03013133 ORC

VOID SHEET

TO: License Fee Management Branch

FROM: Carolyn Boyle

SUBJECT: VOIDED APPLICATION

Control Number: 021805

Applicant: Packard Instrument Co.

Date Voided: 06/05/96

Reason for Void: Approved for one-time 5-year extension of license expiration date.

Susan L. Greene 06/05/96
Signature Date
IMAB/IMNS/NMSS

Attachment:
Official Record Copy of
Voided Action

FOR LFMB USE ONLY

Final Review of VOID Completed:

☑ Refund Authorized and processed

☐ No Refund Due

☐ Fee Exempt or Fee Not Required

Comments:

Log completed ☐

Processed by:

0/1

MLOO

cy to Reg III

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 4, 1996

PACKARD INSTRUMENT CO.
ATTN: MS. DOROTHY MRKVICKA
Radiation Safety Officer

2200 WARRENVILLE ROAD
DOWNERS GROVE, IL 60515

SUBJECT: ONE-TIME EXTENSION OF LICENSE EXPIRATION DATE
LICENSE NUMBER 12-04933-06E, DOCKET NUMBER 3013133

Dear MS. DOROTHY MRKVICKA

On January 16, 1996, the Nuclear Regulatory Commission (NRC) amended its regulations in 10 CFR 30, 40, and 70 to extend the expiration date of certain byproduct, source, and special nuclear material licenses by five years (61 FR 1109). The above referenced license was extended by this rulemaking and will now expire on December 31, 2000. Your license will not be amended to show this extended date until the next routine licensing action. Until then, you may provide copies of this letter to vendors and other interested parties as evidence that the license has been extended as a result of the rule.

The extended license authorizes the same activities and contains the same limitations as it previously did. There will be no change in the frequency that the NRC inspects activities authorized by this license.

The amended rules state that in the case of licensees who are granted extensions and who have a currently pending renewal application for that extended license, the application will be considered withdrawn by the licensee and any renewal fees paid by the licensee for that application will be refunded. This will apply to licenses with expiration dates after July 1, 1995, for which renewal applications and the appropriate fees have been submitted and the renewal is still pending. Refunds will be mailed to licensees under separate cover.

All licensees, including those whose renewal applications were withdrawn by this rulemaking, who wish to change their radiation safety programs must request amendment of their licenses to reflect these changes. Amendment requests must include the correct amendment fee since the NRC cannot apply pending renewal refund balances toward amendment fees.

If you have any questions regarding this letter, please contact the individual below.

Headquarters: Susan L. Greene, (301) 415-7843

Thank you for your cooperation in this matter.

Sincerely,

Donald A. Cool, Director
Division of Industrial and Medical Nuclear Safety
Office of Nuclear Materials Safety and Safeguards

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

NOTE: THE ONE-TIME, 5-YEAR EXTENSION OF YOUR LICENSE EXPIRATION DATE DOES NOT ELIMINATE THE 5-YEAR REPORTING REQUIREMENTS ASSOCIATED WITH YOUR DISTRIBUTION LICENSE. THEREFORE, YOU MUST SUBMIT A PRODUCT TRANSFER REPORT AS OUTLINED IN 10 CFR PART 32 EVEN THOUGH YOUR LICENSE WAS GRANTED A ONE-TIME, 5-YEAR EXTENSION.

January 19, 1996

License No. 12-04933-06E
Docket No. 030-13133
Control No. 021805

Packard Instrument Company
ATTN: Ms. Sylvia A. Palmer
Regulatory Affairs Specialist
2200 Warrenville Road
Downers Grove, Illinois 60515

SUBJECT: LICENSE RENEWAL APPLICATION

Dear Ms. Palmer:

This is to acknowledge receipt of your application for renewal of the materials license identified above. Your application is deemed timely filed and, accordingly, the license will not expire until final action has been taken by this office.

Any correspondence regarding the renewal application should reference your license number and the control number specified above.

Sincerely,

DISTRIBUTION:
License File 12-04933-06E
NMSS r/f
IMNS Central File
CJBoyle
PSantiago
LCamper

Carolyn Boyle, Licensing Assistant
Medical, Academic, and Commercial
Use Safety Branch
Division of Industrial and
Medical Nuclear Safety
Office of Nuclear Material Safety
and Safeguards

Docket No. 030-13133

DOCUMENT NAME: C:\32-DEEMT.CB
C = COVER E = COVER & ENCLOSURE N = NO COPY

OFC	IMAB:NMSS	C						
NAME	CBoyle:cjb							
DATE	01/19/96							

OFFICIAL RECORD COPY

Packard Instrument Co. 2200 Warrenville Road Downers Grove, IL 60515 Tel. 708-969-6000 TLX 21-0031 FAX 708-969-6511

January 8, 1996

PACKARD
A Canberra Company

Director of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

NRC LICENSE NUMBER: 12:04933-06E

Dear Sir:

In compliance with 10 CFR 32.20, Packard Instrument Company is submitting a summary report stating the quantity of each exempt quantity isotope transferred under the specific license referenced above.

In a letter dated June 22, 1994, a summary report covering a five year period from **April 1, 1989** thru **March 31, 1994** was filed. The present report includes the period from **April 1, 1994** to **December 31, 1995**.
The radionuclides and activity totals are summarized below:

	4/1/89 - 3/31/94	4/1/94 - 12/31/95	Total
I-125	539.45 uCi	55.692 uCi	595.142
I-129	58.45 uCi	4.05 uCi	62.5
H-3	21283.49 uCi	808.3395 uCi	22091.829
C-14	28671.41 uCi	853.444 uCi	29524.854
Co-57	269.33 uCi	13.648 uCi	282.978
Cr-51	181.09 uCi	31.85 uCi	212.94
Cs-137	120.50 uCi	2.75 uCi	123.25

This report is being submitted within 30 days after filing a renewal application of the license referenced above.

