

APPLICATION FOR MATERIAL LICENSE

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

APPLICATIONS FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

U.S. NUCLEAR REGULATORY COMMISSION
DIVISION OF FUEL CYCLE AND MATERIAL SAFETY, NMSS
WASHINGTON, DC 20546

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

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

U.S. NUCLEAR REGULATORY COMMISSION, REGION I
NUCLEAR MATERIALS SAFETY SECTION B
601 PARK AVENUE
KING OF PRUSSIA, PA 19406

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

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

IF YOU ARE LOCATED IN:

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

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

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

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

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

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

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

1 THIS IS AN APPLICATION FOR (Check appropriate item)

- ☐ A. NEW LICENSE
☒ B. AMENDMENT TO LICENSE NUMBER SNM-602
☒ C. RENEWAL OF LICENSE NUMBER SNM-602

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

Newport News Shipbuilding
Radiological Control Department
4101 Washington Avenue
Newport News, VA 23607

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

See Attachment #1

4 NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Mr. C. T. Hill

TELEPHONE NUMBER

804-380-2369

SUBMIT ITEMS 5 THROUGH 11 ON 8 1/2 x 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5 RADIOACTIVE MATERIAL

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

See Attachment #2

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

See Attachment #3

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

See Attachment #4

8 TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS

See Attachment #5

9 FACILITIES AND EQUIPMENT

See Attachment #6

10 RADIATION SAFETY PROGRAM

See Attachment #7

11 WASTE MANAGEMENT

See Attachment #8

12 LICENSEE FEES (See 10 CFR 170 and Section 170.31)

FEE CATEGORY 1K AMOUNT ENCLOSED \$ 350.00

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

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

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

SIGNATURE—CERTIFYING OFFICER

TYPED/PRINTED NAME

TITLE

DATE

W. T. Covington

W. T. Covington

Manager, Radiological
Control Department

8/24/88

B907210133 880923
REG1 LIC70
SNM-0602

PDR

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS	APPROVED BY
Ren	Sept 1-11	1K		Mr. Kussner
AMOUNT RECEIVED	CHECK NUMBER			DATE
\$350	788285			9/6/88

1. Newport News Shipbuilding, 4101 Washington Ave.,
Newport News, Virginia, 23607
2. Onboard U. S. Navy nuclear powered ships.
3. Temporary job sites of licensee.

a.	b.	c.
<u>Radioisotope</u>	<u>Chemical and/or Physical Form</u>	<u>Quantity</u>
A. Plutonium 238/Beryllium	Sealed Neutron Source Monsanto Corp. (Neutron Standard Source model 2723)	Not to exceed 3 curies per source

Total weight of Plutonium = 0.212 grams

Weight of PU-238 = 0.170 grams

Pu-238 wt% = 80.17

Pu-239 wt% = 15.55

Pu-210 wt% = 2.72

Pu-241 wt% = 1.05

Pu-242 wt% = 0.498

A trace amount of Pu-236, 1.0 ppm, is contained in the sealed source.

Criticality is not possible with the subject special nuclear material.

Purpose for which licensed material will be used:

- A. Calibration of radiation detection instruments with a range of 0 to 200 mr/hr.
- B. It is requested that the license be issued for the maximum allowable time.

Newport News Shipbuilding is incorporated in Virginia. Its principal office is located at 4101 Washington Avenue, Newport News, Virginia. The names, addresses and citizenship of its principal officers are as follows:

<u>OFFICE</u>	<u>NAME</u>	<u>ADDRESS</u>	<u>CITIZENSHIP</u>
President	E. J. Campbell	160 Yeardeley Drive Newport News, VA 23607	U.S.
Executive Vice-President	W. R. Phillips	102 Goose Creek Road Yorktown, VA 23692	U.S.
Corporate Secretary	C. E. Whitman	525 Pagan Road Smithfield, VA 23430	U.S.
Treasurer	M. W. Appel	29 Ensigne Spence Williamsburg, VA 23185	U.S.

Responsible Individuals

1. C. T. Hill - Radiological Control Manager, RSO
2. G. E. Squires - Radiological Control Manager
3. F. J. Delamain - Radiological Control Manager X
4. J. W. Staton - Radiological Control Manager ✓
5. B. W. Milliken - Instrument Calibration Supervisor X
6. A. C. Clendenin - Senior Instrument Calibration Technician
7. M. P. Sites - Senior Instrument Calibration Technician
8. R. K. Lamb - Senior Instrument Calibration Technician X
9. J. F. Bledsoe - Senior Instrument Calibration Technician X
10. J. R. Schumacher - Senior Instrument Calibration Technician X
11. T. F. Kelly - Instrument Calibration Technician X

ITEM #7

ATTACHMENT 4

C. T. Hill
Radiological Control Manager
Radiation Safety Officer

<u>TYPE OF TRAINING</u>	<u>WHERE TRAINED</u>	<u>DURATION OF TRAINING</u>	<u>ON THE JOB</u>	<u>FORMAL COURSE</u>
a. B. S. Civil Engineering	Va. Polytechnic Institute	1957 to 1962	NO	YES
b. M. S. Sanitary Engineering	Ga. Institute of Technology	1/63 to 3/64	NO	YES
c. U. S. Public Health Service Radiological Health Traineeship	Ga. Institute of Technology	1/63 to 12/64	YES	YES
d. Postgraduate work in radiation biology	Ga. Institute of Technology	3/64 to 3/65	YES	YES
e. Planner in Engineering Section, Radiological Control Dept. - Planning and Engineering activities associated with Radiation Protection for personnel during construction, testing, refueling, backfitting, and overhauling of nuclear steam supply systems	NNS	3/65 to 1/66	YES	YES
f. Consultant Health Physicist	Space Radiation Effects Laboratory	3/65 to 1/66	YES	NO

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C. T. Hill

<u>TYPE OF TRAINING</u>	<u>WHERE TRAINED</u>	<u>DURATION OF TRAINING</u>	<u>ON THE JOB</u>	<u>FORMAL COURSE</u>
g. Principles and practices of radiation protection	NNS (Subject matter included but was not limited to topics g, h, i, j.)	Total of 26 years of formal and on the job training and experience	YES	YES
h. Radioactivity measurement standardization, monitoring techniques, and the use of instruments	"	"	YES	YES
i. Mathematics and calculations basic to the use and measurements of radioactivity	"	"	YES	YES
j. Biological effects of radiation	"	"	YES	YES

