occurred in such a manner as to either overstate or understate the true dosage to the badge assignee. (Refer to adjustment column). Addition of previous exposure prior to commencement of use of the particular film badge assignment reported may also be reflected in the cumulative totals.

USE OF CONTROL DOSIMETER

Reporting is ordinarily in net exposure and the control dosimeter reading is deducted from the personnel dosimeter reading. If the control appears to have been exposed differently from the personnel dosimeters the values of the personnel dosimeters are normalized to our controls only and a nominal control reading reported. A control dosimeter reading is given in arbitrary units, not necessarily millirems. If the control dosimeter reading is subtracted but is equal to 50 mr or greater, that subtracted value will be reported at the bottom of your report.

7. REPORTING OF BETA AND/OR SOFT X-RAY

Minimal beta or soft x-ray skin dose readings are unreported until after a positive skin dose exposure is recorded.

8. RING BADGE READINGS

Ring badge readings are calculated as if due to X or gamma rays. If produced by beta the dosage may be understated;
Reinterpretation is possible under these circumstances.

9. GENERAL RADIATION EXPOSURE GUIDES*

TYPE OF EXPOSURE	GUIDE VALUE
Whole body; head & trunk; blood forming organs; lens of eye; or gonads	1250 millirem per quarter; 5000 millirem per year. Up to 3000 millirem is permitted in a calendar quarter as long as the accumulated occupational dose to the whole body does not exceed 5000 millirem x (age-18)
Skin of whole body	7,500 millirem per quarter
Hands, forearms, feet and ankles	18,750 millirem per quarter

*U.S.N.R.C. regulations Title 10, Part 20, Code of Federal Regulations (9-1-78). NOTE: Certain states and other regulatory agencies may follow guides that are different from the above.

(COLUMN 4) NOTES.

A ABSENT

B-1 This film appears to have been damaged by light. The accuracy of any reading given would be affected thereby.

B-2 This film appears to have been damaged by moisture. The accuracy of any reading given would be affected thereby.

B-3 This film appears to have been damaged by chemical fogging. The accuracy of any reading given would be affected thereby.

B-4 This dosimeter appears to have been manufactured faultily. The accuracy of any reading given would be affected thereby.

B-5 This film appears to have been damaged by heat or pressure. The accuracy of any reading given would be affected thereby.

C Evidence of contamination.

DA This film packet appears to have been exposed out of the badge. Therefore, the value given is based on a high energy gamma calibration and is valid only if the exposure were due to high energy gamma. If it were due to beta particles, the dosage may be from 1.5 to 20.0 times the reported value. If it were due to lower energy x or gamma rays, the value reported may be from 1.1 to 20.0 times the actual dosage.

DC This film packet is partially lightstruck. There is apparently a dose recorded, however, no exact quantitative determination can be made.

DD This film badge appears to have been shielded during exposure. The dose reported is not an exact quantitative determination, but only an indication that the badge was exposed.

DE This film badge appears to have been shielded during exposure. There is a dose recorded, however, no exact quantitative determination can be made.

DF This film packet appears to have been misplaced in the badge. The dose reported is not an exact quantitative determination, but is only an indication that the badge was exposed.

DG Although this film packet was slightly lightstruck, there seems to be no apparent effect on the reading.

DH The beta-gamma background on this film badge was too high to give a valid fast neutron reading.

DI This reading is based on 50-150KV x-ray. This film badge appears to be defective, please return badge for replacement.

DJ This film packet is too old to process.

DL This control packet appears to have been placed in a film badge indicating possible misuse. May we remind you that the value of the control films is lost if used for personnel monitoring or other radiation measurement purposes.

DR This film appears to have been exposed from the rear of the badge.

DS Amounts shown in columns 7 to 10 have been permanently subtracted from cumulative totals at customer's request.

DT Amounts shown in columns 7 to 10 have been permanently added to cumulative totals at customer's request.

DU Amounts shown in columns 7 to 10 have been supplied by customer for period prior to inception of Landauer service and have been permanently added to cumulative totals.

DV Amounts shown in columns 7 to 10 are previous lifetime exposures supplied by customer and have been permanently added to cumulative totals.

DY Other comment - See attached note.

DZ Other comment - See attached note.

E Irregular exposure.

E-1 Due to the irregular exposure the effective energy cannot be properly determined and the dosage is estimated arbitrarily based on 50 to 150 PKV x-rays as probable source of exposure. If different energy the value reported will not be the actual dosage.

E-2 Due to the irregular exposure the effective energy cannot be properly determined and the dosage is estimated arbitrarily based on gamma or x-ray over 400 KEV as probable source of exposure. If different energy, the value reported will not be the actual dosage.

H Unused.

