

10330/1  
Ser 6820-320

17 MAY 1965

FIRST ENDORSEMENT ON NREL LETTER 730-36, AK:jp OF 3 MAY 1965

From: Chief, Bureau of Ships  
To: Chief, Source and Special Nuclear Materials Branch  
Division of Materials Licensing  
U. S. Atomic Energy Commission  
Washington, D. C. 20545

Subj: AEC Source Material License No. SEM-376; Request To Amend

1. Basic letter with enclosures contains a request to amend subject license.
2. Modifications to supplemental information previously submitted with the Laboratory's application for renewal of AEC License No. SEM-376 include:
  - a. Change in membership of Radioisotope Committee due to change in personnel.
  - b. Substitution of film to provide a wider exposure range in the photochemistry program.
3. This material has been reviewed and a replacement of the supplemental sheets (i.e., Supplemental 3 (Item 10) and Supplemental 5 (Item 11b) ) updates the Laboratory's Research and Development Program authorizing materials under license No. SEM-376.

Copy to:  
BUREAU (Code 74)

NREL, STRAN

M. G. WILLIAMS  
By Direction

MAHAFFEY/mitchell  
61457 - 5/17/65  
Serial 650506-0682

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY  
SAN FRANCISCO, CALIFORNIA 94135

IN REPLY REFER TO:

730-36  
AK:jp

3 MAY 1965

*Fwded To AEC by  
Code 682c-520*

From: Commanding Officer and Director  
To: U. S. Atomic Energy Commission (Division of Materials  
Licensing) Washington, D. C. 20545  
Via: Chief, Bureau of Ships (Code 682C) ✓  
Subj: Modification of NRDL's Source Material License SMB-376

*17 May 1965*

Ref: (a) NRDL ltr 730-48 WGN:jp of 25 Jun 1964

Encl: (1) Page 4, Supplement 3 (Item 10) Radioisotope Committee  
Members and Qualifications (3 copies)  
(2) Page 13, Supplement 5 (Item 11b) Personnel Monitoring  
Devices and Procedures (3 copies)

1. As a result of a recent change in staffing at NRDL, it is necessary to make a change in the membership of the Radioisotope Committee, wherein Dr. Richard Cole replaced Dr. Lewis H. Gevantman. It is requested that enclosure (1) replace page 4, Supplement 3 (Item 10) as submitted in reference (a).

2. In the NRDL photodosimetry program, to provide a wider exposure range, we substituted DuPont film 1290 for DuPont 834. It is requested that enclosure (2) replace page 13, Supplement 5 (Item 11b) as submitted in reference (a).

D. C. CAMPBELL

Copy to:  
USAEC (SFOO)

Supplement 3 (Item 10)

**Radioisotope Committee Members and Qualifications**

Dr. Edward R. Tompkins, Chairman

Chairman, Radioisotope Committee, NRDL, November 1962 to date; Associate Scientific Director, NRDL, November 1961 to date; Scientific Liaison Officer, ONR, London, England, July 1960 - October 1961; Head, Chemical Technology Division, NRDL, December 1951 - June 1960; Consultant, NRDL, five months - 1951; Consultant, U. C. Radiation Laboratory, Berkeley, California - 16 months; Assistant Manager and Director of Research for Scientific Service, Inc., Berkeley, California - 18 months; Radiochemist, AEC, Advisory Field Service, Oak Ridge, Tenn. - 6 months; Supervisor, Chemistry Dept., Clinton Laboratory, Oak Ridge, Tenn. - 4 years; Research Chemist, Armour Research Foundation, Chicago, Illinois, 1 year.

Albert L. Smith, Alternate Chairman

Head, Health Physics Division, NRDL, February 1962 to date; Head, Radiological Safety Branch, Health Physics Division, NRDL, July 1956 - February 1962; Health Physicist, NRDL, October 1951 - July 1956; Health Physicist, General Electric Corp., Hanford Atomic Products Operation, January 1948 - October 1951.

Dr. Edward L. Alpen

Head, Biological and Medical Sciences Division, NRDL, April 1959 to present; Head, Biophysics Branch, NRDL, 1956 - April 1959; Head, Thermal Injury Branch, NRDL 1952 - 1956; Investigator in Thermal Injury Branch, NRDL, April 1951 - September 1952; Assistant Professor Pharmacology, George Washington University, Washington, D. C., January 1950 - April 1951.

Dr. Richard Cole

Head, Chemical Technology Division, NRDL, September 1964 to present; Head, Countermeasures Evaluation Branch, Military Evaluations Division, May 1959 - September 1964; Radiological Chemist, Military Evaluations Division, December 1956 - May 1959; Radiological Chemist, Chemical Technology Division, March 1952 - December 1956.

### Supplement 5 (Item 11b)

Radiation detecting instruments are calibrated every three months or as needed (Instrument malfunctions, etc.) by electronic technicians on a calibrated source range. Sources used are Co-60, Cs-137, Pu-Be, U-238. Prior to use of the instrument a check is made with a radioactive test sample (Ra-226, Co-60, Sr-90, Pu-239) to insure instrument operation.

Counting systems are initially calibrated for operating plateaus and checked daily with NBS calibrated standards for instrument performance. When counting systems are serviced they are then recalibrated.

Occasionally checks are made of air samplers to establish the air flow rate.

### Personnel Monitoring Devices and Procedures

The standard film badge dosimeter used at NRDL has four filters of thickness 0.040" aluminum, 0.027" lead, 0.015" cadmium, and 0.010" paper. It can be calibrated so as to give effective energy information as well as dosage information. The film used is a two-film packet, containing DuPont 555 and 1290 film, and can measure gamma exposures from 25 mr to 3000 r.

The DuPont 555 and 1290 films are calibrated for response to beta radiation with a normal uranium plaque, and for response to gamma radiation with a NBS-certified radium source, cesium-137 source, cobalt-60 source, and various energies of X-ray, using NBS-certified thimble chambers as a standard. All calibration exposures are made with the film inside the badge.

Neutron film badges (NfA film) are also used when neutron sources are handled, or when personnel are in proximity to nuclear reactors or neutron producing particle accelerators. A neutron film badge service is supplied by a commercial firm (Radiation Detection Company, Mt. View, California).

Finger ring film badges (beta-gamma) are used whenever there is the possibility of hand exposure in excess of that measured by the body badge. A finger ring service is supplied by a commercial firm. (Radiation Detection Company, Mt. View, California).



U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY  
SAN FRANCISCO CALIFORNIA 94135

682  
JB  
U-455-64  
IN REPLY REFER  
TO FILE:  
941-820  
RSA:fs  
JUL 24 1964

AIR MAIL

From: Commanding Officer and Director  
To: Director, Division of Licensing and Regulation, U. S. Atomic Energy  
Commission, (Mr. Nathan Bassin), Washington, D. C.  
Via: Chief, Bureau of Ships, (Code 682C), Washington, D. C.  
Subj: AEC Approval and License for Production of Calibrated Radiac  
TS-2206/PD  
Ref: (a) Discussions between Mr. Bassin (AEC), Mr. Mahaffey (BuShips)  
and Mr. Alger (NRDL) on 5 Jun 1964  
(b) Fonecon between Mr. Mahaffey and Mr. Alger on 16 Jul 1964  
Encl: (1) Drawing of TS-2206/PD (4 sets)

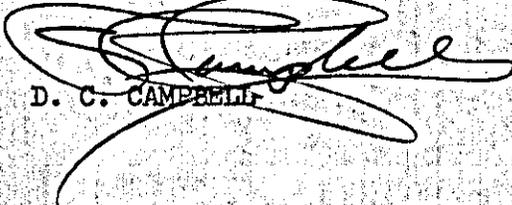
1. The subject radiac, being designed under sponsorship of the Bureau of Ships, contains one mc of  $C^{14}$  in the form of barium carbonate; therefore, the licensing and manufacture of such radiacs are concerns of the Atomic Energy Commission. Reference (a) established that the following information was required for AEC action:

- a. An official designation for the device,
- b. Detailed production drawings, and
- c. A statement of manufacturing and testing procedures.

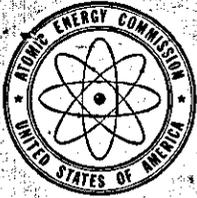
2. Reference (b) established the name as "<sup>Calibrator</sup> ~~Calibrated~~ Radiac TS-2206/PD" and the drawings are enclosed.

3. These radiacs will be assembled, tested and calibrated at NRDL. Drawing No. 941-6480-3, sheet one, shows the details along with instructions for assembly. The glass capsules are loaded with the  $CaF_2 + BaCO_3$  mixture in a glove box. After wipe tests indicate the outside of the ampule assembly is free of  $BaCO_3$ , PC-1 is removed from the box, evacuated, flame sealed, and tested for leaks. Leaks are detected by the weight gain under hydraulic pressure method, i.e., the capsules are precision weighed, stored under water at 40 psi, and reweighed to see if any water has leaked into the capsule. Also each complete radiac receives the water test.

4. Approval for production and for use within the Navy at appropriate radiac calibration and repair facilities is requested.

  
D. C. CAMPBELL

Copy to: (w/o encl)  
AEC (N. Bassin)



IN REPLY REFER TO:

DML:CEM  
40-5063

UNITED STATES  
ATOMIC ENERGY COMMISSION  
WASHINGTON 25, D.C.

682C  
77

JUL 21 1964

Chief, Bureau of Ships  
Department of the Navy  
Washington 25, D. C.

Attention: Mr. R. D. Clubb  
Your ref: 10330/1  
Ser 682C-531

Gentlemen:

Enclosed is Source Material License No. SMB-376, as renewed.

Very truly yours,

*Robert L. Layfield*  
Robert L. Layfield  
Source & Special Nuclear Materials Branch  
Division of Materials Licensing

Enclosure:  
As stated

UNITED STATES  
ATOMIC ENERGY COMMISSION

SOURCE MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954, and Title 10, Code of Federal Regulations, Chapter 1, Part 40, "Licensing of Source Material," and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, possess and import the source material designated below; to use such material for the purpose(s) and at the place(s) designated below; and to deliver or transfer such material to persons authorized to receive it in accordance with the regulations in said Part. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954 and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission, now or hereafter in effect, including Title 10, Code of Federal Regulations, Chapter 1, Part 20, "Standards for Protection Against Radiation," and to any conditions specified below.

Licensee		3. License No.
1. Name	Department of the Navy	SMB-376, as renewed
2. Address	U. S. Naval Radiological Defense Laboratory San Francisco, California	4. Expiration Date July 31, 1967
		5. Docket No. 40-5063
6. Source Material	7. Maximum quantity of source material which licensee may possess at any one time under this license	
Uranium-Thorium	2,474 pounds	

CONDITIONS

8. Authorized use (Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2. above.)

For use in accordance with the procedures described in the licensee's application dated July 2, 1964, except that exemptions and specific authorizations pursuant to Commission regulations are not authorized.

Date of issuance

JUL 21 1964

For the U.S. ATOMIC ENERGY COMMISSION

*Robert L. Layfield*

Robert L. Layfield  
Division of Materials Licensing

10330/1  
Ser 682C-531

FIRST ENDORSEMENT ON NRDL LETTER 730-48, WEN:jp OF 25 JUNE 1964

2 - JUL 1964

From: Chief, Bureau of Ships  
To: Chief, Source and Special Nuclear Materials Branch  
Division of Materials Licensing  
U. S. Atomic Energy Commission  
Washington, D. C. 20545

Subj: AEC Source Material License No. EEC-376; Application For Renewal Of

1. Basic letter with enclosure contains an application for renewal of subject license in response to your notice of license expiration of 28 May 1964.
2. This material has been reviewed and the completed Form AEC-2 with supplemental material has been prepared in accordance with instructions provided with the form.

Copy to:  
NRDL  
BUMED(Coda 74)(w/Basic Mat'l and  
supplement)

MAHAFFEY/mitchell  
61457 - 1 July 1964  
Serial 640629-0478

R. D. CLUBE  
By direction

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY  
SAN FRANCISCO, CALIFORNIA 94135

IN REPLY REFER TO:

730-48  
WGN:jp

25 JUN 1964

AIR MAIL - SPECIAL DELIVERY

From: Commanding Officer and Director  
To: U. S. Atomic Energy Commission (D. A. Nussbaumer, Division  
of Licensing and Regulation) Washington 25, D. C.  
Via: Chief, Bureau of Ships (Code 682) ✓  
Subj: Application for Renewal of Source Material License No. SMB-376  
Ref: (a) USAEC ltr 40-5063 of 28 May 1964  
Encl: (1) Application for Renewal of SMB-376 (4 copies)

1. In accordance with reference (a) enclosure (1) is forwarded for renewal of the Laboratory's Source Material License No. SMB-376 which is to expire on 31 July 1964.