Yours Truly,

Packard Instrument Company

Sylvia Palmer
Radiation Safety Officer

cc: Lee Booth, Packard Corporate RSO
U.S.N.R.C. Region III

Summary of Exempt Quantity sold from April 1, 1994 thru December 31, 1995

Nuclide	Activity	Quantity	Act.*Qty.	Total
I-125	0.091	9	0.819	55.692
	0.182	2	0.364	
	0.364	0	0	
	0.455	21	9.555	
	0.546	0	0	
	0.91	33	30.03	
	1.092	2	2.184	
	1.365	1	1.365	
	1.456	0	0	
	1.82	5	9.1	
	2.275	1	2.275	
I-129	0.05	6	0.3	4.05
	0.1	0	0	
	0.25	3	0.75	
	0.3	1	0.3	
	0.5	4	2	
	0.6	0	0	
	1	0	0	
	0.05	14	0.7	
H-3	0.0125	1	0.0125	808.3395
	0.04	17	0.68	
	0.113	129	14.577	
	10	3	30	
	11.4	13	148.2	
	15	22	330	
	17	9	153	
	1.13	13	14.69	
	1.17	4	4.68	
	22.5	5	112.5	
C-14	0.045	57	2.565	853.444
	100	2	200	
	96	4	384	
	0.009	1	0.009	
	0.02	16	0.32	
	0.045	88	3.96	
	0.45	11	4.95	
	0.56	4	2.24	
	10	19	190	
	9.1	5	45.5	
	2.3	3	6.9	
	3	1	3	
	5	2	10	
Co-57	0.091	1	0.091	13.648
	0.182	1	0.182	
	0.364	0	0	
	0.455	3	1.365	
	0.546	0	0	
	0.91	10	9.1	
	1.09	1	1.09	
	1.82	1	1.82	
Cr-51	0.91	1	0.91	31.85
	1.82	2	3.64	
	4.55	2	9.1	
	9.1	2	18.2	
Cs-137	0.25	11	2.75	2.75

Summary of Exempt Qty sold from Apr. 1, 1989 thru Mar, 31, 1994

Nuclide	Activity	Quantity	Act.*Qty.	Total	Grand Tot
I-125	0.091	57	5.187	263.809	263.809
	0.182	8	1.456		
	0.364	7	2.548		
	0.455	113	51.415		
	0.546	1	0.546		
	0.91	156	141.96		
	1.092	10	10.92		
	1.365	1	1.365		
	1.456	2	2.912		
	1.82	25	45.5		
I-129	0.05	142	7.1	27.6	27.6
	0.1	2	0.2		
	0.25	19	4.75		
	0.3	1	0.3		
	0.5	15	7.5		
	0.6	2	1.2		
	1	1	1		
	0.05	111	5.55		
H-3	0.0125	2	0.025	14900.18	15134.64
	0.04	135	5.4		
	0.113	1090	123.17		
	10	1015	10150		
	11.4	134	1527.6		
	17	61	1037		
	1.13	321	362.73		
	1.17	25	29.25		
	22.5	74	1665		
C-14	0.045	17	0.765	3649.678	4481.508
	100	14	1400		
	0.009	7	0.063		
	0.02	20	0.4		
	0.045	162	7.29		
	0.56	151	84.56		
	10	187	1870		
	2.3	92	211.6		
	5	15	75		
Co-57	0.091	30	2.73	112.462	112.462
	0.182	6	1.092		
	0.364	7	2.548		
	0.455	34	15.47		
	0.546	2	1.092		
	0.91	58	52.78		
	1.09	7	7.63		
	1.82	16	29.12		
Cr-51	0.91	9	8.19	80.08	80.08
	1.82	2	3.64		
	4.55	7	31.85		
	9.1	4	36.4		
Cs-137	0.25	277	69.25	69.25	69.25
H-3	0.1	9	0.9	234.467	
	0.113	9	1.017		
	10	6	60		
	5	3	15		
	0.0125	4	0.05		
	0.04	18	0.72		
	1.17	134	156.78		
C-14	0.045	9	0.405	831.83	
	2	9	18		
	0.02	132	2.64		
	0.045	1043	46.935		
	0.45	201	90.45		
	9.1	74	673.4		