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C. T. Hill

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
Co-60	109 mCi	NNS RadCon Calibration Facility	26 years	Calibration of Instruments, Film Badges, Dosimeters
Cs-137	700 µCi	"	14 years	"
Sr-90	80 µCi	"	18 years	"
Ra-226	300 mCi	"	10 years	"
PuBe	3 Ci	"	15 years	"
PuBe	700 Ci	NNS	10 years	Reactor Refueling Source
New Construction and Testing of 69 NNS&DDCO. Shipboard Reactors	"	"	26 years	-----
Refueling and Overhaul of 55 Shipboard Reactors	"	"	26 years	-----
Inactivation of 2 Shipboard Reactors	"	"	1 year	-----
Commercial Nuclear Plants - 8	"	"	5 years	-----

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G. E. Squires
Radiological Control Manager

<u>TYPE OF TRAINING</u>	<u>WHERE TRAINED</u>	<u>DURATION OF TRAINING</u>	<u>ON THE JOB</u>	<u>FORMAL COURSE</u>
a. Health Physics- Radiation Safety	Westinghouse Electric Corp., Idaho	1958 - 1959	YES	YES
b. Radiation Physics and Fundamentals	Oak Ridge Institute of Nuclear Studies	1962	NO	YES
c. Occupational Radiation Protection	Robert A. Taft Engineering Center	1962	NO	YES
d. Principles and practices of radiation protection	NNS (Subject matter included but was not limited to topics d, e, f, g.)	Total of 35 years of formal and on the job training and experience	YES	YES
e. Radioactivity measurement standardization, monitoring techniques and the use of instruments	"	"	YES	YES
f. Mathematics and calculations basic to the use and measurement of radioactivity	"	"	YES	YES
g. Biological effects of radiation	"	"	YES	YES
h. Radiological Control Monitor	"	"	YES	YES
i. Source operator	NNS Calibration Facility	"	YES	YES

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G. E. SQUIRES

Experience with Radiation (Actual use of radioisotopes or equivalent experience)

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
Co-60	38.1 mCi	NNS RadCon Calibration Facility	13 years	Calibration of Instruments, Film Badges, Dosimeters
Ra-226	300 mCi	"	12 years	"
PuBe	12 Ci	"	3 years	"
PuBe	3 Ci	"	12 years	"
Ir-192	25 Ci	Idaho Falls, Idaho	1 year	Radiographic
Co-60	50 Ci	"	2 years	"
Co-60	1 Ci	"	2 years	"
New Constructions and Testing of 79 Shipboard Reactors		"	32 years	-----
Refueling and Overhaul of 55 Shipboard Reactors		"	27 years	-----
Inactivation of 2 Shipboard Reactors		"	1 year	-----
Commercial Nuclear Plants - 3		"	5 years	-----

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F. J. Delamain

Radiological Control Manager

<u>TYPE OF TRAINING</u>	<u>WHERE TRAINED</u>	<u>DURATION OF TRAINING</u>	<u>ON THE JOB</u>	<u>FORMAL COURSE</u>
a. B. S. Military Science Civil Engineering	USMA West Point	1951 to 1954	NO	YES
b. M. S. Physics - Nuclear	Tulane University	1961 to 1963	NO	YES
c. Nuclear Weapons Effects Officer	U.S. Army Institute of Nuclear Studies	1963 to 1966	YES	NO
d. Regular Course	U. S. Army Command and General Staff College	1966 to 1967	NO	YES
e. Regular Course	National War College	1972 to 1973	NO	YES
f. Radiation Worker	NNS	One week	YES	YES

J. W. Staton

Radiological Control Manager

<u>TYPE OF TRAINING</u>	<u>WHERE TRAINED</u>	<u>DURATION OF TRAINING</u>	<u>ON THE JOB</u>	<u>FORMAL COURSE</u>
a. B. S. Mechanical Engineering	Clemson University	1962 to 1966	NO	YES
b. M. S. Thermal Engineering	Old Dominion University	1967 to 1970	NO	YES
c. Radiation Worker	NNS	One week	YES	YES

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B. W. Milliken
Instrument Calibration Supervisor

<u>TYPE OF TRAINING</u>	<u>WHERE TRAINED</u>	<u>DURATION OF TRAINING</u>	<u>ON THE JOB</u>	<u>FORMAL COURSE</u>
a. Principles and practices of radiation protection	NNS (Subject matter included but was not limited to topics a, b, c, d.)	Total of 7 years of formal and on the job training and experience	YES	YES
b. Radioactive measurements standardization, monitoring techniques and the use of instruments	"	"	YES	YES
c. Mathematics and calculations basic to the use and measurement of radioactivity	"	"	YES	YES
d. Biological effects of radiation	"	"	YES	YES
e. Radiological Control monitor	"	"	YES	YES
f. Source operator	NNS Calibration Facility	"	YES	YES

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B. W. Milliken

EXPERIENCE WITH RADIATION (Actual use of radioisotopes or equivalent experience).

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
Co-60	77 mCi	NNS RadCon Calibration Facility	2 years	Calibration of Instruments, TLD Badges, Dosimeters
Pu8Be	3 Ci	"	"	"
Cs-137	8 μ Ci	"	"	"
New Construction and Testing of 18 Shipboard Reactors		NNS	7 years	-----
Refueling and Overhaul of 14 Shipboard Reactors		"	7 years	-----
Inactivation of 2 Shipboard Reactors		"	1 year	-----

A. C. Clendenin
Senior Instrument Calibration Technician

<u>TYPE OF TRAINING</u>	<u>WHERE TRAINED</u>	<u>DURATION TRAINING</u>	<u>ON THE JOB</u>	<u>FORMAL COURSE</u>
a. Principles and practices of radiation protection	NNS (Subject matter included but was not limited to topics a, b, c, d.)	Total 28 years of formal and on the job training experience	YES	YES
b. Radioactivity measurement standardization, monitoring techniques and the use of instruments	"	"	YES	YES
c. Mathematics and calculations basic to the use and measurement of radioactivity	"	"	YES	YES
d. Biological effects of radiation	"	"	YES	YES
e. Radiological Control monitor	"	"	YES	YES
f. Source operator	NNS Calibration Facility	"	YES	YES

A. C. Clendenin

EXPERIENCE WITH RADIATION (Actual use of radioisotopes or equivalent experience)

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
Co-60	109 mCi	NNS RadCon Calibration Facility	28 years	Calibration of Instruments, Film Badges, Dosimeters
Cs-137	700 μ Ci	"	14 years	"
Sr-90	80 μ Ci	"	18 years	"
PuBe	3 Ci	"	10 years	"
Ra-226	300 mCi	"	10 years	"
Pu8Be	3 Ci	"	18 years	"
New Construction and Testing of 69 NNS & DDCO. Shipboard Reactors		NNS	28 years	-----
Refueling and Overhaul of 55 Shipboard Reactors		"	27 years	-----
Inactivation of 2 Shipboard Reactors		"	1 year	-----