2. It is emphasized that this is a research and development Laboratory and as such we do not "process" source material, as the industrial licensee. Here, amounts of source material are used in variable chemical and physical experiments. Therefore, we require a degree of flexibility in the licensed use of source material as outlined in our application.

D. C. CAMPBELL

*1st Endorsement by Code 682C - 531, dtd. 7/2/64 to the AEC*

10330/1  
Ser 682C-519

FIRST ENDORSEMENT ON NRDL LETTER 730-46, WUN:jp OF 16 JUNE 1964

From: Chief, Bureau of Ships  
To: Chief, Isotopes Branch  
Division of Materials Licensing  
U. S. Atomic Energy Commission  
Washington, D. C. 20545

23 JUN 1964

Via: Chief, Bureau of Medicine and Surgery (Code 74)

Subj: Exposure In Excess of 3.0 Rems Per Quarter; Report Of

1. Forwarded.

Copy to:  
US NRDL

E. D. CLUBB  
By Direction

MAHAFFEY/mitchell  
61457 - June 22, 1964  
Serial 640620-0322

22 June 1964

Telcon With Wm. Neall - U.S.N.R.D.L.

Re - Laboratory's re-submittal of their report on the Camp Parks incident.

AEC has fwded. a ltr. to Lab. indicating this type exposure will be published in the Public Record; however, names should be deleted.

Lab. will fwd. a copy of AEC's ltr. to Buships.

Buships will fwd. 16 June 1964 ltr, ser 730-46, WGN: jp as 1st Endorsement to AEC via BuHed.



UNITED STATES  
ATOMIC ENERGY COMMISSION  
WASHINGTON 25, D.C. 20545

3400/2  
700  
641422A730  
I14C

IN REPLY REFER TO:  
SLR:RH  
4-487-8

JUN 8 1964

Commanding Officer  
U. S. Naval Radiological Defense Laboratory  
San Francisco, California

Recd: 24 June 64

Dear Sir:

Thank you for your letter of May 20, 1964, reporting pursuant to Section 20.405 of 10 CFR 20, the exposure of one of your employees to radiation.

As you perhaps know, reports of this type are required by our regulation 10 CFR 9, "Public Records," to be placed in the Commission's public records. A copy of 10 CFR 9 is enclosed. However, names of persons who are exposed to radiation or radioactive material are not to be included in the public records. You will note that Section 20.405 of 10 CFR 20, "Standards for Protection Against Radiation," includes the following paragraph:

"(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."

Since your report of May 20 clearly identifies the name of the individual who was exposed to radiation, please resubmit your report in compliance with 10 CFR 20.405(c).

Very truly yours,

Eber R. Price  
Director  
Division of State and  
Licensee Relations

Enclosures:

1. 10 CFR 9
2. 10 CFR 20

cc: Comdr. John H. Schulte, MC  
Special Weapons Defense Division  
Washington 25, D. C.

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY  
SAN FRANCISCO, CALIFORNIA 94135

IN REPLY REFER TO:

730-46  
WGN:jp

*1st Endorsement Prepared  
& Fwded To Bu Med & Surgery 6/22/64*  
16 JUN 1964

**From:** Commanding Officer and Director  
**To:** U. S. Atomic Energy Commission (Division of Licensing and Regulation) Washington 25, D. C.  
**Via:** (1) Chief, Bureau of Ships (Code 682) ✓  
(2) Chief, Bureau of Medicine and Surgery (Code 74)  
**Subj:** Exposure in excess of 3.0 rem per quarter; report of  
**Ref:** (a) 10CFR20, Section 20.405

1. The following is resubmitted in accordance with reference (a). On 21 April 1964 an investigator of this Laboratory received an exposure of 3.5 r during work at our Cobalt 60 source range at Camp Parks (Byproduct Material License #4-487-8). This exposure was of an accidental nature, resulting from error in the operation of the source.

2. During routine exposure runs of a repetitive nature on 21 April 1964, one of the 2500 curie Co-60 sources failed to return to its shielded position because of a mechanical obstruction in its path of movement. The warning devices functioned properly but the source operator failed to take note of these and also failed to follow the standard operational procedures of surveillance and monitoring before re-entry to the area. The experimenter who was working with him entered the area and approached the source before he noticed that it was exposed. He immediately departed, but had incurred 3.5 r exposure as recorded by film badge, and subsequent investigation has shown this to be a valid measurement of his exposure.

The obstruction was later removed and the source secured by other operational and health physics personnel.

3. The accident has been completely investigated with findings of operator error as the major contributing factor. The operator has been removed from source operation for an indefinite period of time. The investigator will be withheld from all work involving the risk of radiation exposure until his exposure has been amortized at the rate of 3.0 r/quarter.

070050-0355

16 JUN 1964

730-46  
WGN:jp

In addition to disciplinary actions taken, minor revisions of operational procedures have been adopted, operator retraining will occur every 6 months, and additional warning systems to help the operator in his primary function of source and area security are being studied.

D. C. CAMPBELL

Copy to:  
USAEC, SFOO, Berkeley, Calif.

USE FOR URGENT  
LETTERS ONLY

# NAVAL SPEEDLETTER

DO NOT CLEAR THROUGH  
COMMUNICATION OFFICE

(One box must be checked)

REGULAR MAIL       SPECIAL DELIVERY

AIR MAIL       REGISTERED MAIL

CLASSIFICATION

**UNCLASSIFIED**

IN REPLY REFER TO

10330/1  
SER 6820-394

4 - JUN 1964

TO:

**Commanding Officer and Director  
U. S. Naval Radiological Defense Laboratory  
San Francisco, California**

NAVAL SPEEDLETTER—  
Permits dispatch or informal language.  
May be sent (1) with enclosures, (2) in a window envelope (size 8 1/4" x 3 3/8"), if contents are not classified as confidential or higher, (3) to both naval and nonnaval activities.  
Is packaged 500 sheets of white or of one color: yellow, pink, or green.

(Fold)

Enclosure (1) is forwarded for compliance relative to renewal of Special Nuclear Material License Number D2B-376, as amended and forwarded to you by Bureau of Ships letter 10330/2, Ser 362-519 of 6 September 1961. The information requested in the enclosure should be forwarded to the Bureau of Ships in order that it may be transmitted by the Bureau of Ships to the Atomic Energy Commission prior to 1 July 1964.

Encl:  
(1) USAEC ltr 40-5063 of 28 May 1964 to BUSHIPS with enclosures

R. D. CLUBE  
By direction

MAHAFFEY/mitchell  
62935 - 6/3/64

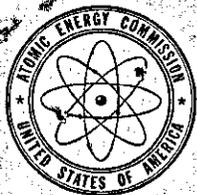
COPY TO

USAEC, Source and Special Nuclear Materials Branch  
20545

ADDRESS:

← SENDER'S MAILING ADDRESS  
Address reply as shown at left or reply hereon and return in window envelope (size 8 1/4" x 3 3/8"), if not classified as confidential or higher.

CLASSIFICATION



UNITED STATES  
ATOMIC ENERGY COMMISSION  
WASHINGTON, D.C. 20545

682 B  
JH  
J

IN REPLY REFER TO:  
40-5063

MAY 28 1964

Department of the Navy  
Bureau of Ships  
Washington 25, D. C.

Attention: Mr. V. F. Saitta  
Your reference: 10330/2  
Ser 362-376  
SUBJECT: NOTICE OF LICENSE EXPIRATION

Gentlemen:

Notice is given that Source Material License Number SMB-376 expires on July 31, 1964.

If you desire to continue your program using source material(s), an application for renewal of the license should be filed with this office. It is to your advantage to file such an application at least thirty (30) days before the expiration date of your existing license. The application should be submitted using Form AEC-2, enclosed, in accordance with the instructions provided with the form. Your program will then be covered by your existing license until action is taken on your application for license renewal. (Title 10, Code of Federal Regulations, Part 40, Section 40.43(b)). If an application is received less than 30 days prior to the expiration date of your license and cannot be processed before your existing license expires, this could result in your possessing source material without a valid license.

If you do not wish to renew your license, please complete the enclosed form "Certification of Status of Source Material Activities under United States Atomic Energy Commission Source Material License Number SMB-376", and return it to this office.

If you have obtained an amendment which has extended the expiration date of the above license or if a new license has been issued which supersedes the above license, please disregard this notice.

This notice of your license expiration is sent for your convenience and it should not be interpreted that similar notices will be sent in the future. The responsibility for timely submission of an application for license renewal remains with the licensee.

Very truly yours,

*Robert R. Rayfield* for

Donald A. Nussbaumer, Chief  
Source & Special Nuclear Materials Branch  
Division of Materials Licensing

Enclosures:  
10 CFR, 20 & 40  
Form AEC-2  
"Certification. . ."

UNITED STATES  
ATOMIC ENERGY COMMISSION

SOURCE MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954, and Title 10, Code of Federal Regulations, Chapter 1, Part 40, "Licensing of Source Material," and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, possess and import the source material designated below; to use such material for the purpose(s) and at the place(s) designated below; and to deliver or transfer such material to persons authorized to receive it in accordance with the regulations in said Part. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954 and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission, now or hereafter in effect, including Title 10, Code of Federal Regulations, Chapter 1, Part 20, "Standards for Protection Against Radiation," and to any conditions specified below.

Licensee		3. License No.
1. Name	Department of the Navy	SRB-376, as amended
2. Address	U. S. Naval Radiological Defense Laboratory San Francisco 29, California	4. Expiration Date
		July 31, 1964
		5. Docket No.
		40-5063
6. Source Material		7. Maximum quantity of source material which licensee may possess at any one time under this license
(a) Natural uranium		(a) Twenty (20) kilograms
(b) Natural thorium		(b) One (1) kilogram
(c) Depleted uranium		(c) Eleven hundred (1,100) kilograms

Ref: 730-110 WJF:jp

CONDITIONS

8. Authorized use (Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.)

- A & B . For use in research in accordance with the procedures described in the licensee's applications dated June 29, 1961 and May 23, 1961.
- C. For use as shielding and in metallurgy research in accordance with the procedures described in the licensee's applications dated May 23, 1961, June 29, 1961, and August 11, 1961.

For the U. S. ATOMIC ENERGY COMMISSION

Date of issuance

362-519

Encl (4) to Ser 362-519

Donald A. Nussbaumer

Division of Licensing & Regulation

10330/1  
Ser 682C-387

FIRST ENDORSEMENT ON NRDL LETTER 730-37, ALS:jp OF 20 MAY 1964

27 MAY 1964

From: Chief, Bureau of Ships  
To: Chief, Isotopes Branch  
Division of Materials Licensing  
U. S. Atomic Energy Commission  
Washington, D. C. 20390

Via: Chief, Bureau of Medicine and Surgery (Code 74)

Subj: Exposure To An Individual In Excess of 3.0 Rems Per Quarter;  
Report Of

1. Basic letter contains a report of an incident at Camp Parks in which an investigator of the Laboratory received an exposure of 3.5 roentgens. This exposure was of an accidental nature and resulted from one of the Cobalt-60 sources failing to return to its shielded position because of a mechanical obstruction in its path of movement.

2. This incident was discussed during a recent telephone conversation with Mr. A. L. Smith of the Laboratory. In accordance with recommendations from the Laboratory's Radiation Protection Committee an application for amendment to Byproduct Material License No. 4-487-8 covering modifications to operating procedures is in preparation. Tentative plans are to submit this material to the Atomic Energy Commission via the Bureau of Ships for review prior to 15 June 1964.

Copy to:  
US NRDL

R. D. CLUBB  
By direction

MAHAFFEY/mitchell  
62935 - 5/27/64

*Copy  
included  
@  
[unclear]*

27 May 1964

Telecon with Mr. A. S. Smith of the Laboratory concerning incident of 21 April 1964 at Camp Parks.

A. Recommendations from the Rad. Prot. in Desktop Committee are being followed and include:

1. Change wording some of operating procedure to clarify meaning of some points.

2. Revising operator's check-off list - providing supplemental check-off lists where repetitive entry is req'd.

3. Re-fresher training for those who haven't operated source on the site within past 6 mos.

4. Installing on "Control Panel" an auxiliary warning system - blinking red light - operated by radiation detector units - this in addition to the mechanically actuated devices operated by switches when sources pass in & out of source containers.