Nuclide	Activity	Quantity	Act.*Qty.	Total	Grand Tot	Final Tot
I-125	0.091	97	8.827	275.639	275.639	539.448
	0.182	21	3.822			
	0.273	1	0.273			
	0.364	5	1.82			
	0.455	198	90.09			
	0.546	2	1.092			
	0.91	85	77.35			
	1.092	5	5.46			
	1.365	5	6.825			
	1.456	1	1.456			
	1.82	37	67.34			
	2.184	1	2.184			
	2.275	4	9.1			
I-129	0.05	143	7.15	30.85	30.85	58.45
	0.1	2	0.2			
	0.25	25	6.25			
	0.2	2	0.4			
	0.5	20	10			
	0.6	2	1.2			
	1	2	2			
	0.05	73	3.65			
H-3	0.0125	33	0.4125	4846.646	6148.846	21283.49
	0.04	163	6.52			
	0.113	1051	118.763			
	10	19	190			
	11.4	117	1333.8			
	17	55	935			
	1.13	225	254.25			
	1.17	120	140.4			
	22.5	83	1867.5			
C-14	0.045	23	1.035	21180.46	24189.9	28671.41
	100	31	3100			
	0.009	30	0.27			
	0.02	15	0.3			
	0.045	63	2.835			
	0.56	137	76.72			
	100	177	17700			
	2.3	91	209.3			
	5	18	90			
Co-57	0.091	35	3.185	156.862	156.862	269.324
	0.182	11	2.002			
	0.364	1	0.364			
	0.455	49	22.295			
	0.546	1	0.546			
	0.91	82	74.62			
	1.09	11	11.99			
	1.82	23	41.86			
Cr-51	0.91	39	35.49	101.01	101.01	181.09
	1.82	1	1.82			
	4.55	6	27.3			
	9.1	4	36.4			
Cs-137	0.25	205	51.25	51.25	51.25	120.5
H-3	0.1	22	2.2	1302.2		
	15	66	990			
	5	62	310			
C-14	0.045	56	2.52	3009.44		
	1	2	2			
	2	47	94			
	3	92	276			
	0.045	9	0.405			
	0.02	142	2.84			
	0.045	945	42.525			
	0.45	135	60.75			
	1	7	7			
	2	6	12			
	9.1	83	755.3			
	96	18	1728			
	0.45	58	26.1			

030-13133

Packard Instrument Co. 2200 Warrenville Road Downers Grove, IL 60515 Tel. 708-969-6000 TLX 21-0031 FAX 708-969-6511

PACKARD

A Canberra Company

December 19, 1995

U.S. Nuclear Regulatory Commission
Division of Nuclear Materials Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

RE: **RENEWAL OF USNRC LICENSE NO. 12-04933-06E**

Dear Sir/Madam

Packard Instrument Company of Canberra Industries, Inc. hereby submits an application renewal of USNRC License No. 12-04933-06E, which is due to expire December 31, 1995. This license authorizes Packard to distribute small quantities of byproduct material to persons exempt from licensing. The application is filed in duplicate and is submitted with a check of $2600.00 to cover the renewal fee.

We presently report no changes to our program and the information of May 24, 1989; and letters dated June 16, 1989; September 25, 1990; October 2, 1990; October 17, 1990; March 27, 1991; June 28, 1991; August 27, 1991; April 29, 1993; May 28, 1993; and August 12, 1993 represent our present operation under this license.

The report of materials transferred under this license for the past five years as required by 10CFR 32.12 shall be filed with the Director of Nuclear Material Safety and Safeguards within 30 days of your receipt of this renewal application.

If additional information or clarification is required, please direct your request to the undersigned.

Yours Sincerely,

PACKARD INSTRUMENT COMPANY

Sylvia Palmer

Sylvia A. Palmer
Regulatory Affairs Specialist

021805

NRC FORM 313 (10-94)
10 CFR 30, 32, 33
34, 35, 36, 39 and 40

U. S. NUCLEAR REGULATORY COMMISSION

APPLICATION FOR MATERIAL LICENSE

APPROVED BY OMB: NO. 3150-0120
EXPIRES 6-30-96

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 9 HOURS. SUBMITTAL OF THE APPLICATION IS NECESSARY TO DETERMINE THAT THE APPLICANT IS QUALIFIED AND THAT ADEQUATE PROCEDURES EXIST TO PROTECT THE PUBLIC HEALTH AND SAFETY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0120), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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.

APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

DIVISION OF INDUSTRIAL AND MEDICAL NUCLEAR SAFETY
OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

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:

LICENSING ASSISTANT SECTION
NUCLEAR MATERIALS SAFETY BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

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

NUCLEAR MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION II
101 MARIETTA STREET, NW, SUITE 2900
ATLANTA, GA 30323-0199

IF YOU ARE LOCATED IN:

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

MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION III
801 WARRENVILLE RD.
LISLE, IL 60532-4351

ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING, SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TX 76011-8064

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 JURISDICTIONS.

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

- [ ] A. NEW LICENSE
- [ ] B. AMENDMENT TO LICENSE NUMBER _____
- [X] C. RENEWAL OF LICENSE NUMBER 12-04933-06E

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

PACKARD INSTRUMENT COMPANY
2200 WARRENVILLE ROAD
DOWNERS GROVE, IL 60515

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

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

SYLVIA PALMER

TELEPHONE NUMBER

(708) 969-6000

SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 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 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 3I
AMOUNT ENCLOSED $ 2600.00

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, 36, 39 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

CERTIFYING OFFICER – TYPED/PRINTED NAME AND TITLE	SIGNATURE	DATE
SYLVIA PALMER, REGULATORY AFFAIRS SPECIALIST	Sylvia Palmer	DEC 19, 1995

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
			$		
APPROVED BY				DATE	

ITEM #5

NRC LICENSE NO. 12-04933-06E

RADIOACTIVE MATERIAL

Line No.	Element And Mass Number	Chemical And/or Physical Form	*Maximum Amount Possessed At Any One Time
1	Hydrogen-3	Organic Chemical in Solution	500 millicuries
2	Carbon-14	Organic Chemical in Solution	500 millicuries
3	Barium-133	Inorganic salt adsorbed on ion exchange resin and encapsulated in plastic rod	25 millicuries
4	Cesium-137	Inorganic salt adsorbed on ion exchange resin and encapsulated in plastic rod	5 millicuries
5	Iodine-129	Inorganic salt adsorbed on ion exchange resin and encapsulated in plastic rod	10 millicuries
6	Iodine-125	Inorganic salt adsorbed on ion exchange resin and encapsulated in plastic rod	500 millicuries
7	Chromium-51	Inorganic salt adsorbed on ion exchange resin and encapsulated in plastic rod	5 millicuries
8	Cobalt-57	Inorganic salt adsorbed on ion exchange resin and encapsulated in plastic rod	2 millicuries

