NRC FORM 313 * (10-87) 10 CFR 30, 32, 33, 34, 35 and 40

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED BY OMB
3150-0120
Expires: 5-30-90

APPLICATION FOR MATERIAL LICENSE

070-00221

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 20555

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

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

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

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

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

IF YOU ARE LOCATED IN:

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

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

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

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

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

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

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 _____
- [X] C. RENEWAL OF LICENSE NUMBER SNM-205

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

GENERAL DYNAMICS CORPORATION
Electric Boat Division
Eastern Point Road
Groton, CT 06340

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

GENERAL DYNAMICS CORPORATION
Electric Boat Division
Eastern Point Road
Groton, CT 06340

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Eugene T. Reimer, Jr.

TELEPHONE NUMBER: (203) 446-5170

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

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

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

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

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

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSEE FEES *(See 10 CFR 170 and Section 170.31)*
FEE CATEGORY 1.K. 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 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948, 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

SIGNATURE–CERTIFYING OFFICER	TYPED/PRINTED NAME	TITLE	DATE
S M Hirschberg	S. M. HIRSCHBERG	DIVISION COUNSEL	6/22/88

9001240063 881121
REG1 LIC70
SNM-205 PDR

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS	APPROVED BY
REN	Jul. 4+	1K		
AMOUNT RECEIVED	CHECK NUMBER			DATE
$350	24140		109130	7/12/88

"OFFICIAL RECORD COPY"

6-27-88

GENERAL DYNAMICS
Electric Boat Division

138-29629
June 22, 1988

U. S. Nuclear Regulatory Commission
Region I, Nuclear Material Section B
631 Park Avenue
King of Prussia, Pennsylvania 19406

Subject: Renewal of Special Nuclear Materials License Number SNM-205

Gentlemen;

General Dynamics Corporation, Electric Boat Division's Special Nuclear Materials License Number SNM-205 expires on July 31, 1988 (Program Code: 22120). Enclosed is the renewal application for the license in accordance with Regulatory Guide 10.3, Revision 1 and the instructions sent by the U.S.N.R.C. on April 4, 1988.

As specified in Title 10, Code of Federal Regulations, Part 170.31, Section 1.K., enclosed is a check in the amount of $350.00 to cover renewal fee processing costs.

By submitting this application at least thirty days prior to the expiration date of the license, it is understood that the existing license will continue in effect until action is taken by the Commission on the renewal application.

If any further information is required, please contact Mr. Eugene T. Reimer, Jr., Division Health Physicist, at telephone number (203) 446-5170. Thank you for your attention to this matter.

Sincerely,

W. C. Everett
Associate Division Counsel

U. S. Nuclear Regulatory Commission

438-29629
June 22, 1988

bxc: W. E. Graber (438)
R. R. Lavimoniere (438)
W. H. Lord (601)
E. T. Reimer, Jr. (438)
R. D. Renza (438)
438 NRC File
438 Document Control File (Letters)

The following information is submitted in support of the renewal of Special Nuclear Materials License SNM-205:

Specification of Applicant

Applicant:	General Dynamics Corporation Electric Boat Division Eastern Point Road Groton, Connecticut 06340
Location of Use:	Electric Boat Division Eastern Point Road Groton, Connecticut, 06340
Location Of Principal Office:	General Dynamics Corporation Pierre Laclede Center St. Louis, Missouri 63105 General Dynamics is incorporated under the Laws of the State of Delaware.
Names, Titles, Addresses, and Citizenship of Principal Officers:	See Attachment (1)

Period of Time for Which License is Requested

Five years.

Specification of Activities to be Performed

Source MRC-Pu8Be-260 is used at the Radiation Laboratory Calibration Facility to calibrate neutron monitoring survey instruments according to Electric Boat Division approved procedures.

