NRC FORM 374 (7-94)

U.S. NUCLEAR REGULATORY COMMISSION

MATERIALS LICENSE

Amendment No. 21

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. The Perkin-Elmer Corporation	In accordance with the letter dated January 9, 1997,
2. 761 Main Avenue Norwalk, Connecticut 06859	3. License Number 06-02135-08 is amended in its entirety to read as follows:
	4. Expiration Date August 31, 2005
	5. Docket or Reference No. 030-03776

6. Byproduct, Source, and/or Special Nuclear Material	7. Chemical and/or Physical Form	8. Maximum Amount that Licensee May Possess at Any One Time Under This License
A. Nickel 63	A. Foils (Amersham Model NCB-7020, and Model NBC, Nuclear Radiation Development N-1001, New England Nuclear Model NER-002, and NER-004)	A. Not to exceed 15 millicuries per foil and 4 curies total

9. Authorized use

A. For research and development as defined in 10 CFR 30.4; manufacturing and testing of gas chromatographs, and for distribution to persons authorized to receive the licensed material pursuant to the terms and conditions of specific licenses issued by the NRC or any Agreement State.

CONDITIONS

10. Licensed material shall be used only at 761 Main Avenue, Norwalk, Connecticut.

11. A. Licensed material shall be used by, or under the supervision of, Richard Adinolfi, Richard Aurilio, Dave Clark, Robert Koelbel, Charles Pancrazio, John Widomski, or Cyril Fernandes.

B. The Radiation Safety Officer for this license is John Widomski.

160004

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ML 10

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License Number: 06-02135-08
Docket or Reference Number: 030-03776
Amendment No. 21

12. The licensee is authorized to distribute the following devices:

Device Model Number	Isotope	Maximum Activity
Detector Cell Assembly 009-0282	Nickel 63	15 millicuries per foil
Detector Cell Assembly 105-0210	Nickel 63	15 millicuries per foil
Detector Cell Assembly 330-0119	Nickel 63	15 millicuries per foil
Detector Cell Assembly L413-0128	Nickel 63	15 millicuries per foil
Detector Cell Assembly N600-0113	Nickel 63	15 millicuries per foil
Detector Cell Assembly N610-0063	Nickel 63	15 millicuries per foil
Detector Cell Assembly N610-0134	Nickel 63	15 millicuries per foil
Detector Cell Assembly Voyager	Nickel 63	15 millicuries per foil

13. The following devices are authorized for export only:

Device Model Number	Isotope	Maximum Activity
Detector Cell Assembly L413-0127	Nickel 63	15 millicuries per foil
Detector Cell Assembly N600-0030	Nickel 63	15 millicuries per foil

14. A. Sealed sources and detector cells containing licensed material shall be tested for leakage and/or contamination at intervals not to exceed six months or at such other intervals as are specified by the certificate of registration referred to in 10 CFR 32.210, not to exceed three years.

B. Notwithstanding Paragraph A of this Condition, sealed sources designed to emit alpha particles shall be tested for leakage and/or contamination at intervals not to exceed three months.

C. In the absence of a certificate from a transferor indicating that a leak test has been made within six months prior to the transfer, a sealed source or detector cell received from another person shall not be put into use until tested.

D. Each sealed source fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to any use or transfer as a sealed source.

E. Sealed sources and detector cells need not be leak tested if:

(i) they contain only hydrogen-3; or

(ii) they contain only a radioactive gas; or

(iii) the half-life of the isotope is 30 days or less; or

(iv) they contain not more than 100 microcuries of beta and/or gamma emitting material or not more than 10 microcuries of alpha emitting material; or

(v) they are not designed to emit alpha particles, are in storage, and are not being used. However, when they are removed from storage for use or transfer to another person, and have not been tested within the required leak test interval, they shall be tested before use or transfer. No sealed source or detector cell shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.

F. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. If the test reveals the presence of 0.005 microcurie or more of removable contamination, a report shall be filed with the U.S. Nuclear Regulatory Commission and the source or detector cell shall be removed immediately from service and decontaminated, repaired, or disposed of in accordance with Commission regulations. The report shall be filed within five days of the date the leak test result is known with the U.S. Nuclear Regulatory Commission, Region I, ATTN: Chief, Nuclear Materials Safety Branch, 475 Allendale Road, King of Prussia, Pennsylvania 19406. The report shall specify the source or detector cell involved, the test results, and corrective action taken.

G. The licensee is authorized to collect leak test samples for analysis by the licensee. Alternatively, tests for leakage and/or contamination may be performed by persons specifically licensed by the Commission or an Agreement State to perform such services.

15. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Application dated December 17, 1984
B. Letter dated January 30, 1986
C. Letter dated February 18, 1986
D. Letter dated April 13, 1989
E. Letter dated June 11, 1990
F. Letter dated June 1, 1995
G. Letter dated January 9, 1997

For the U.S. Nuclear Regulatory Commission

Date APR 21 1997

By ORIGINAL SIGNED BY JUDITH A. JOUSTRA

Nuclear Materials Safety Branch
Region I
King of Prussia, Pennsylvania 19406

APR 2 1 1997

Mr. John Widomski
Radiation Safety Officer
Analytical Instruments Division
The Perkin-Elmer Corporation
761 Main Avenue
Norwalk, Connecticut 06859

Dear Mr. Widomski:

This refers to your license amendment request. Enclosed with this letter is the amended license. Please note that as part of this amendment, in accordance with 10 CFR 30.36, effective February 15, 1996, the expiration date of your license has been extended by a period of five years. Your new expiration date is stated in Item 4 of the license.

Please review the enclosed document carefully and be sure that you understand and fully implement all the conditions incorporated into the amended license. If there are any errors or questions, please notify the U.S. Nuclear Regulatory Commission, Region I Office, Licensing Assistance Team, (610) 337-5093 or 5239, so that we can provide appropriate corrections and answers.

Thank you for your cooperation.

Sincerely,

ORIGINAL SIGNED BY:
JUDITH A. JOUSTRA

Judith A. Joustra
Division of Nuclear Materials Safety

License No. 06-02135-08
Docket No. 030-03776
Control No. 124118

Enclosure:
Amendment No. 21

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ML 10

DOCUMENT NAME: R:\WPS\MLTR\L0602135.08

To receive a copy of this document, indicate in the box: "C" = Copy w/o attach/encl "E" = Copy w/ attach/encl "N" = No copy

OFFICE	DNMS/RI	N	DNMS/RI					
NAME	JJoustra							
DATE	04/07/97		04/ /97		04/ /97		04/ /97	

OFFICIAL RECORD COPY

PERKIN ELMER

The Perkin-Elmer Corporation
761 Main Avenue
Norwalk, CT 06859-0001

03003776
06-02135-08

January 9, 1997

USNRC
475 Allendale Road
King of Prussia PA 19406

RE: Materials License # 06-02135-08
Materials License # 06-02135-12G

The Perkin-Elmer Corp. is requesting amendments to the subject Material Licenses. First, we wish to add the following Electron Capture Detector (ECD) to each license:

Device Model Number	Isotope	Activity
200155	Ni-63	15 mCi

This detector cell assembly was evolved from our currently licensed N610-0063 / N610-0134 devices. The construction has been modified to allow use of the cell assembly into a different series of Perkin-Elmer gas chromatographs. Currently, this device is undergoing safety evaluation by Mr. Brian Smith of Mr. Steve Baggett's group. Approval is expected in the next few weeks.

Second, we wish to add Cyril Fernandes to license 06-02135-08.

Amendment fees in the amount of $580 and $290 for fee categories 3B and 3J are enclosed, as well as two copies of our application for your files.

Sincerely,

John Widomski
Radiation Safety Officer
Analytical Instruments Division

Cc: C. Fernandes
K. Liepins

Enclosures: 6

124118

Tel (203) 762-1000
Fax (203) 762-6000

ML 10

JAN 17 1997

January 09, 1997

Supplement to: APPLICATION FOR MATERIAL LICENSE
B. AMENDMENT TO LICENSE NUMBERS
06-02135-08

5. RADIOACTIVE MATERIAL
No Change

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED
No Change

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING EXPERIENCE
Add to current list "Cyril Fernandes" Experience summary follows:

Addition	Where Trained	Training Duration	On the Job
Cyril Fernandes Director of Operations PE PHOTOVAC	a) PE b,c,d) None	6 years	yes

8. TRAINING FOR INDIVIDUAL(S) WORKING IN OR FREQUENTING RESTRICTED AREAS
Not applicable

9. FACILITIES AND EQUIPMENT
b. Sealed sources are stored in Source Housing, Model #:
0330-0119
N600-0204
N610-0133
add N610-0363

10. RADIATION SAFETY PROGRAM
No change.

11. WASTE MANAGEMENT
Not applicable

NRC FORM 313
(9-88)
10 CFR 30, 32, 33, 34, 35 and 40

APPLICATION FOR MATERIAL LICENSE

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED BY OMB
3150-0120
Expires: 6-30-90

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

APPLICATIONS FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

U.S. NUCLEAR REGULATORY COMMISSION
DIVISION OF INDUSTRIAL AND MEDICAL NUCLEAR SAFETY, NMSS
WASHINGTON, DC 20555

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS, IF YOU ARE LOCATED IN:

CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION I
NUCLEAR MATERIALS SAFETY SECTION B
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406

ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION II
NUCEAR MATERIALS SAFETY SECTION
101 MARIETTA STREET, SUITE 2900
ATLANTA, GA 30323

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION III
MATERIALS LICENSING SECTION
799 ROOSEVELT ROAD
GLEN ELLYN, IL 60137

ARKANSAS, COLORADO, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, SOUTH DAKOTA, TEXAS, UTAH, OR WYOMING, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
MATERIAL RADIATION PROTECTION SECTION
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TX 76011

ALASKA, ARIZONA, CALIFORNIA, HAWAII, NEVADA, OREGON, WASHINGTON, AND U.S. TERRITORIES AND POSSESSIONS IN THE PACIFIC, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION V
NUCLEAR MATERIALS SAFETY SECTION
1450 MARIA LANE, SUITE 210
WALNUT CREEK, CA 94596

030-03776

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTION.

1. THIS IS AN APPLICATION FOR *(Check appropriate item)*

- [ ] A. NEW LICENSE
- [X] B. AMENDMENT TO LICENSE NUMBER 06-02135-08
- [ ] C. RENEWAL OF LICENSE NUMBER _____

2. NAME AND MAILING ADDRESS OF APPLICANT *(Include Zip Code)*

Perkin-Elmer Corporation
761 Main Avenue
Norwalk, CT 06859-0098

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED.

Perkin-Elmer Corporation
761 Main Avenue
Norwalk, CT 06859

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

John Widomski

TELEPHONE NUMBER: (203) 762-6452

SUBMIT ITEMS 5 THROUGH 11 ON 8½ x 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL
a. Element and mass number, b. chemical and/or physical form, and c. maximum amount which will be possessed at any one time.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES AND EQUIPMENT

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSEE FEES *(See 10 CFR 170 and Section 170.31)*
FEE CATEGORY: 3B
AMOUNT ENCLOSED: $ 580.00

13. CERTIFICATION. *(Must be completed by applicant)* THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, AND 40 AND THAT ALL INFORMATION CONTAINED HEREIN, IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948, 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

SIGNATURE-CERTIFYING OFFICER	TYPED/PRINTED NAME	TITLE	DATE
Kaspar Liepins	Kaspar Liepins	Director, Product Assurance	1-8-97

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS

AMOUNT RECEIVED	CHECK NUMBER

124118

APPROVED BY: OFFICIAL RECORD COPY ML 10

DATE: JAN 17 1997

NRC FORM 313 (9-88)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 7.5 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE OFFICE OF INFORMATION AND REGULATORY AFFAIRS, OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

APPLICATION FOR RADIATION SAFETY
EVALUATION OF SEALED SOURCES
(July. '96 - Rev. A)

APPLICANT: Perkin-Elmer Corporation
Chromatography Division
PE Photovac
Norwalk, CT 06859-0184

Copy # 1

APPLICATION FOR RADIATION SAFETY EVALUATION AND REGISTRATION OF SEALED SOURCES - Amendment to Perkin Elmer Registry No. NR-536-D-110B

DATE:	August 1996
APPLICANT:	THE PERKIN-ELMER CORPORATION CHROMATOGRAPHY DIVISION PE Photovac 761 Main Avenue Norwalk, Connecticut 06859-0184
DEVICE TYPE	Detector Cell Assembly
MODELS	PE Photovac 200155
SOURCE MANUFACTURER	Nuclear Radiation Development Inc. 2937 Alt Blvd. Grand Island, N.Y. 14072 Model N1001 Amersham/Searle Corporation 26375 Clearbrook Drive Arlington Heights, Illinois Model N.B.C. 7020
RADIONUCLIDE	Nickel 63
MAXIMUM ACTIVITY	15 milliCuries
LEAK TEST FREQUENCY	3 years
PRINCIPLE USE	N (Ion Generator, Chromatography) Amendment to Perkin Elmer Registry No. NR-536-D-110B Amendment to Perkin Elmer General and Specific Licenses 06-02135-12G and 06-02135-08 respectively
CUSTOM DEVICE	NO

DESCRIPTION

PE Photovac Gas Chromatographs may contain the ECD assembly containing the 200155 cell. The Electron Capture Detector (ECD) for these gas chromatographs consists of a heater block, a temperature controlling mechanism and a Nickel-63 foil situated in a cylindrical cavity of a two piece stainless steel detector body. The sealed source foil for use in the cell assembly consists of a corrosion resistant metal foil substrate which has a radioactive material (Nickel 63) electrolytically deposited on one side. The two body parts are fixed together using four anti-tamper screws. See attached construction section for detailed drawings which include dimensions.

An effluent transfer tube (Anode) is located in line with the horizontally arranged source. At the cell (Cathode) the carrier gas (nitrogen, argon/methane) contacts the cylindrically formed foil and exits through a small tube at the other end of the detector.

The 200155 cell assembly is identical to previously evaluated and registered models N610-0063 and N610-0134. PE Photovac model number 200155 is somewhat different mechanically to meet the needs of PE Photovac Gas Chromatographs.

DRAWING

See attached Photograph section

LABELING

Each cell is stamped with an individual serial number. An aluminum plate containing the radiation symbol, the statement "DANGER RADIOACTIVE MATERIAL" , the isotope, activity, date and maximum operating temperature is affixed to the cell body.

The PE Photovac cell is enclosed in a ECD oven enclosure with the lid of the oven enclosure marked with the standard radioactive material symbol and the words "CAUTION - RADIOACTIVE MATERIAL ". In addition, the lid will also contain the following text:

On *(date)*, this device was determined to contain *15* milliCuries of Nickel 63, a radioactive isotope. The receipt, possession, use and transfer of this device Model No. *200155*, Serial No. *(Serial No.)* are subject to a general license or the equivalent of the U.S. Nuclear Regulatory Commission or of a state with which the NRC has entered into a agreement for the exercise of regulatory authority.

The **ELECTRON CAPTURE DETECTOR CELL IS NOT A CUSTOMER SERVICED PART**. This part is not to be removed, replaced, altered, adjusted or tampered with by the user. Please refer to the ECD section of the Operator Manual supplied with your gas chromatograph.

TESTING

This device must be tested at intervals of no longer than 3 years (1 year in Canada) as required by 10 C.F.R. §31.5(c)(2) and equivalent Canadian regulations for leakage of radioactive material. Please refer to ECD section of the Operator Manual for testing instructions.

The device is labeled in accordance with the requirements of 32.51 (3) if generally licensed. The device will be labeled in accordance with 10 CFR 20.203 when distributed to persons specifically licensed.

See attached "Labeling" section for label drawings which include dimensions.

CONDITION OF USE

The ECD is designed to produce an ionized atmosphere for quantitative and qualitative measurement of elements in gas streams. It is an integral component of the PE Photovac Chromatograph. The ECD will be used in laboratory and field environs by persons trained in the use of gas chromatograph equipment. The ECD will normally be operated at a temperature not exceeding 250°C ± 10°C. The ECD has a rated maximum temperature of 450°C ± 10°C as per Perkin-Elmer registry # NR -536-D-110B.

DETAILS OF CONSTRUCTION

See attached "Construction" section.

TESTING OF PROTOTYPES

The device was tested to the guidelines of ANSI N542. The tests consisted of the following:

Temperature test
External Pressure Test
Impact Test.

In addition tests were carried out for Catastrophic temperature control failures.

See attached "Prototype Tests" section for detailed results

EXTERNAL RADIATION LEVELS

Since the walls of the detector cell are far in the excess of the range of maximum energy beta particles emitted from the contained source, surface readings on the cell should not be expected to exceed ambient background levels.

See attached reports in the "Radiation level" section.

QUALITY ASSURANCE

The source manufacturer performs the following tests on the cell prior to shipment to PE Photovac.

Pressure test
Saturation current test
Wipe test

PE Photovac will perform the following tests :

Visual examination of cell for mechanical defects
Examination of corresponding test results for the ECD from the manufacturer
Wipe Test

Wipe tests are analyzed by National Leak Test Center, P.O. Box 486, North Tonawanda, New York, 14120

A label (PE Photovac Part No. 501612) includes the appropriate radiation safety related documentation and accompanies all ECD shipments. See Labeling section for the drawing which includes dimensions and label print text.

ECD cells are routed through the factory in a strictly controlled sequence used with previously evaluated and registered cells. Attached in the Quality Assurance section are flowcharts detailing the routing of ECD cells through the PE Photovac facility.

Distribution information for the ECD is to be stored in Shipping and Quality.

Quarterly reports are to be submitted to the NRC. Report details are defined in the "Quality Assurance" section.

LEAK TESTING DURING USE

The cell is to be leak tested at intervals not to exceed 3 years. The tests should be conducted in accordance with PE Photovac Operator Manual procedures. Attached are applicable pages in the "Operators Manual" section.

DOCUMENTATION ACCOMPANYING THE SEALED SOURCE

Operators manual sections detailing proper maintenance and use of the ECD accompany each PE Photovac GC.

OVERSIZE
DOCUMENT
PAGE(S) PULLED

SEE APERTURE CARD FILES

APERTURE CARD/PAPER COPY AVAILABLE THROUGH NRC FILE CENTER

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NUMBER OF OVERSIZE PAGES FILMED ON APERTURE CARD(S) 1

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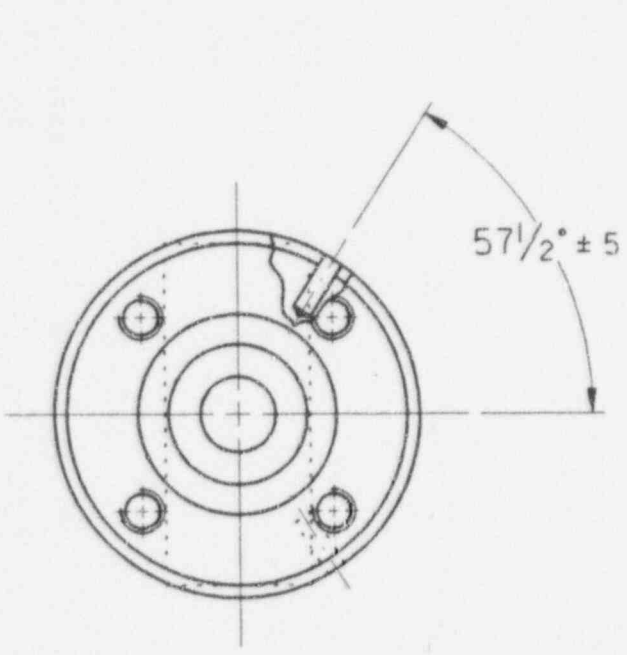
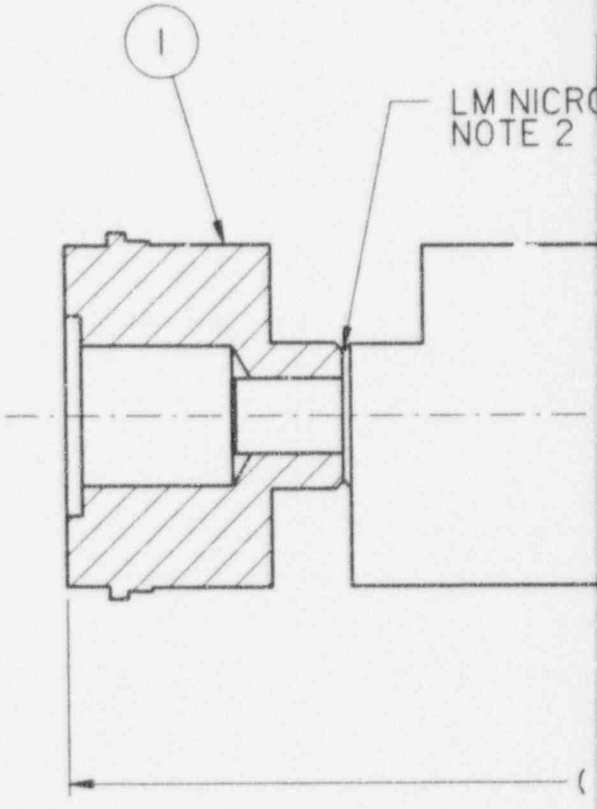
ACCESSION NUMBERS OF OVERSIZE PAGES:

9706160131-01

UNLESS OTHERWISE SPECIFIED					
DECIMALS		FRACTIONS	ANGLES	SURFACE ROUGHNESS	DIMENSIONS ARE IN INCHES
2 PLACE	3 PLACE				ALL DIAS ON SAME AXIS CONC WITHIN .006 TIR
± ---	± ---	± ---	± ---	--- √ AA MAX	BREAK SHARP EDGES .01R OR .01 X 45° MAX
					ALL DIMENSIONS AND TOL APPLY BEFORE FINISH





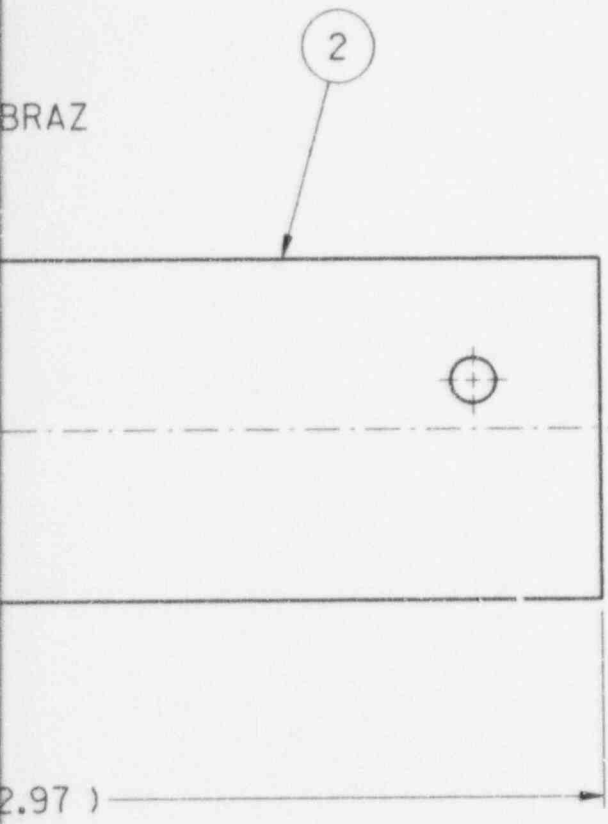
CHG	DESCRIPTION	DATE
1	IST ISSUE	6/11/96

QTY	USED ON
1	N610-0363

N610-0369

MATERIALS LIST

ITEM	DWG SIZE	P-E NO.	DESCRIPTION	QTY
1	B	N610-1145	BODY-9000 ECD	1
2	C	N610-3149	BASE-ASXL ECD	1



NOTES:

1. PRESS FIT BODY (ITEM 1) ONTO BASE (ITEM 2) UNTIL IT BOTTOMS.
2. VACUUM BRAZE WHERE INDICATED BELOW PER P.E. SPEC #1222. ALL INSIDE BORES OF ITEMS 1 AND 2 TO BE FREE OF BRAZING MATERIAL. BRAZE JOINTS TO BE FREE OF LEAKS TO 100 PSI OF HELIUM.