* These possession limits are authorized by License No. IL-01741-01

ITEM #6

NRC LICENSE NO. 12-04933-06E

PURPOSES FOR WHICH LICENSED MATERIAL WILL BE USED

1. Hydrogen-3

   a. Used as a liquid sealed standard to monitor Liquid Scintillation Analyzer performance (Liquid Scintillation Sealed Standards).
   b. Used as a liquid internal standard to determine counting efficiency in liquid Scintillation Analyzers (Internal Standards).
   c. Used as a liquid internal standard for testing Sample Oxidizer performance (Spec-Chec).
   d. Used as a liquid internal standard for Sample Oxidizer quench correction determination (Internal Standards).

2. Carbon-14

   a. Used as a liquid sealed standard to monitor Liquid Scintillation Analyzer performance (Liquid Scintillation Sealed Standards).
   b. Used as a liquid internal standard to determine counting efficiency in liquid Scintillation Analyzers (Internal Standards).
   c. Used as a liquid internal standard for testing Sample Oxidizer performance (Spec-Chec).
   d. Used as a liquid internal standard for Sample Oxidizer quench correction determination (Internal Standards).

3. Barium-133

   a. Used to determine operating parameters of a gas flow proportional counter.

4. Cesium-137

   a. Used for verification of Gamma Scintillation Spectrometer performance (Gamma Rod Sources)
   b. Used for energy calibration of Gamma Scintillation Spectrometers (Gamma Rod Sources)

5. Iodine-129

   a. Used for verification of Gamma Scintillation Spectrometer performance (Gamma Rod Sources and Pico-Calibrators).
   b. Used for energy calibration of Gamma Scintillation Spectrometers (Gamma Rod Sources)
   c. Used for normalization of detectors for Gamma Scintillation Spectrometers (Pico-Calibrators)

6. Iodine-125

   a. Used for verification of Gamma Scintillation performance (Pico-Calibrators)
   b. Used for normalization of detectors for gamma Scintillation Spectrometers (Pico-Calibrators)

7. Chromium-51

   a. Used for verification of Gamma Scintillation performance (Pico-Calibrators)
   b. Used for normalization of detectors for gamma Scintillation Spectrometers (Pico-Calibrators)

8. Cobalt-57

   a. Used for verification of Gamma Scintillation performance (Pico-Calibrators)
   b. Used for normalization of detectors for gamma Scintillation Spectrometers (Pico-Calibrators)

SEALED STANDARDS FOR LIQUID SCINTILLATION COUNTERS

Packard Instrument Company, Inc. manufactures the following types of sealed standards for liquid scintillation counters:

PART #	TYPE	RADIONUCLIDE	VIAL SIZE	VOL	# of VIALS
6008401	Quenched Series	Tritiated Toluene	7 ml	5 ml	10
6008402	Quenched Series	Carbon–14 Toluene	7 ml	5 ml	10
6008411	Unquenched Std.–argon purged	None	7 ml	5 ml	1
6008412	Unquenched Std.–argon purged	Tritiated Toluene	7 ml	5 ml	1
6008413	Unquenched Std.–argon purged	Carbon–14 Toluene	7 ml	5 ml	1
6008501	Quenched Series	Tritiated Toluene	20 ml	15 ml	10
6008502	Quenched Series	Carbon–14 Toluene	20 ml	15 ml	10
6008511	Unquenched Std.–argon purged	None	20 ml	15 ml	1
6008512	Unquenched Std.–argon purged	Tritiated Toluene	20 ml	15 ml	1
6008513	Unquenched Std.–argon purged	Carbon–14 Toluene	20 ml	15 ml	1
6018551	Quenched Series–Ext. Range	Tritiated Toluene	7 ml	5 ml	10
6018552	Quenched Series–Ext. Range	Carbon–14 Toluene	7 ml	5 ml	10
6018594	Quenched Series–Ext. Range	Tritiated Toluene	20 ml	15 ml	10
6018595	Quenched Series–Ext. Range	Carbon–14 Toluene	20 ml	15 ml	10
6018911	Low Level non–purged	Tritiated Toluene	20ml	10 ml	1
6018912	Low Level non–purged	Carbon–14 Toluene	20 ml	10 ml	1
6018913	Low Level non–purged	None	20 ml	10 ml	1
6018917	Low Level Quenched Series	Tritiated Toluene	20 ml	15 ml	10
6018918	Low Level Quenched Series	Carbon–14 Toluene	20 ml	15 ml	10
6007600	U.G. Quenched Series	Tritiated Toluene	20 ml	15 ml	10
6007601	U.G. Quenched Series	Carbon–14 Toluene	20 ml	15 ml	10
6007603	U.G. Quenched Series	Tritiated Toluene	7 ml	5 ml	10
6007604	U.G. Quenched Series	Carbon–14 Toluene	7 ml	5 ml	10

The scintillator solution in these standards contain 4 grams of PPO and 0.25 grams of Dimethyl-POPOP per liter of toluene, except for the Ultima Gold (U.G.) Quenched Series which contains alkylnaphthalene, PPO, and bis–MSB. The solution is flame–sealed in low activity borosilicate glass ampoules. Nitromethane is used as the quenching agent in the quenched standards sets.