5. Provide an air horn system - control center can warn personnel in area.

6. Provide prominent signs on the approach to the road at Camp Parks - "LOOK" - "STOP" - "READ METERS" - "INSPECT SOURCE AREA".

A. Revise Operator's Check-off List to avoid mis-understanding.

B. Provide supplemental check-off list where repetitive entry is necessary.

C. Re-fresher Training for operators who have not used the range within past six months.

D. Investigate need for radiation alarm to be actuated by radiation detection device which will indicate exposed source at both control panel & source.

10330/1  
Ser 682c-166

FIRST ENDORSEMENT ON USNRDL LTR 730-13, FTF:jp OF 18 FEB 1964 TO  
AEC VIA BUSHIPS

28 FEB 1964

From: Chief, Bureau of Ships  
To: Director  
Division of Nuclear Materials Management  
U. S. Atomic Energy Commission  
Washington, D. C. 20390

OK

Subj: Special Nuclear Material License No. SNM-35; Request For  
Amendment

1. Basic letter contains information relative to a request for an amendment to subject license.
2. Any consideration which may be given to this request, at your earliest convenience, will be appreciated.

Copy to:  
NRDL

R. D. CLUBE  
By direction

MAHAFFEY/mitchell  
62935 - 2/28/64  
Serial 640226-0385

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY  
SAN FRANCISCO, CALIFORNIA 94135

682  
702  
4  
IN REPLY REFER TO:

730-3  
ALS:jp

17 JAN 1964

Director, Division of Compliance, Region V  
U. S. Atomic Energy Commission  
2111 Bancroft Way  
Berkeley 4, California

Dear Sir:

Reference is made to your letter of 9 January 1964, concerning the items of noncompliance noted during the December 1963 inspection of our radiation program authorized under AEC Byproduct Material License Nos. 4-487-3, 4-487-8 and Special Nuclear Material License No. SNM-35.

Corrective action has been taken as follows:

1. A schedule has been established whereby all sealed sources held under BPM License 4-487-3 and SNM License-35 are being leak tested at intervals of no greater than six months. As of this date all leak tests are current under the six month requirement.

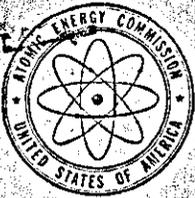
A request has been submitted to the Division of Licensing and Regulation, AEC for an amendment whereby sources in inactive storage will not require the six month leak test. Said sources will be leak tested before return to active use. The storage area will be monitored on a periodic basis.

2. The malfunction of the Cobalt-60 radiation facility at Camp Parks (BPM License 4-487-8) has been documented with a complete description of the incident and with corrective action taken. Users of the facility have been directed to record in the "Operational Log Book" any deficiencies or other unusual circumstances in connection with the operation.

Very truly yours,

D. C. CAMPBELL  
Captain, U. S. Navy  
Commanding Officer and Director

Copy to: (w/cpy of AEC ltr  
of 1/9/64)  
BUSHIPS (Code 682C)



UNITED STATES  
ATOMIC ENERGY COMMISSION  
DIVISION OF COMPLIANCE  
REGION V  
2111 BANCROFT WAY  
BERKELEY 4, CALIFORNIA

640055

10330  
10-8  
700  
A730  
TELEPHONE: THORNWALL 1-5620

IN REPLY REFER TO:

CO:V:RFF

January 9, 1964

Department of the Navy  
U. S. Naval Radiological Defense Laboratory  
San Francisco 24, California

Attention: Commanding Officer

Gentlemen:

Mr. R. F. Fish of this office had a discussion with Captain P. F. Dickens and A. L. Smith of your staff at the conclusion of his recent inspection of your radiation program authorized under AEC Byproduct Material License Nos. 4-487-3, 4-487-8 and Special Nuclear Material License No. SNM-35. During this discussion Mr. Fish explained that certain of your licensed activities appear to be in noncompliance with Atomic Energy Commission requirements. The items and references to the pertinent requirements are listed in item 5 on the enclosed Forms AEC-592, one Form AEC-592 for each license.

This letter is written to give you an opportunity to advise us in writing of (a) your position concerning these items; (b) any corrective steps you have taken or plan to take with respect to each item; and (c) the date all corrective action was or will be completed.

Your reply should be sent to us within 20 days of the date of this letter. This will assure that it will receive proper attention in our further evaluation of the matter.

JAN 9 1964

This office is aware of your December 5, 1963 request, to the Division of Licensing and Regulation, U. S. Atomic Energy Commission, for an amendment to permit possession of up to 10 millicuries of americium-241. For this reason you need not reply to that item pertaining to the unauthorized possession of americium-241, item 5(b) on the Form AEC-592 pertaining to license No. 4-487-3.

Please communicate directly with this office if you have any questions.

Sincerely yours,



R. W. Smith, Director

Attachments:

1. Form AEC-592 for license 4-487-3
2. Form AEC-592 for license 4-487-8
3. Form AEC-592 for license SNM-35

# UNITED STATES ATOMIC ENERGY COMMISSION

## DIVISION OF COMPLIANCE

<b>1. LICENSEE</b> U. S. Naval Radiological Defense Laboratory U. S. Naval Shipyard Hunters Point San Francisco, California	<b>2. REGIONAL OFFICE</b> Region V, Division of Compliance U. S. Atomic Energy Commission 2111 Bancroft Way Berkeley, California 94704
<b>3. LICENSE NUMBER</b> SNM-35	<b>4. DATE(S) OF INSPECTION</b> December 16, 17, 18, 19 and 20, 1963

5. The following activities under your license (identified in Item No. 3 above) appear to be in noncompliance with AEC regulations or license requirements, as indicated.

- a. The plutonium-fluoride and three plutonium-beryllium neutron sources, your source numbers 1, 2 and 3, were not leak tested on a six month frequency. Condition 8 of the license requires the use of these sources in accordance with the procedures which were submitted with the license application. These procedures require leak testing at six month intervals.

Supplementary page None attached.

*R. F. Fish*

R. F. Fish, Radiation Specialist

JAN 9 1964

AEC Compliance Inspector

Date

ORIGINAL: LICENSEE.

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# UNITED STATES ATOMIC ENERGY COMMISSION

## DIVISION OF COMPLIANCE

<b>1. LICENSEE</b> Department of the Navy U. S. Naval Radiological Defense Laboratory Scientific and Medical Departments San Francisco, California	<b>2. REGIONAL OFFICE</b> Region V, Division of Compliance U. S. Atomic Energy Commission 2111 Bancroft Way Berkeley, California 94704
<b>3. LICENSE NUMBER</b> 4-487-3	<b>4. DATE(S) OF INSPECTION</b> December 16 thru 20, 1963

5. The following activities under your license (identified in Item No. 3 above) appear to be in noncompliance with AEC regulations or license requirements, as indicated.

- a. Numerous sealed sources containing cobalt-60, strontium-90 and cesium-137 were not leak tested on a six month frequency as required by Condition 14, Paragraph C of the license.
- b. Americium-241, in amounts in excess of 10 microcuries, was possessed without a valid AEC license permitting such possession which is contrary to Section 30.3 of 10 CFR Part 30, Code of Federal Regulations.

*R. F. Fish*

Supplementary page none attached. R. F. Fish, Radiation Specialist JAN 9 1964  
AEC Compliance Inspector Date

UNITED STATES ATOMIC ENERGY COMMISSION  
DIVISION OF COMPLIANCE

1. LICENSEE Department of the Navy U. S. Naval Radiological Defense Laboratory San Francisco 24, California	2. REGIONAL OFFICE Region V, Division of Compliance U. S. Atomic Energy Commission 2111 Bancroft Way Berkeley, California 94704
3. LICENSE NUMBER 4-487-8	4. DATE(S) OF INSPECTION December 16 thru 20, 1963
5. The following activities under your license (identified in Item No. 3 above) appear to be in noncompliance with AEC regulations or license requirements, as indicated.	
a. A malfunction of the cobalt-60 radiation facility at Camp Parks was not recorded in the "Operational Log Book". Condition 15 of the license requires the use of the facility in accordance with the procedures which were submitted with the license application. These procedures require that any deficiencies or other unusual circumstances be recorded.	
Supplementary page <u>None</u> attached.	<i>R. F. Fish</i> <u>R. F. Fish, Radiation Specialist</u> <u>JAN 9 1964</u> AEC Compliance Inspector Date

ORIGINAL: LICENSEE.

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UNITED STATES  
ATOMIC ENERGY COMMISSION

SPECIAL NUCLEAR MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 70, "Special Nuclear Material Regulations," a license is hereby issued authorizing the licensee to receive and possess the special nuclear material designated below; to use such special nuclear material for the purpose(s) and at the place(s) designated below; and to transfer such material to persons authorized to receive it in accordance with the regulations in said Part. This license shall be deemed to contain the conditions specified in Section 70.32(a) of said regulations, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee  
1. Name U. S. Naval Radiological Defense Lab.  
2. Address U. S. Naval Shipyard  
Hunters Point  
San Francisco, California

3. License No.  
SM-35, as amended

4. Expiration Date  
January 31, 1965

5. Docket No.  
70-35

6. Special Nuclear Material  
Plutonium, U-235, U-233, and U-236  
enriched in the U-235 isotope.

7. Maximum quantity of special nuclear material which licensee may possess at any one time under this license 825 grams of plutonium as encapsulated Pu-Be neutron sources, 23 grams as Al-Alloy, and 150 grams as oxide; 10 grams U-233 as a metal. (Cont'd)

8. Authorized use  
For use in accordance with the procedures described in the licensee's application dated August 15, 1961, and supplement dated December 19, 1961.

9. Quantity of special nuclear material allocated to licensee pursuant to Section 70.31(b) of said part  
-----

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.

Authorized places of use: The address as indicated in Item 2 and those other facilities as listed in the licensee's application dated August 15, 1961.

7. (Cont'd) 110 grams U-235 as metal; and 100 milligrams U-236 as oxide.

## SPECIAL NUCLEAR MATERIAL LICENSE

Supplementary Sheet

License Number SNM-35, as amended

11. This license authorizes the possession and use of the byproduct and special nuclear material produced by the in-pile irradiation of approximately one (1) kilogram of source material and one hundred (100) grams of special nuclear material.
12. The licensee is hereby exempted from the requirements of Section 70.24 of 10 CFR 70, to the extent that this Section applies to the special nuclear material held under this license.

For the U. S. Atomic Energy Commission

by Lyall JohnsonDivision of Licensing and Regulation  
Washington 25, D. C.

Date

31 Jan 1962

UNITED STATES ATOMIC ENERGY COMMISSION

APPLICATION FOR SOURCE MATERIAL LICENSE

Pursuant to the regulations in Title 10, Code of Federal Regulations, Chapter 1, Part 40, application is hereby made for a license to receive, possess, use, transfer, deliver or import into the United States, source material for the activity or activities described.