COMPUTER GENERATED DRAWING

DO NOT SCALE DRAWING

PERKIN ELMER
NORWALK, CONNECTICUT

MATERIAL: MATERIAL LIST	DRAWN F. ANELLO	DATE 6/11/96	BRAZE ASSY-ASXL ECD BASE
	CHECKED D. CLARK	DATE 6/11/96	
	PROJ ENGR D. CLARK	DATE 6/11/96	
FINISH: ----	APPROVED T. LYONS	DATE 6/11/96	B N610-0369 1 CHG
	SCALE 2:1		

9706160131-02

OVERSIZE
DOCUMENT
PAGE(S) PULLED

SEE APERTURE CARD FILES

APERTURE CARD/PAPER COPY AVAILABLE THROUGH NRC FILE CENTER

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NUMBER OF OVERSIZE PAGES FILMED ON APERTURE CARD(S) 1

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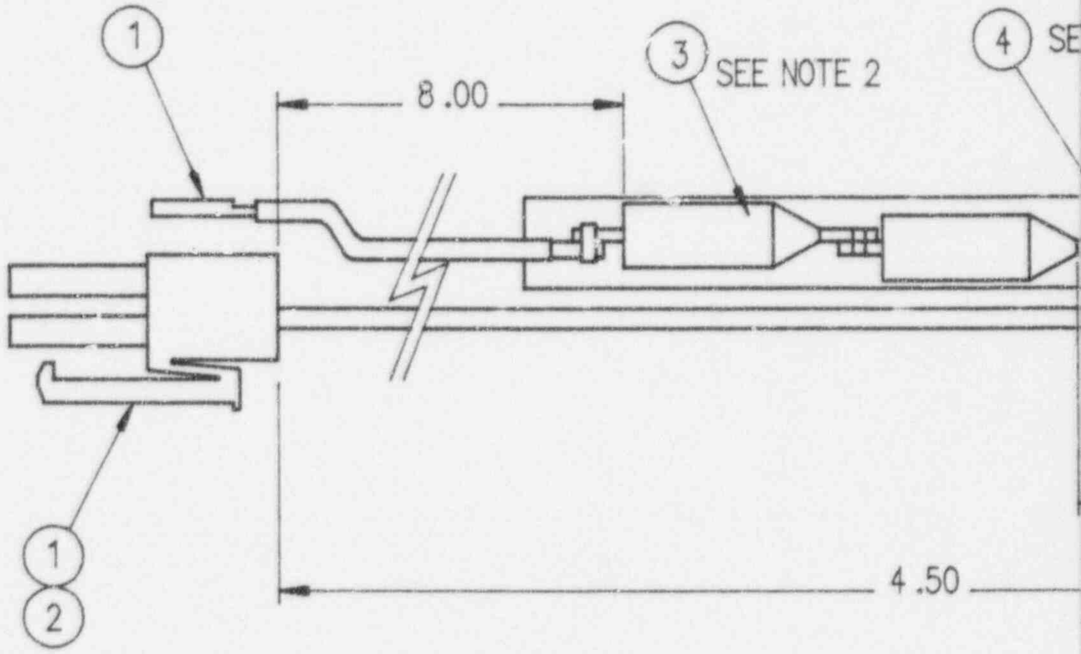
ACCESSION NUMBERS OF OVERSIZE PAGES:

9706160131-03

DWG NO.	80 1229	SHT.	1	REV.	Ø



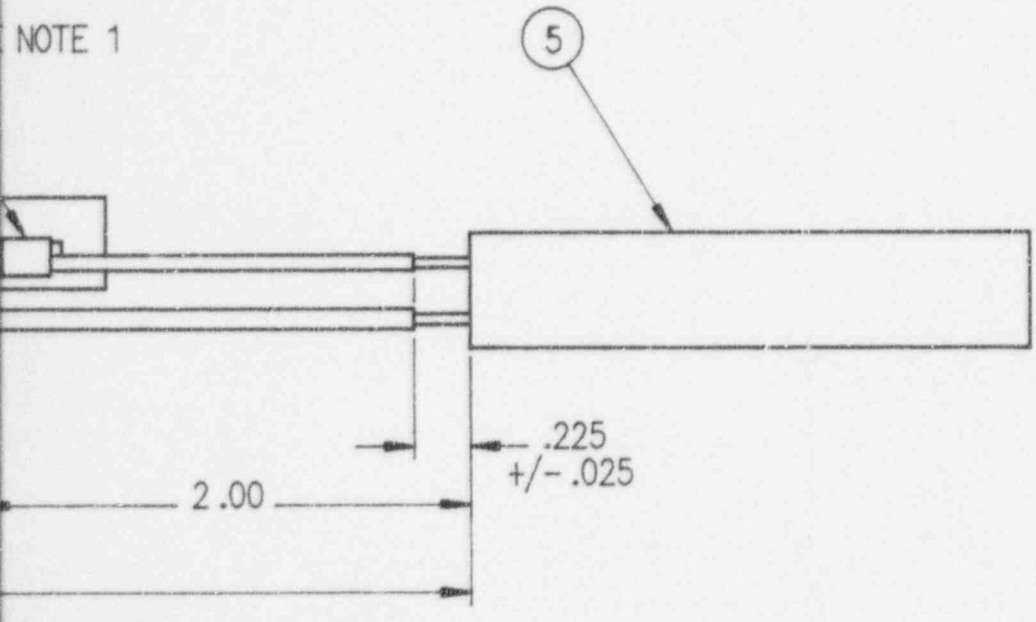
MATERIAL	TOLERANC	
SEE PARTS LIST 30 1229	HOLE DIAMETERS	
SPECIFICATION	.0135 - .250	+.003 -.003
	.251 - .500	+.004 -.003
FINISH	.501 - .750	+.005 -.004
	.751 - 1.000	+.007 -.005

MATERIALS

ITEM	PART #	QTY	DESCRIPTION
1	400142-03	2	CONNECTOR TERMINAL
2	400151-27	1	CONN. HOUSING, 2 PIN, LOCKING
3	400498	1	THERMAL CUTOFF ASSY.
4	400119-12	1	CRIMPING LUG, PARALLEL
5	400217-08	1	HEATER, CARTRIDGE, Ø.188 x 1.5, 44 WATT MAX.

1. CRIMPING LUG MUST BE .125" MIN. AWAY FROM CUTOFF BODY.
2. SILICONE/FIBERGLASS SLEEVING IS PART OF THE THERMAL CUT-OFF ASSEMBLY.

NOTE 1



REV.	ECO #	DESCRIPTION	DATE

REVISIONS

- INCHES		APPROVALS	DATE
MENSIONS	FEATURES	DRAWN BY: MB TRUTER	7 JUNE 96
ECIMAL ± 1.00 ± .063	63 32	CHECKED BY:	June 26/96
		APPROVED BY:	June 26/96
GLES ± 1°		ON ASSY:	
		BREAK ALL EDGES .010 REMOVE ALL BURRS	

PE PHOTONICS
330 COCHRANE DRIVE
MARKHAM, ONTARIO
L3R 8E5 CANADA

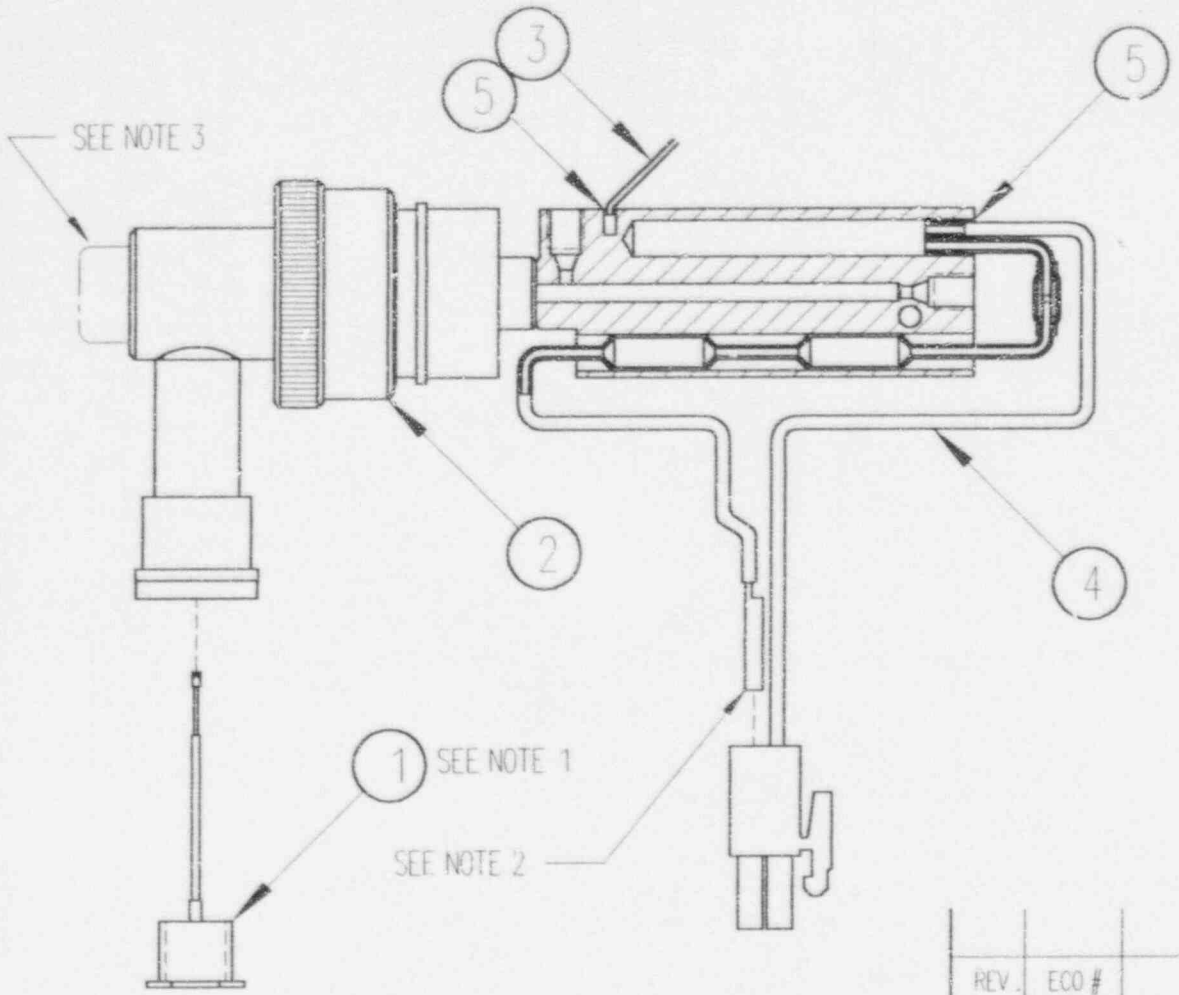
NAME: ECD HEATER ASSEMBLY

SIZE	MFG. CODE	DWG NO.	REV.
B		80 1229	Ø

SCALE 3:1 DO NOT SCALE THIS DRAWING SHEET 1 OF 1

9706160 131-04

DWG NO.	SHT.	REV.
803133	1	B



ITEM	QTY.	DESCRIPTION
1	1	301231, ECD SIGNAL CONNECTOR ASSY.
2	1	N610-0363, ECD ASSY.
3	1	301230, ECD TEMPERATURE SENSOR ASSY.
4	1	301229, ECD HEATER ASSY.
5	1	600271-09, SEALANT, EPOXY

1) REMOVE BNC CONNECTOR ASSEMBLY AS SUPPLIED AND REPLACE WITH 301231 SIGNAL CONNECTOR ASSEMBLY.

2) INSTALL TERMINAL INTO CONNECTOR HOUSING.

3) DISCARD CAP SUPPLIED WITH ECD CELL ASSEMBLY.

CAUTION: DETECTOR CONTAINS RADIOACTIVE MATERIAL. DO NOT DISASSEMBLE

REVISIONS

REV.	ECO #	DESCRIPTION	DATE

MATERIAL: SEE B.O.M. 200155

SPECIFICATION: N/A

FINISH: N/A

TOLERANCES - INCHES

HOLE DIAMETERS		DIMENSIONS	FEATURES
.0135 - .250	+.003 -.003	DECIMAL	63
.251 - .500	+.004 -.003	.XX ± .030	32
.501 - .750	+.005 -.004	.XXX ± .010	
.751 - 1.000	+.005 -.005	ANGLES ± 1°	

APPROVALS		DATE
DRAWN BY:	MBassett	17/06/96
CHECKED BY:	D.S.	13/01/97
APPROVED BY:	MS	13/01/97
ON ASSY:		

PE PHOTOVAC

330 COCHRANE DRIVE
MARKHAM, ONTARIO
L3R 8E5 CANADA

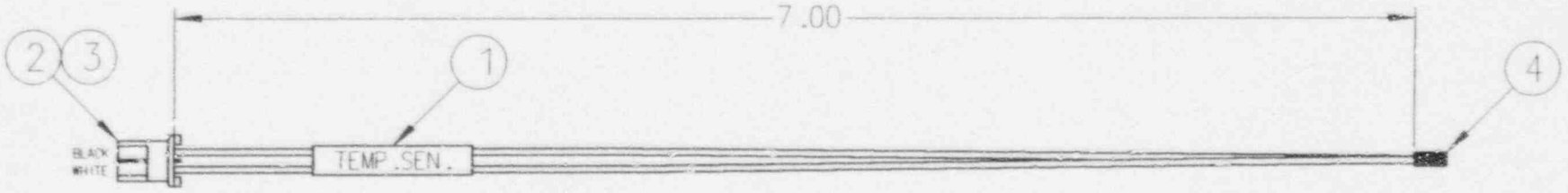
ECD MODEL 200155

SIZE	MFG. CODE	DWG NO.	REV.
A	N/A	803133	B

SCALE 1:1 DO NOT SCALE THIS DRAWING SHEET 1 OF 1

DWG NO.	SHT.	REV.
803134	1	A

ITEM	PART #	QTY.	DESCRIPTION
1	501622-01	1	LABEL, CABLE ASSEMBLY ID MARKER 'TEMP. SEN.'
2	400155-02	1	CONNECTOR HOUS INC, SPOX, 2 CIRCUIT, FEMALE
3	400152-01	2	CONNECTOR TERMINAL, FEMALE CRIMP, 22-28 AWG
4	400035-07	1	TEMPERATURE SENSOR, RTD, 1000 OHMS



REV.	ECO #	DESCRIPTION	DATE

REVISIONS

MATERIAL: SEE B.O.M. 301230

SPECIFICATION:

FINISH:

TOLERANCES - INCHES

HOLE DIAMETERS		DIMENSIONS	FEATURES
.0135 - .250	+.003 -.003	DECIMAL .XX ± .13	63 32
.251 - .500	+.004 -.003		
.501 - .750	+.005 -.004		
.751 - 1.000	+.007 -.005	ANGLES ± 1°	

APPROVALS		DATE
DRAWN BY:	D. BRAY	8/08/96
CHECKED BY:		13/01/98
APPROVED BY:		13/01/97
ON ASSY:		

BREAK ALL EDGES .010
REMOVE ALL BURRS

PE PHOTOVAC
330 COCHRANE DRIVE
MARKHAM, ONTARIO
L3R 8E5 CANADA

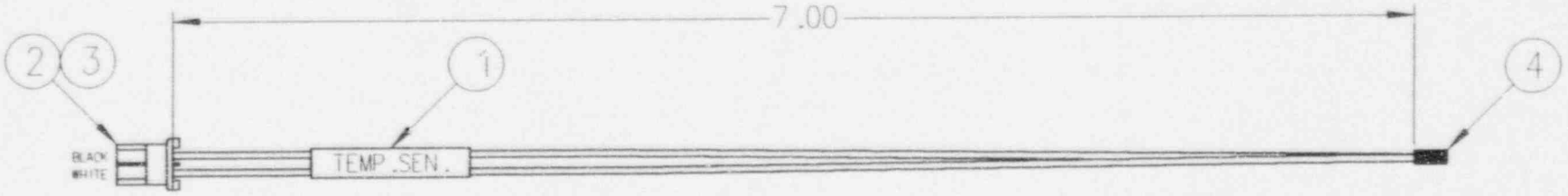
ECD TEMPERATURE SENSOR ASSEMBLY

SIZE	MFG. CODE	DWG NO.	REV.
A		803134	A

SCALE 1:1 DO NOT SCALE THIS DRAWING SHEET 1 OF 1

DWG NO.	SHT.	REV.
803134	1	A

ITEM	PART #	QTY.	DESCRIPTION
1	501622-01	1	LABEL, CABLE ASSEMBLY ID MARKER 'TEMP. SEN.'
2	400155-02	1	CONNECTOR HOUSING, SPOX, 2 CIRCUIT, FEMALE
3	400152-01	2	CONNECTOR TERMINAL, FEMALE CRIMP, 22-28 AWG
4	400035-07	1	TEMPERATURE SENSOR, RTD, 1000 OHMS



REV.	ECO #	DESCRIPTION	DATE

REVISIONS

MATERIAL: SEE B.O.M. 301230

SPECIFICATION:

FINISH:

TOLERANCES - INCHES

HOLE DIAMETERS		DIMENSIONS	FEATURES
.0135 - .250	+.003 -.003	DECIMAL .XX ± .13	63 32
.251 - .500	+.004 -.003		
.501 - .750	+.005 -.004		
.751 - 1.000	+.007 -.005	ANGLES ± 1°	

APPROVALS		DATE
DRAWN BY:	D. BRAY	8/08/96
CHECKED BY:	D.B.	13/01/98
APPROVED BY:	MB	13/01/97
ON ASSY:		

BREAK ALL EDGES .010
REMOVE ALL BURRS

PE PHOTOVAC
330 COCHRANE DRIVE
MARKHAM, ONTARIO
L3R 8E5 CANADA

ECD TEMPERATURE SENSOR ASSEMBLY

SIZE	MFG. CODE	DWG NO.	REV.
A		803134	A

SCALE 1:1 DO NOT SCALE THIS DRAWING SHEET 1 OF 1

DWG NO.	SHT.	REV.
803135	1	A

ITEM	QTY.	DESCRIPTION
1	1	400193-03, SUBMINI COAX JACK
2	1	400137-03, POGO PIN

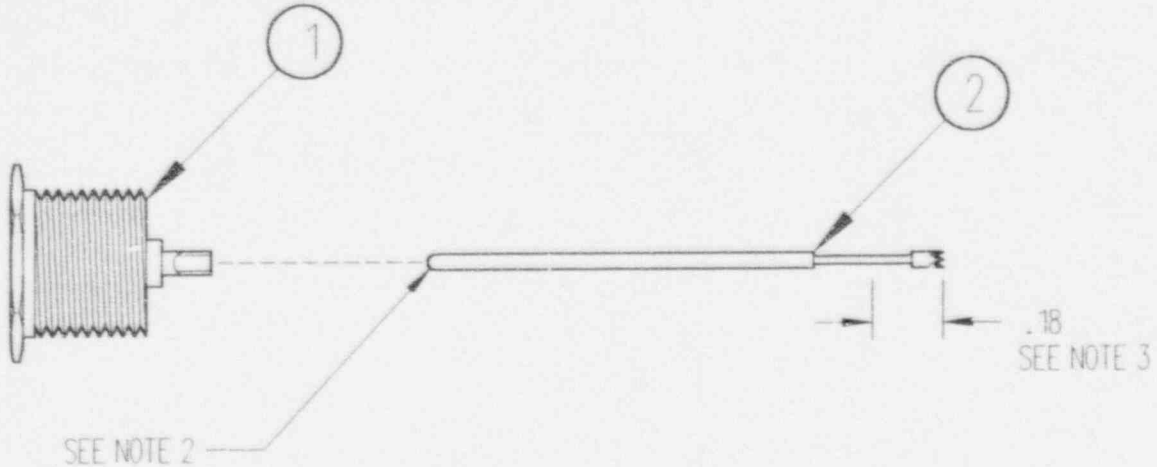
NOTES:

1) SOLDER POGO PIN (ITEM 2) TO COAX JACK (ITEM 1). THE PIN MUST BE BOTTOMED IN THE COAX SOLDER CUP.

2) MASK END OF PIN PRIOR TO SOLDERING.

3) FULL TRAVEL OF THE PIN TIP IS REQUIRED AFTER SOLDERING.

4) DISCARD NUT SUPPLIED WITH COAX JACK. RETAIN LOCK WASHER.



REV.	ECO #	DESCRIPTION	DATE

REVISIONS

MATERIAL
SEE B.O.M. 301231

SPECIFICATION
N/A

FINISH
N/A

TOLERANCES - INCHES

HOLE DIAMETERS		DIMENSIONS	FEATURES
.0135 - .250	+.003 -.003	DECIMAL	63 32
.251 - .500	+.004 -.003	.XX ± .030	
.501 - .750	+.005 -.004	.XXX ± .010	
.751 - 1.000	+.005 -.005	ANGLES ± 1°	

APPROVALS		DATE
DRAWN BY:	M Bassett	29/05/96
CHECKED BY:	D.B.	13/01/97
APPROVED BY:	MJS	13/01/97
ON ASSY:		

PE PHOTOVAC

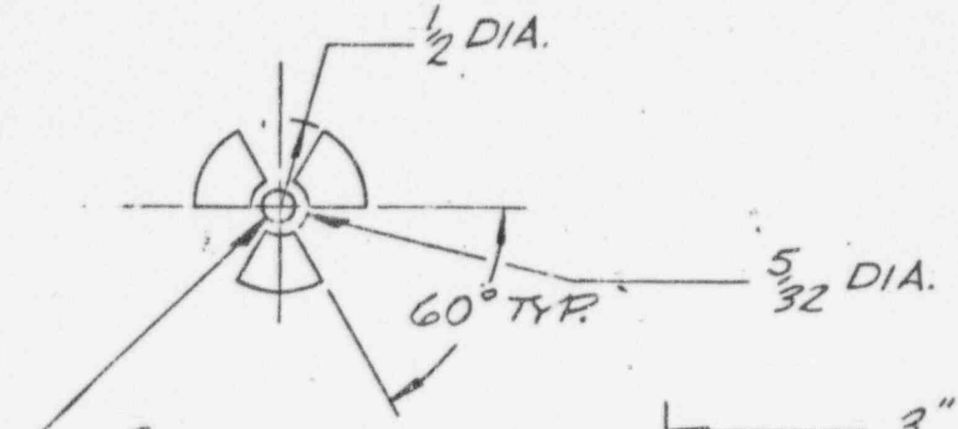
330 COCHRANE DRIVE
MARKHAM, ONTARIO
L3R 8E5 CANADA

ECD SIGNAL CONNECTOR ASSEMBLY

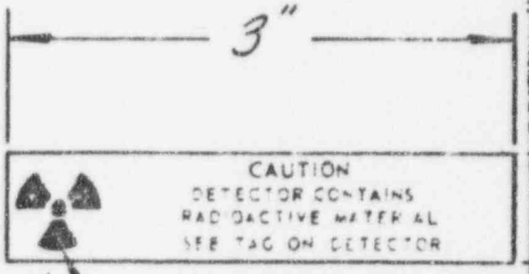
SIZE	MFG. CODE	DWG NO.	REV.
A	N/A	803135	A

SCALE 2:1 DO NOT SCALE THIS DRAWING SHEET 1 OF 1

UNLESS OTHERWISE SPECIFIED					
DECIMALS		FRACTIONS	ANGLES	SURFACE ROUGHNESS	DIMENSIONS ARE IN INCHES
2 PLACE	3 PLACE	± 1/64	±	√ 64 MAX.	ALL DIAS. ON SAME AXIS CONC. WITHIN .006 T.I.R.
± .01	± .005				BREAK SHARP EDGES .01R. OR .01 x 45° MAX.
					ALL DIMENSIONS AND TOL. APPLY BEFORE FINISH



DETAIL A
SCALE 2:1



SEE DETAIL

CHG.	DESCRIPTION	DATE	C.N. NO.
B	REV. 63774	11/27/85	
A	DR 4617	10-8-85	

QTY.	USED ON
1	N600-0204
1	009-0921-
1	009-0911-

009-1650 | B | CHG.

NOTES:

1.—LETTERING AND RADIATION SYMBOL TO BE MAGENTA OR PURPLE.
2.—BACKGROUND TO BE YELLOW.
3.—COLORS TO BE FADE RESISTANT UNDER NORMAL AMBIENT CONDITIONS.
4.—MATERIAL: 0.003 THICK MYLAR WITH ADHESIVE
5.—LETTERING INFORMATION MAY BE OBTAINED FROM P.E SHOP NEGATIVE NUMBER HC-7810.