M. P. Sites

Senior Instrument Calibration Technician

<u>TYPE OF TRAINING</u>	<u>WHERE TRAINED</u>	<u>DURATION OF TRAINING</u>	<u>ON THE JOB</u>	<u>FORMAL COURSE</u>
a. Principles and practices of radiation protection	NNS (Subject matter included but was not limited to topics a, b, c, d.)	Total 4 weeks of formal courses	YES	YES
b. Radioactivity measurement standardization, monitoring techniques and the use of instruments	"	"	YES	YES
c. Mathematics and calculations basic to the use and measurement of radioactivity	"	"	YES	YES
d. Biological effects of radiation	"	"	YES	YES
e. Radiation worker	NNS	One week	YES	YES
f. Source operator	NNS RadCon Calibration Facility	Total of 9 years of formal and on the job training and experience	YES	YES

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M. P. Sites

EXPERIENCE WITH RADIATION (Actual use of radioisotopes or equivalent experience)

<u>ISOTOPE</u>	<u>MAXIMUM AMOUNT</u>	<u>WHERE EXPERIENCE WAS GAINED</u>	<u>DURATION OF EXPERIENCE</u>	<u>TYPE OF USE</u>
Co-60	109 mCi	NNS RadCon Calibration Facility	9 years	Calibration of Instruments, TLD badges, Dosimeter
Ra-226	1 mCi	"	7 years	"
Pu8Be	3 Ci	"	9 years	"
Sr-90	10 μ Ci	"	"	"
Cs-137	8 μ Ci	"	"	"
New Construction and Testing of 18 Shipboard Reactors		NNS	"	-----
Refueling and Overhaul of 14 Shipboard Reactors		"	"	-----
Inactivation of 2 Shipboard Reactors		"	1 year	-----

Total of 9 years of on-the-job training and experience.

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R. K. Lamb

Senior Instrument Calibration Technician

<u>TYPE OF TRAINING</u>	<u>WHERE TRAINED</u>	<u>DURATION OF TRAINING</u>	<u>ON THE JOB</u>	<u>FORMAL COURSE</u>
a. Principles and practices of radiation protection	NNS (Subject matter included but was not limited to topics a, b, c, d.)	Total of 4 weeks of formal courses	YES	YES
b. Radioactivity measurement standardization, monitoring techniques and the use of instruments	"	"	YES	YES
c. Mathematics and calculations basic to the use and measurement of radioactivity	"	"	YES	YES
d. Biological effects of radiation	"	"	YES	YES
e. Radiation worker	"	"	YES	YES
f. Source Operator	NNS Calibration Facility	Total of 9 years of formal and on the job training and experience	YES	YES

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R. K. Lamb

EXPERIENCE WITH RADIATION (Actual use of radioisotopes or equivalent experience)

<u>ISOTOPE</u>	<u>MAXIMUM AMOUNT</u>	<u>WHERE EXPERIENCE WAS GAINED</u>	<u>DURATION OF EXPERIENCE</u>	<u>TYPE OF USE</u>
Co-60	109 mCi	NNS RadCon Calibration Facility	9 years	Calibration of instruments, TLD badges, Dosimeters
Ra-226	1 mCi	"	2 years	"
Pu8Be	3 Ci	"	9 years	"
Sr-90	10 μ Ci	"	"	"
Cs-137	8 μ Ci	"	"	"
New Construction and Testing of 18 shipboard reactors		NNS	"	-----
Refueling and Overhaul of 14 Shipboard Reactors		"	"	-----
Inactivation of 2 Shipboard Reactors		"	"	-----

Total of 9 years of on-the-job training and experience.

J. F. Bledsoe
Senior Instrument Calibration Technician

<u>TYPE OF TRAINING</u>	<u>WHERE TRAINED</u>	<u>DURATION OF TRAINING</u>	<u>ON THE JOB</u>	<u>FORMAL COURSE</u>
a. Principles and practices of radiation protection	NNS (Subject matter included but was not limited to topics a, b, c, d.)	Total of 4 weeks of formal courses	YES	YES
b. Radioactivity measurements standardization, monitoring techniques and the use of instruments	"	"	YES	YES
c. Mathematics and calculations basic to the use and measurement of radioactivity	"	"	YES	YES
d. Biological effects of radiation	"	"	YES	YES
e. Radiation worker	"	One week	YES	YES
f. Source operator	"	Total of 3 years of formal and on the job training and experience	YES	YES

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J. F. Bledsoe

EXPERIENCE with Radiation (Actual use of radioisotopes or equivalent experience)

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
Co-60	50 mCi	NNS RadCon Calibration	3 years	Calibration of Facility
Pu8Be	3 Ci	"	"	Instruments, TLD badges, Dosimeters
Sr-90	8 uCi	"	"	"
Cs-137	7 uCi	"	"	"
New Construction and Testing of 5 Shipboard Reactors		NNS	"	-----
Refueling and Overhaul of 5 Shipboard Reactors		"	"	-----
Inactivation of 2 Shipboard Reactors		"	1 year	-----

Total of 3 years of on the job training and experience.

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J. R. Schumacher
Senior Instrument Calibration Technician

<u>TYPE OF TRAINING</u>	<u>WHERE TRAINED</u>	<u>DURATION OF TRAINING</u>	<u>ON THE JOB</u>	<u>FORMAL COURSE</u>
a. Basic Electricity and Electronics	U.S. Naval Training Center Orlando, Florida	Total of 10 days of formal courses	NO	YES
b. Electronics Technician	U.S. Naval Training Center Great Lakes, Illinois	Total of 22 weeks of formal courses	NO	YES
c. Nuclear Power School	U.S. Naval Training Center Orlando, Florida	Total of 24 weeks of formal courses	NO	YES
d. Nuclear Reactor Prototype School	Nuclear Prototype Training Unit Idaho Falls, Idaho	Total of 24 weeks of formal courses	YES	YES
e. Reactor Plant Operator	U.S. Naval Vessel USS Virginia	4 years	YES	NO
f. Reactor Plant Control Room Operator	Nuclear Training Center PSE&G Salem, NJ	Total of 12 months of formal courses	NO	YES
g. Instrument and Control Technical Assistant	"	Total of 26 weeks of formal courses	NO	YES
h. Principles and Practices of radiation protection	NNS (Subject matter included but was not limited to topics h, i, j, k.)	Total of 4 weeks of formal courses	YES	YES