Specification of Special Nuclear Material

The Plutonium-Beryllium neutron source, MRC-Pu8Be-260, was purchased from the Monsanto Research Corporation in April 1972 and consisted of 0.284 grams, or 4.88 curies, of Plutonium-238. It is double encapsulated with a diameter of 0.75 inches and a length of 0.87 inches. The source is housed in a 15 gallon WEP-B (water extended polyester) solid casting resin filled drum which is located in a recessed source storage repository at the Radiation Laboratory Calibration Facility. The neutron dose equivalent rate of the unshielded source is 13 mrem/hr at a distance of one meter (effective 6/1/88). The requested possession limit is 4.88 curies of Plutonium-238.

Technical Qualifications of Personnel

I. TRAINING AND EXPERIENCE OF EUGENE T. REIMER, JR.

A. Formal Academic Training

1. The Johns Hopkins University School of Hygiene and Public Health, 615 North Wolfe Street, Baltimore, MD 21205.

   Degree: M.H.S. - Radiation Health Sciences
   Dates of Attendance: September 1982 to June 1984

   Courses include:

Nuclear Instrumentation	Radiochemistry
Intro to Rad. Health	Research Reactor Operations
Radiation Safety	Radiobiology
Radiation Dosimetry	Prin. Industrial Hygiene
Prin. Occup. Safety	Adv. Nuc. Med. Instr.
Health Effects of Air Pollutants	

   Relevant information:

   John Hopkins University Scholarship 1983 - 1984
   Health Physics Society Fellowship 1983 - 1984
   Elected National Honorary Public Health Society 1984

2. University of Maryland Baltimore County, 501 Wilkens Avenue, Baltimore, MD 21228

   Degree: B.A. - Biological Sciences
   Date Conferred: June 1982

   Relevant information:

   Elected Phi Kappa Phi Honor Society 1982
   Maryland State Senatorial Scholarship 1981
   University of Maryland Baltimore County Scholarship 1981
   University of Maryland Baltimore County Certificate of Recognition

Technical Qualifications of Personnel

I. TRAINING AND EXPERIENCE OF EUGENE T. REIMER, JR.

A. Formal Academic Training (Continued)

3. Other coursework:

Certification Review for Health Physicists - one week course sponsored by University of Lowell, Lowell, MA - March 1985

ALARA Training Course - one week course sponsored by Reactor Plant Services, General Dynamics Corporation, Groton, CT - February 1985

Byproduct Material Qualification Training - one week course given by Electric Boat Division, Groton, CT - February 1985

Basic Radiation Worker Training - one week course given by Electric Boat, Groton, CT - every eighteen months

Series 90/Spectran AT Multichannel Analyzer Systems Operations - one week course given by Canberra Industries, Meriden, CT - September 1987

Various additional courses having continuing education credits for the American Board of Health Physics recertification

B. Employment Experience:

1. The Johns Hopkins Medical Institutions, Department of Nuclear Medicine and Radiological Health Sciences.

Position: Nuclear Medicine Research Assistant
Period: September 1982 to January 1984
Isotopes used for nuclear medicine research projects
Isotopes used and Maximum Activity:

Ga-67	1 mCi
In-111	1 mCi
Tc-99m	1 mCi
I-125	1 mCi
H-3	1 mCi
C-14	1 mCi

Technical Qualifications of Personnel

I. TRAINING AND EXPERIENCE OF EUGENE T. REIMER, JR.

B. **Employment Experience** (Continued)

2. General Dynamics Corporation, Electric Boat Division.

Position: Division Health Physicist
Period: March 1984 to Present
Isotopes used for instrument calibration.
Isotopes used and Maximum Activity:

Co-60	1 Ci
Cs-137	140 mCi
^{238}Pu/Be	5 Ci
^{241}Am-Be	165 mCi

Radiation Protection Officer for NRC Materials Licenses SNM-205 and 06-01781-03.

II. TRAINING AND EXPERIENCE OF DAVID R. PRENTICE

A. **Formal Academic Training**

1. Associate Degree in Engineering - Mitchell College, New London, CT

2. Other coursework:

Basic Radiation Worker Training - one week course given by Electric Boat Division, Groton, CT - every eighteen months.