5/8

"A"

DO NOT SCALE DRAWING

PERKIN-ELMER
INSTRUMENT DIVISION NORWALK, CONNECTICUT

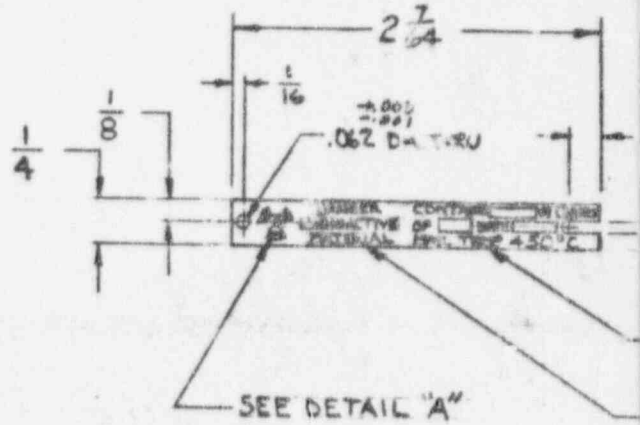
MATERIAL SEE NOTES	DRAWN ORAVSKY	DATE 10-18-68	LABEL - RADIOACTIVITY E.C.D.
TREATMENT +	CHECKED Hal Alberty	DATE 10-18-68	
	PROJ. ENGR. Hal Alberty	DATE 10-18-68	
FINISH SEE NOTES	APPROVED	DATE	B 009-1650 B
	SCALE 1:1		

9706160131-05

UNLESS OTHERWISE SPECIFIED					
DECIMALS		FRACTIONS	ANGLES	SURFACE ROUGHNESS	DIMENSIONS ARE IN INCHES
2 PLACE	3 PLACE	± 1/64	± 1° / ± 1/2	√ AA. MAX.	ALL DIAS. ON SAME AXIS CONC. WITHIN .006
± /	± /				BREAK SHARP EDGES .01R. OR .01 x 45° MAX
					ALL DIMENSIONS AND TOL. APPLY BEFORE F

NOTES:

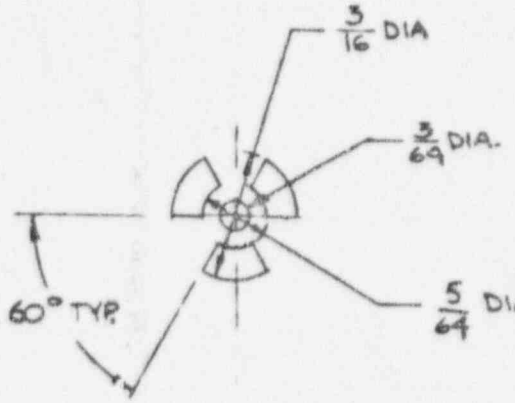
1. CHARACTERS MUST BE LEGIBLE AFTER EXTENDED EXPOSURE AT 450°C.
2. CHARACTERS TO BE FLAT BLACK ON MATTE ALUMINUM BACKGROUND.
3. CHARACTERS (AS SPECIFIED) & BOXED AREAS TO BE PLACED AS SHOWN.



CHG.	DESCRIPTION	DATE	E.N. NO.
B	REV.	8-10-79	33053
A	DE 10910	1/21/76	—

QTY.	USED
1	N600-02
1	330-0

ID. 1.3.3.0.-1.8.3.2 B CHG.



DETAIL "A"
4:1

ANSTEC APERTURE CARD

Also Available on Aperture Card

1/16

COPPERPLATE GOTH. C 2 POINT U/C

SANS SERF - 6 POINT BOLD U/C

DO NOT SCALE DRAWING

PERKIN-ELMER
INSTRUMENT DIVISION NORWALK, CONNECTICUT

MATERIAL # 30(.010) GA #1100-H14 ALUM.	DRAWN CIZMARIK	DATE 10/7/76	LABEL-ECO LOWER RADIOACTIVITY		
TREATMENT —	CHECKED	DATE 10.19.76			
	PROJ. ENGR.	DATE 10-21-76			
FINISH SEE NOTES	APPROVED	DATE	B SIZE	ID. 1.3.3.0.-1.8.3.2	B CHG.
	SCALE 1:1				

FORM 1-0117-02

9706160131-06

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN MILLIMETERS	DIMENSIONS AND TOL APPLY BEFORE FINISH	MAXIMUM INTERNAL RADIUS 0.2

SURFACE ROUGHNESS	HOLE ⩽ 50 DIAMETER	DIAMETER/ LINEAR DIMENSIONS	⩾ 0.5 ⩽ 6	> 6 ⩽ 30	> 30 ⩽ 120	> 120 ⩽ 315	> 315 ⩽ 1 000	> 1 000 ⩽ 2 000	F D
√ Ra MAX	TOLERANCE - JS13	TOLERANCE	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	

(80)

PERKIN ELMER

PE Photovac Model 200155 CERTIFICATION

^{63}Ni Electron Capture Detector

Save for proof of tests.

The attached source complies with the requirements of ANSI N542 (ISO 2919) Classification C32211. This source has been leak tested and is certified to have less than 0.005 µCi, 180 Bq of removable contamination.

Serial Number	Date Received
Assay Number Isotope ^{63}Ni	Activity

Wipe Test Date			
Contamination Removed	µCi	µCi	µC
	Bq	Bq	Bq

Pressurization test at 30psi N_2; Passed:

Initial Test Performed by
Signature

Markham, Ontario, Canada

N610-3148 A

CHG	DESCRIPTION	DATE
A	DR #27450	96/07/03
1	IST ISSUE	96/06/24

QTY	USED ON
1	N610-0363

N610-3148

BREAK SHARP EDGES 0.3 X 45° MAXIMUM					ALL DIAMETERS ON SAME AXIS CONCENTRIC WITHIN 0.2 TIR				
ADII/CHAMFER MENSIONS	≥ 0.5 ≤ 3	> 3 ≤ 6	> 6 ≤ 30	> 30 ≤ 120	> 120 ≤ 315	ANGULAR (SHORTER SIDE LENGTH)	≤ 10	> 10 ≤ 50	> 50 ≤ 120	> 120 ≤ 400
OLERANCE	± 0.2	± 0.5	± 1	± 2	± 4	TOLERANCE	± 1°	± 0.5°	± 0.3°	± 0.2°

(126)

NOTES:

1. PRINT LABEL USING ZEBRA TECHNOLOGIES CORPORATION, MODEL 170Xi OR 90Ki THERMAL TRANSFER PRINTER.
2. USE FILE NO. N61Ø3148\Ø1.PCX TO PRINT LABEL.

9706160131-07

THIRD ANGLE

DO NOT SCALE DRAWING

PERKIN ELMER
NORWALK, CONNECTICUT

MATERIAL	DRAWN	DATE
0211-3342	F. ANELLO	96/06/24
	CHECKED R. VESCIGLIO	DATE 96/06/24
	PROJ ENGR D. CLARK	DATE 96/06/24
FINISH	APPROVED T. LYONS	DATE 96/06/24
----	SCALE 1:1	

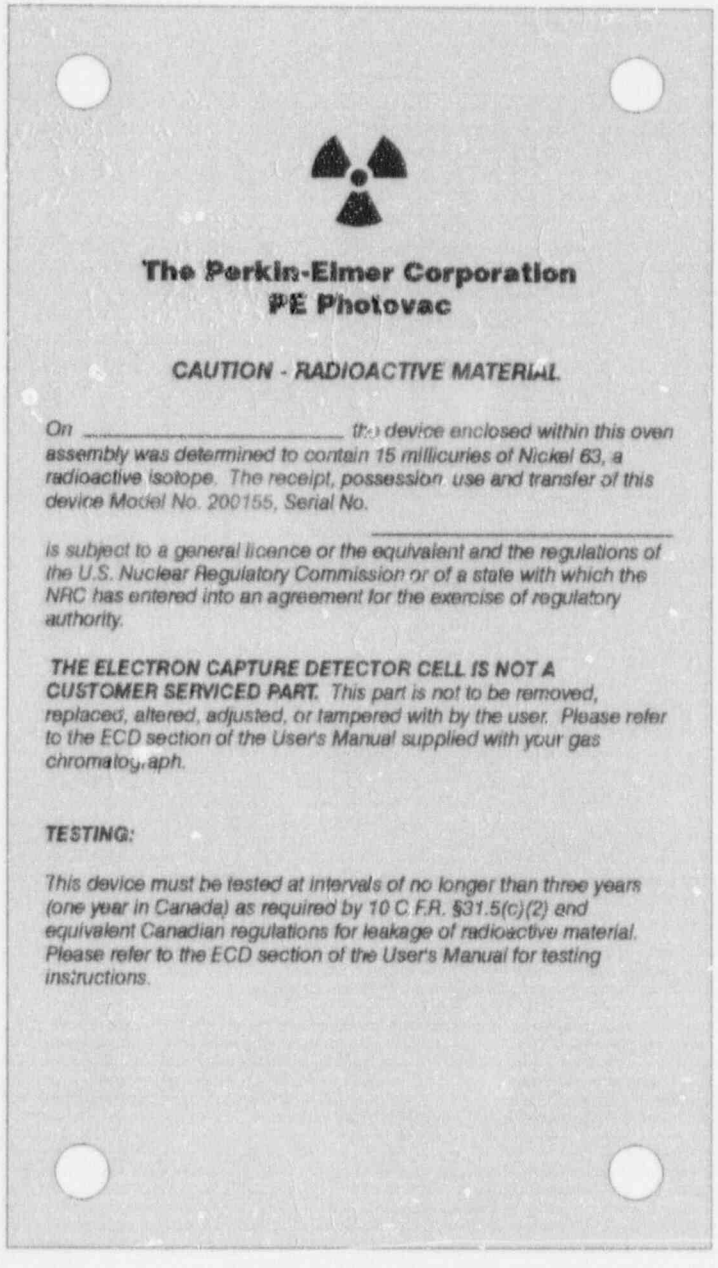
LABEL-ASXL
ECD LEAK TEST

B | N610-3148 | A CHG

PE PHOTOVAC

330 Cochrane Drive
Markham, Ontario
Canada L3R 8E5

4 June, 1996
Part #501585, Revision 1
ECD Housing Lid
Artwork #851453,
Revision Ø



The Perkin-Elmer Corporation
PE Photovac

CAUTION - RADIOACTIVE MATERIAL

On _____ the device enclosed within this oven assembly was determined to contain 15 millicuries of Nickel 63, a radioactive isotope. The receipt, possession, use and transfer of this device Model No. 200155, Serial No. _____ is subject to a general licence or the equivalent and the regulations of the U.S. Nuclear Regulatory Commission or of a state with which the NRC has entered into an agreement for the exercise of regulatory authority.

THE ELECTRON CAPTURE DETECTOR CELL IS NOT A CUSTOMER SERVICED PART. This part is not to be removed, replaced, altered, adjusted, or tampered with by the user. Please refer to the ECD section of the User's Manual supplied with your gas chromatograph.

TESTING:

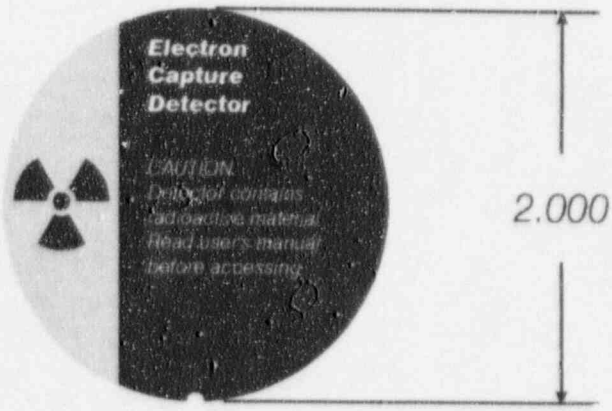
This device must be tested at intervals of no longer than three years (one year in Canada) as required by 10 C.F.R. §31.5(c)(2) and equivalent Canadian regulations for leakage of radioactive material. Please refer to the ECD section of the User's Manual for testing instructions.

Tel (905) 477-8088
Fax (905) 477-8220

PE PHOTOVAC

PE Photovac
330 Cochrane Drive
Markham, Ontario
L3R 8E5

4 June, 1996
Part #501613, Revision Ø
ECD Access Hatch Label
Artwork #851454,
Revision Ø



Tel (905) 477-8088
Fax (905) 477-8220

2. Do not mutilate cylinders.
3. Do not heat the cylinders or expose them to direct sunlight. The cylinders may rupture at high temperatures.
4. Always secure cylinders before removing the cylinder valve protection cap. You should secure the calibration gas cylinder before connecting the regulator and adapter tubing.
5. Do not drag or roll cylinders. Large cylinders should only be moved on carts designed for compressed gas cylinders. Do not move cylinders without the valve protection cap in place.
6. Wear safety glasses when working with compressed gases.
7. Do not store cylinders in a hazardous location. Store cylinders in an upright position away from possible sources of heat or sparks.
8. Never plug, obstruct or tamper with safety relief devices.

1.2.2. Regulators for Compressed Gases

1. Use only the specified regulator for carrier and calibration gas. Confirm regulator type and material with your specialty gas supplier. Use the filling station only for air or nitrogen.
2. Mark each regulator with its intended service and never use a regulator for more than one service. To ensure safety and avoid contamination, regulators should be dedicated to one service. Do not change gas service, or adapt equipment without consulting your gas supplier.
3. Ensure regulator construction materials are compatible with the gas, and that the cylinder pressure gauge will withstand the cylinder pressure.
4. Never use the regulator as a shut-off valve. Close the cylinder when it is not in use.
5. Do not subject the regulator to an inlet pressure greater than recommended.
6. Do not move or detach the regulator when it is pressurized or when it is in use.
7. Before connection, ensure the gas cylinder valve and the regulator CGA connection are clean.
8. When connecting a regulator to a large cylinder turn the pressure control valve on the cylinder all the way out (close the cylinder). Turn the regulator outlet to off. Open the gas cylinder valve slowly and check for leaks. Adjust the delivery pressure and then open the regulator outlet valve.

1.2.3. ECD Radioactive Hazards

Warning: To assure that removable radioactive contamination on the external parts of the ECD remains at a safe level, the United States Nuclear Regulatory Commission requires that the ECD be wipe tested at least once every three years and that a record of the results be maintained for NRC inspection for a period of three subsequent years.

In Canada, the ECD must be wipe tested at least once every twelve months and a record of the results must be maintained for Atomic Energy Control Board (AECB) inspection for a period of three years.

Warning: Thermal Runaway Protection: The 6823 will cut power to the heating system if any heated zone exceeds 120°C. Contact PE Photovac Service for further information.

1.2.4. Government Regulations for ECDs

Note: Do not open the instrument or attempt to remove the ECD. If the ECD must be removed from the instrument, contact the PE Photovac Service Department. See Section 9.10.

Note: The Electron Capture Detector (PE Photovac Part No. 200155) contains 15 millicuries of Nickel-63 (Ni^{63}), a radioactive material. We strongly recommended that you become familiar with the NRC regulations, as well as any other federal, state, or local regulations, covering the use of Nickel-63.

Your possession and use of this detector is governed, in the U.S., by 10 C.F.R. Section 31.5, which is reproduced in Section 9.1.4. Under the provisions of that regulation you are deemed a General Licensee.

Your possession and use of the ECD may also be regulated by the state where you are located. The requirements of state regulatory agencies are similar to those contained in NRC regulation 10 C.F.R. Section 31.5, but they may differ in some respects. You must obtain a copy of the regulations from your particular state. See Section 9.3.1 for a list of the Agreement States. Agreement States have been granted authority by the U.S. Nuclear Regulatory Commission to regulate the possession and use of radioactive material.

In Canada, use of the ECD is governed by Atomic Energy Control Regulations. Under these regulations, you must obtain a possession license before you can receive the ECD. Refer to Part II, Section 7, of the regulations for details of applying for a license. See Section 9.2.1.

You must be familiar with all the regulations governing your use of the ECD. A summary of the requirements of 10 C.F.R. Section 31.5 is listed below. The requirements of the Atomic Energy Control Regulations are similar to those of 10 C.F.R. Section 31.5.

1.2.4.1. Labels

Do not remove any of the labels attached to the ECD cell or any of the labels attached to your gas chromatograph that refer to the ECD cell. Follow all instructions and abide by all precautions provided by the labels and in user instruction manuals referred to by the labels.

1.2.4.2. Leak Testing

You are obligated under federal and state regulations to make certain that the ECD cell is wipe tested for leakage of radioactive materials at intervals of no longer than three years, and that the analysis of these wipe tests is conducted by a person specifically licensed to do so, either by the U.S. Nuclear Regulatory Commission or by an Agreement State. The analyses can be performed by the firms listed in Section 9.4.

In Canada, the ECD must be wipe tested at least once every twelve months and a record of the results must be maintained for AECB inspection for a period of three years. Refer to Regulatory Document R-116 for details. See Section 9.2.3. See section 6.2 for detailed procedure.

1.2.4.3. Cell Failure or Damage

If a leak test detects more than 0.005 millicuries of removable Ni^{63} on the surface of the ECD cell, or if the cell itself is damaged in such a way as to indicate that it may no longer adequately shield the radioactive material inside, you must immediately suspend operation of your gas chromatograph until the cell has been repaired or disposed of by a person specifically licensed to do so.

Any such incident must be reported, by you, to the Regional Office, Inspection and Enforcement, U.S. Nuclear Regulatory Commission. You must also report the incident to the regulatory authority of your Agreement State.

In Canada, you must report the incident to the AECB. See Section 6.3 for more details.

1.2.4.4. Reporting Radiation Incidents, Theft or Loss

Please read NRC Regulation 10 C.F.R. Section 20.402 and 20.403. See Section 9.1.1. In Canada, read Atomic Energy Control Regulations, Part VI, Section 20. See Section 9.2.1. These regulations describe your duties should the ECD equipped 6823 be lost, stolen, or released, or should any person be exposed to radiation.

1.2.4.5. Other Requirements

Regulation 10 C.F.R. Section 31.5 does not permit you to abandon the ECD equipped 6823 or export it. It may not be transferred except to a person specifically licensed to receive it. Within thirty days of such a transfer, you must report to the Director of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, the name and address of the transferee.

No report is needed to transfer a used or defective ECD equipped 6823 to PE Photovac in order to obtain a replacement. You may transfer the ECD equipped 6823 to another general licensee, like yourself, only when it remains at the same location to which it was shipped by PE Photovac. Give the transferee a copy of these instructions and the regulations in Appendix I, and report to the NRC as required in Regulation 10 C.F.R. Section 31.5.

Warning: Do not open or disassemble the ECD equipped 6823!

1.2.5. Battery Pack Care

Do not leave the battery pack uncharged for an extended period of time. This will result in damage to the battery pack.

1. The battery pack is XX% Cadmium (Cd) by weight.
2. Charge the battery pack using the AC adapter provided with or identified for use with this product only in accordance with the instructions and limitations specified in this manual. For AC adapter use only PE Photovac Part No. XX (North America), XX (United Kingdom), XX (Europe).

1.2.6. Excessive Heat and Cold

Do not expose the instrument to intense sunlight for prolonged periods. This may result in a rise in instrument temperature and loss of oven control.

Exposure to excessive heat may also result in instrument contamination.

Do not expose the instrument to extreme cold. Excessive low temperatures will cause decreased battery life and may result in loss of oven control.

1.2.7. Calibration Gas

You must provide adequate ventilation when 6823 is being calibrated.

If compound threshold limit values (TLVs) are exceeded, you should use a gas bag for sampling and provide adequate ventilation during calibration. When using the gas bag adapter tubing, take care not to kink or stress the tubing. Optionally you can vent the DET OUT, BKFLUSH OUT and PUMP OUT ports.

To determine the TLV of the compounds contained in the calibration gas, refer to the Material Safety Data Sheet (MSDS) supplied with your calibration gas cylinder. See Chapter 5 for complete instructions on calibrating the GC.

1.3. Unpacking

The following items are included with the 6823 Gas Chromatograph:

1. User's Manual
2. RS-232 Cable with Adapters
3. AC Adapter/Battery Charger with AC Line Cord
4. Carrier Gas Connection Kit
5. Package of 12 Septa

3.2. Setting Up the ECD

Warning: To assure that removable radioactive contamination on the external parts of the ECD remains at a safe level, the U.S. Nuclear Regulatory Commission requires that the ECD be wipe tested at least once every three years and that a record of the results be maintained for NRC inspection for a period of three subsequent years.

In Canada, the ECD must be wipe tested at least once every twelve months and a record of the results must be maintained for AECB inspection for a period of three years.

Operation of 6823 is fully automated. This includes setup and operation of the ECD. The only setup required is to vent the detector and ensure the detector has been selected for operation. Switching the column effluent to the ECD from the PID is done with the "Setup" key. You do not need to open the instrument in order to setup the ECD.

Warning: Do not open the 6823 or remove the ECD. If the ECD must be removed from the instrument contact PE Photovac Service. See Section 9.10.

To setup an ECD.

1. Locate the ECD out port and connect a suitable length of tubing to vent the detector well away from the instrument and all users. If you are using the GC indoors, you may want to vent the detector outside.

   Venting the ECD outlet does not affect the performance as long as the tubing does not provide any restriction. Ensure the tubing is not kinked or stressed.

2. The make-up gas flow is fixed for each assay. You can measure the total flow at the ECD vent. Connect the flowmeter to the ECD outlet. Measure and record the total flow.

3.3. Performing a Loop Injection Analysis

The instrument will be set up according to the method for your selected assay. To change the injection method, you must se the PC Software. Refer to the PC Software user's manual for more details.

Ensure carrier gas is supplied to the instrument.

1. Ensure the fitting caps have been removed from the ports and then connect a flowmeter to the DET OUT port. For a loop injection ensure the loop purge tube is not installed between the BKFLUSH OUT and SAMPLE IN ports.

2. Balance the flow rates as outlined in Section **Error! Reference source not found.**.

3. In the Analyzer menu, open the Status dialog box. The Lamp Status will be Started OK, or On and Reset.

   If the Lamp Status is Started, then the lamp has been tuned to its previous operating intensity. If the Lamp Status is On and Reset, then the lamp has been tuned to a different intensity. A calibration should be performed to ensure all Library data is correct. If you do not perform a calibration then the message "Warning! UV lamp was reset" is displayed to warn you that the library information may be inaccurate.

4. Check the Offset level in the Status dialog box. If it is above 100 mV allow the instrument to stabilize for about an hour. If this does not bring the signal down, condition the column overnight. See Section 6.10.

5. Open the Method menu and select Loop for an automatic injection. A check mark will appear beside the selected option.

6. Routine Maintenance

6.1. Maintenance Schedule

The 6823 requires regular maintenance to keep it operating efficiently. Replacement of some items will vary with usage.

Item/Operation	Frequency
Injection Port Septum	Every 5-10 injections
Store Library Compounds (for Surrogate Calibration)	Every month
Replace Sample Pump	5000 hours
Wipe Test the ECD	Every 3 years*
Replace Inlet Filter	Every week or as required
Clean UV Lamp	Every 6 months
Replace UV Lamp	Every year
Replace Calibration Gas (Commercial Cylinder)	Every year or as required
Condition Column	As required
Charge Internal Battery	As required
Replace Flowmeter Battery	As required
Clean Flowmeter	As required

Table 13 Maintenance Schedule

* 3 years in USA, 1 year in Canada; contact your local authority for local regulations

6.2. Obtaining an ECD Wipe Test Sample

> **Note:** Until the results of the wipe test are known, use caution and suitable protection when handling equipment in contact with the ECD. Wear disposable plastic or rubber gloves when performing this test.

You must obtain a wipe test kit from an authorized laboratory or consulting firm. See Section 9.4 for a list of agencies in the U.S.

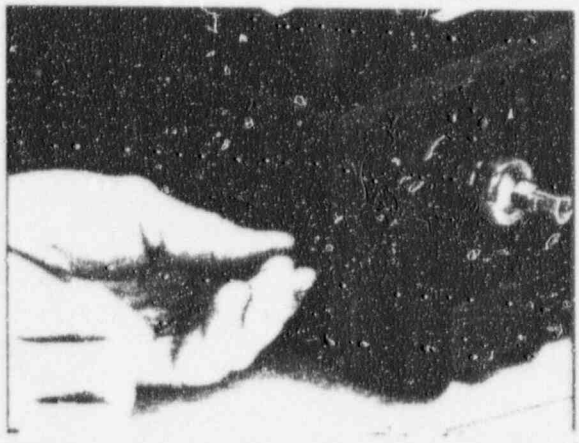
In Canada you must use a consulting agency, unless you have been authorized by the AECB to perform wipe tests. Contact the AECB for more information.

To perform the wipe test:

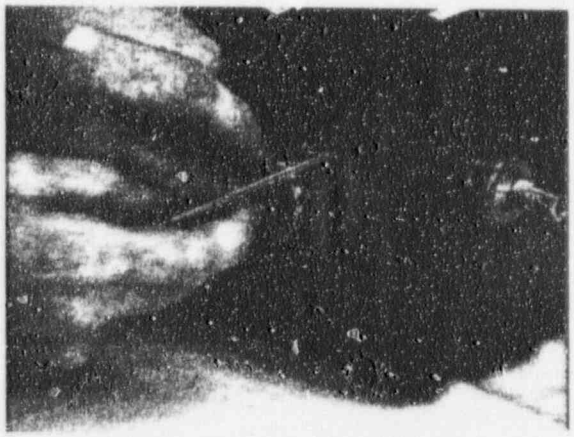
1. Turn the instrument off and allow the detector to cool to the touch.

> **Warning**: Do not open or disassemble the ECD equipped 6823!

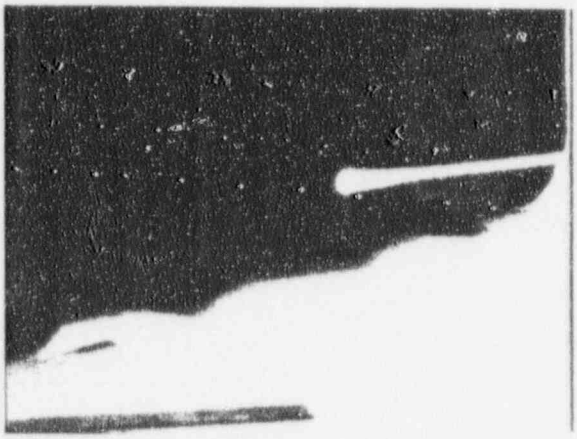
2. Using the instructions included with the wipe-test kit, wipe the outlet area of the detector as shown in Figure 35 with the cotton swab. W[illegible] vent fitting on the top panel of the 6823.