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J. R. Schumacher

<u>TYPE OF TRAINING</u>	<u>WHERE TRAINED</u>	<u>DURATION OF TRAINING</u>	<u>ON THE JOB</u>	<u>FORMAL COURSE</u>
i. Radioactivity measurement standardization, monitoring techniques and the use of instruments	"	"	YES	YES
j. Mathematics and calculations basic to the use and measurement of radioactivity	"	"	YES	YES
k. Biological effects of radiation	"	"	YES	YES
l. Radiation Worker	"	one week	YES	YES
m. Source Operator	"	Total of 1 year of formal and on the job experience	YES	YES

J. R. Schumacher

EXPERIENCE with Radiation (Actual use of radioisotopes or equivalent experience)

<u>ISOTOPE</u>	<u>MAXIMUM AMOUNT</u>	<u>WHERE EXPERIENCE WAS GAINED</u>	<u>DURATION OF EXPERIENCE</u>	<u>TYPE OF USE</u>
Co-60	30 mCi	NNS RadCon Calibration Facility	1 year	Calibration of Instruments, TLD Badges, Dosimeters
Pu8Be	3 Ci	"	"	"
Sr-90	8 μ Ci	"	"	"
Cs-137	7 μ Ci	"	"	"
Operation of 2 Shipboard Reactors		Navy	5 years	-----
Commercial Nuclear Plants - 2		Salem, NJ	5 years	-----

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T. F. Kelly
Instrument Calibration Technician

<u>TYPE OF TRAINING</u>	<u>WHERE TRAINED</u>	<u>DURATION OF TRAINING</u>	<u>ON THE JOB</u>	<u>FORMAL COURSE</u>
a. Principles and practices of radiation protection	NNS (Subject matter included but was not limited to topics a, b, c, d.)	Total of 4 weeks of formal courses	YES	YES
b. Radioactivity measurements standardization, monitoring techniques and the use of instruments	"	"	YES	YES
c. Mathematics and calculations basic to the use and measurement of radioactivity	"	"	YES	YES
d. Biological effects of radiation	"	"	YES	YES
e. Radiation worker	"	one work	YES	YES
f. Source operator	"	Total of 1 year of formal and on the job training and experience	YES	YES

T. F. Kelly

EXPERIENCE with Radiation (Actual use of radioisotopes or equivalent experience)

<u>ISOTOPE</u>	<u>MAXIMUM AMOUNT</u>	<u>WHERE EXPERIENCE WAS GAINED</u>	<u>DURATION OF EXPERIENCE</u>	<u>TYPE OF USE</u>
Co-60	30 mCi	NNS RadCon Calibration Facility	1 year	Calibration of Instruments, TLD badges, Dosimeters
Pu8Be	3 Ci	"	"	"
Sr-90	8 μ Ci	"	"	"
Cs-137	7 μ Ci	"	"	"
New Construction and Testing of 2 Shipboard Reactors		NNS	2 years	-----
Refueling and Overhaul of 1 Shipboard Reactor		"	"	-----
Inactivation of 2 Shipboard Reactors		"	1 year	-----

Total of 2 years of on the job training and experience.

Additional Training

1. All Senior Calibration and Calibration technicians are required to read and understand the manufacturer's most recent service manuals and instruction sheets in a timely manner following receipt at NNS, for each instrument serviced by the applicant.
2. All Senior Calibration and Calibration technicians are required to follow the current applicable NNS calibration procedure for calibrating any instrument. NNS instrument calibration manual will reflect revisions to manufacturer's calibration procedures promptly following their receipt at NNS.
3. All Senior Calibration and Calibration technicians are trained in the use, maintenance and calibration of all equipment currently operated by the Radiological Control Calibration Section.
4. All Senior Calibration and Calibration technicians are required to read the latest operating and emergency procedures for the Calibration Facility.
5. All Senior Calibration and Calibration technicians must participate in continuous on-going refresher training for new and updated information as the information becomes available.

Training for Individuals Working in or Frequenting
Restricted Areas

I. Course Outline

A. Radiation Safety

1. Limits/NNS control level
2. TLD badges and dosimeters
3. Actions for off-scale/lost/damaged dosimeters and/or lost TLD badge
4. Keeping track of exposures
5. Signs and barrier requirements
6. Potential sources of radiation
7. Accountability of radioactive material

B. Contamination Control

1. Definition of contamination and limits
2. Potential sources of contamination
3. Control and prevention of contamination
4. Decontamination

C. Waste Disposal

1. Reducing waste
2. Disposal of waste

D. Instrumentation

1. Purpose for use of each type of instrument
2. How to use each type of instrument

E. Operating Procedures for Calibration Facility

F. Emergency Procedures for Calibration Facility

G. Minimizing Exposure Methods

H. NNS Radiation Safety Program

II. Duration of Training shall be Minimum of 2 hours

- III. Only "Responsible Individuals" are Qualified Instructors for the program identified in part I of attachment 5.
- IV. A list of trained personnel and the records of their training shall be kept by the Radiological Control Department.
- V. Other personnel who require occasional access to restricted areas and who enter these areas for observation or similar purposes, shall have training considered necessary by the licensee for the conditions expected to be encountered. When individuals are not trained in accordance with part I and II of attachment 5, these personnel shall be escorted by "Responsible Individuals" when entering these areas.

Facilities and Equipment

A. Calibration Facility

The Calibration Facility is located in the southwest end of building 123. It is 13 feet wide by 75 feet long and its arrangement is shown on page 3 of attachment #6. The facility is adjacent to a storage warehouse on its northeast side and a roadway on its southwest side.

The Calibration Laboratory has two restricted areas, the Source Storage and Use Area and the Calibration Room. (The Calibration Room is a restricted area only when a source is removed from storage for use). Access to these areas is controlled with secured doors and rope barriers. The Source Storage and Use Area also has an electric eye audible alarm which activates when entrance to the area is attempted. This electric eye serves as a notification to personnel when entering a high radiation area as required by Title 10 CFR part 20.203. When the Source Storage and Use Area is posted as a high radiation area the doors leading to the Calibration Room are locked or guarded to prevent unauthorized access. Refer to page 3 of attachment 6 for added description.