<p>1. (Check one)</p> <p><input type="checkbox"/> (a) New license</p> <p><input type="checkbox"/> (b) Amendment to License No. _____</p> <p><input checked="" type="checkbox"/> (c) Renewal of License No. <b>SMB-376</b></p> <p><input type="checkbox"/> (d) Previous License No. _____</p>		<p>2. NAME OF APPLICANT</p> <p><b>U. S. Naval Radiological Defense Laboratory</b></p> <p>3. PRINCIPAL BUSINESS ADDRESS</p> <p><b>San Francisco, California 94135</b></p>																	
<p>4. STATE THE ADDRESS(ES) AT WHICH SOURCE MATERIAL WILL BE POSSESSED OR USED</p> <p><b>(See supplement 1)</b></p>																			
<p>5. BUSINESS OR OCCUPATION</p> <p><b>U. S. Navy</b></p>		<p>6. (a) IF APPLICANT IS AN INDIVIDUAL, STATE CITIZENSHIP</p> <p><b>Not applicable</b></p>	<p>(b) AGE</p> <p><b>Not applicable</b></p>																
<p>7. DESCRIBE PURPOSE FOR WHICH SOURCE MATERIAL WILL BE USED</p> <p><b>The U. S. Naval Radiological Defense Laboratory is a Laboratory engaged in basic and applied research on the physical and biological effects of nuclear and thermal radiation, with particular emphasis upon those factors relating to the requirements of the military services.</b></p>																			
<p>8. STATE THE TYPE OR TYPES, CHEMICAL FORM OR FORMS, AND QUANTITIES OF SOURCE MATERIAL YOU PROPOSE TO RECEIVE, POSSESS, USE, OR TRANSFER UNDER THE LICENSE</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:20%;">(a) TYPE</th> <th style="width:25%;">(b) CHEMICAL FORM</th> <th style="width:25%;">(c) PHYSICAL FORM (Including % U or Th.)</th> <th style="width:30%;">(d) MAXIMUM AMOUNT AT ANY ONE TIME (in pounds)</th> </tr> </thead> <tbody> <tr> <td>NORMAL URANIUM</td> <td>any</td> <td>any</td> <td>45</td> </tr> <tr> <td>URANIUM DEPLETED IN THE U-235 ISOTOPE</td> <td>any</td> <td>any</td> <td>2426</td> </tr> <tr> <td>THORIUM</td> <td>any</td> <td>any</td> <td>3</td> </tr> </tbody> </table> <p>(e) MAXIMUM TOTAL QUANTITY OF SOURCE MATERIAL YOU WILL HAVE ON HAND AT ANY TIME (in pounds)</p> <p><b>2474 lbs.</b></p>				(a) TYPE	(b) CHEMICAL FORM	(c) PHYSICAL FORM (Including % U or Th.)	(d) MAXIMUM AMOUNT AT ANY ONE TIME (in pounds)	NORMAL URANIUM	any	any	45	URANIUM DEPLETED IN THE U-235 ISOTOPE	any	any	2426	THORIUM	any	any	3
(a) TYPE	(b) CHEMICAL FORM	(c) PHYSICAL FORM (Including % U or Th.)	(d) MAXIMUM AMOUNT AT ANY ONE TIME (in pounds)																
NORMAL URANIUM	any	any	45																
URANIUM DEPLETED IN THE U-235 ISOTOPE	any	any	2426																
THORIUM	any	any	3																
<p>9. DESCRIBE THE CHEMICAL, PHYSICAL, METALLURGICAL, OR NUCLEAR PROCESS OR PROCESSES IN WHICH THE SOURCE MATERIAL WILL BE USED, INDICATING THE MAXIMUM AMOUNT OF SOURCE MATERIAL INVOLVED IN EACH PROCESS AT ANY ONE TIME, AND PROVIDING A THOROUGH EVALUATION OF THE POTENTIAL HAZARDS ASSOCIATED WITH EACH STEP OF THOSE OPERATIONS.</p> <p><b>(See supplement 2)</b></p>																			
<p>10. DESCRIBE THE MINIMUM TECHNICAL QUALIFICATIONS INCLUDING TRAINING AND EXPERIENCE THAT WILL BE REQUIRED OF APPLICANT'S SUPERVISORY PERSONNEL INCLUDING PERSON RESPONSIBLE FOR RADIATION SAFETY PROGRAM (OR OF APPLICANT IF APPLICANT IS AN INDIVIDUAL).</p> <p><b>(See supplement 3)</b></p>																			
<p>11. DESCRIBE THE EQUIPMENT AND FACILITIES WHICH WILL BE USED TO PROTECT HEALTH AND MINIMIZE DANGER TO LIFE OR PROPERTY AND RELATE THE USE OF THE EQUIPMENT AND FACILITIES TO THE OPERATIONS LISTED IN ITEM 9; INCLUDE: (a) RADIATION DETECTION AND RELATED INSTRUMENTS (including film badges, dosimeters, counters, air-monitoring and other survey equipment as appropriate. The description of radiation detection instruments should include the type of radiation detected and the range(s) of each instrument.)</p> <p><b>(See supplement 4)</b></p>																			
<p>(b) METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED IN (a) ABOVE (for film badges, specify method of calibrating and processing, or name supplier.)</p> <p><b>(See supplement 5)</b></p>																			

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.

~~Chairman, Radiological Defense Committee~~  
(Title of certifying official authorized to act on behalf of the applicant)

E. R. TOMPKINS

BY: *E. R. Tompkins*

Dated \_\_\_\_\_

~~U.S. Naval Radiological Defense Laboratory~~  
(Applicant named in Item 2)

15. The applicant, and any official executing this certificate on behalf of the applicant named in Item 1, certify that this application is prepared in conformity with Title 10, Code of Federal Regulations, Part 40, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief.  
(This item must be completed by applicant)

**CERTIFICATE**

14. IF PRODUCTS FOR DISTRIBUTION TO THE GENERAL PUBLIC UNDER AN EXEMPTION CONTAINED IN 10 CFR 40 ARE TO BE MANUFACTURED, USE A SUPPLEMENTAL SHEET TO FURNISH A DETAILED DESCRIPTION OF THE PRODUCT, INCLUDING:  
(a) PERCENT SOURCE MATERIAL IN THE PRODUCT AND ITS LOCATION IN THE PRODUCT.  
(b) PHYSICAL DESCRIPTION OF THE PRODUCT INCLUDING CHARACTERISTICS, IF ANY, THAT WILL PREVENT INHALATION OR INGESTION OF SOURCE MATERIAL THAT MIGHT BE SEPARATED FROM THE PRODUCT.  
(c) BETA AND BETA PLUS GAMMA RADIATION LEVELS (Specify instrument used, date of calibration and calibration technique used) AT THE SURFACE OF THE PRODUCT AND AT 12 INCHES.  
(d) METHOD OF ASSURING THAT SOURCE MATERIAL CANNOT BE DISSOCIATED FROM THE MANUFACTURED PRODUCT.

13. WASTE PRODUCTS  If none will be generated, state "None" opposite (a), below. If waste products will be generated, check here  and explain on a supplemental sheet:  
(a) Quantity and type of radioactive waste that will be generated. See supplement 10)  
(b) Detailed procedures for waste disposal.

(See supplement 9)

(c) DETAILED DESCRIPTION OF RADIATION SURVEY PROGRAM AND PROCEDURES.

(See supplement 8)

(b) EMERGENCY PROCEDURES IN THE EVENT OF ACCIDENTS WHICH MIGHT INVOLVE SOURCE MATERIAL.

(See supplement 7)

12. DESCRIBE PROPOSED PROCEDURES TO PROTECT HEALTH AND MINIMIZE DANGER TO LIFE AND PROPERTY AND RELATE THESE PROCEDURES TO THE OPERATIONS LISTED IN ITEM 9; INCLUDE:  
(a) PROCEDURES FOR USE OF NUCLEAR MATERIALS AND SAFETY FEATURES AND PROCEDURES TO AVOID NONNUCLEAR ACCIDENTS, SUCH AS FIRE, EXPLOSION, ETC., IN SOURCE MATERIAL STORAGE AND PROCESSING AREAS.

(See supplement 6)

11(c). VENTILATION EQUIPMENT WHICH WILL BE USED IN OPERATIONS WHICH PRODUCE DUST, FUMES, MISTS, GASES, ETC.

Supplement 1 (Item 4)

Material will be possessed and used by the U. S. Naval Radiological Defense Laboratory, San Francisco, California 94135 and may also be used at Navy, Army, and Air Force facilities provided such use is under the direct supervision and control of the U. S. Naval Radiological Defense Laboratory personnel and in accordance with procedures established by the Radioisotope Committee of the U. S. Naval Radiological Defense Laboratory.

It may be sent out to other AEC or State licensed activities.

## Supplement 2 (Item 9)

Thorium from microgram to gram amounts is used in the following typical ways:

1. Check sources.
2. Radiochemistry.
3. X-ray contrast (animals).
4. Metal fabrication.
5. Platelet labeling (animals).
6. Cyclotron production of small quantity fission products.

During these operations with the possible exception of metal fabrication, there is no measurable airborne activity generated. The metal fabrication is carried out in a controlled atmospheric enclosure. Standard contamination control measures are employed for all processes as outlined in Item 12 and Appendix A.

Uranium depleted in isotope U-235 in milligrams to gram amounts is used such as the following:

1. Metal oxidation studies.
2. Fission fragment track production.
3. Fission product production.
4. Standard sources.
5. In addition it is used for shielding in Bureau of Explosives approved shipping containers.

All chemical and metal oxidation studies are done in chemistry hoods equipped with negative pressure exhaust and filter systems. Radiation safety measures are employed for all uses.

Natural uranium in milligram to gram amounts is employed in ways similar to the following:

Supplement 2 (Item 9) (Continued)

1. beta-ray spectrometer targets.
2. ion exchange studies.
3. calibration standards.
4. thermal neutron activation analysis.
5. fission fragment track production.

Radiation shielded and atmospheric controlled enclosures are employed for processing all material into small low-level sealed sources.

Supplement 3 (Item 10)

**Radioisotope Committee Members and Qualifications**

Dr. Edward R. Tompkins, Chairman

Chairman, Radioisotope Committee, NRDL, November 1962 to date; Associate Scientific Director, NRDL, November 1961 to date; Scientific Liaison Officer, ONR, London, England, July 1960 - October 1961; Head, Chemical Technology Division, NRDL, December 1951 - June 1960; Consultant, NRDL, five months - 1951; Consultant, U. C. Radiation Laboratory, Berkeley, California - 16 months; Assistant Manager and Director of Research for Scientific Service, Inc., Berkeley, California - 18 months; Radiochemist, AEC, Advisory Field Service, Oak Ridge, Tenn. - 6 months; Supervisor, Chemistry Dept., Clinton Laboratory, Oak Ridge, Tenn. - 4 years; Research Chemist, Armour Research Foundation, Chicago, Illinois, 1 year.

Albert L. Smith, Alternate Chairman

Head, Health Physics Division, NRDL, February 1962 to date; Head, Radiological Safety Branch, Health Physics Division, NRDL, July 1956 - February 1962; Health Physicist, NRDL, October 1951 - July 1956; Health Physicist, General Electric Corp., Hanford Atomic Products Operation, January 1948 - October 1951.

Dr. Edward L. Alpen

Head, Biological and Medical Sciences Division, NRDL, April 1959 to present; Head, Biophysics Branch, NRDL, 1956 - April 1959; Head, Thermal Injury Branch, NRDL, 1952 - 1956, Investigator in Thermal Injury Branch, NRDL, April 1951 - September 1952; Assistant Professor Pharmacology, George Washington University, Washington, D. C., January 1950 - April 1951.

Dr. Lewis H. Gevantman

Head, Chemical Technology Division, January 1961 to date; Head, Radiation Chemistry Branch, NRDL, November 1959 - January 1961; Head, Radiation Chemistry Group, NRDL, 1954 - 1959; Radiological Chemist, NRDL, 1950 - 1954.

Supplement 3 (Item 10) (Continued)

Dr. William E. Kreger

Head, Nucleonics Division, NRDL, 1961 to date; Head, Nuclear Radiation Physics Branch, NRDL, 1958 - 1961; Senior Investigator (Nuclear Physicist), Shielding Section, NRDL, 1952 - 1957.

Supplement 4 (Item 11a)

<u>Instrument</u>	<u>Type</u>	<u>Quantity on Hand</u>	<u>Range</u>	<u>Purpose</u>
Berkeley 2750	Side Window GM	18	0-50,000 c/m	$\beta$ - $\gamma$ dose rate and contamination monitoring.
Eberline E112B	Side Window GM	6	0-20 mr/hr	$\beta$ - $\gamma$ dose rate and contamination monitoring.
Nuclear 1615B	End Window GM	3	0-50,000 c/m	$\beta$ - $\gamma$ dose rate and contamination monitoring.
AN/PDR 27	End Window GM Enclosed GM	67	0-5 mr/hr 0-500 mr/hr	$\beta$ - $\gamma$ dose rate and contamination monitoring.
El-Tronics CP3D (Cutie Pie)	Ionization Chamber	13	0-10 rad/hr	$\beta$ - $\gamma$ dose rate monitoring.
CP3DM (Cutie Pie)	Ionization Chamber	25	0-10 rad/hr	$\beta$ - $\gamma$ dose rate monitoring.
CP3DMS (Cutie Pie)	Ionization Chamber	10	0-100 rad/hr	$\beta$ - $\gamma$ dose rate monitoring.
AN/PDR-T1B	Ionization Chamber	18	0-50 r/hr	$\gamma$ dose rate monitoring.
Keleket AN/PDR-3	Five Fold (GM)	2	$10^4$ Counts	$\beta$ - $\gamma$ hand and foot counter.
Austin, Model 4	Five Fold(GM)	2	$10^4$ Counts	$\beta$ - $\gamma$ hand and foot counter.
IM-113 A/PDR	Side Window GM	26	0-20 mr/hr	$\beta$ - $\gamma$ dose rate and contamination monitoring.