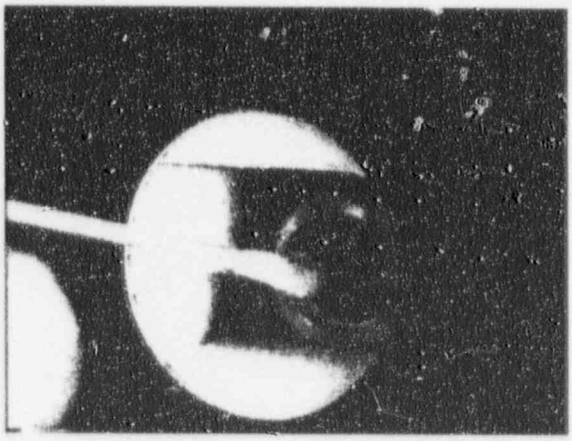
Remove the 3 screws of the access hatch.



Pry off the cover to the ECD oven enclosure.



Wipe the ECD vent hole with the wet swab and then with the dry swab.



Wipe all accessible outside metal surfaces of the ECD with the wet swab and then with the dry swab.

Replace the cap and secure the cover with the 3 screws.

Figure 35 Wipe Testing the ECD

3. Place the cotton swab in the container provided in the wipe-test kit. Include a data sheet stating that the wipe test was performed on a PE Photovac ECD (PE Photovac Part No. 200155), the serial number of the instrument and the date of the test.
4. Request a new wipe-test kit to be sent with the test results.
5. Return the envelope to the leak testing center specified in the leak test kit.

Warning: If the ECD does not pass the wipe test, contact PE Photovac Service immediately.

Note: When ordering a wipe test or a wipe test kit, specify that the sensitivity of the wipe test be 0.0001 microcurie. Ni^{63} is a beta emitter.

6.3. Disposing of an ECD Cell

If it is necessary to dispose of an ECD equipped 6823, or to have the ECD detector removed from the 6823, contact:

Photovac Monitoring Instruments

25-B Jefryn Boulevard West

Deer Park, New York

11729, USA

Tel (516)254-4199

Fax (516)254-4284

PMI can supply shipping and disposal instructions and current fees.

In addition, report the ECD cell disposal to the NRC:

Nuclear Material Safety and Safeguard
U.S. Nuclear Regulatory Commission
Washington, DC 20251

You may also need to report the cell disposal to your state and local agency. If you are in an Agreement State, you must report the cell disposal to the state agency. See Appendix 2.

In Canada, you must report the proposed ECD cell disposal to the AECB before you dispose of the cell:

Atomic Energy Control Board
P.O. Box 1048
Ottawa, Ontario, K1P 5S9
(613)995-1385

6.4. Replacing the Injection Port Septum

A worn out septum causes leakage which will result in poor reproducibility and an unstable baseline. When an injection is made the baseline will suddenly drop below zero as the needle is pushed against the septum. This will also occur if the septum is improperly seated in the injection port.

A silicone septum with a Teflon face (PE Photovac Part No 380032) is recommended for use with the 6823. This type of septum will last for about 5 to 10 injections depending on the syringe needle. To change the septum:

1. Unscrew the black septum retainer.
2. Use a syringe needle to withdraw the old septum.
3. Ensuring that the new septum is handled as little as possible, preferably with forceps or tweezers, place the new septum, Teflon face down, in the injection port.
4. Position the septum in the injection port with the syringe needle and then carefully screw the black retainer back in place.

The septum retainer must not be overtightened. This will cause unusual resistance to needle penetration and may result in needle blockage. To ensure the septum retainer is tightened down properly:

5. Connect a flowmeter to the DET OUT port.
6. Watch the flow as the septum retainer is tightened. The retainer should be tightened so that the septum is seated against the lower half of the injection port assembly. A steady flow rate, which does not increase as the retainer is further tightened, indicates the retainer is in the correct position.

for the column packing or coating. When choosing the type of column for a specific application, the following criteria must be considered:

1. Polar or non-polar compounds to be separated.
2. Weight and volatility of the compounds to be separated.

For more information on the types of columns available for specific applications contact the PE Photovac Technical Services/Applications Department.

8.4. Photoionization Detector

The detector consists of a high frequency (HF) driver circuit and the Electrodeless Discharge Tube or lamp. The lamp contains low pressure gas into which the high frequency energy is "coupled" through an antenna wrapped around the lampholder. The lamp driver power supply is controlled by the microprocessor based on a feedback signal from a light sensor on the HF driver circuit board.

Dissipation of the energy in the gas causes it to glow with a bright blue-violet light. Ultraviolet (UV) light of approximately 120 nm is also produced. UV light of this wavelength carries 10.6 electron volts (eV) of energy. The UV light is emitted from the lamp and is directed at the stream of gas in the sample inlet or at the carrier gas eluting from the column. When light of this energy hits the eluting molecules, they may become ionized.

Figure 39 Photoionization Detector

The lamp generates photons which ionize specific molecules in the gas stream. Many of the chemicals considered pollutants, including most hydrocarbons, are ionized.

The permanent air gases (argon, carbon dioxide, nitrogen, oxygen, water vapor etc.) require a relatively high energy for ionization, and are not ionized by the UV photons.

Whether or not a certain molecule is ionized depends upon its Ionization Potential (IP). If the IP of a molecule is less than 10.6 eV it will most likely be ionized. If the IP is greater than 10.6 eV, it is not readily ionized. Most of the permanent air gases including water vapor have IPs over 12 eV. This means that the carrier gas and the sample matrix are not ionized.

After the compounds have been ionized by the lamp, the ionized particles in the detector cell are subjected to a continuous electric field between the repeller electrode and the collector electrode. The ions move in the electric field, generating a current which is proportional to the concentration of the ionized molecules in the detector cell. An electrometer circuit converts the current to a voltage which is then fed to the microprocessor.

8.5. Electron Capture Detector

The ECD is the most sensitive detector available for the analysis of electrophilic compounds such as chlorinated hydrocarbons found in pesticide residues. It is concentration-sensitive and nondestructive.

The ECD cell contains a nickel foil in a cylinder through which the carrier gas flows. The coating of the foil's inner surface contains the radioactive isotope Nickel-63 and has a nominal sensitivity of 15 millicuries. To optimize detector response, make-up gas is combined with column effluent.

Beta particles emitted from the Ni^{63} ionize the carrier gas. The resultant ions and electrons travel to the collector anode assembly under the influence of a pulsed polarizing voltage applied between the source and the collector. The pulse frequency is varied to maintain a constant average current. The presence of an electron absorbing species in the detector decreases the current as the absorbed electrons form ions, which travel more slowly than electrons. The pulse frequency of the

polarizing supply is auto.natically controlled to maintain a constant current and is used to form the detector output signal.

The ECD contains 2 thermal cut off fuses. The fuses will blow if the heater control circuit fails and the heater temperature exceeds the safety limit. The ECD cannot be serviced by the customer and must be returned to PE Photovac for servicing.

9. Appendices

9.1. Title 10, Chapter 1 CFR - Energy

9.1.1. Sections 20.402 and 20.403

§20.402 Reports of Theft or Loss of Licensed Material

(a) (1) Each licensee shall report to the Commission, by telephone, immediately after it determines that a loss or theft of licensed material has occurred in such quantities and under such circumstances that it appears to the licensee that a substantial hazard may result to persons in unrestricted areas.

(2) Reports must be made as follows:

(i) Licensees having an installed Emergency Notification System shall make the reports to the NRC Operations Center in accordance with §50.72 of this chapter.

(ii) All other licensees shall make reports to the Administrator of the appropriate NRC Regional Office listed in Appendix D of this part.

(b) Each licensee who makes a report under paragraph (a) of this section shall, within 30 days after learning of the loss or theft make a report in writing to the U.S. Nuclear Regulatory Commission, Document Control Desk, Washington, DC 20555, with a copy to the appropriate NRC Regional Office listed in Appendix D of this part. The report shall include the following information:

(1) A description of the licensed material involved, including kind, quantity, chemical and physical form;

(2) A description of the circumstances under which the loss or theft occurred;

(3) A statement of disposition or probable disposition of the licensed material involved;

(4) Radiation exposures to individuals, circumstances under which the exposure occurred, and the extent of the possible hazard to persons in unrestricted areas;

(5) Actions which have been taken, or will be taken, to recover the material; and

(6) Procedures or measures which have been or will be adopted to prevent a recurrence of the loss or theft of licensed material.

(c) Subsequent to filing the written report the licensee shall also report any substantive addition information on the loss or theft which becomes available to the licensee, within 30 days after he learns of such information.

(d) Any report filed with the Commission pursuant to this section shall be so prepared that names of individuals who have received exposure to radiation are stated in a separate part of the report.

(e) For holders of an operating license for a nuclear power plant, the events included in paragraph (b) of this section must be reported in accordance with the procedures described in §50.73 (b), (c), (d), (e) and (g) of this chapter and must include the information required in paragraph (b) of this section.

[34 FR 7500, May 9, 1969, as amended at 38 FR 1271, Jan. 11, 1973; 48 FR 33859, July 26, 1983]

§20.403 Notification of Incidents

(a) *Immediate Notification.* Each licensee shall immediately report any events involving byproduct, source or special nuclear material possessed by the licensee that may have caused or threatens to cause:

(1) Exposure of the whole body of any individual to 25 rems or more of radiation; exposure of the skin of the whole body of any individual to 150 rems or more of radiation; or exposure of the feet, ankles, hands or forearms of any individual to 375 rems or more of radiation; or

(2) The release of radioactive material in concentrations which if averaged over a period of 24 hours, would exceed 5,000 times the limits specified for such materials in Appendix B, Table II of this part; or

(3) A loss of one working week or more of the operation of any facilities affected; or

(4) Damage to property in excess of $200,000.

(b) *Twenty-four hour notification.* Each licensee shall within 24 hours of the discovery of the event, report any event involving licensed material possessed by the licensee that may have caused or threatens to cause:

1) Exposure of the whole body of any individual to 5 rems or more of radiation; exposure of the skin of the whole body of any individual to 30 rems or more of radiation; or exposure of the feet, ankles, hands or forearms of any individual to 75 rems or more of radiation; or

(2) The release of radioactive material in concentrations which, if averaged over a period of 24 hours, would exceed 500 times the limits specified for such materials in Appendix B, Table II of this part; or

(3) A loss of one day or more of the operation of any facilities affected; or

(4) Damage to property in excess of $2,000.

(c) Any report filed with the Commission pursuant to this section shall be prepared so that names of individuals who have received exposure to radiation will be stated in a separate part of the report.

(d) Reports made by licensees in response to the requirements of this section must be made as follows:

(1) Licensees that have an installed Emergency Notification System shall make the reports to the NRC Operations Center in accordance with §50.72 of this chapter.

(2) All other licensees shall make the reports required by paragraphs (a) and (b) of this section to the NRC Operations Center[1] and by telegram, mailgram or facsimile to the Administrator of the appropriate NRC Regional Office listed in Appendix D of this part.

[27 FR 5905, June 22, 1962, as amended at 28 FR 6823, July 3, 1963; 42 FR 43965, Sept. 1, 1977; 43 FR 2719, Jan. 19, 1978; 48 FR 33859, July 26, 1983; 52 FR 33917, Sept. 9, 1987]

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[1] Commercial telephone number of the NRC Operations Center is (202)951-0550.

9.1.2. Section 30.34

§30.34 Terms and Conditions of License

(a) Each license issued pursuant to the regulations in this part and the regulations in Parts 31 through 35 and 39 of this chapter shall be subject to all applicable provisions, of the Radiation Protection Act of 1990 (The Act) (Ill. Rev. Stat. 1990 Supp., ch. 111«, par. 210-1 et seq.), now or hereafter in effect, and to all valid rules, regulations, and orders of the Commission.

(b) No license issued or granted pursuant to the regulations in this part and the regulations in Parts 31 through 35 and 39 nor any right under a license shall be transferred, assigned or in any manner disposed of, either voluntarily or involuntarily, directly or indirectly, through transfer of control of any license to any person unless the Commission shall, after securing full information find that the transfer is in accordance with the provisions of the Act, and shall give its consent in writing.

(c) Each person licensed by the Commission pursuant to the regulations in this part and the regulations in Parts 31 through 35 and 39 shall confine his possession and use of the byproduct material to the locations and purposes authorized in the license. Except as otherwise provided in the license, a license issued pursuant to the regulations in this part and Parts 31 through 35 and 39 of this chapter shall carry with it the right to receive, acquire, own, and possess byproduct material. Preparation for shipment and transport of byproduct material shall be in accordance with the provisions of part 71 of this chapter.

(d) Each license issued pursuant to the regulations in this part and Parts 31 through 35 and 39 shall be deemed to contain the provisions set forth in section 183b.-d., inclusive, of the Act, whether or not these provisions are expressly set forth in the license.

(e) The Commission may incorporate, in any license issued pursuant to the regulations in this part and Parts 31 through 35 and 39, at the time of issuance or thereafter by appropriate rule, regulation or order, such additional requirements and conditions with respect to the licensee's receipt, possession, use and transfer of byproduct material as it deems appropriate or necessary in order to:

(1) Promote the common defense and security;

(2) Protect health or to minimize danger to life or property;

(3) Protect restricted data;

(4) Require such reports and the keeping of such records, and to provide for such inspections of activities under the license as may be necessary or appropriate to effectuate the purposes of the Act and regulations thereunder.

(f) Licensees required to submit emergency plans by §30.32(1) shall follow the emergency plan approved by the Commission. The licenses may change the approved plan without Commission approval only if the changes do not decrease the effectiveness of the plan. The licensee shall furnish the change to the appropriate NRC Regional Office specified in §30.6 and to affected offsite response organizations within six months after the change has been made. Proposed changes that decrease, or potentially decrease, the effectiveness of the approved emergency plan may not be implemented without prior application to and prior approval by the Commission.

(g) Each licensee preparing technetium-99m radiopharmaceuticals from molybdenum-99/technetium-99m generators shall test the generator eluates for molybdenum-99 breakthrough in accordance with 35.204 of this chapter. The licensee shall record the results of each test and retain each record or three years after the record is made.

(h) (1) Each licensee shall notify the appropriate NRC Regional Administrator, in writing, immediately following the filing of a voluntary or involuntary petition for bankruptcy under any Chapter of Title 11 (Bankruptcy) of the United States Code by or against;

(i) The licensee;

(ii) An entity (as that term is defined in 11 U.S.C. 101(14)) controlling the licensee or listing the license or licensee as property of the estate; or

(iii) An affiliate (as that term is defined in 11 U.S.C. 101(2)) of the licensee.

(2) This notification must indicate:

(i) The bankruptcy court in which the petition for bankruptcy was filed; and

(ii) The date of the filing of the petition.

[30 FR 8185, June 26, 1965, as amended at 38 FR 33969, Dec. 10, 1973; 43 FR 6922, Feb. 17, 1978; 48 FR 32328, July 15, 1983; 52 FR 1295, Jan. 12, 1987; 52 FR 8241, Mar. 17, 1987; 53 FR 19245, May 27, 1988; 53 FR 23383, June 22, 1988; 54 FR 14061, Apr. 7, 1989)]

9.1.3. Sections 30.51, 30.52 and 30.53

Records, Inspections, Tests and Reports

§30.51 Records

(a) Each person who receives by product material pursuant to a license issued pursuant to the regulations in this part and Parts 31 through 35 of this chapter shall keep records showing the receipt, transfer, and disposal of the byproduct material as follows:

(1) The license shall retain each record of receipt of byproduct material as long as the material is possessed and for three years following transfer or disposal of the material.

(2) The licensee who transferred the material shall retain each record of transfer for three years after each transfer unless a specific requirement in another part of the regulations in this chapter dictates otherwise.

(3) The licensee who disposed of the material shall retain each record of disposal of byproduct material until the Commission terminates each license that authorizes disposal of the material.

(b) The licensee shall retain each record that is required by the regulations in this part and Parts 31 through 35 of this chapter or by license condition for the period specified by the appropriate regulation or license condition. If a retention period is not otherwise specified by regulation or license condition, the record must be retained until the Commission terminates each license that authorizes the activity that is subject to the recordkeeping requirement.

(c) (1) Records which must be maintained pursuant to this part and Parts 31 through 35 of this chapter may be the original or a reproduced copy or microform if such reproduced copy or microform is duly authenticated by authorized personnel and the microform is capable of producing a clear and legible copy after storage for the period specified by the Commission regulations. The record may also be stored in electronic media with the capability for producing legible, accurate, and complete records during the required retention period. Records such as letters, drawings, specifications, must include all pertinent information such as stamps, initials, and signatures. The licensee shall maintain adequate safeguards against tampering with and loss of records.

(2) If there is a conflict between the Commission's regulations in this part and Parts 31 through 35 and 39 of this chapter, license condition, or other written Commission approval or authorization pertaining to the retention period for the same type of record, the retention period specified in the regulations in this part and Parts 31 through 35 and 39 of this chapter for such records shall apply unless the Commission, pursuant to §30.11, has granted a specific exemption from the record retention requirements specified in this part or Parts 31 though 35 and 39 of this chapter.

[41 FR 18301, May 5, 1976, as amended at 43 FR 6922, Feb. 17,1978; 52 FR 8241, Mar. 17, 1987; 53 FR 19245, May 27, 1988]

§30.52 Inspections

(a) Each licensee shall afford to the commission at all reasonable times opportunity to inspect byproduct material and the premises and facilities wherein byproduct material is used or stored.

(b) Each licensee shall make available to the Commission for inspection upon reasonable notice, records kept by him pursuant to the regulations in this chapter.

[30 FR 8185, June 26, 1965]

§30.53 Tests

Each licensee shall perform or permit the Commission to perform such test as the Commission deems appropriate or necessary for the administration of the regulations in this part and parts 31 through 35 and 39 of this chapter, including test of :

(a) Byproduct material;

(b) Facilities wherein byproduct material is utilized or stored;

(c) Radiation detecting and monitoring instruments ; and

(d) Other equipment and devices used in connection with the utilization or storage of byproduct material.

[30 FR 8185, June 26, 1965, as amended by 43 FR 6922, Feb. 17. 1978; 52 FR 8241, Mar. 17, 1987]

9.1.4. Section 31.5

§31.5 Certain Measuring, Gauging or Controlling Devices[2].

(a) A general license is hereby issued to commercial and industrial firms and to research, educational, and medical institutions, individuals in the conduct of their business and State or local government agencies to own, receive, acquire, possess, use, or transfer in accordance with the provisions of paragraphs (b), (c) and (d) of this section, byproduct material, contained in devices designed and manufactured for the purpose of detecting, measuring, gauging, or controlling thickness, density, level, interface location, radiation, leakage, or qualitative or quantitative chemical composition, or for producing light or an ionized atmosphere.

(b) The general license in paragraph (a) of this section applies only to byproduct material contained in devices which have been manufactured or initially transferred and labeled in accordance with the specifications contained in a specific license issued pursuant to §32.51 of this chapter or in accordance with the specifications contained in a specific license issued by an Agreement State, which authorizes distribution of devices to persons generally licensed by the Agreement State.

(c) Any person who acquires, receives, possesses, uses, or transfers byproduct material in a device pursuant to the general license in paragraph (a) of this section:

(1) Shall assure that all labels affixed to the device at the time of receipt, and bearing a statement that removal of the label is prohibited, are maintained thereon and shall comply with all instructions and precautions provided by such labels;

(2) Shall assure that the device is tested for leakage of radioactive material and proper operation of the "on-off" mechanism and indicator, if any, at no longer than 6-month intervals or at such other intervals as are specified in the label; however,

i) Devices containing only krypton need not be tested for leakage of radioactive material, and

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[2] Persons possessing byproduct material in devices under the general license in §31.5 before Jan. 14, 1975, may continue to possess, use or transfer that material in accordance with the requirements of §31.5 in effect on Jan. 14, 1975.

ii) Devices containing only tritium or not more than 100 microcuries (3.7 MBq) of other beta and/or gamma emitting material or 10 microcuries (0.37 MBq) of alpha emitting material and devices held in storage in the original shipping container prior to initial installation need not be tested for any purpose;

(3) Shall assure that the tests required by paragraph (c)(2) of this section and other testing, installation, servicing and removal from installation involving the radioactive materials, its shielding or containment, are performed:

i) In accordance with the instructions provided by the labels, or

ii) By a person holding a specific license pursuant to Parts 30 and 32 of this chapter or from an Agreement State to perform such activities;

(4) Shall maintain records showing compliance with the requirements of paragraphs (c)(2) and (c)(3) of this section. The records must show the results of tests concerning the installation, leakage testing, servicing and removal of radioactive material, its shielding or containment. The records also must show the dates of performance of, and the names of persons performing testing, installing, servicing and removal from the installation of radioactive material, its shielding or containment. The licensee shall retain these records as follows:

(i) Each record of a test for leakage of radioactive material required by paragraph (c)(2) of this section must be retained for three years after the next required leak test is performed or until the sealed source is transferred or disposed of.

(ii) Each record of a test of the "on-off" mechanism and indicator required by paragraph (c)(2) of this section must be retained for three years after the next required test of the "on-off" mechanism and indicator is performed or until the sealed source is transferred or disposed of.

(iii) Each record that is required by paragraph (c)(3) of this section must be retained for three years from the date of the recorded event or until the device is transferred or disposed of.

(5) Upon the occurrence of a failure of or damage to, or any indication of a possible failure of or damage to, the shielding of the radioactive material or the "on-off" mechanism or indicator, or upon the detection of 0.005 microcurie (185 Bq) or more of removable radioactive material, shall immediately suspend operation of the device until it has been repaired by the manufacturer or other person holding a specific license pursuant to Parts 30 and 32 of this chapter or from an Agreement State to repair such devices, or disposed of by transfer to a person authorized by a specific license to receive the byproduct material contained in the device and, within 30 days, furnish to the Director of the appropriate Nuclear Regulatory Commission Inspection and Enforcement Regional Office listed in Appendix D of Part 20 of this chapter, a report containing a brief description of the event and the remedial action taken;

(6) Shall not abandon the device containing byproduct material;

(7) Shall not export the device containing byproduct material except in accordance with Part 110 of this chapter;

(8) Except as provided in paragraph (c)(9) of this section shall transfer or dispose of the device containing byproduct material only by transfer to a person holding a specific license pursuant to Parts 30 and 32 of this chapter or from an Agreement State, to receive the device and within 30 days after transfer of a device to a specific licensee shall furnish to the Director of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington D.C. 20555, a report containing identification of the device by manufacturer's name and model number and the name and address of the person receiving the device. No report is required if the device is transferred to the specific licensee in order to obtain a replacement device;

(9) Shall transfer the device to another general licensee only:

(i) Where the device remains in use at a particular location. In such case the transferor shall give the transferee a copy of this section and any safety documents identified in the label on the device and within 30 days of the transfer, report to the Director of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington D.C. 20555, the manufacturer's name and model number of device transferred, the name and address of the transferee and the name and/or position of an individual who may constitute a point of contact between the Commission and the transferee; or

(ii) Where the device is held in storage in the original shipping container at its intended location of use prior to initial use by a general licensee;

(10) Shall comply with the provisions of §§20.2201 and 20.2202 of this chapter for reporting radiation incidents, theft, or loss of licensed material, but shall be exempt from the other requirements of Parts 19, 20 and 21 of this chapter.

(d) The general license in paragraph (a) of this section does not authorize the manufacture or import of devices containing byproduct material.

9.2. Canadian Atomic Energy Control Regulations

Note: Users of the information in this section are advised that it is provided for the convenience of reference only and as such has no official sanction. The original Regulations and amendments thereto should be consulted for all purposes of interpreting and applying the law.

9.2.1. Part II, Sections 3 to 7

PART II
PRESCRIBED SUBSTANCES AND ITEMS

3. Subject to section 6, no person shall, unless exempted in writing by the Board, produce, mine, prospect for, refine, use, sell or possess for any purpose any prescribed substance except in accordance with a license issued pursuant to section 7.

4. Subject to section 6 [and subsection 18.1(5)], no person shall, unless exempted in writing by the Board, use, sell, or possess any device or equipment containing radioactive prescribed substances except in accordance with a license issued pursuant to section 7.

[5 (1) No person shall

(a) import any prescribed substance,

(b) export any prescribed substance, or

(c) export any prescribed item.]

except in accordance with a license issued pursuant to section 7.

(2) A license referred to in section (1) shall be produced by or on behalf of the licensee to a collector of customs at the port of entry into or exit from Canada of the prescribed substance or prescribed item, as the case may be, or at such other place as designated by the Deputy Minister of National Revenue and Excise, before the prescribed substance or the prescribed item is released for import or export.