*according to M. Elwell
(NRC) High Radiation Area
is only a small area in
room. Easy to get out of
area*

The Source Storage and Use Area contains the calibration table and the source storage pit. The calibration table is used as a range to ensure the appropriate distance between an instrument being calibrated and a calibration source. The table measures distances from on contact with the source up to 500 centimeters away. The source storage pit is recessed in the ground and has 6 inch concrete sides and bottom with a lid that contains 1/2 an inch of lead for shielding. This lid is equipped with a lock to prevent access or unauthorized removal of licensed material. The pit contains all license material greater than 100 microcuries per source.

Contained within the source storage pit are shielded source storage containers which contain licensed material with activity amounts greater than 100 microcuries. These containers are shielded to reduce the radiation levels and personnel exposure encountered when the sources are in storage. Also each source storage container containing 100 microcuries or more of radioactivity may only be removed from storage under direct supervision of a qualified source operator. Containers with less than 100 microcuries of radioactivity are provided with suitable fasteners to prevent accidental loss of the material.

In addition, each source and source storage container has attached a durable tag (at least one inch square) bearing the magenta and yellow radiation symbol and the instructions CAUTION (or DANGER) - RADIOACTIVE MATERIAL - DO NOT HANDLE - NOTIFY CIVIL AUTHORITIES IF FOUND. The source serial number, isotope and activity is stated on the tag.

At temporary job sites, restricted areas will be established with rope barriers at radiation levels of 2 mr/hr or less and signs posted on the rope barrier will have the yellow and magenta radiation emblem with the words CAUTION - RADIATION AREA - DO NOT ENTER WITHOUT RADCON PERMISSION. If this restricted area is to be used for more than thirty days, then entrances to the area shall be equipped with locks and control devices with audible alarms and lights. The entrance shall be posted with a sign reading WARNING - RADIATION AREA WHEN LIGHT IS ON. If a high radiation area exists when using the source, controls to limit access and posting of the area are required in accordance with Title 10 CFR part 20.203.



The Calibration Facility is also equipped with source handling tools for handling sources. In case of a spill or release of contamination a "spill kit" is also located at the facility.

1. 12" Concrete shielding
2. 6" Concrete shielding
3. Source storage cabinet
4. Source storage pit
5. Source location during use
6. Calibration table
7. Electric eye audible alarm

W. Workbench

IS. Instrument storage

- Notes:
1. Calibration room is a restricted area when source is in use position.(location 5)
 2. The facility is on the ground floor and there are no tunnels under the facility.
 3. The ceiling above the source storage and use area contains 5" of concrete shielding.
 4. The rope barrier that restricts access to the source storage and use area is also posted as a high radiation area when the situation exists.
 5. The southwest door leading to the calibration room and the southern door entrance into the office area are normally secured.

-  Flashing red light
 Rope barrier

Source storage and use area



Radiation Safety Program

I. Personnel Monitoring Equipment

- A. At NNS, personnel monitoring is accomplished with pocket chamber dosimeters and TLD badges (gamma and neutron TLD badges). The Environmental/Radiation Health Section of the Radiological Control Department at NNS is responsible for distributing and collecting gamma and neutron TLD badges and processing gamma TLD badges. The processing of gamma TLD badges is performed using the Harshaw/Filtrol 8000C or the Victoreen Model 2800 TLD Readers. (Neutron dosimetry is currently processed by the U. S. Navy Medical Command). Gamma TLD badges are processed at least monthly. Neutron TLD badges are removed from service and sent for processing approximately every six weeks.
- B. Records of day-to-day gamma exposure monitoring are maintained from cumulative exposures of direct reading ion chamber dosimeters. These dosimeters are response checked to ensure their measured exposure is +20% to -10% of their actual exposure when exposed to a calibration source. The ranges of the dosimeters routinely used for monitoring whole body exposure are 0-200 mr and 0-500 mr.

II. Radiation Detection Instruments and Instrument Calibration

A. RADIATION DETECTION INSTRUMENTS

TYPE	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE	USE
1. Eberline E-130/HP-210 Portable thin-window GM survey meter (window is 1.2-2.0 mg/cm ²)	19	Beta and Gamma	*0-50,000 CPM in 3 ranges	Survey and monitoring of personnel and areas
2. Eberline E-140/HP-210 Portable thin-window GM survey meter (window is 1.2-2.0 mg/cm ²)	60	Beta and Gamma	*0-50,000 CPM in 3 ranges	Survey and monitoring of personnel and areas
3. Eberline RM-3A/HP-210 RM-3C/HP-210 RM-3C-4/HP-210 Thin-window G.M. survey meter (window is 1.2-2.0 mg/cm ²)	52	Beta and Gamma	*0-50,000 CPM in 3 ranges	Survey and monitoring of personnel and swipe counting
4. Eberline RM-14/HP-210 RM-15/HP-210 Thin-Window G.M. survey meter (window is 1.2-2.0 mg/cm ²)	23	Beta and Gamma	*0-50,000 CPM in 3 ranges	Survey and monitoring of personnel and swipe counting
5. Tracerlab "SNOOPY" NP-1, NP-2 Portable BF ₃ Proportional survey meter	32	Neutron	††0-2000 mrem/hr in 4 ranges	Area survey instrument
6. AN/PDR-27 Portable Thin-window high and low range GM tube survey meter (window is mica 0.0005 inches thick)	94	High range Gamma, Low range Beta and Gamma	0-500 mrem/hr in 4 ranges	Survey and monitoring of objects and areas
7. Eberline E-510/HP-200, 220 Portable GM survey meter	13	Gamma	0-20,000 mrem/hr in 4 ranges	Survey of objects and areas
8. Eberline E-530N/HP-200, 220 Portable GM survey meter	28	Gamma	0-20,000 mrem/hr in 4 ranges	Survey of objects and areas

TYPE	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE	USE
9. Eberline PAC-1SA/AC-3 Portable Scintillation survey meter (mylar window 0.85 mg/cm ²)	16	Alpha	0-2x10 ⁶ CPM in 4 ranges	Survey and monitoring of personnel and areas
10. LUDLUM/NaI probe Portable Scintillation survey meter	13	Gamma	†0-50,000 CPM in 3 ranges	Survey of objects and areas
11. Teletector Portable thin-window high and low range GM tube survey meter (window is mica 0.0005 inches thick)	14	Beta and Gamma	High range 0-1000 Rem/hr in 3 ranges and low range 0-50 mrem/hr in 2 ranges	Survey of objects and areas
12. NUMEC PC-3B Gas flow Proportional scaler and detector	3	Alpha, Beta and Gamma	0-1x10 ⁹ counts	Swipe counter, scaler
13. Eberline MS-1, 2 and 3 scaler	17	Beta, Gamma and Neutron	0-1x10 ⁶ counts	Swipe counter, scaler
14. NUMEC GP-1 and GP-5 APD GM, air pump, survey meter	38	Beta and Gamma	0-1x10 ⁶ counts	Air Particle Detector
15. LUDLUM/NaI detector Model 2500 Scaler/ratemeter	3	Gamma	0-1x10 ⁶ counts	Sample and Counting standard scaler
16. Bendix Model 550 Hi-Volume Air Sampler	64	Beta, Gamma and Alpha	N/A	Air Sampler

B. All instruments in use are calibrated at least once every three months. (Portal Monitor "Friskall" frisker booths are calibrated once every six months).