Supplement 4 (Item 11a) (Continued)

<u>Instrument</u>	<u>Type</u>	<u>Quantity on Hand</u>	<u>Range</u>	<u>Purpose</u>
Juno No. 3	Ionization Chamber	5	0-5000 mr/hr	α, β-γ dose rate and contamination monitoring.
Berkeley 2750 (Modified)	End Window GM (with thin window)	2	0-50,000 c/m	Low energy beta monitoring.
Eberline PAC 3G	Gas propor- tional	13	0-100,000 c/m	α contamination monitoring.
Eberline PAC 15A	Scintillator	8	0-2,000,000 c/m	α contamination monitoring.
AN/PDR-49A	BF <sub>3</sub> proportional counter	3	2.5 x 10 <sup>4</sup> n/cm <sup>2</sup> /sec slow or fast	neutron dose rate monitoring.
AN/PDR-47	Proton recoil proportional counter	5	0-500 mrep/hr fast	fast neutron dose rate monitoring.
Nuclear Model 2111 (Pee Wee)	BF <sub>3</sub> proportional counter	1	10 <sup>2</sup> /n/cm <sup>2</sup> /sec fast 10 <sup>3</sup> /n/cm <sup>2</sup> /sec slow	neutron dose rate monitoring.
NRDL Tritium Meter	Ionization Chamber	1	10 <sup>-3</sup> μc/cc sensitivity	Tritium air con- tamination monitoring.
T-289 Tritium Defector	Ionization Chamber	2	10 <sup>-5</sup> μc/cc sensitivity	Tritium air con- tamination monitoring.

Supplement 4 (Item 11a) (Continued)

<u>Instrument</u>	<u>Type</u>	<u>Quantity on Hand</u>	<u>Range</u>	<u>Purpose</u>
T-290 Tritium Detector	Ionization Chamber	2	$10^{-3}$ $\mu\text{c/cc}$ sensitivity	Tritium air contamination monitoring.
Dosimeters IM-9E/PD	Direct reading pocket chamber	73	0-200 mr	$\gamma$ personnel dosimetry.
Dosimetry, Bendix Model 866	Direct reading pocket chamber	19	0-1 R	$\gamma$ personnel dosimetry.
Dosimeter, Bendix Model 611	Direct reading pocket chamber	25	0-5 R	$\gamma$ personnel dosimetry.
Dosimeter IM-19B/PD	Direct reading pocket chamber	25	0-10 R	$\gamma$ personnel dosimetry.
Dosimeter, Landsverk with adjustable finger ring	Indirect reading pocket chamber	10	0-2 R	$\gamma$ personnel hand dosimetry.
Reader-Charger Landsverk	Electrometer	1	-	Reading and charging indirect reading pocket chamber.
Film badge	DuPont 555 and 834; 4 filter film holder	9000	20 mr to 1000 r	$\beta$ - $\gamma$ personnel dosimetry.
Film badge	Eastman NTA film	65	20 mrem to 10,000 mrem	Fast neutron personnel dosimetry.

Supplement 4 (Item 11a) (Continued)

<u>Instrument</u>	<u>Type</u>	<u>Quantity on Hand</u>	<u>Range</u>	<u>Purpose</u>
Film badge, finger ring	DuPont 508 and 1290	15	20 mr to 1000 r	$\beta$ - $\gamma$ personnel hand dosimetry.
Staplex, high volume	Air Sampler	16	25 cfm	$\alpha$ , $\beta$ - $\gamma$ aerosol sample collec- tion.
Schmidt, low volume	Air Sampler	10	1.75 cfm	$\alpha$ , $\beta$ - $\gamma$ aerosol sample collection.
Port-A-Vac	Air Sampler	5	$6 \times 10^5$ cc/min	$\alpha$ , $\beta$ - $\gamma$ aerosol sample collection.

Supplement 4 (Item 11a) (Continued)

<u>Instrument</u>	<u>Type</u>	<u>Quantity</u>	<u>Purpose</u>
Nuclear-Chicago Model 151A with scaler interchangeable end window GM and side window GM	GM Counter	1	$\beta$ - $\gamma$ , air, water and wipe sample counting.
Baird-Atomic Model 132 Scaler with end window GM	GM Counter	1	$\beta$ - $\gamma$ , air, water and wipe sample counting.
Berkeley Scaler with end window GM	GM Counter	2	$\beta$ - $\gamma$ , air, water and wipe sample counting.
RCL Scaler with end window GM	GM Counter	1	$\beta$ - $\gamma$ , air, water and wipe sample counting.
Radiation Instruments Development Laboratories Scaler with scintillation counter.	Scintillation Counter	1	$\alpha$ air, water, and wipe sample counting.
Nuclear-Chicago Scaler Model 202 with interchangeable alpha and beta scintillation counter	Scintillation Counter	1	$\alpha$ , $\beta$ air, water and wipe sample counting.
Baird-Atomic Single Channel Spectrometer with 4"x4" sodium iodide thallium activated crystal	Scintillation Counter	1	$\gamma$ air, water and wipe sample count- ing and isotope identification.
Nuclear-Chicago Model 186A Scaler with gas proportional counter	Gas proportional	1	$\alpha$ , beta and low energy beta air, water and wipe sample counting.

Supplement 4 (Item 11a) (Continued)

Handling and storage equipment available at NRDL includes the following:

1. Twelve shipping containers, lead-shielding thickness ranging from 2" to 11" .
2. 100 storage containers, 1" lead.
3. 32 storage containers, 2" lead.
4. 28 storage containers, 3" lead.
5. One concrete-shielded storage vault for isotope storage containers.
6. One concrete-shielded storage vault for radiation sources.
7. Two fenced-storage areas for contaminated equipment.
8. Twenty remote pipettes for isotope solution transfers.
9. Two sets of master-slave manipulators.
10. Two concrete-walled hot cells.
11. Four lead-shielded glove boxes.
12. Twelve glove boxes, unshielded.
13. Miscellaneous remote-handling tongs.
14. Sixteen radiobiological laboratories with 43 fume hoods.
15. Twenty-three radiochemical laboratories with 43 fume hoods.
16. Three radiophysics laboratories with 3 fume hoods.
17. One mobile radiological safety protective equipment supply station.

Supplement 4 (Item 11a) (Continued)

Respiratory Protection - FILTER RESPIRATORS

(a) Mark Five face-mask (standard Navy issue), a molded rubber face-fitting mask, with adjustable straps, plastic eyepiece, with 2 filters of CC-6 cellulose - asbestos paper, 99.98% efficient for 0.7 micron (median size) methylene blue particles.

(b) M9A1 face mask (standard Army issue) a molded rubber face-fitting mask, with adjustable straps, plastic eyepiece, with attached canister filter cartridge of CC-6 cellulose-asbestos paper, 99.98% efficient for 0.7 micron particles of median size methylene blue.

Respirators are fitted to the face by the adjustment of flexible straps, drawing the soft rubber material snugly against the sides of the head. Fit is tested by blocking air passage through the filter and ascertaining that no air can be drawn into the mask past the fitted head part or the flutter valve exhaust port. Maintenance includes inspection for worn parts and their replacement. Filters which are found to contain any radioactivity when monitored are replaced. Respirators are issued on an individual basis and the rubber parts are periodically cleaned by alcohol swabs. All masks are thoroughly cleaned with alcohol before being re-issued to other individuals. Indoctrination in using these devices is given to anybody unfamiliar with them. The use and testing of these devices is supervised by Health Physics personnel until the individual is completely familiar with the device and its operation.

\* Ref: Industrial Dust, by Drinker and Hatch

### Supplement 5 (Item 11b)

Radiation detecting instruments are calibrated every three months or as needed (Instrument malfunctions, etc.) by electronic technicians on a calibrated source range. Sources used are Co-60, Cs-137, Pu-Be, U-238. Prior to use of the instrument, a check is made, with a radioactive test sample (Ra-226, Co-60, Sr-90, Pu-239) to insure instrument operation.

Counting systems are initially calibrated for operating plateaus and checked daily with NBS calibrated standards for instrument performance. When counting systems are serviced they are then recalibrated.

Occasionally checks are made of air samplers to establish the air flow rate.

### Personnel Monitoring Devices and Procedures

The standard film badge dosimeter used at NRDL has four filters of thickness 0.040" aluminum, 0.027" lead, 0.015" cadmium, and 0.010" paper. It can be calibrated so as to give effective energy information as well as dosage information. The film used is a two-film packet, containing DuPont 555 and 834 film, and can measure gamma exposures from 50 mr to 100 r.

The DuPont 555 and 834 films are calibrated for response to beta radiation with a normal uranium plaque, and for response to gamma radiation with a NBS-certified radium source, cesium-137 source, cobalt-60 source, and various energies of X-ray, using NBS-certified thimble chambers as a standard. All calibration exposures are made with the film inside the badge.

Neutron film badges (NTA film) are also used when neutron sources are handled, or when personnel are in proximity to nuclear reactors or neutron producing particle accelerators. A neutron film badge service is supplied by a commercial firm (Radiation Detection Company, Mt. View, California).

Supplement 6 (Item 11c)

All spaces where radioactive material is employed are ventilated.

The system is basically as follows:

Each floor has its own air intake and exhaust systems. Air is drawn in at each floor level and then exhausted to the roof through separate ducts. Thin fiberglass filters are used on the intake air, which also is cooled or heated as necessary. Exhaust air is filtered in only those spaces having hoods. Two commercial types of fiberglass filters are employed for this purpose. One is a throw-away type, while the other has a higher capacity and is used for low level radioactive exhausts. All filters are changed as performance requires.

The criteria used here for hood design was that no sizeable amount of radioactivity was to be employed in the hoods, but special containment systems such as glove boxes would be used instead. One hood, however, was outfitted with a separate extra high capacity filtered exhaust system, in our radioisotope storage room. This hood is available for work wherein airborne contamination may be a problem. The face velocity of all hoods was set at 100-125 linear feet per minute.

For failures within the supply system, i.e., fan breakdown, etc., there is a provision for switching from one fan to another. In case of a power failure, after a period of 9 seconds, emergency power is supplied to the exhaust fans only. It is estimated, under these conditions that about 30% of normal supply air is drawn into the building through the supply system ducts, though the supply fans are off.

Supplement 7 (Item 12a)

The Health Physics Division of the Laboratory is responsible for the protection of Laboratory personnel and the environment from radiological and industrial hazards.

This includes adequate radiological safety measures for all Laboratory personnel working in spaces where radioactive material is handled. Special monitoring services are provided where any experimental or maintenance operation involves an unusual radiological hazard. These services include monitoring film badges, pocket dosimeters, and appropriate radioclinical examination for internal contamination. A supply of calibrated monitoring instruments, adequate to measure all types of radiations, is maintained for the Health Physics Division and self-monitoring purposes. An active air sampling program guards against buildup of hazardous airborne concentrations of radioactive materials.

The Radiological Health Division of the Laboratory performs physical examinations, including radio-urinalysis, for all personnel entering or leaving the employ of the Laboratory, and additional examinations during employment as required by the nature of the work.

The responsibilities of the Health Physics Division include the control and accountability of all radioisotopes including source materials used in the Laboratory.

The control procedures requires the use of specific forms. Individual use-approval forms, called NRDL Form 44 and 44A (Appendix B) attached) are initiated by each experimenter when a particular radioactive material is required. This experimental plan is reviewed by the Radioisotope Committeeman who has supervisonal cognizance over the experimental program. When he has approved the completed form it is submitted for review to the Health Physics Division. The Health Physics Division investigates the request and recommends safety requirements for the particular experimental setup, on NRDL Form 76, Isotope Procurement Investigation (see copy in Appendix B). The Form 76 is then submitted with the completed Form 44 to the Chairman of the Radioisotope Committee for review and final approval. A purchase order and procurement of the radioisotope is then processed, after final approval is granted.

All shipments of radioactive material are delivered, unopened, to the Health Physics Division where Health Physicists, or technical personnel under their supervision, open the package. In each instance they conduct

Supplement 7 (Item 12a) (Continued)

a radiological survey, perform any necessary decontamination, and determine, the activity content of the material. A record is made which shows the identity, quantity, activity, and location of the material. This record is maintained as long as the material is at NRDL.