6. (1) No license is required by any person engaged in:

(a) the transport of goods for hire or reward in respect of the transport of any prescribed substance or any device or equipment necessary for such transport;

(b) prospecting for prescribed substances if such prospecting does not involve the removal of more than ten kilograms of uranium or thorium from any deposit thereof in any one calendar year;

(c) any use, sale or possession of a substance containing deuterium if

(i) such substance does not contain hydrogen having a greater concentration of deuterium than is normally found in nature, or

(ii) such use, sale or possession does not involve more than 10 kilograms of deuterium in any calendar year where such a substance does contain hydrogen having a greater concentration of deuterium than is normally found in nature;

(d) a substance containing naturally occurring radioactive isotopes of elements of atomic number less than 80 and in no greater concentration than is normally found in nature;

(e) a substance containing radioactive isotopes of elements of atomic number less than 90 if

(i) the quantity of such isotopes per kilogram of substance does not exceed the schedules quantity, and

(ii) any such isotopes on the surface of the substance are not, in the opinion of the Board or a designated officer, readily dispersible and the quantity of such isotopes on the surface of the substance does not exceed one-tenth of the scheduled quantity per square meter of substance;

(f) sources of ionizing radiation containing radioactive isotopes of elements of atomic number less than 90 if

(i) the quantity of such isotopes in each such source does not exceed the scheduled quantity, and

(ii) not more than 10 sources are required in any calendar year;

(g) any device incorporating a substance containing radioactive isotopes of elements of atomic number less than 90 or of americium isotope Am-241 if

(i) the total quantity of such isotopes per device does not exceed 10 times the scheduled quantity, and

(ii) [the design of the device and the method of incorporating the radioactive isotopes are approved by the Board or a designated officer]; and

(h) any incandescent mantle containing thorium.

(3) Nothing in subsection (2) authorizes the use or possession for any purpose without a license of any substance containing

(a) uranium isotope U-233; or

(b) uranium having a greater concentration of the isotope U-235 than is normally found in nature.

7. (1) The Board or a designated officer may issue a license for any purpose referred to in Section (3) or in respect of any device or equipment referred to in section (4) upon receipt of a written application from the person requiring the license.

(2) [The application for a license referred to in subsection (1) shall include the applicable fee set out in the *AECB Cost Recovery Fees Regulations* and shall set out such of the following information ad the Board or designated officer may require]:

(a) the nature and quantity of the prescribed substance and the purpose for which it is required;

(b) the maximum quantity of the prescribed substance likely to be required at any one time for the purpose set out in the application;

(c) a description of the premises in which the prescribed substance is to be located ad of any equipment in connection with which it is to be used;

(d) a description of the measures to be taken to prevent theft, or loss or any unauthorized use of the prescribed substance;

(e) a description of the measures to be taken, including any plan in case of accident, to prevent the receipt by any person of a dose of ionizing radiation [or an exposure to radon daughters] in excess of any dose specified in respect of such person in Schedule II;

(f) a description of the method of diagnosing of the radioactive prescribed substance;

(g) a description of the qualifications, training, and experience of any person who is to use the prescribed substance; and

(h) any other information necessary to evaluate the application.

(3) [A license issued by the Board or a designated officer pursuant to subsection (1) may contain such conditions as the Board or the designated officer deems necessary in the interests of health, safety and security and, without limiting the gene~ality of the foregoing, may include conditions respecting]

(a) the measures to be taken to prevent the receipt by any person of a dose of ionizing radiation [or an exposure to radon daughters] in excess of any dose specified in respect of such person in Schedule II;

(b) the monitoring devices and other methods for measuring the dose of ionizing radiation [or exposure to radon daughters] received by any person;

(c) instructions to be given to atomic radiation workers respecting the hazards of ionizing radiation and the procedures to be followed to limit exposure to ionizing radiation;

(d) the maximum quantity and concentration of radioactive or other hazardous material that may be discharged into the air and water as a result of the use of the prescribed substance;

(e) the method of disposing of the radioactive prescribed substance;

(f) the measures to be taken to prevent theft, loss or any unauthorized use of the prescribed substance; and

(g) the qualifications, training, and experience of any person who is to use or supervise the use of the prescribed substance or any device or equipment to which the license applies.

[(4) The Board or designated officer may issue a license to a person for any purpose referred to in subsection 5(1) on receipt of a written application from the person.

(5) A license issued by the Board or a designated officer pursuant to subsection (4) may contain such conditions as the Board or the designated officer deems necessary in the interests of health, safety and security.]

9.2.2. Part VI, Section 20 and 21

Loss or Theft of Prescribed Substances

20. (1) Every person in possession of a prescribed substance or operating a nuclear facility in which a prescribed substance is located shall, in the event of any loss or theft of such prescribed substance in a quantity exceeding ten times the scheduled quantity, make a report of such loss or theft within 24 hours to the inspector appointed for the place or area in which the loss or theft occurred and shall as soon as possible thereafter send a complete report of such loss or theft to the Board, such inspector and the person, if any,

appointed pursuant to section 16 as radiation safety adviser for the place or area in which the loss or theft occurred.

(2) For the purpose of subsection (1), loss does not include any loss necessarily incidental to any authorized use of the prescribed substance.

21. (1) Every person

(a) in charge of a nuclear facility

(b) in charge of a device or of equipment containing radioactive prescribed substances, or

(c) in possession of a radioactive prescribed substance shall, in the event of an occurrence that results or is likely to result in the receipt by any person of a dose of ionizing radiation [or of an exposure to radon daughters] in excess of any dose [or exposure] specified in respect of such person in schedule II,

(d) report such occurrence within 24 hours to the inspector appointed for the place or area in which the occurrence has taken place

(e) as soon as possible after the occurrence, send a complete report of such occurrence to the board, to the inspector referred to in paragraph (d) and to the person or committee appointed pursuant to section 16 to advise on radiation safety in respect of the place or area in which the occurrence has taken place.

(f) if the occurrence has resulted in the receipt by any person of a dose of ionizing radiation [or of an exposure to radon daughters] in excess of any dose [or exposure] specified in respect of such person in schedule II, send a copy of the report referred to in paragraph (e) to the place medical advisor appointed for the place or area in which the occurrence has taken place.

(2) In the event of any occurrence described in subsection (1), the person in charge of a nuclear facility or the equipment containing the prescribed substance or the person in possession of the prescribed substance, as the case may be, shall

(a) immediately take all appropriate measures to prevent or minimize exposure of any person to ionizing radiation [or radon daughters] resulting from such occurrence; and

(b) comply with any instructions that may be given by the inspector appointed for the place or area in which the occurrence has taken place.

9.2.3. R-116

9.3. ECD Licensing Requirements (Addresses may change without notice)

9.3.1. Agreement States

Alabama Bureau of Radiological Health Environmental Health Administration Room 314, State Office Building Montgomery, Alabama 36130 (205) 261-5313	**Arizona** Arizona Radiation Regulatory Agency 4814 South 40th Street Phoenix, Arizona 85040 (602) 255-4845
Arkansas Division of Radiation Control and Emergency Management Arkansas Department of Health 4815 West Markham Little Rock, Arkansas 72205-3867 (501) 661-2301	**California** Radiological Health Branch Department of Health 714 P Street, Room 498 Sacramento, California 95814 (916) 445-0931 Licensing and Inspection (916) 322-2073

Colorado Colorado Department of Health Radiation Control Division 4300 Cherry Creek Drive South Denver, Colorado 80222-1530	**Florida** Office of Radiation Control Department of Health and Rehabilitative Services 1317 Winewood Blvd. Tallahassee, Florida 32399-0700 (904) 487-1004
Georgia Radiological Health Section Department of Human Resources Room 600 878 Peachtree Street Atlanta, Georgia 30309 (404) 894-5795	**Idaho** Compliance Section Idaho Department of Health and Welfare Statehouse Boise, Idaho 83720 (208) 334-5879
Illinois Department of Nuclear Safety 1035 Outer Park Drive Springfield, Illinois 62704 (217) 785-9868	**Iowa** Bureau of Radiological Health Iowa Department of Health Lucas State Office Building Des Moines, Iowa 50319 (515) 281-4928
Kansas Bureau of Air Quality and Radiation Control Department of Health and Environment Forbes Field Building 321 Topeka, Kansas 66620 (913) 296-1542	**Kentucky** Radiation Control Branch Department of Health Services Cabinet for Human Resources 275 East Main Street Frankfort, Kentucky 40621 (502) 564-3700
Louisiana Nuclear Energy Division Office of Air Quality and Radiation Protection P.O. Box 82135 Baton Rouge, Louisiana 70884-2135 (504) 765-0102	**Maryland** Center for Radiological Health Department of the Environment 2500 Broening Highway Baltimore, Maryland 21224 (301) 631-3300
Mississippi Division of Radiological Health State Board of Health 3150 Lawson Street P.O. Box 1700 Jackson, Mississippi 39215-1700 (601) 354-6657/6670	**Nebraska** Division of Radiological Health State Department of Health 301 Centennial Mall South P.O. Box 95007 Lincoln, Nebraska 68509 (402) 471-2168
Nevada Radiological Health Section Health Division Department of Human Resources 505 East King Street, Room 202 Carson City, Nevada 89710 (702) 885-5394	**New Hampshire** Radiological Health Program Bureau of Environmental Health Division of Health Services Health and Welfare Building, Hazen Drive Concord, New Hampshire 03301 (603) 271-4588
New Mexico New Mexico Hazardous and Radioactive Material Bureau P.O. Box 26110 525 Camino De Los Marquez Santa Fe, New Mexico 87502 (505) 827-4308	**New York** Division of Policy Analysis and Planning 2 Rockefeller Plaza Albany, New York 12223 (518) 473-0048
North Carolina Department of Environmental Health and	**North Dakota** Director

Natural Resources Division of Radiation Protection P.O. Box 27687 Raleigh, North Carolina 27611-7687 (919) 741-4283	Division of Environmental Engineering Radiological Health Program State Department of Health 1200 Missouri Avenue Bismark, North Dakota 58502-5797 (701) 224-2348
Oregon Radiation Control Section Department of Human Resources 1400 South West Fifth Avenue Portland, Oregon 97201 (503) 229-5797	**Rhode Island** Radioactive Materials and X-Ray Programs Rhode Island Department of Health Cannon Building, Davis Street Providence, Rhode Island 02908 (401) 277-2438
South Carolina Bureau of Radiological Health South Carolina Department of Health and Environmental Control J. Marion Sims Building 2600 Bull Street Columbia, South Carolina 29201 (803) 734-4700	**Tennessee** Division of Radiological Health Terra Building, 150 9th Avenue, N. Nashville, Tennessee 37219-5404 (615) 741-7812
Texas Bureau of Radiation Control Texas Department of Health 1100 W. 49th Street (Mail only) Austin, Texas 78756 (512) 835-7000	**Utah** Bureau of Radiation Control State Department of Health 288 North 1460 Street P.O. Box 16690 Salt Lake City, Utah 84116-0690 (801) 538-6734
Washington Washington State Department of Health Division of Radiation Protection Airdustrial Center, Building #5 P.O. Box 47827 Olympia, Washington 98504-7827 (360)753-3468	

9.3.2. Nuclear Regulatory Commission Regional Offices

Region	Address	Telephone(24 hours
Region I: Connecticut, Delaware, District of Columbia, Maine Maryland Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.	USNRC, 475 Allendale Road, King of Prussia, PA 19406	(610) 337-5000 (FTS) 346-5000
Region II: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, Puerto Rico, South Carolina, Tennessee, Virginia Virgin Islands, and West Virginia.	USNRC, 101 Marietta Street, NW, Suite 2900, Atlanta, GA 30323	(404) 331-4053 (FTS) 242-4503
Region III: Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconson	USNRC 799 Rooselvelt Road Glen Ellyn, IL 60137	(708) 790-5500 (FTS) 388-5500

Region IV: Arkansas, Colorado, Idaho, Kansas, Louisiana, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, and Wyoming.	USNRC, 611 Ryan Plasa Drive, Suite 1000, Arlington, TX 76011	(817) 880-8100 (FTS) 728-8100
Region IV: Field Office	USNRC, Region IV Uranium Recovery Field Office, 730 Simms Street, P.O. Box 25325, Denver, CO 80225	(303) 236-2805 (FTS) 776-2805
Region V: Alaska, Arizona, California, Hawaii, Nevada, Oregon, Pacific Trust Territories, and Washington.	USNRC, 1450 Marina Lane, Suite 210, Walnut Creek, CA 94596	(415) 943-3700 (FTS) 463-3700

9.4. Wipe Test Agencies

Wipe test kits may be ordered directly from the agency providing the service. In locations, other than Canada and the US, contact your PE Photovac representative for further information

9.4.1. United States

National Leak Test Center
P.O. Box 486
North Tonawanda, New York 14120
Tel: 716-693-0550

9.4.2. Canada

Contact the AECB for more organizations providing leak testing services.

BC Ministry of Health Radiation Protection Services 200-307 West Broadway Vancouver, B.C., V5P 1P9 (604)660-6633	AGAT Laboratories Environmental Division Bay 3, 1411 - 25th Avenue Calgary, Alberta, T2E 7L6 (403)299-2080

Saskatchewan Labour Radiation Health Office 1150 Rose Street Regina, Saskatchewan, R4R 3V7 (306)565-4486	University of Manitoba Safety Office 191 Frank Kennedy Centre Winnipeg, Manitoba, R3T 2N2 (204)474-6315
Ronan Engineering Ltd. 32 Bermondsey Road Toronto, Ontario, M4B 1Z5 Tel.:(416)752-0310 FAX: (416)752-8072	Novalab 6420 Cote de Liesse Lachine, Quebec, H8T 1A1 (514)636-6218
New Brunswick Radiation Protection Services 348 King Street Fredericton, New Brunswick, E3B 5H1 (506)453-2360	Stuart Hunt and Associates 356 Nagels Hill Road Site 56 Box 32 St. John's Newfoundland, A1C 5H5 (709)753-3476

9.5. AC Line Cord

In most cases the 6823 will be shipped with an AC line cord that will fit the AC wall outlet in your area. If this cannot be done, you may need to obtain an AC line cord suitable for the AC receptacle in your area.

The AC line cord, attached plug and receptacle must be marked with your country's certification mark and the cord must have a Harmonization (HAR) Mark.

The line cord must be rated for either 100 to 120 VAC at 60 Hz or 220 to 240 VAC at 50 Hz. The voltage rating will depend on the voltage in your area.

Contact your local PE Photovac representative to obtain more information.

9.6. Preparing Vapor Standards

It is recommended that commercial analyzed calibration gas be used with the 6823.

If standards are to prepared manually, care must be taken in order to ensure they are free from contamination. Preparation of low concentration standards lacks consistency due to the difficulty of preparing low concentrations of gases and vapors accurately. Contamination is a major source of error in the preparation of standards and in the resultant calibration.

Statically prepared standards, those which are prepared by syringe injection into a sample container, are easily accessible. If standards are to be prepared use the following instructions carefully observing all precautions for handling dangerous materials.

9.6.1. Standards from Pure Gases

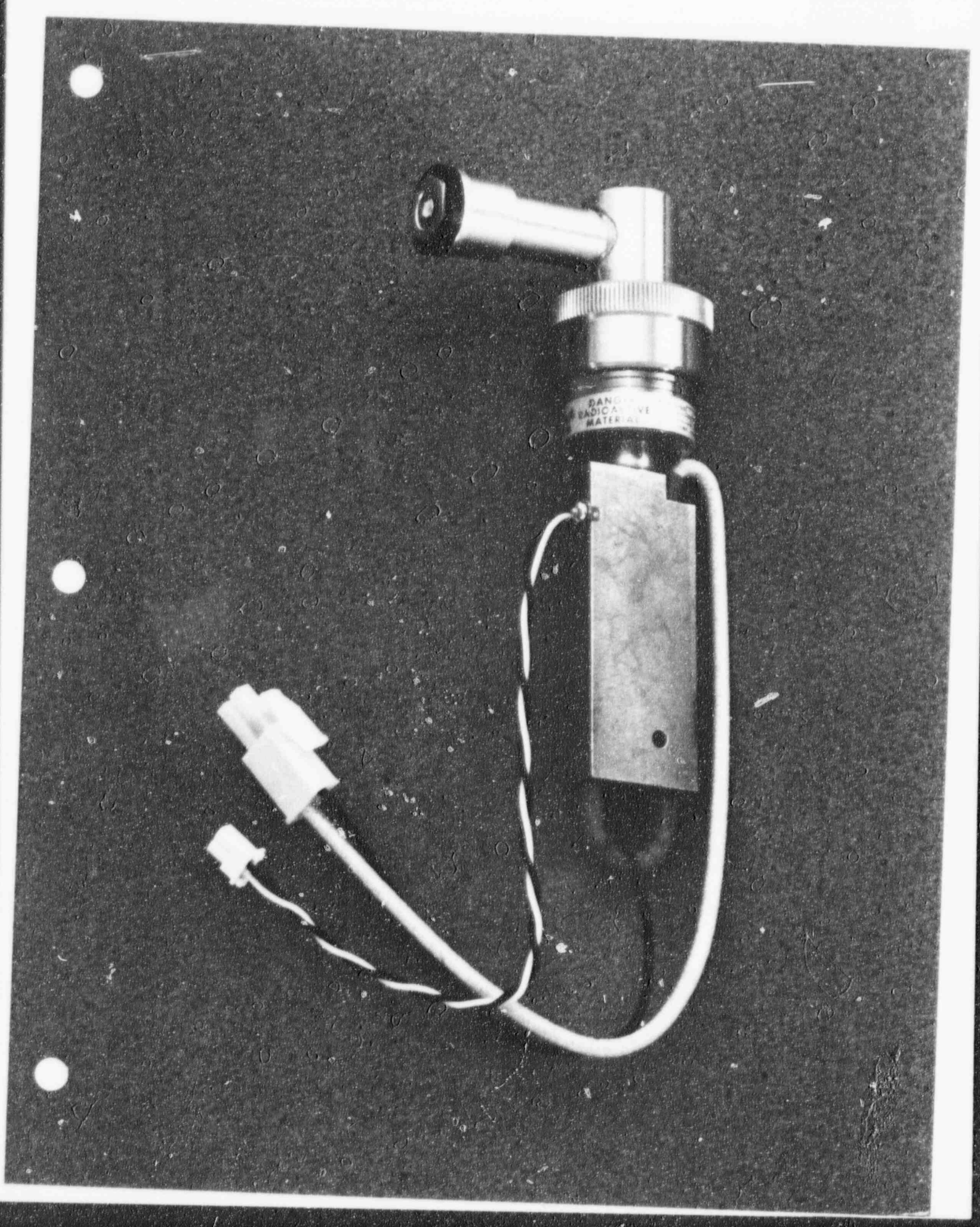
First a procedure for preparing a standard from a pure gas will be outlined.

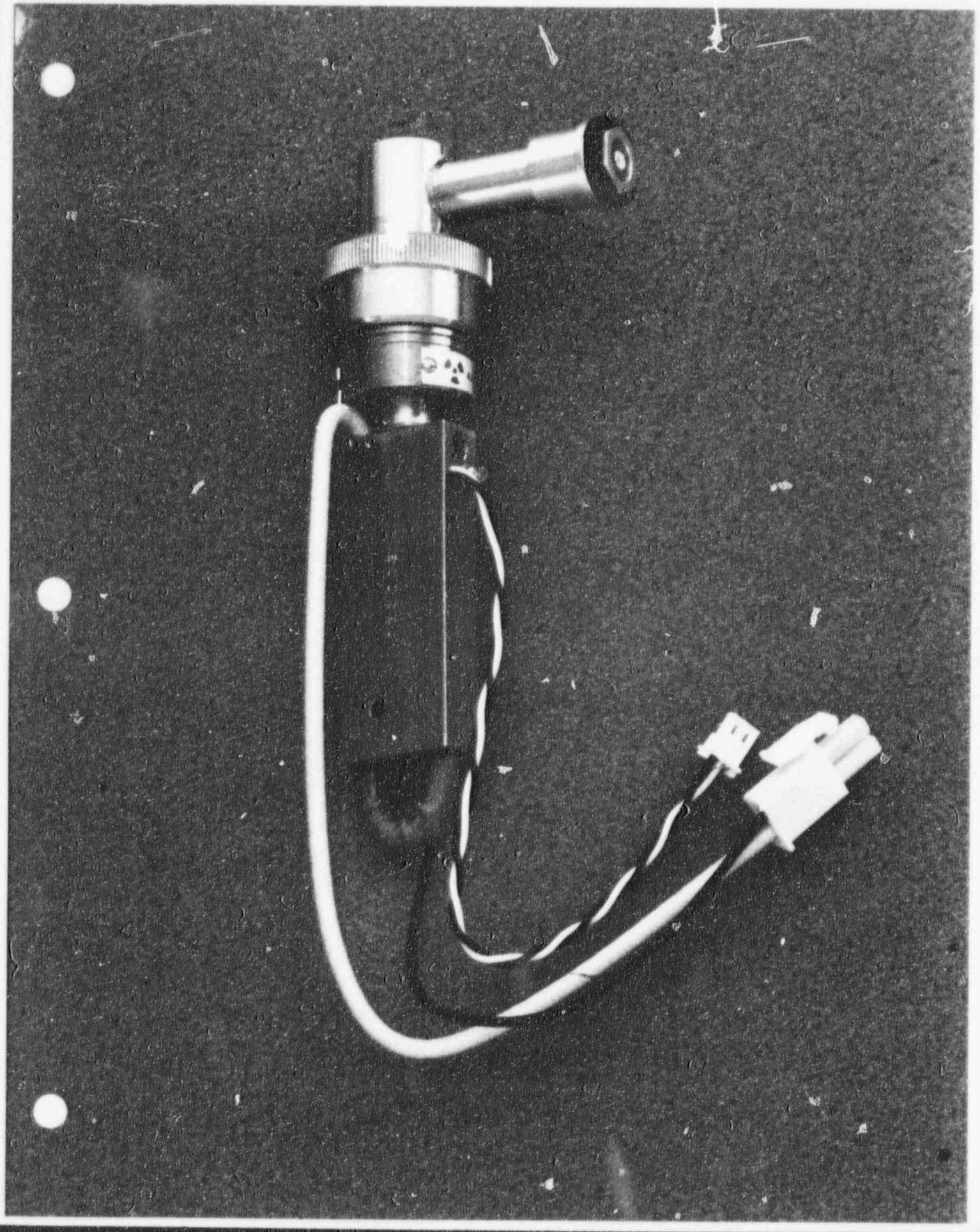
To prepare a 10 ppm standard of a pure gas such as butane:

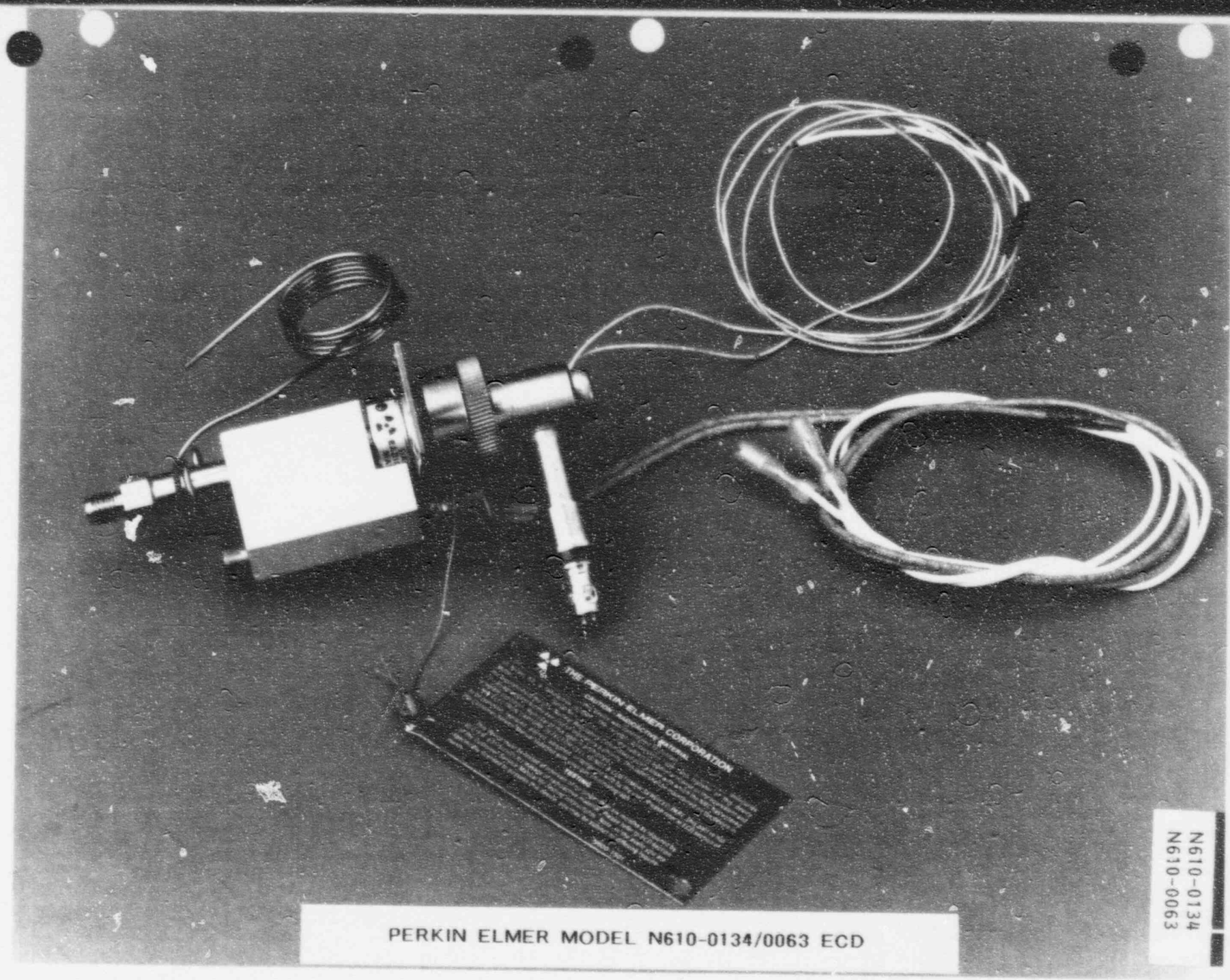
1. Flush a 1 L (PE Photovac Part No. 600628-02) gas bag with clean air to remove possible contamination.
2. Evacuate the bag completely and fill it with 1 L of Ultra Zero air. Measure 1 L exactly using a syringe.
3. In a fumehood withdraw 10 microliter (uL) of pure butane gas. Observe proper handling precautions for the pure gas.
4. Inject 10 uL of the pure gas into the 1 L gas bag.