* 100 CPM = 0.03 mrem/hr for Co-60.

† 1000 CPM = 0.01 mrem/hr for Co-60.

†† The high range (0-2000 mr/hr) is not normally calibrated

III. Operating and Emergency Procedures

A. Definitions

1. Control Area - Any area to which access is controlled for radiological safety purposes.
2. Sealed Source - Radioactive material permanently bonded or fixed in a capsule or matrix designed to prevent release and dispersal of the radioactive material.
3. Contamination - Loose particulate radioactive material in an undesirable location.
4. Source Operator - An individual who has satisfactorily completed the formal indoctrination course in the use of radioactive sources, demonstrated competency in the safe use of radioactive sources and associated equipment and is responsible for the safe use of such sources and equipment.
5. Accident - Any occurrence by which control of the source is lost or which may cause the source to be ruptured.

B. General Instructions and Regulations

1. With respect to license SNM-602, these instructions and regulations supercede all previous instructions concerning the protection against radiation hazards at NNS.
2. These instructions and regulations are a part of NNS license to handle and use radioactive material used for instrument checks and calibration. No modification or deviations from these instructions and regulations shall be permitted.
3. Requirements invoked by Title 10 Code of Federal Regulations will be adhered to for activities involving this license and the material possessed under this license.
4. NNS has placed in effect the provisions of NAVSEA 389-0288 "Radiological Controls for Shipyards" for the control of radiation and radioactivity associated with the Naval Nuclear Propulsion Program.
5. Messers C. T. Hill, G. E. Squires, F. J. Delamain, J. W. Staton, B. W. Milliken, A. C. Clendenin, M. P. Sites, R. K. Lamb, J. F. Bledsoe, J. R. Schumacher and T. F. Kelly are those individuals directly responsible to the NNC for the use and security of licensed material and for the overall Radiation Safety Program.

6. The Radiation Safety Officer is responsible for ensuring that regulations concerning entrance into control areas are complied with.
7. TLD badges (Gamma and, if necessary, neutron) and direct reading dosimeters must be worn by all personnel inside the calibration room when it is established as a radiation area in accordance with 10 CFR 20.
8. The number of personnel inside the calibration room when it is a restricted area must be kept at a minimum.
9. Any time any source is removed from the calibration facility, the source operator or user must sign a utilization logbook for signature custody of the source(s).
10. All source operators, prior to using a sealed source in excess of one millicurie, shall successfully complete written, oral and practical examinations and sign a statement verifying they have read and understand the NNS Radiation Safety Program. The written examination and signed statement will be maintained on file by the Radiological Control Department.
11. Only qualified source operators will be permitted to use a source in excess of one millicurie.
12. All personnel authorized to receive dosimetry equipment shall have proper periodic physical exams.
13. The personnel under this license shall not exceed:

a. Whole body	1250 mrem/year
b. Hands, feet and ankles	15.875 ren/quarter
c. Forearms	5.75 ren/quarter
d. Skin of whole body	2.375 ren/quarter

Prior to any individual exceeding the above levels, written approval shall be obtained from the Manager of Radiological Control Department. At no time shall anyone exceed the limits set forth in 10 CFR 20.

NOTE: For b, c and d above, the exposure limits listed are in excess of whole body exposure.

14. Any individual working in or frequenting any portion of a radiation area shall be kept informed of the storage, transfer, use and the radiation levels of radioactive material in the area.

15. Any loss of radiological control or excessive exposure to personnel involving licensed material shall be reported to the Radiation Safety Officer immediately.
16. The calibration of radiac instruments is the responsibility of the RadCon Instrument Calibration Section and shall be performed by Instrument Calibration personnel only.
17. The NNS RadCon "Calibration Manual for Radiation Detection Instrumentation" shall be followed without deviation whenever an instrument is to be calibrated. (The "Calibration Manual for Radiation Detection Instrumentation" contains explicit safety, source handling, calibration and record keeping instructions concerning the calibration of instruments.)
18. Any instrument that is not calibrated on all scales shall be prominently marked to assure only calibrated scales will be used.
19. All instruments in use (except Portal Monitors and portable air samplers) at NNS are required to be calibrated at least every three months when in use and after each instrument repair. (Portal Monitor "Friskall" frisking booths and portable air samplers are calibrated at least once every 6 months.)
20. NNS "General Safety Manual" precautions must be obeyed when working with instruments utilizing high voltages.
21. Dangerous and defective instruments must be properly tagged to ensure they are not used.
22. Electronic alignment and linearity checks for instruments shall be performed by Electronic Instrument Shop personnel in accordance with manufacturer's technical manual.
23. NNS calibrates all survey instruments to within $\pm 10\%$ of the calculated or known values for each point checked on each range of the survey meter.
24. Portable gamma/beta-gamma survey instruments shall be calibrated with a Cobalt-60 source in open air with three check points on each scale. An alternative method for calibrating instruments which measure in events per unit of time may consist of calibration with a pulse generator, followed by a response source check to a radiation source. (Explicit instructions contained in the NNS RadCon "Calibration Manual for Radiation Detection Instrumentation" will be adhered to.)