All radioactive material is stored, when not in use, in a subterranean storage vault in the isotope storage room. This room has walls of reinforced concrete 36" thick and a locked door. The storage vault consists of 40 stainless steel cylinders each holding four (4) lead containers. These lead containers are divided into three effective shielding thicknesses (1", 2", and 3"). The containers are removed from the storage vault by a remote controlled traveling crane of 3 ton capacity.

To avoid non-nuclear accidents in storage and experimental areas, the following is carried out:

Personnel are indoctrinated in safety and good housekeeping practices for Laboratory operations by their immediate supervisors. Work spaces are grouped together away from unprotected areas such as the library, auditorium, and secretarial offices. Volatile and combustibles are stored away from nuclear materials. Laboratory buildings are inspected daily by the Guard Force and Safety Officer who are instructed to look for fire hazards and report them for remedial action. San Francisco Naval Shipyard Fire Department officials regularly examine NRDL fire fighting facilities and make additional recommendations. Off-hours inspections are made at frequent intervals by the Guard Force and Laboratory Duty Officer to insure plant safety.

Supplement 8 (Item 12b)

Emergency procedures for accidents which might involve source material are fires in glove boxes, laboratories, fume hoods, etc.

To control accidents all glove boxes are outfitted with dry powder and/or liquid chemical fire extinguishers.

In addition, CO<sub>2</sub> and H<sub>2</sub>O fire extinguishers are dispersed throughout the buildings. There is an automatic sprinkler system and firehose station. The firehose stations are staffed with designated occupants on each floor for emergency firefighting.

The Laboratory is evacuated in event of fire by public address system. Personnel required for duties associated with combating fire remain in the building. The local fire department of San Francisco Naval Shipyard has been provided with information as to Laboratory lay out. Familiarization fire drills are carried out from time to time.

### Supplement 9 (Item 12c)

In order to assure that adequate safety procedures are being followed in experiments with source material, the initial use is checked by Health Physics. In addition, areas where source material is stored are routinely surveyed.

The monitoring consists of surveys for radiation and contamination levels with portable radiation detection instruments and by wipes of several areas in the space for evidence of removable activity. Air sampling is also conducted if there is a possibility of contaminated aerosol. Any potentially serious conditions is called to the attention of the scientific investigator for corrective action.

An overall surveillance of the Laboratory radiological situation is maintained by a Environmental Monitoring Program. Air samples are collected continuously at the extremities of the Laboratory, as well as within the Chemistry Division's hood exhaust system. The samples from the Chemistry Division are monitored as they are collected and will cause a warning system to alarm if above safe operating levels occur. The air samples collected at the Laboratory extremities are changed bi-weekly and decay counted for radioactive aerosol concentration.

Film badges are placed throughout Laboratory spaces to detect any hazardous radiation levels. These are processed on a scheduled basis.

All Laboratory liquid effluent (except sanitary drains) is held in storage tanks and analyzed on a routine basis. The radioactivity concentration must be below maximum permissible concentrations prior to release to sewage system. Reports of all surveys are recorded and maintained in Health Physics files.

Supplement 10 (Item 13a)

The type of waste generated will be either liquid or solid. For any airborne active waste it is first filtered before release to the environment. Any waste generated during an experiment will be in microgram amounts.

The total amount of waste in the holding area will not exceed milligram amounts before being collected by waste disposal contractor.

Supplement 10 (Item 13b)

Dry and liquid waste containers are provided in all laboratory spaces where source material is used or stored. They are emptied routinely when 3/4 full or when monitoring surveys indicate they should be removed from the area. The wastes are then taken to a fenced area and stored until collected by a licensed contractor.

NRDL 5100.10  
700  
13 February 1959

NRDL INSTRUCTION 5100.10

From: Commanding Officer and Director

To: Distribution List C

Subj: Radiological Safety Precautions

Encl: (1) Radiological Emergency Instructions  
(2) Health and Safety Services  
(3) Laboratory Areas Designated as Zone 1

1. Purpose. To prescribe measures for safety in the handling and use of radioactive materials in work operations of the Laboratory.

2. Cancellation. This Instruction cancels NRDL Instructions 3040.2, 5100.2, 5100.4, 6470.2, and 6470.3.

3. Scope. The safety measures prescribed herein are applicable to operations conducted in the Laboratory work environment. They do not apply to nuclear defense situations.

4. Radiological Emergency. Enclosure (1) contains instructions applicable to a radiological emergency. These instructions shall be conspicuously posted by the supervisor of work operations in each room or work area containing radioactive materials.

5. Administration of Radiological Safety. Safety is everyone's job. Authority and responsibility to perform work, or to direct the work of others (see NRDLINST 5450.3, Subject: Laboratory Organization), includes authority and responsibility to perform that work with proper regard for one's personal safety and that of subordinates, co-workers, and others in the work environment and beyond. Because of the nature of the radiological hazard, the Laboratory provides professional consultative services for scientific investigators and research management personnel, and in addition services in the field of radiological health and safety, such as radiological monitoring, protective clothing issue, decontamination, and waste disposal. Enclosure (2) outlines in greater detail the services available to personnel working with radioactive materials.

6. Definitions.

a. Maximum Permissible Exposure (MPE): The highest amount of external radiation to which an individual may without special authorization be exposed in connection with Laboratory operations.

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13 February 1959

b. Maximum Permissible Concentration (MPC): The highest concentration of radioactive substances (usually expressed as microcuries per cubic centimeter) in air, water or other material that normally will be permitted in Laboratory work areas.

c. Maximum Permissible Dose (MPD): The largest dose of radiation that an individual will be permitted to absorb in connection with Laboratory work. Maximum dosages, which vary with different parts of the body, are determined as a result of existing knowledge and are posted in Laboratory work areas.

#### 7. Zone Precautionary Measures.

a. Zone Designations. Laboratory areas are divided into four zones, as follows:

Zone 1 - Radioactive material not permitted. Enclosure (3) designates the specific areas comprising Zone 1.

Zone 2 - Background control required. Examples: Counting rooms, film storage and developing areas, laboratories for radiochemical urinalyses and tracer studies. Contamination control procedures required and must be formally documented.

Zone 3 - Radiation Area. Examples: Work areas where radioactive material may be handled routinely.

Zone 4 - High Radiation Area. Examples: Work areas in which the radiation level is such that a major portion of the body could receive greater than 100 mrem/hr; work areas in which an aerosol greater than 10 times the MPC is generated. Dosage and contamination controls are required and must be formally documented.

Zone designations 2, 3 and 4 will be made by the supervisor of work operations in the particular work area.

b. Zone Markers. The zone number shall be conspicuously posted for zones 2, 3 and 4. For zone 1 the marker will contain merely the words "No Radioactive Materials". Zone markers shall be standardized by the Health Physics Division, and shall be posted by the Engineering Division in accordance with enclosure (3) and designations made by operating supervisors.

c. Zone Regulations for Radiation Hygiene. Throughout zones 2, 3 and 4 there shall be posted -

- (1) Instructions for handling emergencies (enclosure (1)).
- (2) Special directions for radiation hygiene fitted to the particular operations in that space. These shall include, for the radioactive materials used or to be used, the maximum permissible body burdens, air and water concentrations, and amounts and concentrations permitted for disposal in the sewer. These special directions shall be prepared by the operating supervisor in consultation with the Health Physics Division (Code 730).

8. Contamination Control Measures.

a. General.

(1) Eating, smoking, and drinking are prohibited in areas where radioactive materials are used or stored (zones 2, 3 and 4); NOTHING WHATEVER SHALL BE PUT IN THE MOUTH, including fingers, lipstick, pipettes, and suction tubes.

(2) When an operation is finished, the gloved hands shall be washed and monitored. If radioactivity is not reduced below the posted level, gloves shall be put out of use. After removing gloves, the hands shall be washed and monitored. Hands shall be washed before going from zone 2, 3 or 4 to zone 1.

(3) Laboratory coat and rubber gloves shall be worn when working with micro or millicurie quantities of unconfined radioactive contaminants; for curie quantities of unconfined material, complete dressout is required (cap, coveralls, gloves, shoe covering and mask, as necessary).

(4) Protective clothing, whether or not having been exposed to radioactive contamination, shall not be worn or carried into the cafeteria area.

(5) If aerosol production is possible, or radioactive vapor or gas is involved, the material shall be transferred to a fume hood or, if above MPC levels, to a glove box. Heating of containers that hold radioactive material shall be done in a pan or tray to catch the material if spilled, and shall be done in a fume hood even if the material is considered non-volatile.

(6) Operations with radioactive solutions shall be conducted in a tray or basin of sufficient capacity to hold all the solution if spilled.

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(7) Samples for counting shall not be carried to the counting room in hands or instruments that have not been monitored and ascertained to be free of loose contamination. Samples must be carried in trays or similar receptacles.

(8) Radioactive material may not be transported via the escalators.

(9) Glassware known to be contaminated shall, in the Laboratory where it is used, be rinsed to remove the major part of the activity. It shall be segregated when sent to the glass washing shop for cleaning. Water used for washing and rinsing shall be regarded as contaminated waste and disposed of as such.

(10) Radioactive areas may not be entered by maintenance personnel, nor radioactive equipment worked upon by such personnel, without a special work permit (12ND NRDL-93) prepared by a health physicist. Sink drain lines, hoods, ventilation ducts and filters shall be checked for contamination by Code 730 before opening for maintenance work.

(11) Contaminated materials may not be taken into machine shops or other zone 1 areas.

(12) All contaminated equipment, including vehicles, shall be tagged with contamination tags that clearly indicate the extent and location of the contamination. These tags may not be removed until determined by Code 730 to be no longer required.

(13) Radiation sources shall be inspected and leak tested by Code 730 at six-month intervals.

b. Special Precautions for High-Level Areas. Many Laboratory radiation sources and particle accelerators produce levels of such magnitude that personnel exposed for even short periods of time might receive serious radiation doses. Special safety systems and operating procedures are necessary to prevent inadvertent exposure:

(1) Machines. Flashing light and/or sound alarm systems which are automatically activated when the machines are turned on shall be installed on all radiating machines. Door interlock systems to prevent entry into the radiation area when the machine is in operation are mandatory. Special operating procedures shall be properly documented and posted to serve as an aid in preventing accidental exposure.

13 February 1959

(2) Sealed Sources. All radiation sources greater than one curie shall be delineated with permanent-type barriers. Warning signs will be posted and flashing light systems will operate when the source is exposed. Procedures shall be properly documented and posted to serve as an aid in preventing accidental exposure. Such procedures shall be prepared by the operating supervisor in consultation with the Health Physics Division, Code 730.

c. Storage and Handling of Radioactive Materials.

(1) Shipments. Shipments of radioactive materials arriving at the Laboratory shall be delivered only to a health physicist. Outgoing shipments of radioactive materials shall be checked by Code 730 for compliance with ICC radiation levels and labeling requirements. A current inventory of all radioactive materials on hand in the Laboratory shall be maintained by Code 730.

(2) Movement Within Laboratory. Solutions shall be in containers affording protection against breakage or spillage. For high activity levels, the container shall be a secondary container or catchment under or around it. Caution shall be exercised in handling radioactive liquids in the Laboratory. Work areas (bench tops, hoods, and the like) must be covered with absorbent material. Liquid samples carried between rooms must be in closed, non-breakable containers or else in a container surrounded by a secondary non-breakable container with absorbent material sufficient to take up the entire sample if spilled.

(3) Multicurie Sources. Special operational procedures shall be posted for and observed by the operators of multicurie sources. In the event of malfunctioning of a source closure mechanism, a health physicist shall be contacted immediately. The control wire leading to the source shall be inspected before each usage and replaced if found to be defective.

d. Waste Disposal. All radioactive materials for disposal shall be placed in waste containers provided for the purpose. NEVER USE THE SINK. Waste solutions and solids containing alpha emitters shall be placed in cartons and sealed with polyethylene before placement in containers. Special carboys shall be used for organic liquids. Carcasses containing radioactive material shall be placed in plastic bags, formaldehyde added, and the sealed bags placed in the 20-gallon cans provided for disposal purposes.

e. Field Operation Samples and Shipments. Movement and storage of field operation samples and equipment will be subject to special instructions issued for the particular field operation by the Commanding Officer and Director.

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f. Approval of Use of Radioactive Materials. Scientific investigators may not undertake an experimental program involving radioactive materials until the Laboratory Radioisotope Committee has approved the use of the materials and all safety aspects of the experimental program. For procedural details see NRDL Instructions in the 5400 and 4400 series.