Diffusion of the butane takes place rapidly, and within a minute, a 10 ppm butane standard is ready.

The general formula for preparing a standard from a pure or dilute gas is:







PERKIN ELMER MODEL N610-0134/0063 ECD

N610-0134
N610-0063

Prototype Testing Overview

Prototype cell assemblies were tested to the ANSI-542 Sealed Sources Performance Requirements for Ion Generators (Chromatography). In addition, tests were devised to ensure the safety/integrity of the device under various failure conditions.

Sealed source usage		Sealed source test and class				
		Temperature	Pressure	Impact	Vibration	Puncture
Radiography – Industrial	Unprotected source	4	3	5	1	5
	Source in device	4	3	3	1	3
Medical	Radiography	3	2	3	1	2
	Gamma teletherapy	5	3	5	2	4
	Interstitial and intracavitary appliances[1]	5	3	2	1	1
	Surface applicators	4	3	3	1	2
Gamma gauges (medium and high energy)	Unprotected source	4	3	3	3	3
	Source in device	4	3	2	3	2
Beta gauges and sources for low-energy gamma gauges or X-ray fluorescence analysis (excluding gas-filled sources)		3	3	2	2	2
Oil-well logging		5	6	5	2	2
Portable moisture and density gauge (including hand-held or dolly-transported)		4	3	3	3	3
General neutron source application (excluding reactor start-up)		4	3	3	2	3
Calibration sources – Activity greater than 1 MBq		2	2	2	1	2
Gamma irradiation sources	Unprotected source	4	3	4	2	4
	Source in device	4	3	3	2	3
Ion generators[2]	Chromatography	3	2	2	1	1
	Static eliminators	2	2	2	2	2
	Smoke detectors	3	2	2	2	2

1) Sources of this nature may be subject to severe deformation in use. Manufacturers and users may wish to formulate additional or special test procedures.

2) Source-device combination may be tested.

Table 2 – Classification of sealed source performance standards

Test	Class						
	1	2	3	4	5	6	X
Temperature	No test	− 40 °C (20 min) + 80 °C (1 h)	− 40 °C (20 min) + 180 °C (1 h)	− 40 °C (20 min) + 400 °C (1 h) and thermal shock 400 °C to 20 °C	− 40 °C (20 min) + 600 °C (1 h) and thermal shock 600 °C to 20 °C	− 40 °C (20 min) + 800 °C (1 h) and thermal shock 800 °C to 20 °C	Special test
External pressure	No test	25 kPa absolute to atmospheric	25 kPa absolute to 2 MPa absolute	25 kPa absolute to 7 MPa absolute	25 kPa absolute to 70 MPa absolute	25 kPa absolute to 170 MPa absolute	Special test
Impact	No test	50 g from 1 m	200 g from 1 m	2 kg from 1 m	5 kg from 1 m	20 kg from 1 m	Special test
Vibration	No test	3 times 10 min 25 to 500 Hz at 49 m/s² (5g)[1]	3 times 10 min 25 to 50 Hz at 49 m/s² (5g)[1] and 50 to 90 Hz at 0.635 mm amplitude peak to peak and 90 to 500 Hz at 98 m/s² (10g)[1]	3 times 30 min 75 to 80 Hz at 1.5 mm amplitude peak to peak and 80 to 2 000 Hz at 196 m/s² (20g)[1]			Special test
Puncture	No test	1 g from 1 m	10 g from 1 m	50 g from 1 m	300 g from 1 m	1 kg from 1 m	Special test

1) Peak acceleration amplitude.

External Pressure Test

Two cell assemblies were placed into a vacuum chamber and exposed to a pressure between 12.8 and 15.0 Kilonewtons per square meter absolute as measured by a WALLACE & TIERNAN Model 61D-1D-0800 absolute pressure gage. After 5 minutes, the chamber was returned to atmospheric pressure. The chamber was then evacuated again to an absolute pressure between 12.8 and 15.0 Kilonewtons per square meter. After 5 minutes, the chamber was returned to atmospheric pressure.

No visible damage to the assemblies was evident. Wipe tests performed afterwards yielded results of .808 nCi for the first assembly and .014 nCi for the second. Since these values are below 5 nCi, these sources are considered to be leak free.

Temperature Test

By means of an OMEGA Model HH81 digital thermometer, two cell assemblies are known to have been subject to a -50 degree Celsius environment. The temperature was allowed to stabilize for 45 minutes and the assemblies were allowed to soak at that temperature for a further 20 minutes.

No visible damage to the assemblies was evident. Wipe tests performed afterwards yielded results of no detectable activity on either assembly.

By means of an OMEGA Model SDX-SET-GP-K-SMP K type thermocouple, the same two cell assemblies are known to have been subject to an oven atmosphere temperature of between 82 and 86 degree Celsius. After a stabilization period of 5 minutes, the assemblies were soaked at this temperature for one hour.

A wipe test performed afterwards yielded a result of no detectable activity on either assembly. No visible damage to the assemblies was evident.

Impact Test

Each Model 200155 was positioned so that it was most vulnerable to impact. The cylinder was determined to be the most vulnerable area. A 50.13 gram steel hammer was dropped a distance of 1 meter onto each assembly.

Each assembly was then dropped ten times onto a steel anvil from a height of 1.5 meters. The orientation of the assembly was varied so that each surface of the assembly was impacted at least once.

Other than minor cosmetic dents and scratches no damage to the assembly was evident. Wipe tests performed afterwards yielded results of .656 nCi for the first assembly and .022 nCi for the second. Since these values are below 5 nCi, these sources are considered to be leak free.

ECD Thermal Protection

Temperature Control

The ECD oven temperature is measured using a platinum RTD and switched by a solid state relay controlled by a microprocessor. The microprocessor is capable of detecting an open RTD or a shorted RTD and in either case will shut down the ECD heater. The microprocessor will not allow the ECD oven to be set to a temperature above 200 °C. In the event of either a software malfunction or a or a shorted solid state relay the ECD temperature is limited by two thermal cut-offs.

Thermal Cut-Offs:

Two thermal cut-offs wired in series with the heater protect the ECD from exceeding its maximum operating temperature of 450 °C. The UL/CSA recognized thermal cut-offs that are used are designed to open at a maximum temperature of 250 °C or less. The thermal cut-offs are in good thermal contact with the ECD to ensure fast response of the device (see Table 1). The leads of the thermal cut-off and heater are protected from shorting by using high temperature insulation with a dielectric strength of at least 1500 VDC and minimum insulation thickness of 0.020 inch.

Temperature Control Failure

In the event of a software failure, failure of the solid state relay or a microprocessor failure the heater assembly has been designed to limit the maximum temperature of the ECD to less than the ECD's operating temperature of 450 °C. The thermal cut-offs will open when their internal temperature reaches the designed trip temperature. The following test will verify that the 240 °C thermal cut-off will limit the ECD temperature to less than the maximum designed operating temperature of the ECD.

TEST

1. A 6823 ECD enclosure was used to mount the ECD.
2. Two 240 °C thermal cut-offs were installed in series with the heater.
3. The heater was connected to a variable power supply.
4. A flow of nitrogen gas (20 ml/min) was applied to the cell to simulate normal chromatographic use.
5. The power supply was adjusted to deliver 44 Watts of power to the cell.
6. The ECD temperatures were taken at intervals during warm up of the ECD.
7. The ECD temperature was allowed to stabilize.
8. The maximum temperature recorded was 284.6 °C (See Table 1)
9. The thermal cut-offs opened at the designed trip temperature. TC1 shows the surface temperature of the thermal cut-off to be 243.3 °C when it opened.
10. The test also shows that the thermal cut-off temperature TC1 and the heater temperature TC2 are in good thermal contact with each other. At the maximum temperature the difference between the two was only 32 °C.

TABLE 1 ECD thermal run away with 44 Watts applied to heater.

TIME (min)	TC1 °C	TC2 °C	RTD °C	Thermal Cut-Off
0	23.2	22.3	22.8	Closed
2	58.9	87.0	63.3	Closed
4	115.0	129.7	98.7	Closed
5	140.8	180.0	125.7	Closed
6	174.5	201.0	144.1	Closed
7	204.7	255.0	178.9	Closed
7.5	229.0	277.0	195.0	Closed
8	**243.3**	280.6	207.0	Open
8.5	252.6	**284.6**	205.0	Open
9	241.7	278.0	200.7	Open
10	230.0	249.6	187.4	Open
11	211.9	239.2	179.3	Open
13	183.1	193.5	157.2	Open

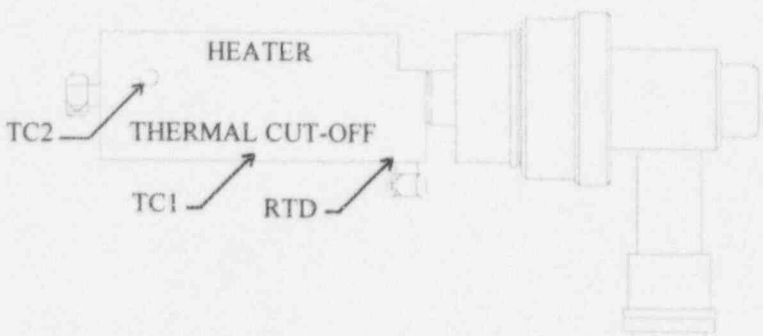
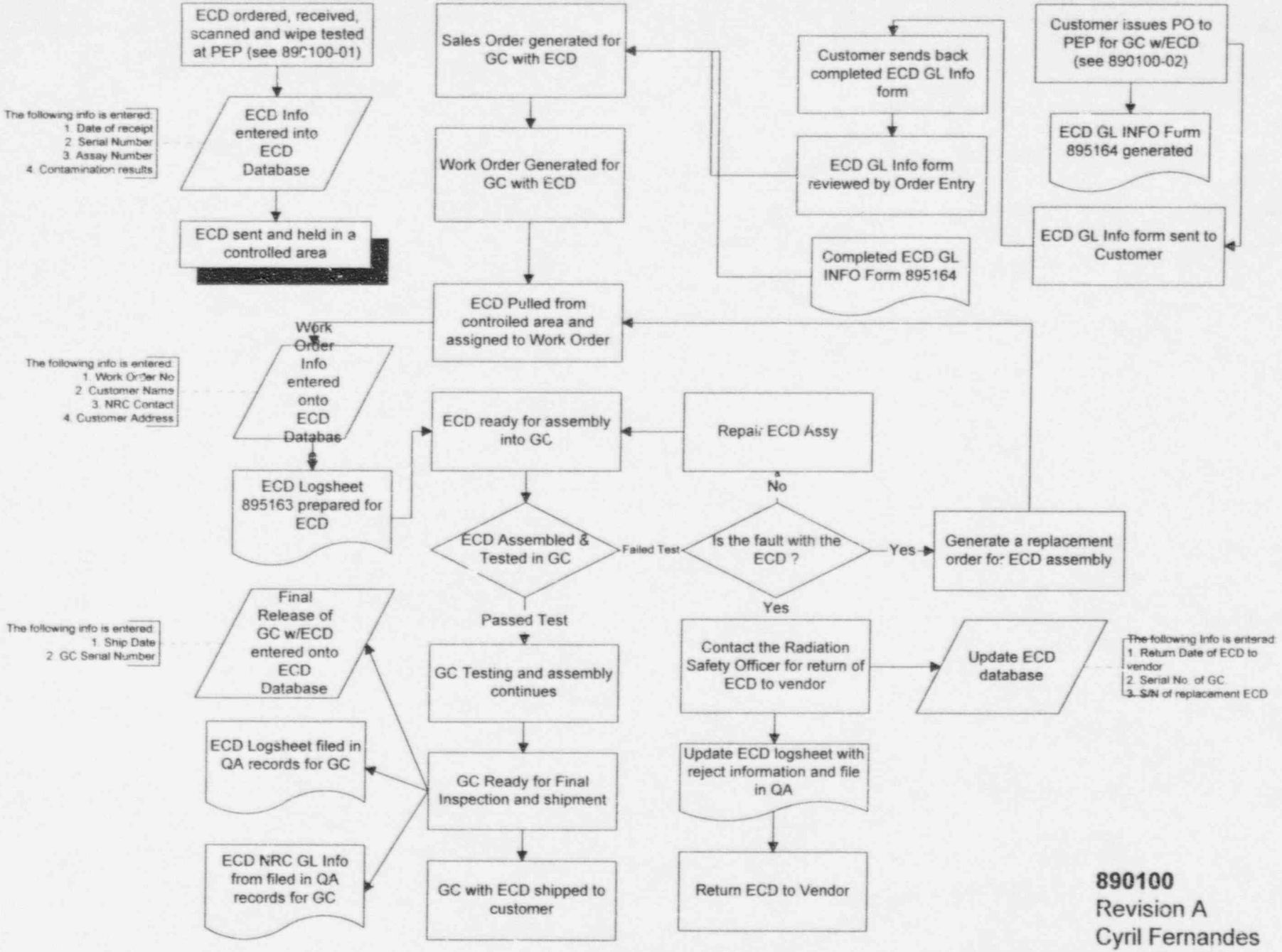


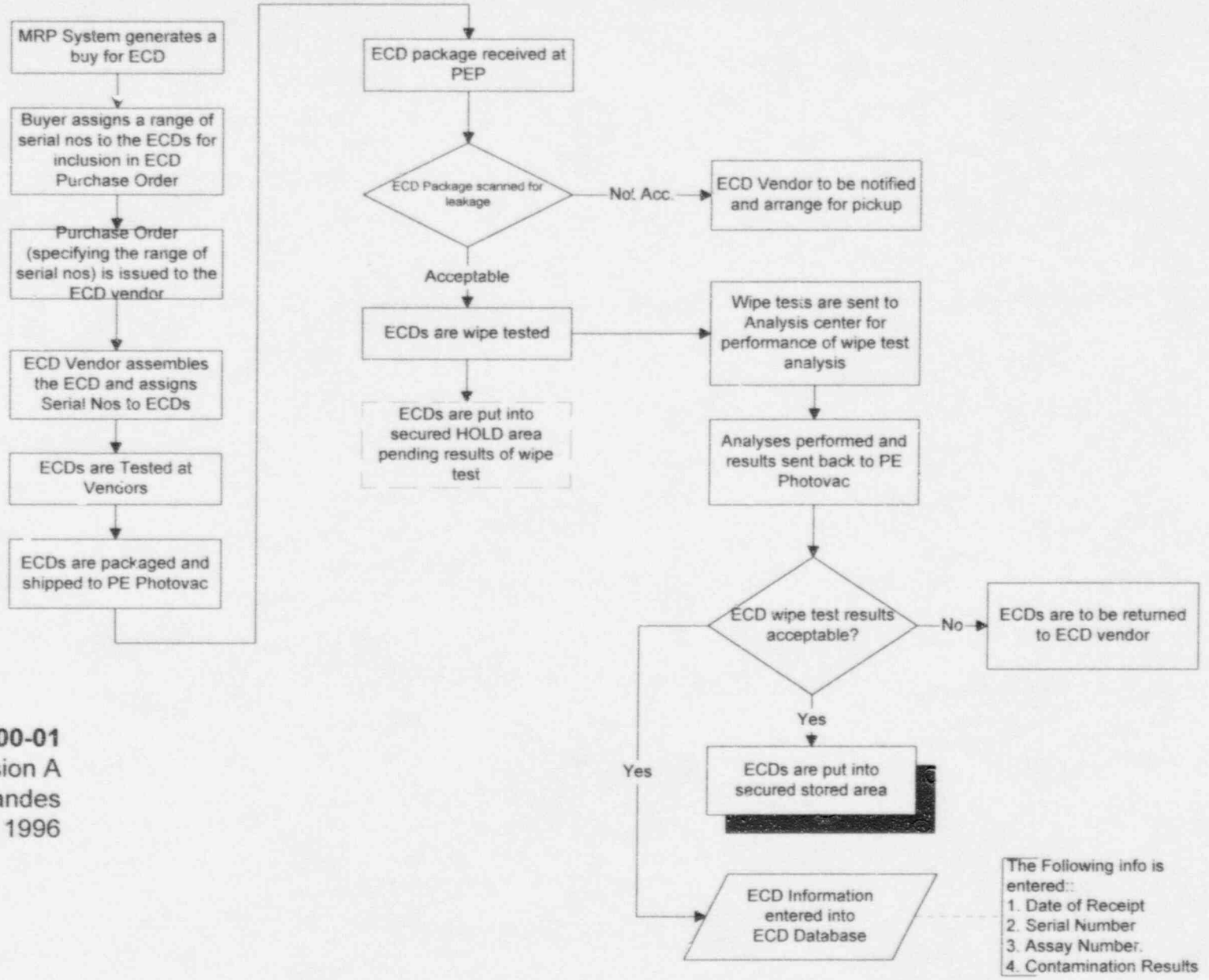
Figure 1. ECD showing thermocouple and RTD locations for measuring temperatures in Table 1

ECD Informational and Operational Flow through PE Photovac (Markham, Ont., Canada)



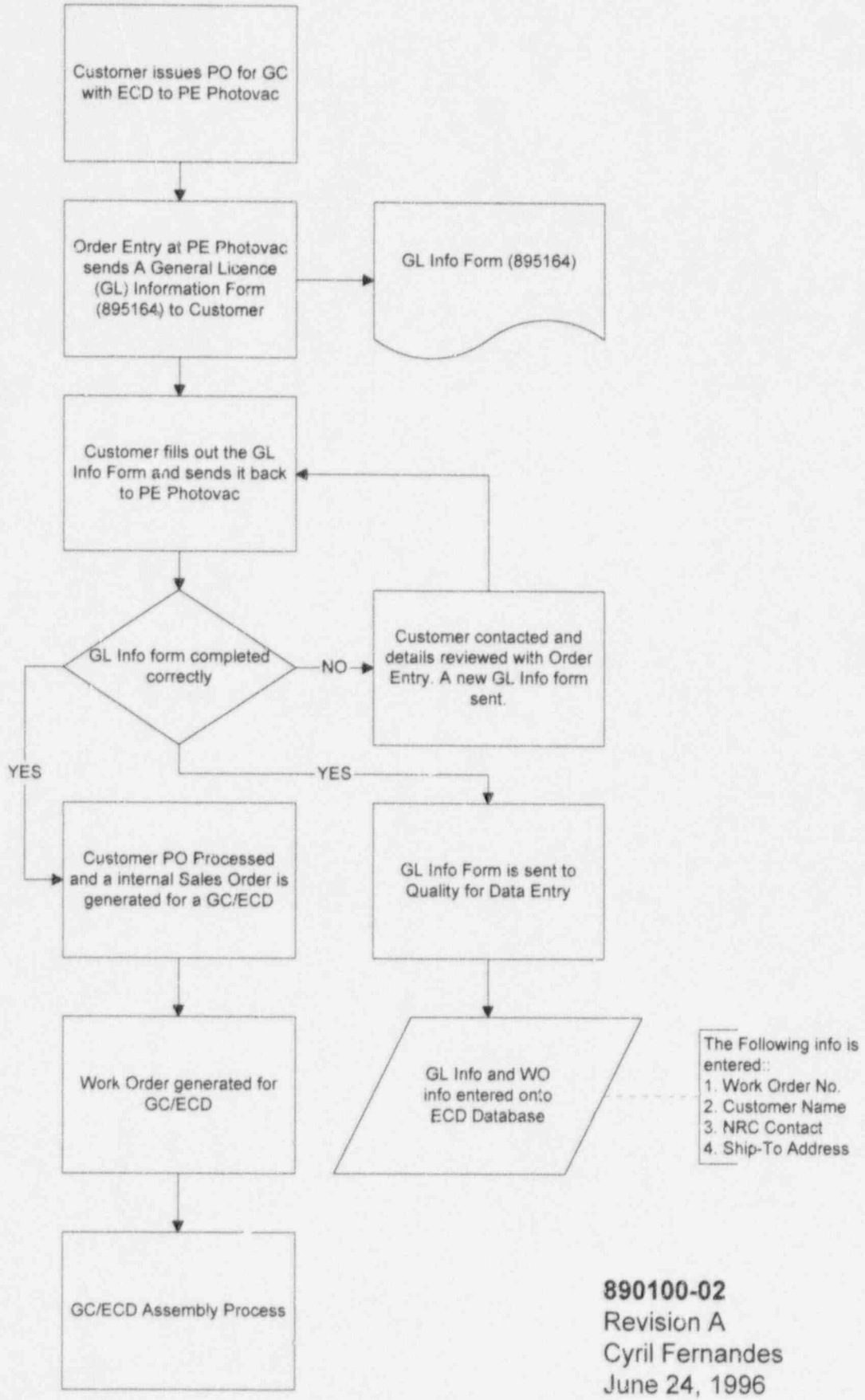
890100
Revision A
Cyril Fernandes
June 7, 1996

ECD Ordering and Stocking Process



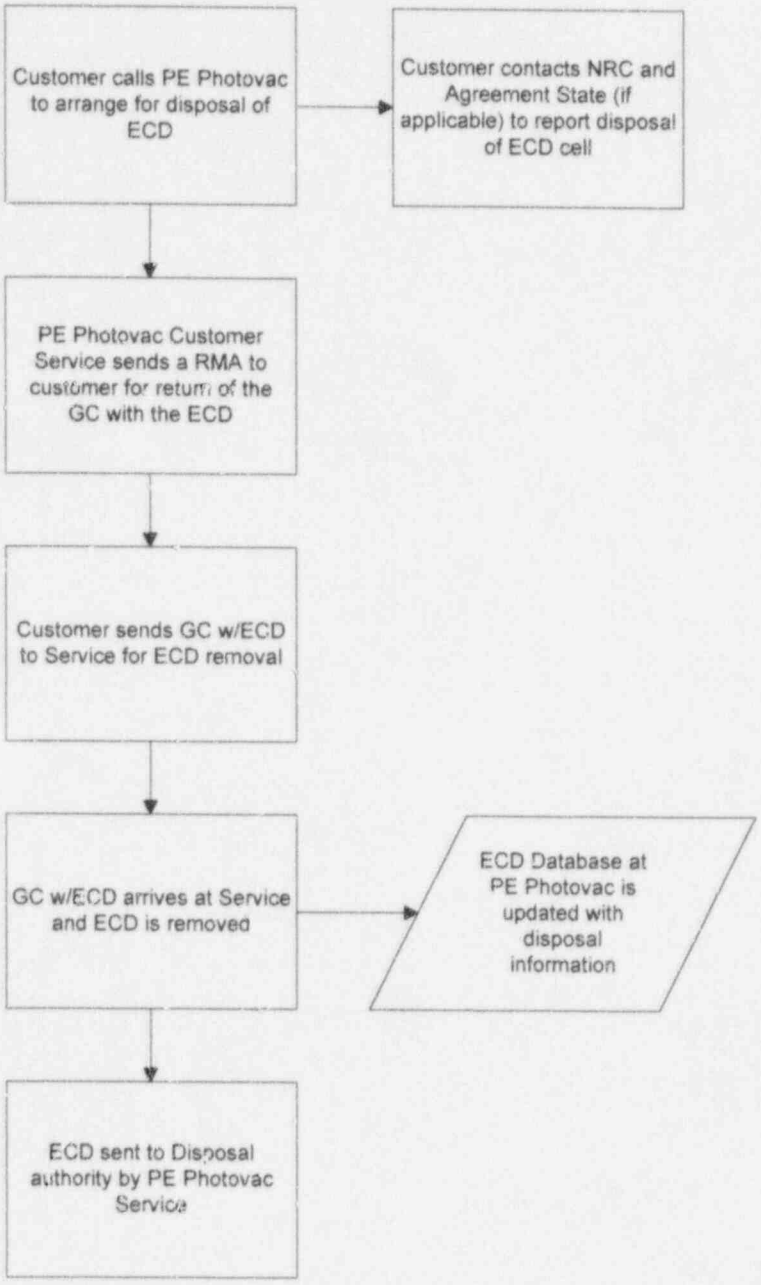
890100-01
Revision A
Cyril Fernandes
June 24, 1996

GC/ECD Customer Ordering Process



890100-02
Revision A
Cyril Fernandes
June 24, 1996

ECD Cell Disposal Process



890100-03
Revision A
Cyril Fernandes
June 24, 1996

ECD DATABASE - NRC Contact List (3rd Quarter 1996)

S A M P L E R E P O R T

Date Received	Serial No	Assay No	WO No.	Customer Name	Contact	Address	City	State	Ship Date	GC S/N
5/20/96	9986	8976	137654	Envirotech	John Doe	330 Cochrane Driv	Markham	OH	35250	JJDD291
7/3/96	9987	8765	564978	Remconsulting	Mary Smith	105 Doncaster	Thornhill	MD	35255	JJEE276
7/15/96	3456	9876	297456	Cal State Univ	Jane Doe	10 Sussex Drive	Los Angel	CA	35321	JJFF224

Notes:

1. This is a sample list and does not contain names or information of customers who have purchased GCs with ECDs
2. This list will represent the format to be used when submitting names and contacts to NRC.