PACKARD
A Canberra Company

Packard Instrument Company. 800 Research Parkway, Meriden, CT 06450 U.S.A.
Tel: 203–238–2351 Toll Free: 1–800–323–1891 TX: 643251 FAX: 203–639–2172

Packard International Offices:

Australia, Mt. Waverley 61–3–543–4266; **Austria**, Vienna 43–1–302504–0; **Belgium**, Brussels 32–2–4668210; **Canada**, Ontario 1–800–387–9559; **Denmark**, Greve 45–42909023; **France**, Rungis (33) 1 46.86.27.75; **Germany**, Frankfurt (49–69) 663010; **Italy**, Milano 39–2–33910796/7/8; **Japan**, Tokyo 81–3–3866–5850; **Netherlands**, Groningen 31–50–413360; Tilburg (013) 423900; **Russia**, Moscow, 7–095–238–7335; **Switzerland**, Zurich (01) 481 69 44; **United Kingdom**, Pangbourne, Berks (44) 0734 844981.

CALIBRATION OF STANDARDS

Packard's standards for liquid scintillation counters are prepared from stock solutions that are calibrated against National Institute of Standards and Technology (NIST) Reference Materials. The following table provides information regarding the reference materials used:

	Tritium	Carbon–14
NIST Reference Material	Toluene	n–Hexadecane
NIST Reference Number	4947C*	4222C**
NIST Concentration Uncertainty	±1.2%	±0.81%

The uncertainty for Packard Standards relative to the NIST Reference Material is computed as a percentage error (99% confidence level), using the following equation:

$$\text{Uncertainty (\%)} = \sqrt{e_1^2 + e_2^2}\ , \text{ where}$$

e_1 = Uncertainty of assay of stock solution relative to NIST material
e_2 = Uncertainty of dispensing of stock solution into ampoules
e_1 = 0.8% maximum (99% confidence level)
e_2 = 0.6% maximum (99% confidence level)

Using these values, the maximum uncertainty relative to NIST materials is ± 1%.

The total uncertainty in disintegration rate of the radionuclide in Packard standards is computed as a percentage error (99% confidence level) using the following equation:

$$\text{Total Uncertainty (\%)} = \sqrt{e_1^2 + e_2^2 + e_3^2}\ , \text{ where}$$

e_1 and e_2 are as listed above
e_3 = Uncertainty in concentration of NIST reference material (%).

The maximum total uncertainty in the disintegration rate of the radionuclide is:

for Tritium Standards, ± 1.6%
for Carbon–14 Standards, ± 1.3%

* Assayed by NIST, 4 March 1987 ** Assayed by NIST, 3 September 1990.

USES OF STANDARDS

Unquenched standards are used for verification of instrument performance. Performance is verified by making routine measurements of the appropriate standards. These data should be kept in a log for the instrument; the log provides convenient comparisons of data over an extended period of time.

A. The Unquenched Tritium Standard is used to verify the Tritium counting region of interest for efficiency and reproducibility.

B. The Unquenched Carbon–14 Standard is used to verify the Carbon–14 counting region of interest for efficiency and reproducibility. It is also used in some instruments to calibrate the quench indicating parameter. See your Operation Manual for details.

C. The Background Standard is used to verify the instrument background, which could be affected by radioactive contamination, changes in environmental radiation, and electrical noise entering the counting channels. For certain instruments equipped for manual normalization, it is the normalization standard. It can be used in combination with the Tritium and Carbon–14 Unquenched Standards to establish Figures of Merit.

D. The LOW LEVEL STANDARDS are specifically designed to verify the LOW LEVEL performance of Packard Tri–Carb Liquid Scintillation Analyzers operating in the LOW LEVEL COUNT MODE or the HIGH SENSITIVITY COUNT MODE. These standards should not be used during System Normalization and Calibration (SNC), since the instrument is calibrated using argon purged unquenched standards. The LOW LEVEL STANDARDS are for use only in the performance monitoring of the LOW LEVEL COUNT MODE or the HIGH SENSITIVITY COUNT MODE. Packard warrantees LOW LEVEL STANDARDS for 14 months from the date of manufacture.

E. The Ultima Gold Quenched Series are designed for use when counting samples in Ultima Gold cocktail. Packard warrantees the performance of these standards for 2 years from the date of manufacture. For optimum life, the recommended storage temperature is 4°C.

A series of quenched standards is used to establish a correlation between the counting efficiency in a region of interest and a quench indicating parameter (QIP). The QIP can be Sample Channels Ratio (SCR), Sample Count Ratio (SCR), Spectral Index of Sample (SIS) or a parameter based on an external standard measurement. External standard parameters include External Standard Channels Ratio (ESR), the Spectral Index of External Standard (SIE), or the Transformed Spectral Index of External Standard (tSIE). Efficiency correlation curves determined with these standards will apply to a wide variety of scintillation solutions. Applicability of the efficiency correlation to any specific scintillator solution should be determined in the laboratory. This is accomplished by comparing the correlation curves of the standards and the scintillator solution containing a known amount of the same radionuclide. Use of the sealed standards simplifies routine checking of the efficiency correlation curves since sample preparation is eliminated.

For instrument settings and procedures for establishing efficiency correlation curves, refer to the operation manual for the instrument or contact the instrument manufacturer.

The following are signs which may indicate that the standards are not suitable for the uses as described above.