9. Personnel Monitoring.

a. Personnel Dosimetry Records. A record of radiation exposure shall be maintained within the Radiological Safety Branch, Code 732, on Form 12ND NRDL-179, Personnel Dosimetry Record, for every individual performing duty on Laboratory premises or visiting the Laboratory.

b. Film Badges. A film pack is attached to each security and identification badge, which shall be worn continuously by Laboratory personnel and visitors while in Laboratory work areas. The badge should not be removed from Laboratory premises. If a badge is inadvertently left in a radiation field, it shall be returned to the Information and Identification Desk for issuance of a new film pack.

c. Off-Station Exposure. Known exposure of any kind above the individual's usual Laboratory radiation environment shall be promptly reported to Code 730.

(1) Non-NRDL Operations. Exposures to radiation at another activity are ordinarily recorded on film badges issued by that activity. Where there is no film badge service, arrangement shall be made with Code 730 for issuance of special film badges as necessary.

(2) Field Operations. Laboratory personnel involved in field operations shall make prior arrangements with Code 730 for subsequent incorporation of all exposure data in Form 12ND NRDL-179, Personnel Dosimetry Record.

(3) Dental or Medical Examination or Treatment. Dental or medical examinations or treatments involving radiation shall be reported to Code 730. Such reports may be brief and informal, e.g., "two x-rays by dentist", "a chest x-ray", "two x-rays of the wrist". ~~At the time of the Laboratory's annual chest x-ray program, a statement shall be obtained from each individual as to his total medical or dental exposures during the preceding 12-month period.~~

d. Pocket Dosimeters. Pocket dosimeters shall, in addition to film badges, be worn by persons in Zone 4. They shall be read by the wearer whenever he suspects overexposure. In addition the dosimeter shall be read daily by the wearer and by the health physicist. Whenever the reading is above 100 mr, the source of exposure should be

identified with a view to improving the protective arrangements, and the film pack processed and replaced with a fresh one. Readings of pocket dosimeters will not be made a part of the permanent dosimetry record.

e. Hand and Foot Counters. Hand and foot counters are stationed in certain areas of the Laboratory for self-monitoring by persons working with radioactive materials.

f. Portable Monitoring Instruments. Portable monitoring instruments are supplied in all work areas containing radioactive materials. These instruments shall be used for self-monitoring upon leaving the work area.

g. Standards of Exposure. The MPD must be regarded primarily as a limit within which it has been determined that Laboratory operations shall be conducted. On the other hand, there are no known limits within which there can be complete disregard of exposure, which must therefore be kept at a minimum in all circumstances. If any radiation level exceeds the posted MFE, a health physicist shall be notified at once.

h. Overexposure. Any overexposed individual shall be excluded from further exposure until sufficient time has elapsed to bring his dosage within the MPD.

#### 10. Personal Protection.

a. Protective Clothing and Equipment. Control of radioactive contamination requires the use of protective clothing to eliminate body contacts with the contaminant and the spread of contamination to clean areas. Personal protection is in direct proportion to the body area covered. Penetrability, durability, and ease of decontamination are important in the choice and use of protective clothing. The following types of protective clothing and equipment shall be available for issue without charge to Laboratory personnel working with radioactive materials:

- (1) Fine weave coveralls and laboratory coats.
- (2) Gloves (surgeon's rubber, cotton, leather, heavy rubber).
- (3) Shoe covering (plastic booties, rubber boots, rubber overshoes).
- (4) Respiratory equipment (such as Army Assault Mask or Navy Mark V Masks).
- (5) Hoods (made of plastic or fine weave canvas).

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13 February 1959

b. Shielding. Shielding built into apparatus or its permanent housing shall be augmented if measurement of escaping radiation shows it necessary. Temporary barriers shall be erected where needed to make each operation safe. Concrete blocks and lead bricks and sheet lead of several thicknesses shall be available for issue from the Ready Supply Store as needed. A health physicist should be consulted during the planning of the operation.

c. Specifications. Specifications for personal protective equipment and materials purchased by the Laboratory for radiological safety purposes shall be approved by Code 730.

#### 11. Environmental Monitoring.

a. Routine Monitoring. Monitoring of Laboratory areas shall be done at regular intervals and on special occasions, as determined by Code 730. This includes, at various locations in the immediate geographic area, the measurement of radiation in liquid effluents being discharged into the public sewer system and in air effluents escaping from or being found outside the building. The health physicist will recommend corrective measures for any radioactive contamination disclosed. Records shall be kept of all monitoring operations.

b. Special Monitoring. Special monitoring surveys shall be made as directed by the Head of the Health Physics Division and recorded as follows:

- (1) Radiological clearance of equipment or areas.
- (2) Contamination levels after decontamination operations.
- (3) Radiation and contamination levels in connection with specific experiments.
- (4) Personnel contamination.

Results of these surveys shall be reported on Form 12ND NRDL-342, Special Monitoring Report, and permanent records shall be made of all significant results. Code 730 will evaluate the significance of any contamination and recommend corrective action.

#### 12. Medical Examinations.

a. Radiological Health Examinations. Personnel shall be given a radiological health examination upon entering or terminating employment or duty at the Laboratory. This examination shall be in addition to the regular physical examination.

b. Radiochemical Urinalyses. Radiochemical urinalyses shall be performed on Laboratory personnel who prior to coming to the Laboratory have engaged in the handling of plutonium, uranium, or radioactive rare earths, and on personnel known or suspected to have inhaled or ingested radioactive material. Urinalyses and related tests will be repeated as determined by the Radiological Health Division (Code 720) until final medical clearance.

c. Special Medical Examinations. Special medical examinations and tests to detect and assess possible radiological injury, or to establish a base line for comparison with future tests, shall be made as determined necessary by Code 720 in the following situations:

(1) Where a person appears to have exceeded, since his entrance on duty, a total accumulated deep dose of 5 rem per year of penetrating radiation, or an accumulated skin dose of 25 rem per year of soft radiation.

(2) Where a person develops an acute unexplained illness of more than three days duration.

(3) Where a person is expected to be exposed to neutron or microwave radiations, a special eye examination shall be conducted prior to assignment to such duty, semiannually, and upon termination of employment.

d. Field Operations. Instructions shall be issued regarding physical examinations prior to each field operation. These instructions will be the basis for physical examinations of the participants prior to their departure. If any person is subjected during a field operation to an exposure in excess of the MPD, he will, immediately upon terminating his participation in the operation, report to Code 720 for a complete physical and clinical laboratory examination, including a radiochemical urinalysis.

### 13. Decontamination Procedures.

a. Area Decontamination. Decontamination of a work area shall be done by personnel normally using the space or by maintenance personnel of the Engineering Division (Code 240), depending upon the degree of effort required. A health physicist will supervise all necessary monitoring surveys and make recommendations as to decontamination procedures.

b. Equipment Decontamination. Equipment used in the Laboratory or in field operations may become contaminated to the extent that special treatment is required before use or storage. For uncontrolled use, it is mandatory that equipment be decontaminated to final or standard clearance levels. For decontamination advice and assistance, a health physicist shall be consulted.

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13 February 1959

c. Personnel Decontamination. There is no completely standardized system for skin decontamination. However, certain general methods have been fairly successful and these are incorporated in the procedure posted in each skin decontamination kit obtainable from the health physicist. Health physics personnel shall be consulted whenever personal contamination has not been completely removed by washing with soap and water.

d. Clothing Decontamination. Personal clothing that has become contaminated must be removed and later decontaminated. Replacement clothing will be issued from Laboratory protective clothing stocks on an emergency basis. In no case may contaminated clothing be worn away from the Laboratory.

/s/ J. H. McQuilkin

J. H. McQUILKIN

RADIOLOGICAL EMERGENCY

(Post in all work areas containing radioactive material)

NOTIFY AT ONCE -

<u>Contamination</u> -	Health Physics Division	Ext. 240
<u>Wounds or Injuries</u> -	Radiological Health Officer	Ext. 235
<u>Fire</u> -		Dial "0"

(Note: After normal working hours, notify Laboratory Duty Officer, Extension 318, who will notify others as necessary.)

IN CASE OF CONTAMINATION -Wounds or Injuries

Flush under cold running water, while spreading the edges of the gash, if any.

Await arrival of Radiological Health Officer.

Contaminated Skin

Wash with soap and water, taking care not to spread contamination. (Skin decontamination kits are available in Room 191 and 255 of Building 815.)

Await arrival of Radiological Health Officer and health physicist.

Contaminated Work Areas

Evacuate the area.

Avoid spreading contamination by keeping evacuees together in one area.

Await arrival of health physicist.

IN CASE OF FIRE -

Evacuate area.

Sound alarm by dialing "0", giving specific location and emphasizing that it is a radioactive area, or use nearest fire alarm box.

Enclosure (1)

13 February 1959

## HEALTH AND SAFETY SERVICES

	NRDL Directives (Series)	Contact	
		Code	Organization
Radiological policy questions	5420	700	Chairman, Radiological Policy Committee
Correction of generally unsafe conditions	5100	700	Laboratory Safety Officer
Approval of use of radioactive materials in experiments	5420	730	Chairman, Radioisotope Committee
Radiological health examinations	6400	720	Radiological Health Officer
Radiological safety consultations (e.g., MPE limits, safety instructions, specifications)	5100)	730	Health Physics Division (Radiological Safety Branch)
Dosage records of personnel	6400)		
Special monitoring services	5100)		
Work permits for maintenance personnel	5100)		
Movement and shipment of radioactive materials	4400)		
Radiological Accident Reports	3040)		
Protective clothing	10100		
Procurement of radioactive materials	4400	252	Procurement Services Branch, Logistic Support Division
Movement of field samples	4400	250	Logistic Support Division
Clothing decontamination	10128)	242	Plant Support Branch, Engineering Division
Area decontamination service	11104)		
Radioactive waste disposal	4500)		

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13 February 1959

Enclosure (2)

	NRDL		Contact
	<u>Directives</u> <u>(Series)</u>	<u>Code</u>	<u>Organization</u>
Monitoring instruments	10510	243	Central Instruments Branch, Engineering Division
Security and identification badges	5500	<sup>840</sup> <del>830</del>	Information and Identi- fication Desk, Adminis- trative Department

Enclosure (2)

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY  
San Francisco 24, California

NRDL 5100.10 CH-2  
700  
11 April 1960

NRDL INSTRUCTION 5100.10

From: Commanding Officer and Director

To: Distribution List C

Subj: Radiological Safety Precautions

Encl: (1) Radiological Emergency Instructions  
(2) Health and Safety Services

CH-1 5 Mar 1959

Ch-2 11 Apr 60

Sup 1 2 May 61

Ch-3 9 May 61

1. Purpose. To prescribe measures for safety in the handling and use of radioactive materials in work operations of the Laboratory.

2. Cancellation. This Instruction cancels NRDL Instructions 3040.2, 5100.2, 5100.4, 6470.2, and 6470.3.

3. Scope. The safety measures prescribed herein are applicable to operations conducted in the Laboratory work environment. They do not apply to nuclear defense situations.

4. Radiological Emergency. Enclosure (1) contains instructions applicable to a radiological emergency. These instructions shall be conspicuously posted by the supervisor of work operations in each room or work area containing radioactive materials.

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6. Definitions.

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b. Maximum Permissible Concentration (MPC). The highest concentration of radioactive substances (usually expressed as microcuries per cubic centimeter) in air, water or other material that normally will be permitted in Laboratory work areas.

c. Maximum Permissible Dose (MPD). The largest dose of radiation that an individual will be permitted to absorb in connection with Laboratory work. Maximum dosages, which vary with different parts of the body, are determined as a result of existing knowledge and are posted in Laboratory work areas.

## 7. Zone Precautionary Measures.

a. Zone Designations. Laboratory areas are divided into four zones, as follows:

- \* Zone 1 - Radioactive Material not Permitted. Examples: cafeteria, auditorium, offices on the 3d floor, escalators, etc.
- Zone 2 - Background Control Required. Examples: Counting rooms, film storage and developing areas, laboratories for radiochemical urinalyses and tracer studies. Contamination control procedures required and must be formally documented.
- Zone 3 - Radiation Area. Examples: Work areas where radioactive material may be handled routinely.
- Zone 4 - High Radiation Area. Examples: Work areas in which the radiation level is such that a major portion of the body could receive greater than 100 mrem/hr; work areas in which an aerosol greater than 10 times the MPC is generated. Dosage and contamination controls are required and must be formally documented.