25. Neutron survey instruments shall be calibrated with a neutron source in open air with three check points on each scale. (Explicit instructions contained in the NNS RadCon "Calibration Manual for Radiation Detection Instrumentation" will be adhered to.)
26. Scalers shall be calibrated by running a voltage plateau to establish the operating voltage. Efficiency is then determined with a Co-60 source or Th-230 source depending on the isotope to be detected. (Explicit instructions contained in the NNS RadCon "Calibration Manual for Radiation Detection Instrumentation" will be adhered to.)
27. Friskers equipped with HP-210 probes shall indicate a predetermined value when exposed to a Technetium-99 source mounted in a calibration check board.
28. Air particle detectors shall be calibrated with a pulse generator to determine proper linearity and gain control settings. The rate of air flow shall be determined with an air flow calibration device. The "fail-safe" indicator lamp shall be checked for proper operation and the audible and visual alarm set point shall be checked for proper response at the indicated CPM in a low background area using a Co-60 check source. Portable air samples shall be checked every six months, or whenever significant flow changes are expected, with an air flow calibration device to determine the rate of air flow. Six months calibration of air flow is not required if flow check devices installed on the instrument do not indicate significant change of flow. (Explicit instructions contained in the NNS RadCon "Calibration Manual for Radiation Detection Instrumentation" will be adhered to.)
29. All records of instrument calibration will be kept on file by the Radiological Control Department.
30. All calibration sources are NBS traceable. Sources are certified to within $\pm 5\%$ of the stated activity or dose rate.
31. All sources, 1 millicurie or greater of radioactivity, shall be physically inventoried on the first working day of each month. A report of the inventory is sent to the Manager, Radiological Control Department and the Radiation Safety Officer.
32. A quarterly inventory is conducted to account for all sources possessed under the license. Records of the inventory will be kept by the Radiological Control Department. The inventory includes the isotope, serial number, activity and location of each source and the date the inventory was conducted.

C. General Calibration Method (Explicit calibration procedures for each instrument calibrated at NNS are contained in the RadCon "Calibration Manual for Radiation Detection Instrumentation".)

1. Pre-calibration check

a. Mechanical

(1) Visually inspect instrument for physical damage, corrosion and/or defective parts.

(2) Thoroughly clean as necessary.

b. Operational

(1) Check proper operation of all switches, lights, etc.

(2) Check audible response (if applicable).

2. Typical Calibration Steps for Gamma, Beta/Gamma and Neutron Survey Instruments (Explicit calibration procedures for each instrument calibrated at NNS are contained in the RadCon "Calibration Manual for Radiation Detection Instrumentation").

a. Determine distances from a source that will give low, high and mid-scale readings for each range. (Instruments which require other scale readings shall be calibrated in accordance with the RadCon "Calibration Manual for Radiation Detection Instrumentation".)

b. Turn range selector switch to the lowest range and place instrument on the calibration cart.

c. Align the detector tube with the source holder.

d. Place the cart on the calibration table to the predetermined distance to give a mid-scale reading.

e. Make any further adjustments prior to removal of source from storage. (If the appropriate source is already in the source holder, adjust the holder for the instrument being calibrated and omit step g.)

f. Activate red lights and rope barriers. Ensure all personnel in the area have proper dosimetry devices. If a high radiation area will exist then ensure entrances are properly secured and electric eye audible alarm is activated.

g. Remove source from storage container and place in holder.

- h. Check meter for response within $\pm 10\%$ of calculated reading. Adjust potentiometer if necessary.
- i. Move cart to check response of each reading on every applicable range.
- j. If the instrument can not be properly calibrated on all appropriate ranges then tag the instrument for repair.
- k. Remove source from holder and return to storage container.
- l. Place a calibration sticker (with due date and initials) on the instrument.
- m. Complete all records of calibration.

E. Calibration of Pocket Dosimeters

1. Pre-calibration

- a. Dosimeters are checked for any physical damage.
- b. Dosimeters are checked for proper operation.

2. Calibration

- a. Determine the dose rate at a predetermined distance and the time of exposure for the dosimeters to receive the required dose.
- b. Set the desired number of dosimeters at the predetermined distance.
- c. Align the center of the dosimeters' chambers with the source holder.
- d. Activate red lights and rope barriers. Ensure all personnel in the area have proper dosimetry devices. If a high radiation area will exist then ensure entrances are properly secured and the electric eye audible alarm is activated.
- e. Remove source from storage container and place in holder.
- f. Remove the source from the holder and place back into its storage container once the appropriate time has passed for the desired dose.
- g. Dosimeters shall respond to calculated values from a calibration source with a $+20\%$ to a -10% tolerance. For low range dosimeters, a drift check over a 24 hour period shall indicate a drift of 2%

or less of the full scale reading. For high range dosimeters, allow a one hour drift and record the value, then allow an additional 24 hour drift. The difference between the two readings shall be 2% or less of the full scale reading.

h. If the dosimeters cannot be properly calibrated, they shall be removed from service.

i. Complete all records of calibration.

F. Survey Program

Routine area surveys are performed weekly at the calibration facility. The areas surveyed are specific locations in the source storage and use area (i.e. top of source storage pit and calibration table), the calibration room and office. The surveys performed are contamination swipe/scan surveys and radiation surveys.

The limits of fixed or removable contamination set for release for unrestricted use of equipment or facilities is no detectable alpha contamination and $<450 \mu\text{Ci}/100\text{cm}^2$ beta-gamma contamination as measured with standard survey instruments.

Quarterly surveys are performed with the largest gamma source out of storage to determine the effect of the radiation levels on working areas in or near the facility. This is also accomplished with the largest neutron source.

The instrument serial numbers and measured levels obtained from the instruments for the surveys are recorded and maintained at the calibration facility.

G. Use of Shielding and Remote Handling Equipment

The time involved transferring sources between containers and use locations is the period of time when the highest radiation dose rates are experienced. It is imperative that the user has a completely thought-out plan of action before removing a source from storage. If deemed necessary, a rehearsal shall be made with a dummy source. During the transfer, personnel shall maintain as much distance as practicable between their bodies and the source.

Sources in excess of one millicurie shall be manipulated with remote handling devices. These devices consist of one magnetic grappling rod which is approximately 6 feet 4 inches in length and one mechanical grappling rod which is approximately 5 feet 6 inches in length. Other similar devices may be used. Sources of 1.0 millicurie or less shall be

TIME SHOULD THE SKIN OF PERSONNEL TOUCH THE ACTIVE OR EMITTING AREA/SURFACE OF A SOURCE.) Any equipment required for the safe manipulation of sources, which is not in perfect working condition, shall not be used. Such equipment shall be tagged "DEFECTIVE DO NOT USE" and the proper RadCon Calibration Facility personnel shall be notified of the conditions. A report of the damages or defects shall be made to the Radiation Safety Officer immediately.

H. Special Precautions for Handling Large Sealed Calibration Sources

1. An appropriate shipping/storage container shall be used to transport sources in excess of one millicurie. This container shall provide enough shielding to prevent a radiation level in excess of 200 mr/hr on any exterior surface or a radiation level in excess of 10 mr/hr at one meter from any exterior surface.
2. The Plant Protection Department shall be notified by the source operator each time a source in excess of one millicurie is moved from a designated storage area or use area. The following information shall be transmitted to the Plant Protection Department.
 - a. Where the source is to be transferred.
 - b. Estimated time the source will be at the new location.
 - c. The name of the source operator making the move.