Series 90/Spectran AT Multichannel Analyzer Systems Operations - one week course given by Canberra Industries, Meriden, CT - September 1987

Technical Qualifications of Personnel

II. TRAINING AND EXPERIENCE OF DAVID R. PRENTICE

B. Employment Experience

1. General Dynamics Corporation, Electric Boat Division

Position: Senior Engineering Assistant
Period: Eighteen years working directly with the Division Health Physicist on Radiation Protection and instrument calibration.
Isotopes used and Maximum Activity:

Co-60	1 Ci
Cs-137	140 mCi
^{238}Pu/Be	5 Ci
^{241}Am-Be	165 mCi

III. Byproduct and Special Nuclear Material Qualification Program

Radiological Control personnel qualified and approved as defined in the "Byproduct and Special Nuclear Material Qualification Program" [see Attachment (2)] may use the source MRC-Pu8Be-260 for calibration purposes without the direct supervision of E. T. Reimer, Jr. or D. R. Prentice.

Description of Equipment and Facilities

Source MRC-Pu8Be-260 is stored and used at the Radiation Laboratory Calibration Facility. The exterior of the Facility is shielded by twenty-four inches of concrete. The source is stored when not in use in a fifteen gallon WEP-B filled drum which is located in an eight foot deep recessed source storage repository in the calibration area. The calibration area is equipped with a gamma radiation detector/alarm/warning system which is activated automatically in a 5 mrem/hr gamma field and manually activated during use of the MRC-Pu8Be-260 neutron calibration source. When the system is energized in one of these two ways, two blinking red lights are turned on in the passageway leading to the calibration area to warn personnel of exposure conditions. In addition, a radiologically posted entrance gate to the calibration area causes an audible alarm when opened. In accordance with local Operating Instructions, the detector/alarm system described above must be manually activated previous to the use of the source MRC-Pu8Be-260. Heat detector units are also installed in the Facility in the unlikely event of the occurrence of a fire. The source is handled using one of two six foot long remote handling devices. The recessed source storage repository, or source pit, is secured with a lock, and only authorized personnel have access to a key. The Calibration Facility itself is also secured with two more locks, thereby limiting access to personnel. The ability to obtain keys to these locks are restricted by the Radiological Control Department's Key Authorization System.

Personnel Monitoring

Neutron thermoluminescent dosimeters (albedo neutron dosimeters) are worn by all personnel using or handling the source described. These dosimeters (LiF), supplied by the U. S. Naval Medical Command (formerly the Bureau of Medicine and Surgery), are worn to determine whole body dose equivalent and are changed approximately twice per calendar quarter. Dosimetry calibrations and dose determinations are performed by the Naval Medical Command. Calcium Fluoride TLD's and pocket dosimeters are also worn as a matter of general practice so that other NRC licensed byproduct material sources may be utilized for other instrument calibrations.

Radiation Monitoring Devices

The following instrumentation is available for measuring neutron radiation:

> Tracerlab NP-2 Portable neutron monitors, calibrated from 0 - 2,000 mrem/hr. The instruments are calibrated twice a year using NBS traceable source MRC-Pu8Be-260. Electric Boat Division currently has in excess of ten of these instruments, and calibrates them in accordance with local Operating Instructions (OI 311).

Contamination Control and Accountability

Leak testing of the source is performed on a six month basis. Swipe samples are assayed for alpha activity using a zinc sulfide scintillation detector (Ludlum Model 43-2 alpha detector connected to a counter scaler) which is calibrated twice a year and before leak test analysis with an NBS traceable alpha source in accordance with local Operating Instructions (OI 305). An indication of activity exceeding 0.005 microcuries of alpha contamination would result in an immediate withdrawal of the sealed source from use, performance of decontamination measures, an investigation as to the cause of the activity, the performance of appropriate corrective measures, and notifications to applicable personnel and organizations. A return to an authorized vendor for repair or reclamation would follow decontamination actions outlined in local Operating Instructions. Tests for leakage and/or contamination shall be performed by E. T. Reimer, Jr., D. R. Prentice, or by other persons specifically authorized by the NRC to perform such services. Physical inventory of all licensed sources is performed quarterly.