\* Supervisors will determine the zone level of all work areas under their control, with advice from personnel of the Health Physics Division (Code 730), as necessary.

\* A chart showing the zone level of all NRDL work spaces will be maintained and posted in the Code 730 office.

\* b. Zone Markers. The zone number will be conspicuously posted for zones 2, 3 and 4. ANY SPACE THAT DOES NOT DISPLAY A ZONE NUMBER SHALL BE CONSIDERED A ZONE 1 AREA. Zone markers will be standardized by Code 730 and posted by the Engineering Division (Code 240) in accordance with the information provided by the appropriate supervisor.

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY  
San Francisco 24, California

NRDL 5100.10 SUP-1  
700

2 May 1961

Ch-3 9 May 1961

Ch-4-13 Nov 62

Ch-5-7 May 62

5100.10

NRDL INSTRUCTION 5100.1-SUP-1

From: Commanding Officer and Director

To: Distribution List C

Subj: Radiation Exposure and Records

Ref: (a) AEC's "Standards for Protection Against Radiation" (10 CFR 20)

1. Purpose. To prescribe procedures and responsibilities for control of radiation exposure, use of film dosimeters, and maintenance of exposure records.

2. Effect on Existing Instruction. This Supplement changes NRDL Instruction 5100.10, of which paragraphs 9a, b, c (1) and (2) are specifically superseded.

3. Background. Revised regulations and licensing requirements of the Atomic Energy Commission effective 1 January 1961, as contained in reference (a), make it necessary to redefine limits on occupational radiation doses received by Laboratory personnel and visitors in Laboratory work areas. The term "occupational dose" includes exposure in connection with Laboratory operations but does not include exposure occasioned by medical examination or treatment.

4. Dose Limits.

a. General. Subject to exceptions in paragraphs b and c, below, the occupational whole-body dose limit for Laboratory operations is 1.25 rems per calendar quarter.

b. Special Operations. When required by the nature of the NRDL experiment, an individual may be permitted to receive a whole-body dose greater than 1.25 rems per calendar quarter provided:

(1) The exposure shall not cause the individual to exceed 3.0 rems in the particular calendar quarter;

(2) The exposure shall not cause the individual to exceed his maximum permissible accumulated dose (MPD) as computed by the formula  $(N-18) \times 5$  rem (N being the individual's age); and

(3) The operating supervisor in charge of the experiment previously ascertains that the individual has a documented exposure history on file with Health Physics Division (Code 730).

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2 May 1961

c. Minors. The dose limit for individuals under 18 years of age is 0.125 rems per calendar quarter.

5. Film Badges.

a. NRDL Personnel. NRDL personnel will wear film badges at all times in all NRDL work areas, including Camp Parks. NRDL identification and film badges will not be removed from the Shipyard area. Routine provision for film badges at Camp Parks, University of California cyclotron, and Stanford Reactor will be made by Code 730.

b. Film Badges in Connection with Non-NRDL Operations. Normally film badge service is provided by the facility visited. Where there is no film badge service, prior arrangements will be made with Code 730 for issuance of film badges as necessary.

c. Visitors. All visitors to NRDL facilities, including contractors and their employees, will wear film badges, except visitors to Zone 1 areas of Building 815.

6. Records of Radiation Exposure. Occupational radiation exposures will be determined by Code 730 and cumulative records maintained on prescribed forms. NRDL personnel industrially exposed in connection with work for another employer will obtain an exposure record and deliver to Code 730. Code 730 will send that employer a record of the individual's exposure at NRDL.

7. Notification of Exposure.

a. Immediate notification of exposure in excess of limits herein prescribed will be given the individual and his supervisor by Code 730.

b. Information as to radiation exposure of an individual will be provided to the individual or his supervisor whenever requested.

c. Following termination of employment at NRDL, the individual's radiation exposure record will be made available only upon his request.

  
E. B. ROTH

ISOTOPE PROCUREMENT INVESTIGATION  
12ND NRDL-76 (Rev 5/62)

Adequate Safety Precautions Being Taken in Experiment

Yes  No

Special Equipment Requirements

Comments

Signature of Investigator

Date

Reviewed by Branch Head

Date

Appendix B

**MODIFICATION OF RADIOISOTOPE USE APPROVAL**  
**12ND NRDL-44A (Rev 12/62)**

1. Use only when modifying original request, Form 12ND NRDL-44
2. Prepare original and 2 copies, including sketches, drawings, etc., if any.
3. After the Branch Head has signed forward all 3 copies to the Health Physics Division, Code 730.

From (Branch Head)	Stub No. Reference	Date
To Chairman, Radioisotope Committee, Code 901	Via Health Physics Division, Code 730	

Remarks

Signature of Branch Head

Signature of Chairman, Radioisotope Committee

**Appendix B**

**RADIOISOTOPE USE APPROVAL**  
**12ND NRDL-44 (Rev 12/62)**

1. Prepare original and 2 complete copies, including sketches, drawings, etc., if any.
2. Forward all 3 copies to Division Radioisotope Committeeman for signature.
3. After Division Radioisotope Committee-

- man's signature forward all 3 copies to Health Physics Division, Code 730.
4. Use Form NRDL-44A for variations from previously approved Form 12ND NRDL-44.

To Chairman, Radioisotope Committee, Code 901		
Via (1) Division Radioisotope Committeeman, Code	Signature	Date
(2) Health Physics Division, Code 730		

It is requested that approval of the use of the following isotope be granted.

Element and Isotope	Chemical Form	Pile Irradiation or Cyclotron Bombardment Services Required
Quantity (mc or units)	Date Required	User (Name and Code)
Location of Use (Bldg., Room No., Other)		Zone Leave (Check)
		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
Waste Concentrations and Amounts		Estimated Activity Per Experimental Run
Liquid	Solid	

Experiment (Title or brief description)

---

Proposed Procedure (Attach sketch or description of apparatus)

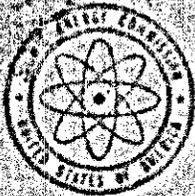
Submitted By	Code	Date
--------------	------	------

Approved for use as requested.

Signature of Chairman, Radioisotope Committee	Date
---	------

Distribution of completed copies:

Division Radioisotope Committeeman, Code	Code 730	Code 730 Investigator
--	----------	-----------------------



UNITED STATES  
ATOMIC ENERGY COMMISSION  
WASHINGTON 25, D.C.

IN REPLY REFER TO:  
40-5063  
LAR:ND

Department of the Navy  
Bureau of Ships  
Washington 25, D. C.

Attention: Mr. V. F. Saltta  
Your reference: 10330/2  
Ser 362-376

Gentlemen:

Pursuant to your request of August 18, 1961, enclosed is Source Material License SMB-376, as amended.

With regard to extending the expiration date to August 31, 1966, Section 40.42 of the Regulation 10 CFR 40 (copy enclosed) provides that specific licenses shall expire no later than three (3) years from the last day of the month in which it is issued.

Very truly yours,

Donald A. Russbaumer, Chief  
Source & Special Nuclear Materials Branch  
Division of Licensing & Regulation

Enclosures:  
License SMB-376  
10 CFR 40

8289023-61

*Enc (2) to Ser 362-579*

10330/2  
Ser 362-376

FIRST ENDORSEMENT ON USNRDL ltr. 730-110, WJF: jp of 11 Aug 1961 to AEC  
via BUSHIPS

From: Chief, Bureau of Ships  
To: U. S. Atomic Energy Commission  
Division of Licensing and Regulation  
(Mr. D. A. Hussbaumer)  
Washington 25, D. C.

18 AUG 1961

Subj: Request for Amendment to Source Material License SME-376  
(superseding Source Material License No. C-4959)

1. Forwarded with the request that the subject license be amended as indicated in the basic letter. In addition, it is requested that the expiration date of the subject license be changed to 31 August 1966 to coincide with the expiration date of Byproduct Material License 4-487-3. This would simplify records and procedures on the part of the Laboratory.

Copy to:

FILE

362B (w/bamat) ←

10330/2  
S. F. Ser 362-519  
By [unclear]

From: Chief, Bureau of Ships  
To: Commanding Officer and Director  
U. S. Naval Radiological Defense Laboratory

6-SEP 1961

Subj: AEC Source Material License SME-376, as amended; forwarding of

Ref: (a) NRDL ltr 730-110, WJF: jp of 11 Aug 1961 to AEC via BUSHIPS

Encl: (1) AEC Source Material License SME-376, as amended  
(2) AEC ltr 40-5063, I&R:ND of 24 Aug 1961 to BUSHIPS

1. Enclosure (1) is the amended license requested by reference (a).  
Enclosure (2) explains why the license was not extended beyond 31 July 1964.

Prepared by L. E. Sieffert, X 61652  
Typed by D. Johnson, 8/17/61  
8151283-61 - controlled

V. F. S. [unclear]

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY  
SAN FRANCISCO 24, CALIFORNIA

IN REPLY REFER  
TO FILE:

730-110

WJF:jp

11 AUG 1961

**AIR MAIL**

**From:** Commanding Officer and Director  
**To:** U. S. Atomic Energy Commission (D. A. Nussbaumer, Division  
of Licensing and Regulation) Washington 25, D. C.  
**Via:** Chief, Bureau of Ships (Code 362)  
**Subj:** Request for Amendment to Source Material License No. C-4959  
**Ref:** (a) NRDL ltr 730-69 to AEC Division of Licensing and Regulation  
of 29 June 1961

1. Request is made for an amendment to this Laboratory's Source Material License No. C-4959, which is now being processed by you for renewal.
2. It is requested that 100 kilograms of depleted uranium be licensed for research purposes. This quantity is desired in addition to the 1,000 kilograms requested for shielding purposes.
3. It is proposed to use the depleted uranium in a metallurgy research program for studies of the separation of fission product radionuclides from uranium. Experimental runs will involve the use of about ten (10) pounds of metal, to which will be added various fission product isotopes. The experiment will not involve reactor irradiations. Health and safety control measures will be conducted in accordance with stipulations made in reference (a).

E. B. ROTH

UNITED STATES  
ATOMIC ENERGY COMMISSION

SOURCE MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954, and Title 10, Code of Federal Regulations, Chapter 1, Part 40, "Licensing of Source Material," and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, possess and import the source material designated below; to use such material for the purpose(s) and at the place(s) designated below; and to deliver or transfer such material to persons authorized to receive it in accordance with the regulations in said Part. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954 and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission, now or hereafter in effect, including Title 10, Code of Federal Regulations, Chapter 1, Part 20, "Standards for Protection Against Radiation," and to any conditions specified below.

Licensee		3. License No. SM-376
1. Name	Department of the Navy	4. Expiration Date July 31, 1964
2. Address	U. S. Naval Radiological Defense Laboratory San Francisco 29, California	5. Docket No. 40-5063
6. Source Material	7. Maximum quantity of source material which licensee may possess at any one time under this license	
(a) Natural uranium	(a) Twenty (20) kilograms	
(b) Natural thorium	(b) One (1) kilogram	
(c) Depleted uranium	(c) One thousand (1,000) kilograms	

REF: 73-69  
40-5063

CONDITIONS

- B. Authorized use (Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.)
- A & E. For use in research in accordance with the procedures described in the licensee's applications dated June 29, 1961 and May 23, 1961.
- C. For use as shielding in accordance with the procedures described in the licensee's application dated May 23, 1961 and June 29, 1961.

For the U. S. ATOMIC ENERGY COMMISSION

Date of issuance 31 July 1961

U.S. GOVERNMENT PRINTING OFFICE: 1961-O-541001 Donald A. Nussbaumer  
Division of Licensing & Regulation

10330/2  
Ser 362-519

From: Chief, Bureau of Ships  
To: Commanding Officer and Director  
U. S. Naval Radiological Defense Laboratory

6-SEP 1961

Subj: AEC Source Material License SMB-376, as amended; forwarding of

Ref: (a) NRDL ltr 730-110, WJF: jp of 11 Aug 1961 to AEC via BUSHIPS

Encl: (1) AEC Source Material License SMB-376, as amended  
(2) AEC ltr 40-5063, L&R:ND of 24 Aug 1961 to BUSHIPS

1. Enclosure (1) is the amended license requested by reference (a).  
Enclosure (2) explains why the license was not extended beyond 31 July 1961.

Copy to:  
AEC (Source & Special Nuclear Materials Branch,  
Division of Licensing and Regulation)  
→ 362B (w/encls)

W. F. Scitka  
By Direction

Prepared by L. E. Sieffert, X 61652  
Typed by Carter, 9/5/61