(COLUMN 5) DOSIMETER TY[illegible]

A. X, GAMMA, BETA, FAST NEUTRON (NEUTRAK 8)
B. X, GAMMA, BETA, FAST NEUTRON (NEUTRAK 144)
C. X, GAMMA, BETA, FAST NEUTRON (NEUTRAK 144), TI[illegible]
D. [illegible]
E. [illegible]
F. [illegible] TLD, FAST NEUTRON [illegible]
G. [illegible] BETA
H. X, GAMMA, BETA, FAST NEUTRON [illegible]
I. X, GAMMA, BETA, FAST NEUTRON (NEUTRAK & THER[illegible]
K. TLD (3 CHIPS)
L. TLD (4 CHIPS)
M. TLD (2 CHIPS) FAST NEUTRON (NEUTRAK 144)
N. FAST NEUTRON (NEUTRAK 144)
O. TLD (1 CHIP) FAST NEUTRON (NEUTRAK 8)
P. X, GAMMA, BETA, FAST NEUTRON (NTA FILM)
Q. DEX-RAY™
R. SPECIAL FILM
T. TLD (2 CHIPS)
U. TLD (1 CHIP RING)
W. [illegible] TLD
X. SPECIAL TLD
Y. X, GAMMA, BETA, THERMAL NEUTRON
Z. TLD (2 CHIPS), FAST NEUTRON (NEUTRAK 144)

OPTION CODE (WHEN USED)
1 - ADDITIONAL BETA CALC. & COMBI[illegible]
2 - ADDITIONAL BETA CALC
3 -- COMBINATION HOLDER

(COLUMN 12) ENERGY RANG[illegible]

For some badges, the range col[illegible] may contain either L, M, or H. [illegible] made for exposures in excess [illegible] dicate the approximate effect[illegible] of the x or gamma exposure. [illegible] approximately 100 KEV (effect[illegible] between approximately 100 K[illegible] approximately 250 KEV (effective[illegible] in excess of approximately 25[illegible] (Very low energy x or gamma [illegible] result in exposure, predominately [illegible] are separately itemized as [illegible]

(COLUMN 16) ADJUSTMENTS

Adjustments made to cumula[illegible] this or previous report of [illegible]

A - Additions
B - Subtractions
C - Additions & Subtractions
D - Dosage data supplied by c[illegible] prior to inception of Landauer servi[illegible]
E - Dosage data supplied by cus[illegible] prior to inception of Landauer [illegible] changes have also been made.
F - Previous lifetime exposure supp[illegible]
G - Previous lifetime exposure supp[illegible] additional changes have also be[illegible]

(COLUMNS 17-18) PERMISSIBLE [illegible]

Unless birth date and lifetime [illegible] are supplied by the customer, [illegible] ported in columns 17 and 18. [illegible] supplied this data, column 17 [illegible] multiplying 5000 times the d[illegible] age in years and 18 (if age is [illegible] This value is computed on a mon[illegible] 18 is determined by subtracting [illegible] column 17. Permissible values a[illegible] uary 8, 1957 recommendatio[illegible] Committee on Radiation Prot[illegible] ments. These values are given [illegible] posures only.

Chemart
CORPORATION

January 30, 1981

United States Nuclear Regulatory Commission
Region III
799 Roosevelt Rd.
Glen Ellyn, IL 60137

Attn: Wayne J. Slawinski

Dear Mr. Slawinski:

In reference to your inspection here on January 21-22, 1981 and [redacted] exposure for the period 10/22/79 to 11/4/79.

Upon noting the reported gamma - X-ray dose of 1870 millirems for the period 10/22/79 to 11/4/79, we pulled [redacted] Field Service Reports for this period of time.

We also contacted Landauer to verify this reading. Landauer indicated that the badge appears to have been shielded during exposure and that the dose reported is not an exact quantitive determination, but only an indication that the badge was exposed.

Inspecting [redacted] Field Service Reports showed that all of the jobs were "NORMAL" and should not have resulted in an exposure of that magnitude. One Field Service Report was missing. On this job, [redacted] was involved in the decommissioning and packing for shipment of a neutron moisture gage located at Cities Service in Copper Hill, Tennessee. If [redacted] had received excessive exposure at Cities Service, the Landauer report would have indicated a neutron dose as well as a gamma-X-ray dose.

[redacted] indicated that there were no unusual occurances during this period of time which might result in the reported exposure.

Based upon the preceeding, we concluded that the reported reading of 1870 mr was incorrect and estimated [redacted] exposure for the year 1979 as follows:

• [redacted] YTD (Period 10/8/79 to 10/21/79)	540 millirem
• An arbitrary figure based upon [redacted] highest exposure for any report period (Period 7/30/79 to 8/12/79)	390 millirems
TOTAL ESTIMATED EXPOSURE FOR 1979	930 millirems

10FR20.101(6) permits exposure up to 3 rems during any calendar quarter so long as the accumulated occupational dose is less than 5(N-18) rems.

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Even under the assumption that the Landauer report was correct, we concluded that this was not a reportable incident since [redacted] at age [redacted] would have been permitted a quarterly whole body dose of 3000 millirem.

I hope this answers your questions concerning the incident. If you require any additional information, please feel free to call.

Thank you.

Sincerely,

THE OHMART CORPORATION

Frederick N. Dirling

Frederick N. Dirling
Radiation Safety Officer

FND/jm
cc: TED
JJG
PES
HLC
Paul Houillion
Jerry Williams
Paul Holzschuher
Gary Robertson
Employee File

Encls.