Cyril Fernandes - July 15, 1996

Effect of High Temperature
on
A Typical NRD Ni-63 Gas Chromatography Source
Report NC-400-1PT

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Introduction

Beta radiation sources having the form of metal foils plated with metallic Nickel 63 are widely used in the gas chromatographic technique of chemical analysis. Normal and correct application of the GC method and equipment typically involves high temperature exposure for long time periods. The Nickel 63 type of radioactive ionization source is considered to have exceptionally good resistance to change of characteristics when subjected to elevated temperature, but it is of importance to demonstrate this through specific testing.

An earlier series of tests performed by one of the authors of the present study had demonstrated that Nickel 63 sources produced by him at that time did exhibit anticipated temperature resistance. The present series substantially extends the earlier work, while also demonstrating reproducibility of the results.

Purpose of Current Tests

Using a standard NRD Model N1001 Ni-63 chromatography source, to examine the effect of prolonged high temperature exposure on the release rate of Ni-63, and on the available ionization current.

To determine reproducibility of results outlined in our study dealing with Ni-63 sources of earlier manufacture in another laboratory.

Description of Source Tested

NRD Source Model	- N1001
Source Serial Number	- A599
Source Construction	- Nickel metal plated on one surface of gold foil .007" thick
Source Dimensions	- 0.5" x 1.5"
Nickel 63 Content	- 11 millicuries
Pretreatment	- Source fired at 430°C for 15 minutes in argon atmosphere

Test Procedures

1) Initial Room Temperature Tests - Source in form of a flat foil was measured for ion current by means of standard NRD ion chamber. (3" parallel plate chamber with 1" air gap.) It was then formed into cylindrical shape (approximately 1/2" diameter and 1/2" height), and inserted into a concentric design detector cell of the high temperature electron capture type. This cell was then assembled into the equipment layout shown in Figure 1. With dry nitrogen gas flowing at a rate of 100ml/minute, the initial ion current was checked at room temperature. (Ion current data is shown in Graph No. 1.)

2) Exposure Tests at 400° to 450°C.

a. Detector cell was heated and maintained at 400° to 450°C for 500 hours. Cell was purged continuously with dry nitrogen gas at rate of 100 ml/minute throughout this period. Ion current measurements were taken at approximately 100 hour intervals at the operating temperature. (Ion current data is shown in Graph No. 3, showing a typical periodic measurement. A plot of ion current measurements taken at a representative voltage and temperature is shown in Graph No. 2.)

b. Nickel 63 volatilization and radioactive leakage tests were performed at approximately 100 hour intervals during the course of the cell operation described in (a) above. Dry filter paper wipes were taken from inner surfaces of dry trap #1 of Figure 1; aliquots of 1 ml each were taken from wet traps #2 and #3, evaporated to dryness, and measured for activity. (Measurement data is given in Table #1.)

c. After 500 hours of operation, the cell was cooled to room temperature. Ion current measurements were taken as temperature dropped. (Measurement data show in Graph No. 4.) Cell was then disassembled, and its inner and outer surfaces were wipe tested for presence of activity. Nickel 63 source was removed from cell, flattened to its original form, and examined for possible discoloration, flaking, cracking, etc. (Data re wipe tests and surface characteristics shown in Table #2.) Measurements of the flat foil source were made in the standard ionization chamber with 1" air gap as in section (1) of test procedure.

3) Exposure Tests at 500° to 530°C

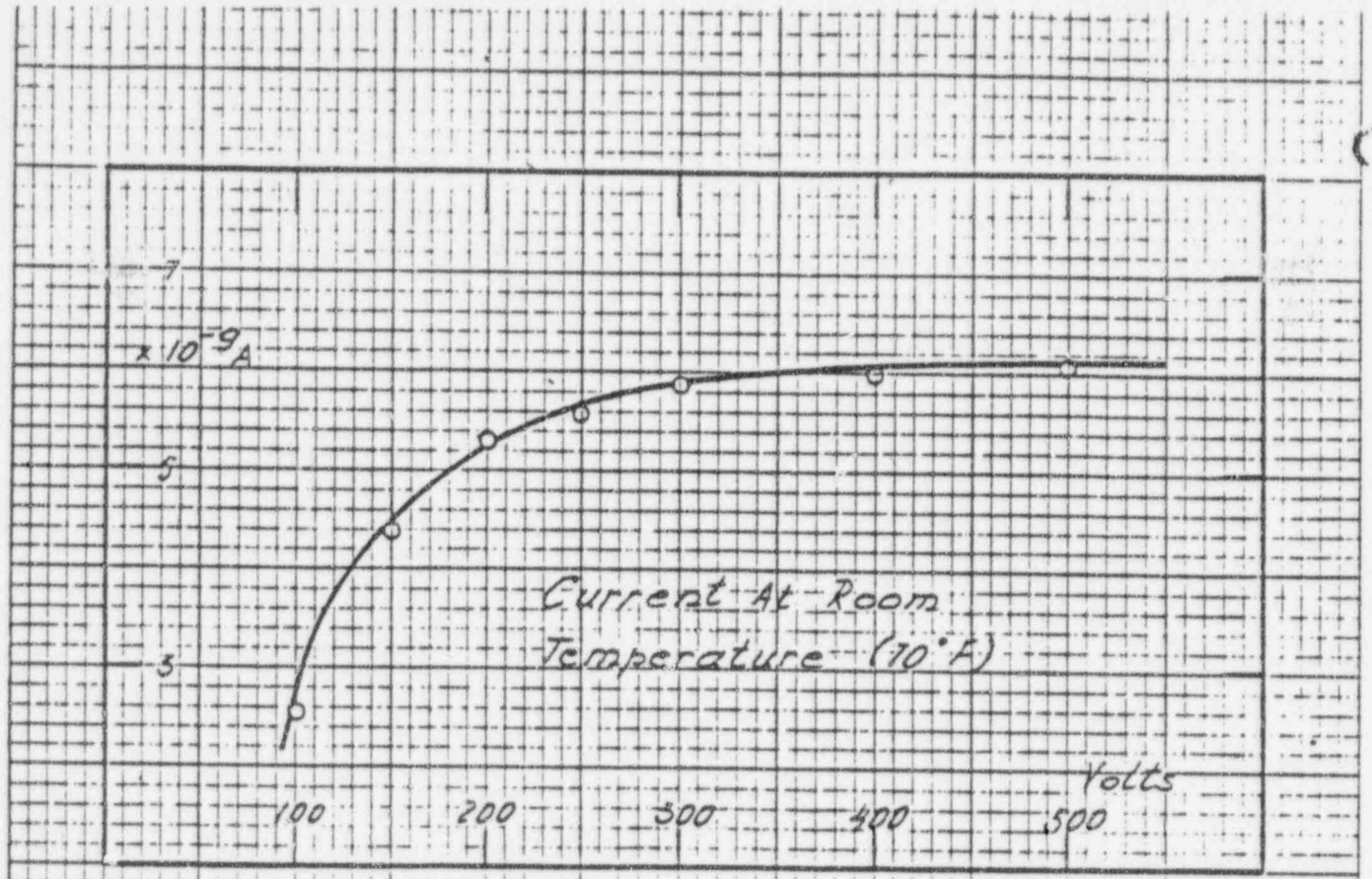
The Ni-63 source tested above was again formed into cylindrical shape and inserted into the detector cell. With nitrogen gas flowing as before, the ion current was determined at temperature 50°C. (Data given in Graph No. 5.) Cell was then heated and maintained at 500° to 530°C for 92 hours with continual nitrogen purge. At completion of this run, heating was terminated and cell was disassembled. Final leak tests were performed through wiping inner and outer surfaces of cell, as well as inner surfaces of dry and wet traps. (Measurement data given in Table #3.) Final measurements of the flattened foil source were made in the standard ionization chamber with 1" air gap as in section (1) and section (2c) of test procedure. (See Graph No. 6 for comprehensive comparison of results of ionization chamber measurements before and after each high temperature exposure series.)

Discussion

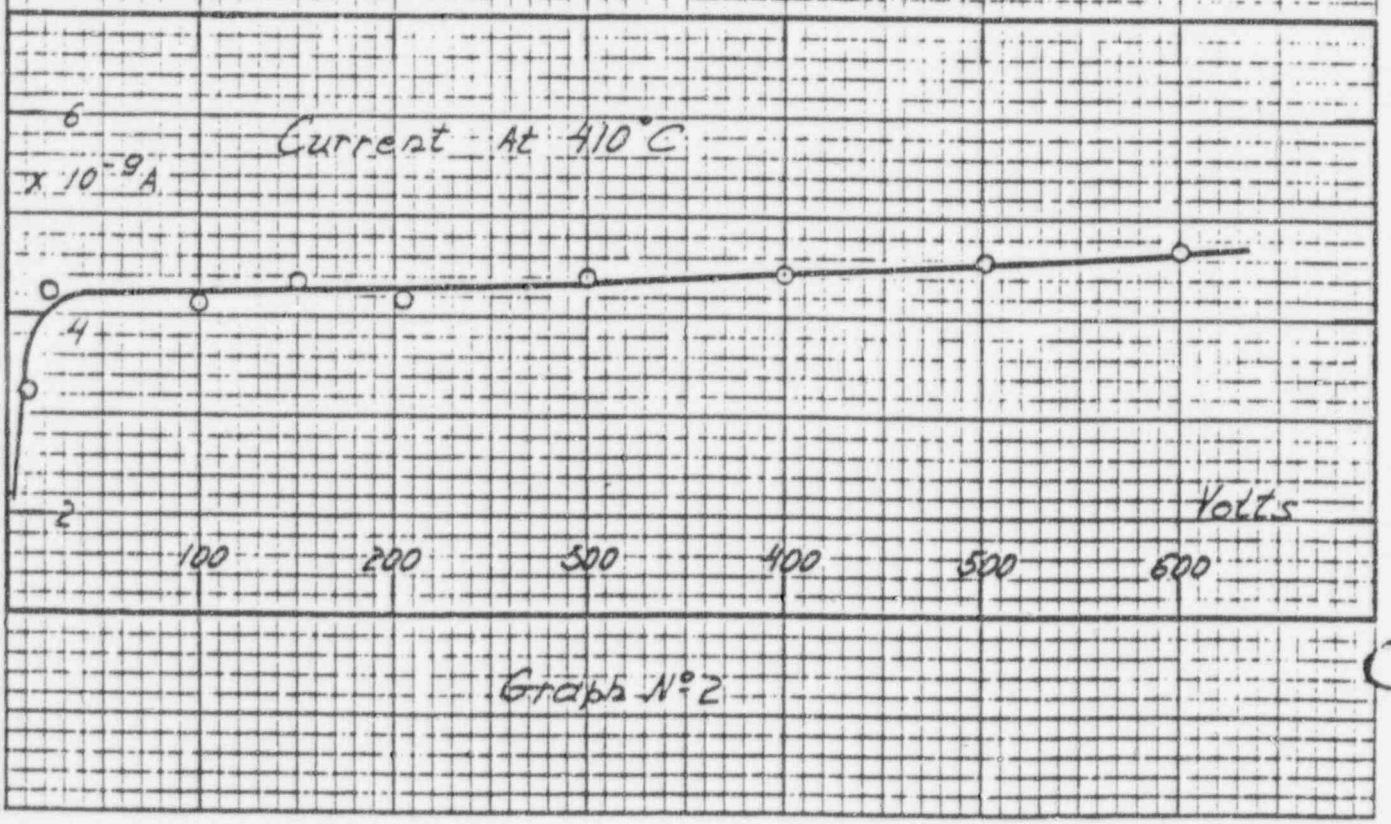
The tests and data obtained provide clear assurance that high temperature exposure of this type of Ni-63 plated source does not result in a detectable release and volatilization of Ni-63 into the environment. It is considered that the detectable but

insignificant beta count rates found on inner cell surfaces after completion of testing are the result of mechanical transfer of removable activity from the source surface during assembly and disassembly operations. In this connection one should recall that the Ni-63 plated foil is considered to be a "bound" source, not a "sealed" source.

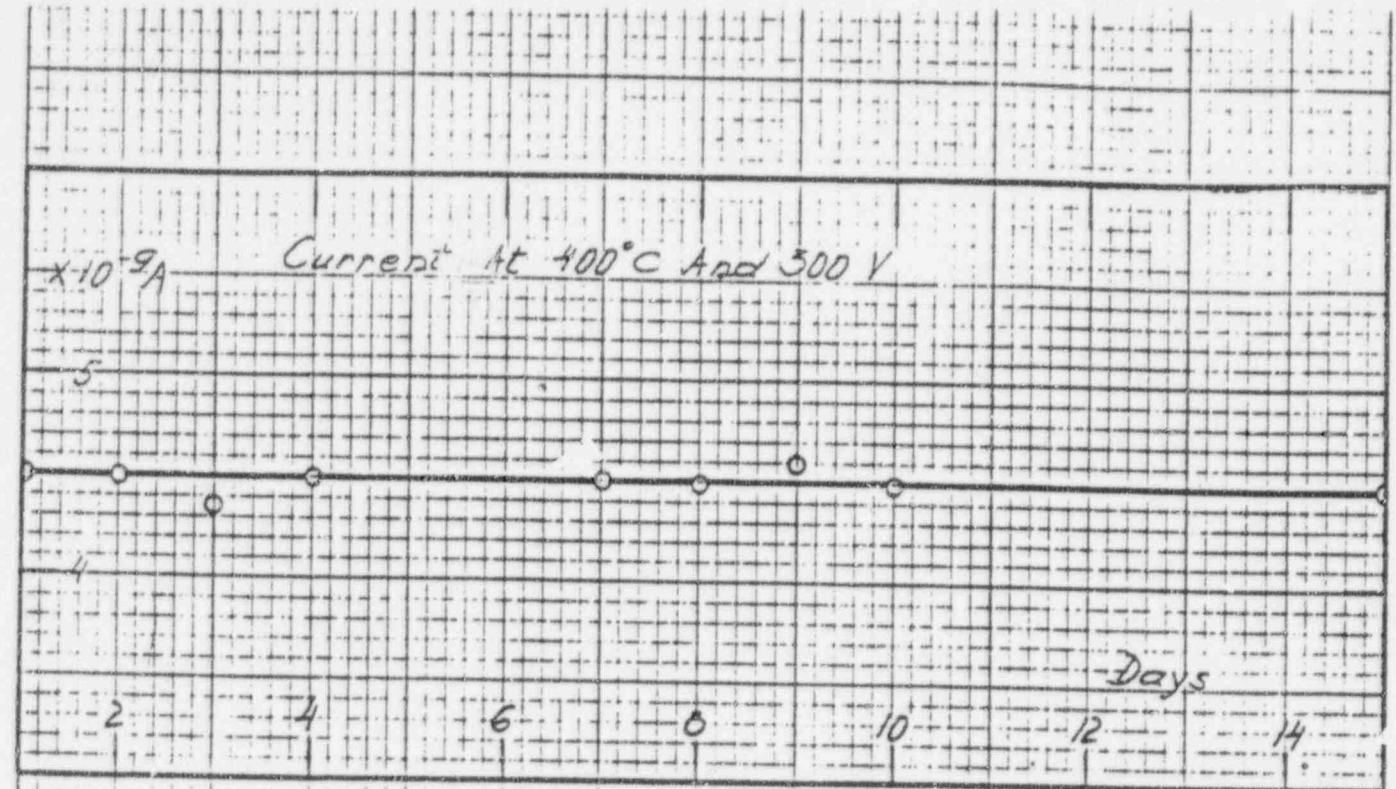
Although not of prime interest in the present test series, the appearance of the family of ionization curves in Graph No. 6 deserves comment. The apparent decrease in ionization current after each high temperature series, even though moderate, must be considered as an indication of slight changes occurring in the available activity of the source. Since no active material has migrated from the foil, the probability of diffusion of Ni-63 into the substrate remains for investigation. Even though the temperature ranges of the present tests (400°C to 530°C) are considerably higher than in field usage of the Ni-63 type GC cell, this simply suggests an accelerated rate of change as contrasted with the effects which may be experienced in the field during many thousands of hours of use.