1. An obvious difference in the height of the scintillation solution in one or more of a set of standards may indicate a break in the seal, and leakage of the standard.

2. Readings on one standard which are obviously out of line with other standards in the set.

    a. Unquenched standards in a set should all have essentially the same external standard readings.

    b. Quenched standards in a series are marked in alphabetical sequence relative to their external standard values. ("A" represents the least quenched sample.)

3. Obviously discolored scintillator solution in one or more standards. CAUTION: Standards should not be exposed to sunlight or UV light as this can cause solution to turn yellow.

4. Obviously scratched or dirty ampoules.

The assayed value of a standard should be corrected for decay if the standard is used after 0.5% of the half-life of the radionuclide has elapsed since calibration. At this interval, the required correction will exceed one standard deviation of the assayed value. See the last page of this booklet for a Tritium decay table listing the fraction of the activity remaining after date of calibration. Carbon-14 Standards should not need to be corrected for decay.

Standards should be handled by their tops to minimize accumulation of dirt on the ampoule surface. All fingerprints and dirt should be wiped from each standard with a soft tissue (such as Kimwipe®*). Standards should be stored in the cabinet of the TRI-CARB Liquid Scintillation Counter to ensure temperature equilibration and to prevent photolytic decomposition by ambient light.

USEFUL LIFE OF A STANDARD

A sealed standard should not be used beyond its "useful life" as defined in ANSI Standard N42.15-1980: "'useful life' is a period not to exceed five years."

Additional Radiation Safety Precautions and Instructions Relating to the Handling, Use, Storage, and Disposal of the Radioactive Material in Packard Instrument Company Products.

(Per Title 10 Code of Federal Regulations (CFR) 32.19(d) (3))

1. Handling

    Although the amount of radioactive material in Packard Instrument Co. sealed source standards is extremely small (fractions of a microcurie), the user should still exercise the basic radiation safety principles of time, distance, and shielding. That is, a) do not handle the radiation source longer than needed to do the task, and b) recognize that distance from the radiation source and c) shielding (such as lead foil) are effective methods of minimizing exposure.

    Use should be only by responsible persons in authorized areas.

    Eating, drinking, smoking and the application of cosmetics should be prohibited in areas of use.

2. Use

    Even low activity, exempt quantity licensed products containing radioactive material are to be used only as intended by the manufacturer and in accordance with the instructions provided with the products. Any other usage is likely to be in noncompliance with regulations.

*Registered trademark of Kimberly Clark Co.

3. **Storage**
   Any product labeled as "Radioactive Material" is to be secured in safe storage when not in use. Even when actual hazard does not exist, the general public has an apprehension against seeing such labeled items in noncontrolled environments. In addition, there is always danger of loss or theft when sources are unsecured.

4. **Disposal**
   These license–exempt quantity radioactive standards may be disposed of without regard to their radioactive content provided all radiation symbols have been removed or defaced; however, these products must be disposed of according to applicable Federal, State and Local regulations governing the toxic and hazardous properties of the products.

The user instructions with this product are very specific for nuclear detection equipment quality control purposes. It is therefore reasonable to assume that the user has already been trained in radiation safety precautions or is operating under the supervision of a person with such training. In the event there are any questions relating to the handling, use, storage, and disposal of the license–exempt quantities contained in this product, please feel free to call the Regulatory Affairs Specialist at Packard Instrument Company, Downers Grove, Illinois. Phone (800) 323–5891 or (708) 969–6000. You may call the Nuclear Regulatory Commission, Agreement State (Health Department), or Licensing State for assistance in unusual cases.

CERTIFICATION

Packard Instrument Company, Inc. certifies that the standards it produces are at the activity stated on the label at the time of calibration, within the limits of uncertainty stated in this booklet.

TRITIUM DECAY TABLE (FRACTION REMAINING)
Half–life 12.43 Years[1]

YEARS[2] \ MONTHS[3]	0	1	2	3	4	5	6	7	8	9	10	11
0	1.0000	.9954	.9908	.9862	.9816	.9770	.9725	.9680	.9635	.9590	.9546	.9502
1	.9458	.9414	.9370	.9327	.9284	.9241	.9198	.9155	.9113	.9070	.9028	.8986
2	.8945	.8903	.8862	.8821	.8780	.8739	.8699	.8659	.8618	.8578	.8539	.8499
3	.8460	.8420	.8381	.8343	.8304	.8265	.8227	.8189	.8151	.8113	.8076	.8038
4	.8001	.7964	.7927	.7890	.7854	.7817	.7781	.7745	.7709	.7673	.7638	.7602
5	.7567	.7532	.7497	.7462	.7428	.7393	.7359	.7325	.7291	.7257	.7223	.7190
6	.7157	.7123	.7090	.7958	.7025	.6992	.6960	.6928	.6896	.6864	.6832	.6800
7	.6769	.6737	.6706	.6675	.6644	.6613	.6582	.6552	.6522	.6491	.6461	.6431
8	.6401	.6372	.6342	.6313	.6284	.6254	.6225	.6197	.6168	.6139	.6111	.6083
9	.6054	.6026	.5998	.5971	.5943	.5915	.5888	.5861	.5833	.5806	.5779	.5753
10	.5726	.5699	.5673	.5647	.5621	.5595	.5569	5543	.5517	.5491	.5466	.5441
11	.5415	.5390	.5365	.5341	.5316	.5291	.5267	5242	.5218	.5194	.5170	.5146
12	.5122	.5098	.5074	.5051	.5027	.5004	.4981	.4958	.4935	.4912	.4889	.4867

[1] Unterweger, M.P., B.M. Coursey, F.J. Schima and W.B. Mann, Int. J. Appl. Radiat. and Isot. 31, 611 (1980)
[2] 1 year = 365.25 days
[3] 1 month = 365/12 = 30.44 days

LICENSING AND LABELING INFORMATION

Packard Instrument Company is authorized to distribute these sealed standards to persons exempt from licensing and licensing requirements as provided in 30.18 of 10 CFR Part 30.