Specification of Radiation Safety Responsibilities and Duties

The responsibility for the safe performance of licensed activities and adherence to NRC requirements lies with the Licensee management, in agreement with the NRC's position as outlined in NRC Information Notice No. 88-10, dated March 28, 1988, entitled, "Materials Licensees: Lack of Management Controls over Licensed Programs." The Electric Boat Division program for radiation safety regarding NRC licensed materials is separated into the following categories:

Specification of Radiation Safety Responsibilities and Duties
(Continued)

1. **Radiation Safety Officer (RSO):** Has day to day radiation safety responsibilities which include the granting or removal of authorization of individuals to use licensed byproduct or special nuclear material, the institution of measures to correct deficiencies, to help ensure that NRC regulations are faithfully adhered to, and to help ensure the security of sources. The RSO is also responsible for overseeing the Byproduct and Special Nuclear Material Qualification Program, interfacing with the NRC on license amendments, renewals, or other subjects, and to render health physics support in the event of an accident. The results of quarterly inventories and semiannual leak tests are be approved by the RSO.

2. **Radiological Control Department Manager (Dept. 438):** Supports and monitors the RSO and the rest of the Radiological Control staff to ensure they have adequate resources to do their assigned jobs and implement all radiation safety requirements. Radiological Control Management has ultimate responsibility for all NRC activities allowed by the license.

3. **Authorized Users of NRC Licensed Material:** Must be knowledgeable of and adhere to all provisions of NRC licenses, applicable regulations as set forth in the Code of Federal Regulations, and local Operating Instructions. In addition, they have the responsibility for ensuring the safe use of licensed materials by directly supervising the actions of technicians trained in the utilization of such material in instrument calibration.

4. **Supervisor of the Central Issue Point:** Responsible for the personnel dosimetry program, including the distribution and collection of thermoluminescent dosimeters, determination of whole body dose equivalent, and assignment of such doses to individual exposure records. Also has the responsibility for furnishing to the NRC, other institutions or companies, and individuals with information on personnel exposure histories or statistical reports of those exposures as required by applicable regulation. Has the responsibility to administratively bar personnel from receiving exposures in excess of local control levels. Provides source access control keys to authorized individuals and assures that the key authorization list is current.

Specification of Radiation Safety Responsibilities and Duties
(Continued)

5. **Superintendent of Radiological Control Operations:** Responsible for ensuring that periodic area radiation surveys are conducted in those areas where NRC licensed sources are stored or used, that source security checks are performed, and that radiological control operations involving transport of licensed material within the shipyard are performed in accordance with local Operating Instructions in a safe manner. Responsible for ensuring that swipe tests and surveys to measure radioactive leakage or contamination are performed upon receipt or shipout of licensed material. Responsible for radiological control operations support in the event of an incident.

6. **Radiological Control Administration Supervisor:** Responsible for the collection and maintenance of official memoranda and records such as leak test results, periodic physical inventories, radiation survey results, NRC licenses, etc.

7. **Radiological Stores Personnel:** Responsible for preparing radioactive material for shipout and handling the receipt of such materials into Electric Boat Division in accordance with applicable regulations.

The applicant and undersigned official executing this certificate on behalf of the applicant certifies that this application is prepared in conformity with Title 10, Code of Federal Regulations, Part 70, and that all information contained herein, including any supplement attached hereto, is true and correct to the best of our knowledge and belief.