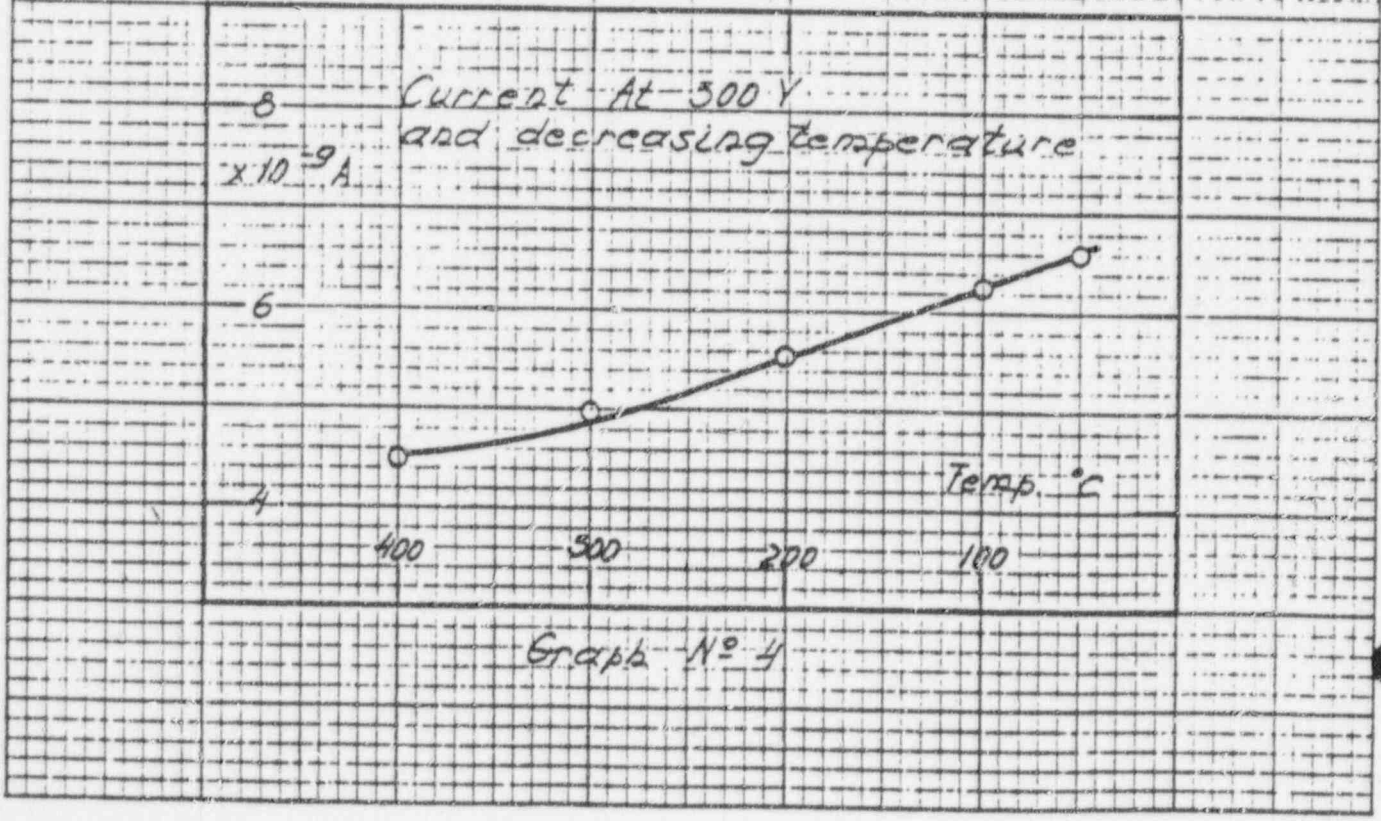
Graph N°1



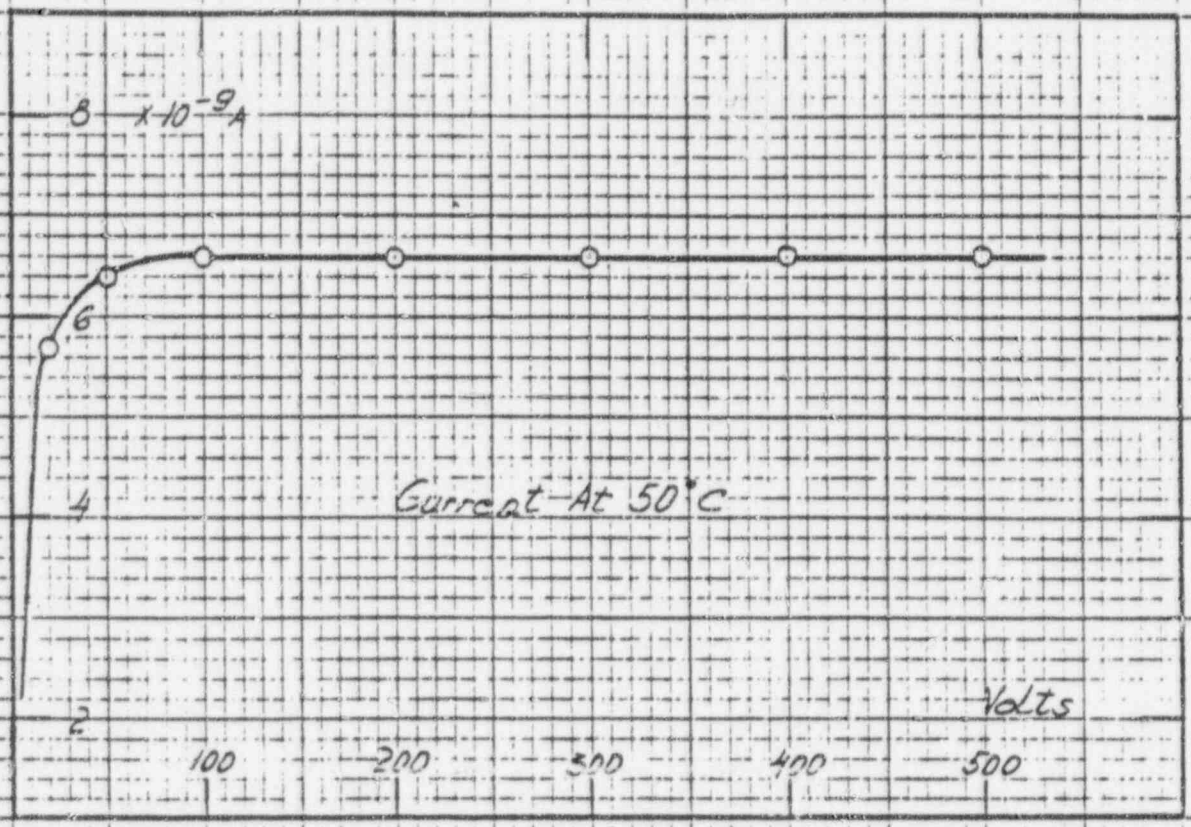
Graph N°2



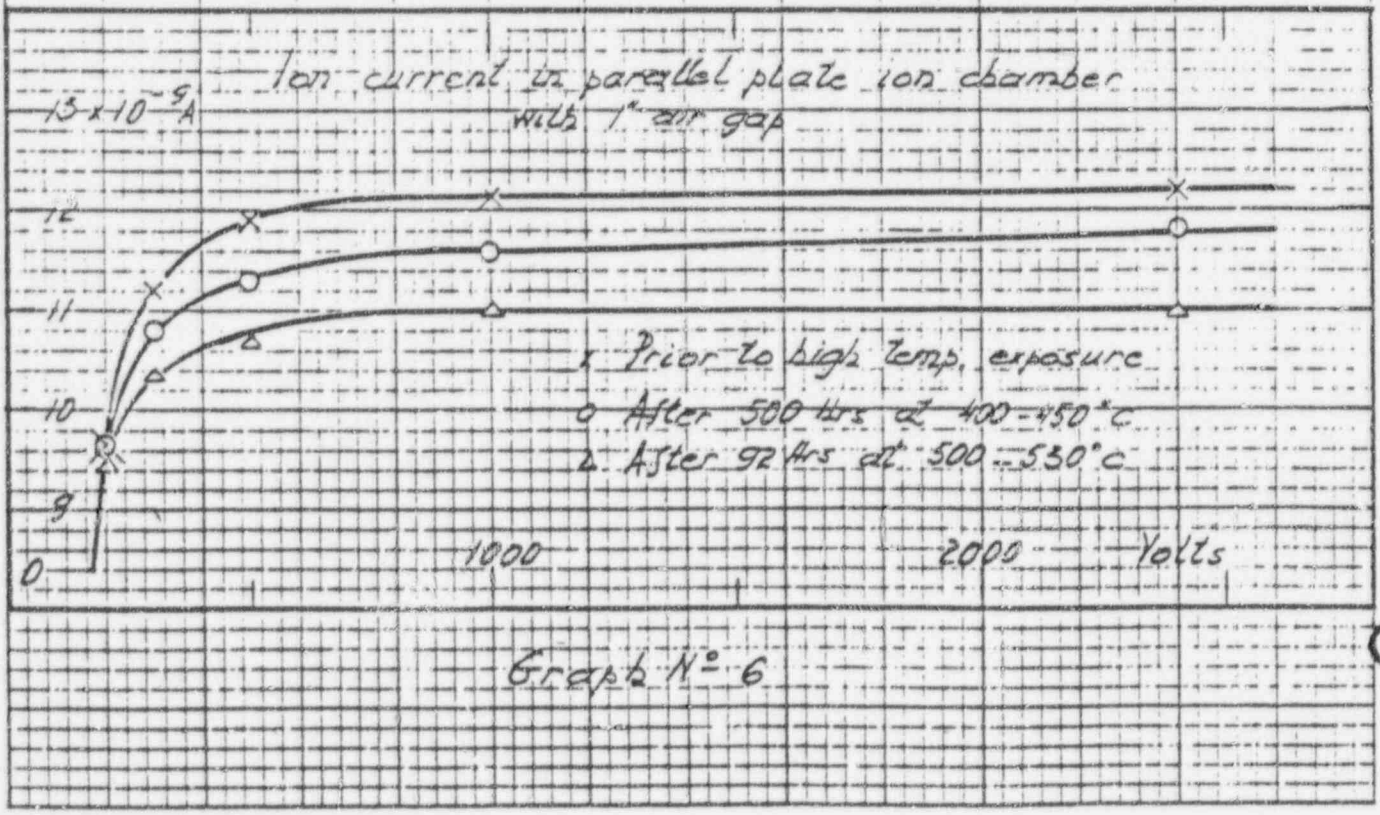
Graph No 3



Graph No 4



Graph No. 5



Graph No. 6

Sketch of setup used for high temperature test

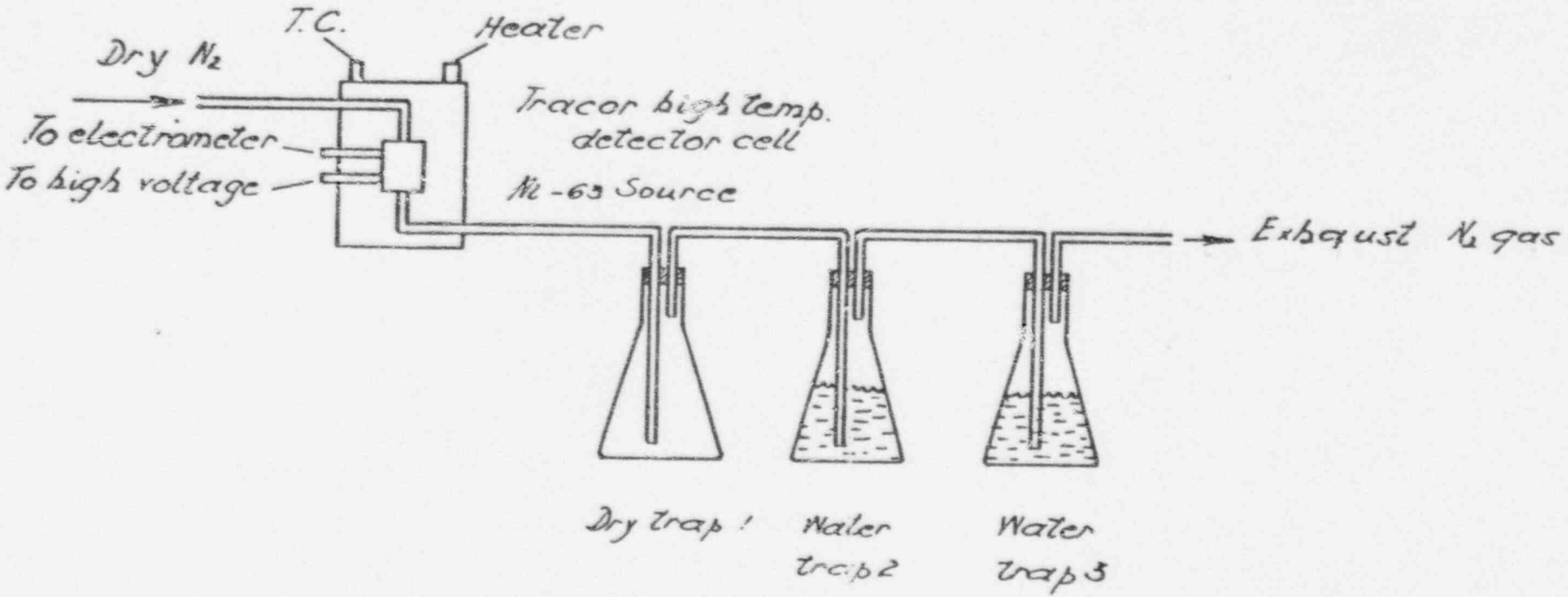
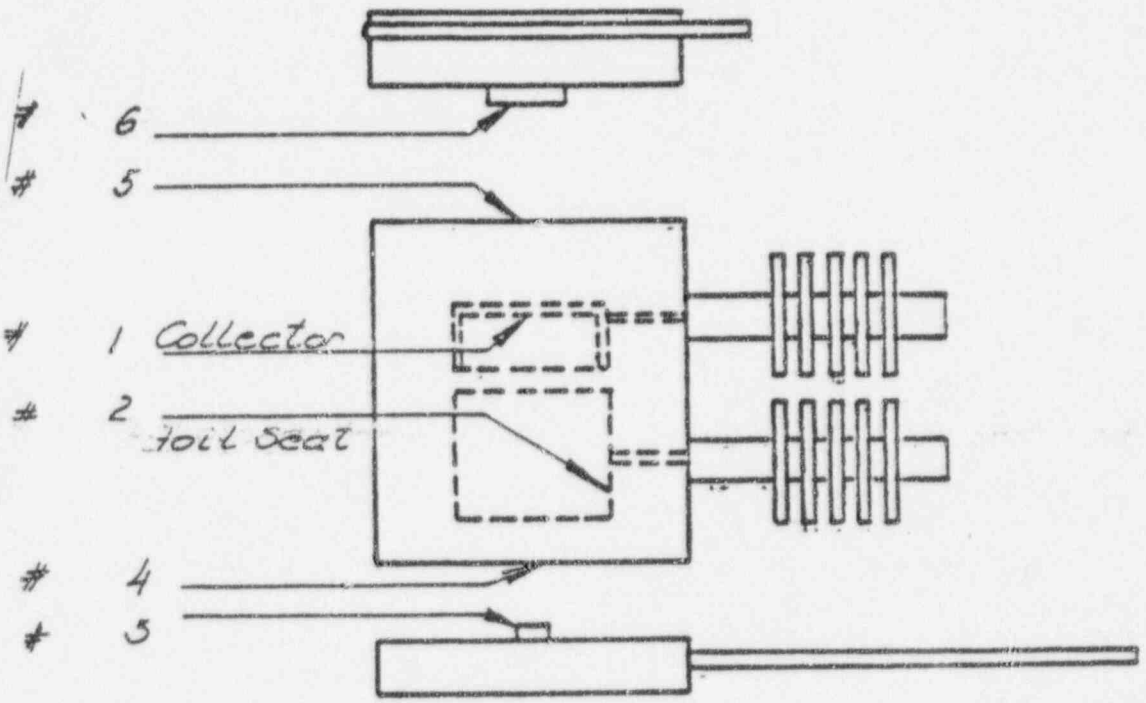
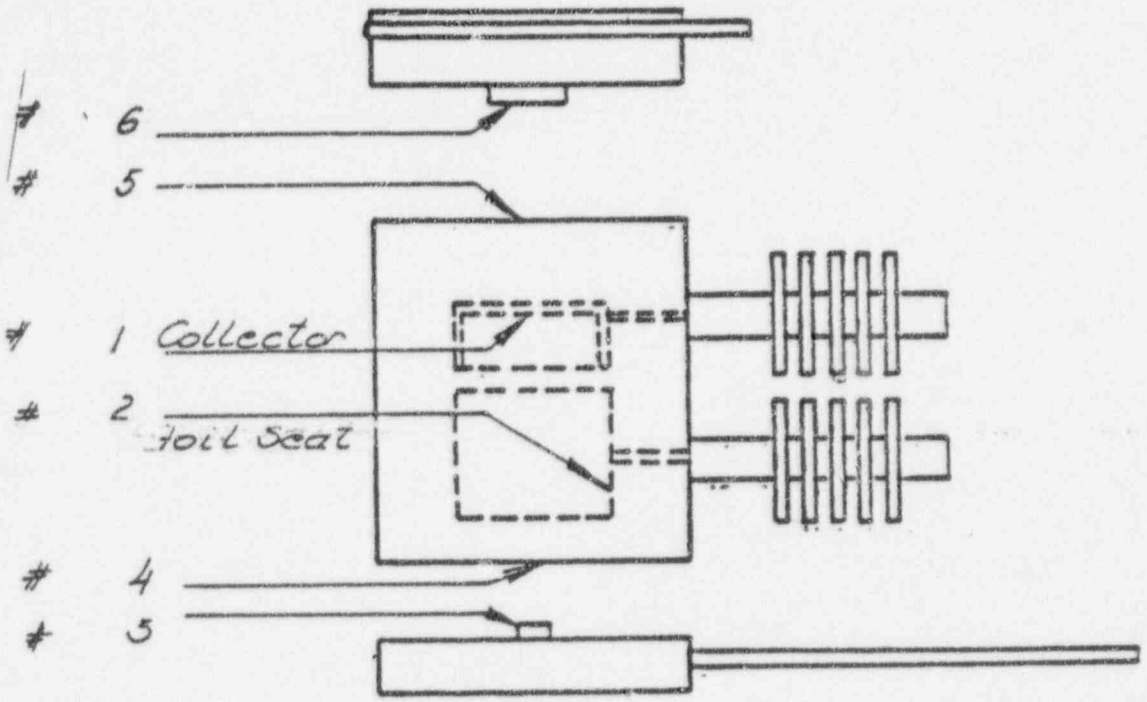


Figure 1.



Wipe Take Scheme



Wipe Take Scheme

Hrs Elapsed	Dry Flask	Flask #2 Liq.	Flask #3 Liq.
96	BkG	BkG	BkG
288	-1-	-1-	-1-
432	-1-	-1-	-1-
480	-1-	-1-	-1-
500	-1-	-1-	-1-

Table I

Detector Cell Wipe	Characteristic of foil cell	Results
No activity on outer cell surfaces has been detected	Discoloration	No
	Cracks	No
	Flaking	No
	Bending	No

Table II

Evaluation of Detector cell surfaces

inner Surfaces		Outer Surface	Dry Flask Wipe	Flask # 2 Liq.	Flask # 3 Liq.
Wipe #	Cpm				
1	1	3kG	BkG	BkG	BkG
2	11.300				
3	21				
4	31				
5	54				
6	5				

Table III

Wipe test evaluation of apparatus after 500-530°C series

Return to KP4

Yale University

UNIVERSITY HEALTH SERVICES
HEALTH PHYSICS DIVISION

Kenneth Price
314 Wright Nuclear Structure
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260 Whitney Avenue
New Haven, Connecticut 06520
Area Code 203-436-2936

August 18, 1980

Mr. Pat Dorsey
Perkin-Elmer Corp.
Norwalk, Conn.

Dear Mr. Dorsey:

I have enclosed the results of calculations which I feel apply to 10 CFR 32.51, (a), (2), parts ii and iii dealing with normal operation and accident conditions of the gas chromatograph.

If you have any further questions feel free to contact me.

Thank you.

Ken Price
Health Physicist

KP/vc

KENNETH W. PRICE

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EXPERIENCE - EDUCATIONAL

Degree/Year	Institution	Field Study
B.S. - 1966	California State College California, Pennsylvania	Physics/Math
M.P.H. - 1968	Yale University New Haven, Connecticut	Radiological Health

EXPERIENCE - PROFESSIONAL

Organization	Years	Position
Northeastern Regional Health Laboratory Winchester, Massachusetts	1967	U.S.P.H.S. Fellow
Lawrence Livermore Laboratory Mercury, Nevada	1968 - 1974	Health Physicist; Nuclear Weapons Testing
Nevada Nuclear Test Site Mercury, Nevada	1972 - 1973	Consultant to the U.S.A.E.C. in conjunction with the Los Alamos Scientific Laboratory
Yale University University Health Services New Haven, Connecticut	1974 - Present	Health Physicist
Nalge Corporation Rochester, New York	1977	Consultant in demonstrating the usefulness of a product for liquid scintillation counting
Radio Station WELI New Haven, Connecticut	1977	Taped a one half-hour interview discussing Nuclear Weapons Testi
Southern Connecticut State College New Haven, Connecticut	1978	Consultant, Electron Microscopes
Perkin-Elmer Corporation Norwalk, Connecticut	1979	Consultant, General Radiation Safety; Advice on Setting up Radioactive Materials Handling Areas; Meter Calibration, Smear Surveys

Yale School of Medicine Department of Epidemiology and Public Health New Haven, Connecticut	1979	Appointed Lecturer in Public Health: Radiological Hea
Yale University University Health Services New Haven, Connecticut	197[illegible] - Present	Deputy Director, Health Physics Division
Dyna-Tek Ltd. Park Ridge, New Jersey	1980	Consultant, General Radiation Safety
State of Connecticut Governor's IRAT ~~Energy~~ Response Team Emergency	1980	Member of Independent Risk Assessment Team

PUBLICATIONS

K. W. Price, "Determination of Neutron Spectra and Dose at the Yale MP Tandem Van de Graaff Accelerator", Master's Thesis, 1968.

G. R. Holeman, D. McM. Shaw and K. W. Price, "Stray Neutron Spectra and Comparison of Measurement with Discrete Ordinates Calculations", Proceedings of the Second International Conference on Accelerator Dosimetry and Experience, 553, 1969.

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G. R. Holeman, K. W. Price, L. F. Friedman and R. Nath, "Neutron Spectra From a Sagittaire Medical Accelerator", Proceedings of the Fourth International Conference of the International Radiation Protection Association, Vol. 3, 827, 1977.

G. R. Holeman, K. W. Price, L. F. Friedman and R. Nath, "Neutron Spectral Measureme[illegible] in an Intense Photon Field Associated with a High Energy X-Ray Radiotherapy Machine", Medical Physics, Vol. 4, No. 6, 1977.

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K. W. Price, R. Nath and G. R. Holeman, "Fast and Thermal Neutron Profiles for a 25 MV X-Ray Beam", Medical Physics Journal, July/August, 1978.

K. W. Price, G. R. Holeman and R. Nath, "A Technique for Determining Fast and The Neutron Flux Densities in Intense High Energy (8-30 MEV) Photon Fields, Health Physics Journal, Vol. 35, August, 1978.

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R. Nath, K. W. Price and G. R. Holeman, "An Intercomparison of Neutron Measureme for a 25 MV X-Ray, Radiotherapy Accelerator", Submitted to Medical Physics, February, 1980.

K. W. Price, R. Nath and G. R. Holeman, "High Energy X-Ray Spectrum Measurements Using Photo Nuclear Activation Detectors", submitted to the 25th Annual Meeting of the Health Physics Society, February, 1980.

SOCIETIES

Member, National Chapter of the Health Physics Society.
Member, Connecticut Chapter of the Health Physics Society.

HONORS

U.S.P.H.S. Fellowship, Yale University, 1966 - 1968.

SUMMARY

It appears very unlikely that under normal operating conditions of the unit, exposures would result that even approach the limits of 10 C.F.R. 32.51 (a)(2)(ii). An accident situation would yield a surface skin dose in the range of 12 MREM/Hr. due to submersion in a contaminated atmosphere. However, this dose would be to the dead layer of the skin only, due to the low Beta energy of Ni^{63}. Dose to the internal lung tissues due to submersion would be even less, due to the natural breathing process. A total lung dose due to actual deposition of insoluable $Ni^{63}O$ would be in the range of 8 Rem (50 Yr. integrated dose equivalent, acute uptake). Dose to the G.I. tract would be less. The most serious situation occurs when the Ni^{63} foil is placed in direct intimate contact with bare skin. A surface dose rate of ~ 7300 RAD/Hr. would result, but the dose rate falls to zero at about the depth of sensitive skin tissue, the basal cells (.007 cm deep). Skin erythema could result with prolonged contact, but recovery should be certain. If the foil were placed in a pocket, the dose rates would be very much less due to absorption in the material and air.

/s/ Kenneth Price 8/17/80

Health Physicist

RESPONSE TO 10 C.F.R. 32.51 (a)(2)(ii):

Under normal operating conditions, the Ni foil is securred in a cell, and that cell is in the device. The Ni^{63} isotope is electrodeposited onto a Ni foil backing, making it very strongly bound to the foil. The melting point of Ni is 1455 ^{o}C, and the boiling point is 2900 ^{o}C (1) (Ref. 1). Engineering tests indicate a maximum possible temperature in the cell $\leq$ 530 ^{o}C.

Radiation dose rates outside of the cell should be minimal, as Ni^{63} emits Beta radiation of very low energy (E_{max} = 0.066mev, E_{ave} = .017mev). The calculated range (2) of these Beta's is 6.59 mg/cm^{2}. The walls of the cell are greater than the range of the maximum energy Betas which are emitted.

There should be no liberation of airborn Ni^{63} during normal operation, and the only radiation leakage would be very low energy characteristic x-rays and bremsstrahlung which would be absorbed almost entirely within the walls of the cell.

RESPONSE TO 10 C.F.R. 32.51 (a)(2)(iii):

In the event of a catastrophic accident or direct tampering and removal of the Ni foil by an unauthorized individual, several possible exposure routes may result. Three such conditions will be addressed:

(1) Complete vaporization of a 15 mCi Ni^{63} foil and subsequent prompt release into a stagnant laboratory atmosphere, external dose rate to an individual present in the room;

(2) Same as above, but the dose to the lung due to ingestion and retention of Ni^{63};

(3) Removal of the Ni foil from the cell by an unauthorized individual, and dose rate to skin due to direct contact of foil and skin.

(1.) The assumption is made that complete vaporization of 15 mCi of Ni^{63} is instantaneously released into a lab which is 10' X 10' X 8' and that there is no ventillation and no reduction with time of the Ni^{63} air concentration. Because Ni^{63} is a low energy Beta emitter, no internal exposure will result due to submersion of an individual into this atmosphere[3]. (Deposition in lung will be discussed later.) From reference 3, the external Beta dose rate conversion factor at the skin surface is:

$$1.56 \times 10^{8} \ \frac{(\text{MREM/YR})}{(\mu\text{Ci/cm}^{3})} \ .$$

The concentration of Ni^{63} in the room would be:

6.62×10^{-4} uCi/cm^3 ,

yielding a skin surface dose rate of :

11.8 MREM/HR .

The dose rate to the internal surface of the lung would be less due to the natural breathing process. In an accident situation where such a release might occur, it is very unlikely an individual would be present for an extended period of time. At any rate, it is very improbable that the limts in table 32.24, Column IV of 10 C.F.R. 32 would be exceeded. It should also be pointed out that what skin dose did result would be to the uppermost dead layer, as the range of the Ni^{63} maximum energy Betas in tissue is 6.59×10^{-3} cm, and the depth of the sensitive basal layer of the skin is 7.00×10^{-3} cm and the lens of the eye 0.3 cm (ICRP 30).[4]

(2.) Again, the 15 mCi of Ni^{63} is released into a lab (10' X 10' X 8') with no ventillation, yielding a constant concentration of 6.62×10^{-4} uCi/cm^3. The Ni^{63} would be released as NiO, which is insoluable in water and only slightly soluable in acid. NiO is a Class W inorganic compound according to the ICRP task group on lung dynamics[5]. A mean particle diameter of 1 um will be

assumed as suggested in ICRP 30[4]. The ICRP lung model was used in calculating the resultant lung dose[4]. The following assumptions were made in the calculations:

(a) ^{63}Ni is released as ^{63}Ni O, which is insoluable in water, with an AMAD of 1 um, and is a Class W compound.

(b) In an accident condition, a maximum likely individual residence time was set equal to one hour.

(c) Standard man breathing rate, light activity, 9600 liters/8 hours, or 1.2×10^{6} cm^3 breathed in one hour[6].

(d) Initial ^{63}Ni concentration 6.62×10^{-4} uCi/cm^3 with no ventillation assumed.

(e) No clearance from lung is assumed during the one hour of uptake, and no respiratory protection assumed.

Using the appropriate factors from the lung model, the total initial amount of activity deposited in the total lung system is $\sim$ 500 uCi. ICRP 2 suggests a maximum permissible total body burden of soluable ^{63}Ni of 900 uCi[7]. Based on the results of the calculations, the total dose commitment to the lung from a one hour exposure is 8.2 REM. If this is averaged over a period of 50 years, this results in about 164 MREM/YR. This is approximately equal to the

U.S. population average exposure per year of 170MREM/YR. Again, the maximum allowable doses as given in table 32.24, Column IV of 10 C.F.R. 32 would not be exceeded. The dose commitment to the G.I. tract would be very much less due to the short residence time in the gut.

(3.) The approximate Beta absorbed dose rate at various depths in tissue was calculated assuming 15mCi uniformly distributed on a 2.4cm disc, in direct contact with bare skin[8]. The results of the calculations are given below; also given are the centimeter depths in tissue for which the absorbed dose was computed.

Tissue Depth, cm	RAD/HR
0.0010	7308
0.0050	.839
0.0066	.022
>.0066	≈ 0

The dose rate near the immediate surface of the skin is quite large and falls off with depth quite rapidly. However, the dose is to the non-functional dead layer of the skin, as the depth of the skin tissue basal layer is ~0.0070cm[4]. A possible skin reaction (i.e. skin erthema) could occur if the foil were in direct intimate contact with the skin. However, the damage would be localized to the immediate area of the foil and recovery would be expected. Any clothing and subsequent air space (i.e. foil in a pocket) would reduce the absorbed dose greatly.

REFERENCES

(1) Handbook of Chemistry and Physics

(2) Radiological Health Handbook

(3) Health Physics, Vol. 38, April, 543-621.

(4) ICRP Report 30

(5) Health Physics, Vol. 12, 1966

(6) ICRP Report 23

(7) ICRP Report 2

(8) Radiation Dosimetry, Hine and Brownell

BETWEEN:

LICENSE FEE MANAGEMENT BRANCH, ARM
AND
REGIONAL LICENSING SECTIONS

(FOR LFMS USE)
INFORMATION FROM LTS

PROGRAM CODE: 03214
STATUS CODE: 0
FEE CATEGORY: 3B
EXP. DATE: 20050831
FEE COMMENTS: _____
DECOM FIN ASSUR REQD: N

LICENSE FEE TRANSMITTAL

A. REGION I

1. APPLICATION ATTACHED
APPLICANT/LICENSEE: PERKIN-ELMER CORPORATION
RECEIVED DATE: 970117
DOCKET NO: 3003776
CONTROL NO.: 124118
LICENSE NO.: 06-02135-03
ACTION TYPE: AMENDMENT

2. FEE ATTACHED
AMOUNT: $580.00
CHECK NO.: 008184

3. COMMENTS

SIGNED M. A. Perkins
DATE 1/19/97

B. LICENSE FEE MANAGEMENT BRANCH (CHECK WHEN MILESTONE 03 IS ENTERED / ✓ /)

1. FEE CATEGORY AND AMOUNT: 3B $530

2. CORRECT FEE PAID. APPLICATION MAY BE PROCESSED FOR:
AMENDMENT ✓
RENEWAL _____
LICENSE _____

3. OTHER _____

SIGNED _____
DATE _____

I (97)

Log (A-1-12)
Remitter PERKIN-ELMER
Check No. 8184
Amount $580 (Alcoa 12-4119)
Fee Category 3B
Type of Fee AMD
Date Check Rec'd 1/27/97
Date Completed 1/28/97
By: GG