At the conclusion of the operations, the source operator shall advise the Plant Protection Department that the source has been returned to its designated storage area.

3. Source(s) in excess of one millicurie must be handled with remote handling devices.
4. Source storage containers containing 100 microcuries or more of radioactivity may only be removed from storage under direct supervision of a qualified source operator.
5. Source storage containers shall be surveyed prior to removal of the source and after returning the source to its storage container to ensure proper storage.
6. If a source in excess of one millicurie is to be used outside of the Calibration Room, the source operator shall record the contact readings of the source storage container prior to removal of the source from the container. When the source is returned to storage the survey will be performed again and compared to the initial survey to ensure proper storage of the source.

5. Source storage containers shall be surveyed prior to removal of the source and after returning the source to its storage container to ensure proper storage.
6. If a source in excess of one millicurie is to be used outside of the Calibration Room, the source operator shall record the contact readings of the source storage container prior to removal of the source from the container. When the source is returned to storage the survey will be performed again and compared to the initial survey to ensure proper storage of the source. Also if the source is to be used in open air and in an area not regularly established as a radiation area, then a rope barrier shall be established where radiation levels of 2 mrem/hr or less exist. On the rope barrier, signs bearing the radiation caution symbol and words "CAUTION - RADIATION AREA - DO NOT ENTER WITHOUT RADCON PERMISSION" shall be hung. If this source is to be used in an established radiation area for more than thirty days then the entrance to the area shall be equipped with locks and a control device with an audible alarm and light. The entrance shall be posted with a sign reading WARNING - RADIATION AREA WHEN LIGHT IS ON. If a high radiation area will exist for either of the two situations above, then the area will be controlled and posted in accordance with Title 10 CFR part 20.203.

I. Routine Personnel Monitoring Program

*Calibration by
of source by
3 months of the
equipment*

All personnel working with radioactive sources shall wear a direct reading dosimeter, gamma TLD and neutron TLD badge (if required). Direct reading dosimeters shall be read and recorded daily and have a range of zero to 200 milliroentgens or greater. If a direct reading dosimeter is found to be off-scale, then the TLD badge shall be processed immediately. Gamma TLD badges are processed at least monthly. Neutron TLD badges are removed from service and sent for processing approximately every six weeks.

J. Emergency Procedures

1. The following conditions would be indicative of a radiological emergency:
 - a. The loss of accountability of radioactive material
 - b. Leaking sealed sources
 - c. Over exposure to personnel
 - d. Any reportable event as detailed in 10 CFR part 20.

2. In the occurrence of any of the above emergency conditions, the following immediate actions shall be taken to minimize area contamination and radiation exposure to persons in the vicinity of the emergency area:
 - a. The emergency area shall be isolated.
 - b. All unnecessary personnel will be evacuated immediately to a contamination control check point. Personnel shall be surveyed for radioactive contamination and decontaminated if necessary.
 - c. The accident or emergency shall be reported immediately to the Radiation Safety Officer or one of his designated representatives and request help if needed.
 - d. All unfiltered ventilation shall be secured to contain airborne contamination.
 - e. Radiation, contamination and airborne radioactivity surveys shall be taken of the emergency area and all adjacent areas to determine the extent of the problem.
 - f. Evaluate all personnel dosimetry to determined exposure received for the emergency.
 - g. Calculate or estimate exposures for unmonitored personnel (if any).
 - h. Insure proper medical attention is given to all personnel involved with the emergency.
 - i. The affected areas shall be decontaminated (if necessary) and returned to normal working conditions as soon as possible.
3. The remedial actions to be taken concerning the emergency shall include an investigation into the cause of the accident and any preventative measures to aid in preventing a recurrence of a similar situation.
4. A list of personnel to contact in case of an emergency involving radioactive material held under this license shall be posted. These personnel shall direct remedial actions for the emergency.

1.	C. T. Hill	Work: 380-2369
		Home: 826-9589

2.	G. E. Squires	Work: 380-2239
		Home: 826-1650

3.	F. J. Delamain	Work: 380-3243
		Home: 898-3730
4.	J. W. Staton	Work: 390-3236
		Home: 868-9909
5.	B. W. Milliken	Work: 688-8042
		Home: 1-498-3741

K. Leak Test of Sealed Sources

1. All sealed sources with a half-life greater than thirty days and containing 100 microcuries or more of beta and/or gamma emitting material or 10 microcuries or more of alpha emitting material shall be leak tested upon receipt or transfer and every six months or less thereafter. Sources in storage shall be leak tested prior to transfer or use unless they have been leak tested within six months prior to the date of transfer or use. Leak testing shall be performed by a qualified source operator.
2. Procedure for Leak Testing:
 - a. A Whatman filter paper Number 1, 4.25 cm. in diameter, or equivalent, shall be used.
 - b. The paper shall be saturated with isopropanol and rubbed firmly over the entire surface of the source or the surfaces of the devices in which the sealed source is permanently mounted or stored.
 - c. Leak test samples shall be counted with appropriate detectors and swipe counters for the type of radiation emitted. Counting systems shall have a minimum sensitivity of 0.005 microcuries or less.
 - d. Records of leak tests results shall be kept in units of microcuries and kept on file until one year after transfer or disposal of the source.
 - e. If the leak test reveals the presence of 0.005 microcuries or greater of removable contamination, the source shall be removed from service immediately. The Radiation Safety Officer shall be notified immediately of the situation and he shall submit required reports with the Nuclear Regulatory Commission within five days of the test.

CALIBRATION CERTIFICATION SHEET

Customer and
Address :

Calibration Date: _____

Customer Contact:

Instrument Type:

Model:

Calibrated by: _____

Serial Number:

Supervisor
Signature:

Manufacturer:

Calibrated for:

Routine: Shield Survey: Post Shield Survey: Special:

SOURCE DATA DATE:

Isotope _____ Serial No. _____ Exposure Rate @ 1 Meter _____ Accuracy \pm _____

Isotope	Serial No.	Exposure Rate @ 1 Meter	Accuracy \pm
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[illegible]

L. Record Management

All record keeping and reviewing concerning the calibration facility and the material held under this license, except personnel exposure records, are maintained at the NNS Radiological Control Calibration Facility. All calibration facility survey records shall be maintained indefinitely and instrument calibration records shall be maintained for at least three years.

Waste Management

Under this license, Newport News Shipbuilding only possesses a solid sealed Pu8Be source. Therefore, there will be no radioactive effluents or waste generated with the use of the special nuclear material.