By: S M Hirschberg

S. M. Hirschberg
Division Counsel

GENERAL DYNAMICS CORPORATION
Electric Boat Division

GENERAL DYNAMICS CORPORATION

Corporate Officers

Name and Address	Title	Citizenship
Stanley C. Pace Pierre Laclede Center St. Louis, MO 63105	Chairman and Chief Executive Officer	USA
Herbert F. Rogers Pierre Laclede Center St. Louis, MO 63105	President	USA
Ralph E. Hawes Valley Systems Division 11000 East Fourth Street Rancho Cucamonga, CA 91730	Executive Vice President - Missiles and Electronics	USA
Standley H. Hoch Pierre Laclede Center St. Louis, MO 63105	Executive Vice President - Finance	USA
James R. Mellor Pierre Laclede Center St. Louis, MO 63105	Executive Vice President - Marine, Land Systems and International	USA
Russell W. Meyer, Jr. Cessna Aircraft Company 5800 E. Pawnee Road Wichita, KS 67218	Executive Vice President Chairman - Cessna	USA
Frederick S. Wood Pierre Laclede Center St. Louis, MO 63105	Executive Vice President - Contracts, Pricing, & International Offset	USA
Charles A. Anderson Fort Worth Division General Dynamics Blvd. Fort Worth, TX 76108	Vice President and General Manager - Fort Worth	USA
Melville R. Barlow Electronics Division 5011 Kearny Villa Road San Diego, CA 92123	Vice President and General Manager - Electronics	USA

Name and Address	Title	Citizenship
Leonard F. Buchanan Pierre Laclede Center St. Louis, MO 63105	Vice President - Advanced Engineering and Business Development	USA
B. Edward Ewing Pierre Laclede Center St. Louis, MO 63105	Vice President - Operations and Production Engineering	USA
Michael C. Keel Valley Systems Division 11000 East Fourth Street Rancho Cucamonga, CA 91730	Vice President and General Manager - Valley Systems	USA
A. M. Lovelace Space Systems Division 5001 Kearny Villa Road San Diego, CA 92123	Vice President and General Manager - Space Systems Division	USA
John E. McSweeny Convair Division 5001 Kearny Villa Road San Diego, CA 92138	Vice President and General Manager - Convair	USA
Robert A. Morris Pierre Laclede Center St. Louis, MO 63105	Vice President - Communications	USA
William H. L. Mullins Washington Office 1745 Jefferson Davis Hwy. Suite 1000 Arlington, VA 22202	Vice President - Government Relations	USA
Arch A. Rambeau Pierre Laclede Center St. Louis, MO 63105	Vice President - Human Resources	USA
Sterling V. Starr Pomona Division 1675 West Mission Blvd. Pomona, CA 91766	Vice President and General Manager - Pomona	USA

Name and Address	Title	Citizenship
Fritz G. Tovar Electric Boat Division 75 Eastern Point Road Groton, CT 06340	Vice President and General Manager - Electric Boat Division	USA
Robert W. Truxell Land Systems Division 850 Stephenson Highway Suite 400 Troy, MI 48083	Vice President and General Manager - Land Systems Division	USA
David J. Wheaton Forth Worth Division General Dynamics Blvd. Forth Worth, TX 76105	Vice President - Program Development and Planning	USA
James J. Cunnane Pierre Laclede Center St. Louis, MO 63105	Vice President and Controller	USA
Robert H. Duesenberg Pierre Laclede Center St. Louis, MO 63105	Vice President and General Counsel	USA
C. Robert Stoker Pierre Laclede Center St. Louis, MO 63105	Vice President and Treasurer	USA
E. Alan Klobasa Pierre Laclede Center St. Louis, MO 63105	Corporate Secretary and Assistant General Counsel	USA

Byproduct and Special Nuclear Material

Qualification Program

Purpose: To provide training and qualification as required by Condition 12 of U. S. Nuclear Regulatory Commission Byproduct Materials License 06-01781-03 and Condition 11 of Special Nuclear Materials License SNM-205.

Applicability: All individuals not specifically listed on Materials Licenses 06-01781-03 or SNM-205 must successfully complete the Qualification Program and receive approval from the Radiation Protection Officer prior to using licensed sources without the direct supervision of qualified personnel.

General:

1. The Byproduct and Special Nuclear Material Qualification Program is divided into a number of modules to facilitate the training of personnel in using specific radioactive sources. Individuals successfully completing the modules listed under each source class described below, and obtaining approval from the Radiation Protection Officer, are qualified as responsible individuals to use sources under that particular class. This restriction is maintained by a key authorization list which limits access of source security keys.

2. Class A

   Personnel successfully completing training Modules I, II, III, and IV, or its equivalent, i.e., Calibration Facility Qualification Program, dated May 1983, shall have use of any licensed material listed on Materials Licenses 06-01781-03 and SNM-205, except the Kevex Model 9900 Energy Dispersive X-Ray Analyzer (Materials License 06-01781-03), which is a separate Class D authorization.