The contents of these standards are exempt from NRC or Agreement State licensing requirements. "Radioactive Material" – Not for Human Use – Introduction Into Foods, Beverages, Cosmetics, Drugs or Medicinals, or Into Products Manufactured for Commercial Distribution is Prohibited. Exempt Quantities Should Not be Combined."

R1201021 LICENSING TRACKING SYSTEM DATE: 960104
PAGE: 1

LTS WORKSHEET

Pat-
pls assign CB

DOCKET NO : 03013133 LICENSE NO : 12-04933-06E STATUS: 2

MAIL CONTROL: 021805 RECEIPT DATE : 960102 ACTION TYPE: 3
DUE DATE : 960630

FED. GOVT : N INST. CODE : 04933 LICENSE REGION: 0

ISSUE DATE: 931026 ORIGINAL DATE: 780619 EXPIRATION DATE: 19951231

NAME : PACKARD INSTRUMENT CO. DECOM FIN ASSUR REQD: N
SUBM: _

DEPT/BUREAU: _____ CONT PLAN REQD: N APPRV: _

BUILDING : _____

STREET : 2200 WARRENVILLE ROAD

CITY : DOWNERS GROVE STATE: IL ZIP: 60515

CONTACT PERSON: SYLVIA PALMER PHONE: 708-969-6000

PRIMARY PGM CODE : 03253 SECONDARY PGM CODES: _____

INSPECTION REGION: 3 PRIORITY CODE: 5 INSPECTION CATEGORY: E2

RADIATION SAFETY OFFICER: DOROTHY MRKVICKA

STATES WHERE USE IS AUTHORIZED: 1
0 - ALL LISTED STATES
1 - SAME AS STATE IN ADDRESS
2 - ALL STATES
3 - NON-AGREEMENT STATES

AUTHORIZED STATES: _____ (USE ONLY IF ABOVE IS ZERO)