3. Class B

   Personnel successfully completing training Modules I, II, and III shall be limited in using solely the Eberline Instrument Corp. Model 1000 Multi-Source Gamma Calibrator (Materials License 06-01781-03).

Byproduct and Special Nuclear Material

Qualification Program (Continued)

General: (Continued)

4. Class C

Personnel successfully completing training Modules I, II, and V Qualification, shall be limited in using solely the check sources listed in Subitems 6F and 6(of Materials License 06-01781-03. Current qualification as a Radiological Control Monitor as outlined in 389-0288, "Radiological Controls for Shipyards", Article 108, is recognized as equivalent to the successful completion of Modules I and II.

5. Class D

Personnel successfully completing training Modules I, VI, and VII shall be limited in using solely the Kevex X-Site 9900 Energy Dispersive X-Ray Analyzer (Materials License 06-01731-03).

6. Qualified personnel in each class shall have at least the knowledge, understanding, and practical abilities as listed in this modular program of instruction and demonstrate these abilities in situations they might encounter during normal work and in emergency and nonroutine situations. All qualification training shall be for an eighteen-month period. Requalification will consist of successfully completing the following practical factor modules for each class, have a current TLD Qualification (Module I), and obtain approval from the Radiation Protection Officer. All requalifications of responsible users are to be witnessed and certified by those personnel individually named in Materials Licenses SNM-205 and 06-01781-03 as authorized users.

Class	Requalification Module
A	III and IV
B	III
C	V
D	VII

Byproduct and Special Nuclear Material

Qualification Program (Continued)

General: (Continued)

7. Individuals who fail to successfully complete all requalifications for their user class before qualifications expiration will lose authorization to handle NRC licensed material. Requalification after this time will require proof of current TLD Module I qualification, successful completion of Module II, and the performance of applicable practical factor modules for the appropriate user class, unless specifically exempted by the Radiation Protection Officer.

8. Random retention tests and/or practical factor modules may be given to any individual trained as a responsible user of NRC licensed material at any time during his/her current qualification. Failure to successfully complete a retention test or practical factor module will result in the immediate loss of qualification. Requalification after this time will be as that outlined in General, paragraph 7 above.

Module Descriptions

Module I: TLD Qualification

This module qualifies an individual to work in a radiation area. The basic program is 22 hours; requalification is for 16 hours every 18 months.

1. Basic Radioactivity Definitions
2. Occupational Exposure Control Levels and Limits
3. Exposure Control Devices: Dosimeters
4. Administrative Exposure Tracking
5. Time, Distance, and Shielding
6. Radiation Sources
7. Radioactive Contamination and Control
8. Controlled Areas: Monitoring
9. Controlled Areas: Emergency Procedures
10. Radiological Posting

Module Descriptions (Continued)

Module II: Radiation Safety Fundamentals

This module provides 40 hours of course work as required for responsible individuals Class A, B, and C qualification.

1. Mathematics Review

   Algebra, logarithms, and exponential functions.

2. Physics Review

   Atomic structure; electrons, protons, and neutrons; chart of the nuclides; nuclear forces, models.

3. Radioactivity and Radioactive Decay

   Alpha, beta, gamma, and X-ray radiation; decay chains; radiation interaction with matter; range of radiation in matter; activity; specific activity; half-life; decay equations.

4. Radiation Detection and Measurement

   Radiation quantities and units; correlation of units of activity and gamma exposure rate; radiation shielding and inverse square law; radiation detection instrument theory; circuits, ionization chamber detectors, scintillation detectors, neutron detectors, direct reading dosimeters, thermoluminescent dosimeters.

5. Biological Effects of Radiation

   Acute whole body exposure; nonstochastic effects; genetic effects; chronic effects, carcinogenesis, risk.

6. Radiation Protection Principles

   Time, distance, and shielding; radiation limits and guides, ICRP, NCRP, and Code of Federal Regulations; in-house procedures; contamination and its control, ALARA; radiological posting, surveys and monitoring.