REPORTING IDENTIFICATION SYMBOL: _____

APPROVAL FOR: REDISTRIBUTION: N STORAGE ONLY: N
TEMPORARY JOB SITES: N INCINERATION: N
BURIAL: N

EXEMPTIONS: (1)_____ (2)_____

prod transfer ✓
deemed timely ✓

```
MATERIAL TYPE    : NPA              FORM CODE: NPA    AGGREGATE CODE: NPA
MODEL NUMBER     : ________________________________________
DESCRIPTION      : ________________________________________
TOTAL QUANTITY   : 0000000.000000000    UNIT: ___
OTHER            : _               # SOURCES: ___

MATERIAL TYPE    : __________       FORM CODE: ___    AGGREGATE CODE: ___
MODEL NUMBER     : ________________________________________
DESCRIPTION      : ________________________________________
TOTAL QUANTITY   : ________________     UNIT: ___
OTHER            : _               # SOURCES: ___

MATERIAL TYPE    : __________       FORM CODE: ___    AGGREGATE CODE: ___
MODEL NUMBER     : ________________________________________
DESCRIPTION      : ________________________________________
TOTAL QUANTITY   : ________________     UNIT: ___
OTHER            : _               # SOURCES: ___

MATERIAL TYPE    : __________       FORM CODE: ___    AGGREGATE CODE: ___
MODEL NUMBER     : ________________________________________
DESCRIPTION      : ________________________________________
TOTAL QUANTITY   : ________________     UNIT: ___
OTHER            : _               # SOURCES: ___

MATERIAL TYPE    : __________       FORM CODE: ___    AGGREGATE CODE: ___
MODEL NUMBER     : ________________________________________
DESCRIPTION      : ________________________________________
TOTAL QUANTITY   : ________________     UNIT: ___
OTHER            : _               # SOURCES: ___

MATERIAL TYPE    : __________       FORM CODE: ___    AGGREGATE CODE: ___
MODEL NUMBER     : ________________________________________
DESCRIPTION      : ________________________________________
TOTAL QUANTITY   : ________________     UNIT: ___
OTHER            : _               # SOURCES: ___

MATERIAL TYPE    : __________       FORM CODE: ___    AGGREGATE CODE: ___
MODEL NUMBER     : ________________________________________
DESCRIPTION      : ________________________________________
TOTAL QUANTITY   : ________________     UNIT: ___
OTHER            : _               # SOURCES: ___
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NAME	AUTHORIZATION

ADDRESS WHERE MATERIAL IS USED OR POSSESSED

BUILDING:
ROOM:
STREET:
CITY:
STATE:

BUILDING:
ROOM:
STREET:
CITY:
STATE:

BUILDING:
ROOM:
STREET:
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BUILDING:
ROOM:
STREET:
CITY:
STATE:

DOCKET: 03013133 LIC: 12-04933-06E NAME: PACKARD INSTRUMENT CO.

PARTY ISSUING MECHANISM: ASSUR TYPE : _ (C=CERT D=DFP)
NAME : ______ MECH TYPE : __
ADDR1: ______ MECH AMOUNT: ______
ADDR2: ______ APPROVED? _ DATE: ______
CITY : ______ EXPIRES ? _ DATE: ______
STATE: __ ZIP: ______

PARTY ISSUING MECHANISM: ASSUR TYPE : _ (C=CERT D=DFP)
NAME : ______ MECH TYPE : __
ADDR1: ______ MECH AMOUNT: ______
ADDR2: ______ APPROVED? _ DATE: ______
CITY : ______ EXPIRES ? _ DATE: ______
STATE: __ ZIP: ______

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CITY : ______ EXPIRES ? _ DATE: ______
STATE: __ ZIP: ______

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CITY : ______ EXPIRES ? _ DATE: ______
STATE: __ ZIP: ______

PARTY ISSUING MECHANISM: ASSUR TYPE : _ (C=CERT D=DFP)
NAME : ______ MECH TYPE : __
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ADDR2: ______ APPROVED? _ DATE: ______
CITY : ______ EXPIRES ? _ DATE: ______
STATE: __ ZIP: ______

PARTY ISSUING MECHANISM: ASSUR TYPE : _ (C=CERT D=DFP)
NAME : ______ MECH TYPE : __
ADDR1: ______ MECH AMOUNT: ______
ADDR2: ______ APPROVED? _ DATE: ______
CITY : ______ EXPIRES ? _ DATE: ______
STATE: __ ZIP: ______

PARTY ISSUING MECHANISM: ASSUR TYPE : _ (C=CERT D=DFP)
NAME : ______ MECH TYPE : __
ADDR1: ______ MECH AMOUNT: ______
ADDR2: ______ APPROVED? _ DATE: ______
CITY : ______ EXPIRES ? _ DATE: ______
STATE: __ ZIP: ______

LICENSE DATA, CONTINUED PAGE: 5

DOCKET NO: 03013133 LICENSE NUMBER: 12-04933-06E
NAME : PACKARD INSTRUMENT CO.

MEDICAL QUALITY MANAGEMENT PROGRAM REQUIRED: N RECEIVED: _ APPROVED: _

DECOMMISSIONING FINANCIAL ASSURANCE REQUIRED: N SUBMITTED: _

CONTINGENCY PLAN REQUIRED: N APPROVED: _

DECAY-IN-STORAGE APPROVED: N HOLDING FOR < 10 HALF-LIVES APPROVED: _

T 1/2 > 65 DAYS, ISOTOPE(S): _____ _____ _____
_____ _____ _____

INTERIM STORAGE UP TO 1996: N

BETWEEN:

License Fee Management Branch, ARM
and
Regional Licensing Sections

(FOR LFMS USE)
INFORMATION FROM LTS

Program Code: 03253
Status Code: 2
Fee Category: 3I
Exp. Date: 19951231
Fee Comments: _____
Decom Fin Assur Reqd: N

LICENSE FEE TRANSMITTAL

A. REGION 4

1. APPLICATION ATTACHED
   Applicant/Licensee: PACKARD INSTRUMENT CO.
   Received Date: 960102
   Docket No: 3013133
   Control No.: 021805
   License No.: 12-04933-06E
   Action Type: Renewal

2. FEE ATTACHED
   Amount: $2,600.
   Check No.: 096877

3. COMMENTS

Signed C Boyle
Date 1/4/96

B. LICENSE FEE MANAGEMENT BRANCH (Check when milestone 03 is entered √)

1. Fee Category and Amount: 3I $2600

2. Correct Fee Paid. Application may be processed for:
   Amendment _____
   Renewal √
   License _____

3. OTHER _____

Signed JL
Date 1/17/96

Log Jan. 1 1995
Remitter Canberra Instr., Inc.
Check No. 96877
Amount $2,600 Refunded $2,600
Fee Category 3I
Type of Fee Renewal
Date Check Rec'd 1/17/96
Date Completed 1/17/96
By: JL

OCT 2 4 1996

DIVISION OF ACCOUNTING AND FINANCE
REQUEST FOR REFUND TO EMPLOYEE/VENDOR

THE EMPLOYEE/VENDOR IDENTIFIED BELOW HAS OVERPAID THE NUCLEAR REGULATORY COMMISSION FOR GOODS AND/OR SERVICES PROVIDED AND IS DUE A REFUND

EMPLOYEE/VENDOR/PAYEE CODE: _____

NAME: Packard Instrument Co.

ADDRESS: ATTN: Ms Dorothy Mrkvicka / RSO

ADDRESS: 2200 Warrenville Rd

CITY: Downers Grove STATE: IL ZIP: 60515

TRANS CODE: PX

TRANS TYPE: ___	FUND: ___	JOB CODE: ___	AMOUNT: $2,600.00
TRANS TYPE: IR	FUND: R1435	JOB CODE: INTR	AMOUNT:
TRANS TYPE: IR	FUND: R1099	JOB CODE: ADCH	AMOUNT:
TRANS TYPE: IR	FUND: R1099	JOB CODE: FINE	AMOUNT:

TOTAL REFUND AMOUNT: $2,600.00

COMMENTS: Lic 12-04933-06E/CR6877/REN EXTN RLMRG

(limit comments to 40 characters, including spaces)

PREPARED BY: Sandra Kimberly DATE: 10/24/96

AUTHORIZED BY: [signature] DATE: 6/24/96

ORIGINAL INV. NO: _____ DATE PAID: _____ AMOUNT: _____

REFUND ENTERED INTO COLLECT BY: _____

REFUND DETERMINED BY: _____ DATE: _____

PLEASE ATTACH APPROPRIATE SUPPORTING DOCUMENTATION

Jan. 1 HQS
021805