Module Descriptions (Continued)

Module II: Radiation Safety Fundamentals (Continued)

7. Emergency Preparedness

Radiological emergency plan; evacuation routes and procedures; communications; the responsible individual's role in an emergency.

8. Byproduct and Special Nuclear Material

Review of Materials Licenses 06-01781-03 and SNM-205; radiation detection instrument operation; calibration facilities walk-through; use and identification of radioactive material.

9. Review

Successful completion of this course is achieved by passing a written examination reviewed by the Radiation Protection Officer or his designate.

Module Descriptions (Continued)

Module III: South Yard Calibration Facility Practical Factors

This module requires successful completion of demonstration of the ability to properly operate the Eberline Instrument Corporation Model 1000 Multi-Source Gamma Calibrator by observing all radiological safety practices (Materials License 06-01781-03).

1. Demonstrate knowledge of source accountability (log out and in).

2. Demonstrate the proper use of dosimetry.

3. Demonstrate proper security of area and sources.

4. Demonstrate proper posting procedures while using the sources.

5. Demonstrate proper response to unusual situations.

Module Descriptions (Continued)

Module IV: North Yard Calibration Facility Practical Factors

This module requires successful completion of demonstration of the ability to properly use sources stored at the North Yard Calibration Facility by observing all radiological safety practices (Materials Licenses SNM-205 and 06-01761-03).

1. Demonstrate safe handling of sources using remote handling tools.

2. Demonstrate knowledge of source accountability (log out and in).

3. Demonstrate the proper use of dosimetry.

4. Demonstrate proper security of area and sources.

5. Demonstrate proper posting procedures while using the sources.

6. Demonstrate proper response to unusual situations.

Module Descriptions (Continued)

Module V: Sea Trial Check Source Practical Factors

This module requires successful completion of the demonstration of the ability to properly source check instruments with the sources listed on Byproduct Materials License 06-01731-03 subitems 6F and 6G and source security procedures while observing all radiological safety practices.

1. Demonstrate geometrical configuration of source and instrument for source checks.

2. Demonstrate knowledge of source security during sea trials and other uses.

3. Demonstrate proper use of dosimetry.

4. Demonstrate knowledge of source accountability (log out and in).

5. Demonstrate proper response to unusual situations.

Module Descriptions (Continued)

Module VI: Kevex X-Site 9900 Radiation Safety Course

This module provides radiation safety instruction for operators of the Kevex X-Site 9900 Energy Dispersive X-Ray Analyzer and is 20 hours in duration (Materials License 06-01781-03).

I. **Radiation**

A. Radiation - Define:

1. Decay
2. Half-Life
3. Types of Radiation:
   a. Particulate:
      1) Alpha
      2) Beta
      3) Neutron
   b. Electromagnetic (X and Gamma):
      1) Origin
      2) Characteristics
4. Units of Radiation Dose:
   a. Roentgen
   b. Rad
   c. Rem
   d. Dose vs. Dose Rate
   e. Subunits
   f. Quality Factors

Module Descriptions (Continued)

Module VI: Kevex X-Site 9900 Radiation Safety Course (Continued)

I. **Radiation** (Continued)

A. Radiation - Define (Continued)

5. Curie - Define

a. As a unit of quantity

b. Intensity and distance relationship

6. Exposure Control:

a. Time

b. Distance

c. Shielding

7. Radiation Limits:

a. Natural Background and Medical Exposure

b. 10 CFR 20 Limits

B. Biological Effects:

1. Effects of ionization in tissue

2. Extremities and whole body exposure

3. Effects and levels of acute exposure

4. Radiation Sickness

5. Fetus and embryo suggested limits

6. Somatic versus genetic effects

7. Acute versus chronic dose

Module Descriptions (Continued)

Module VI: Kevex X-Site 9900 Radiation Safety Course (Continued)

II. **Radiation Detection**

A. Principles of Radiation Detection and Measurement

1. Personal Dosimetry

a. Thermoluminescent Dosimeter (TLD)

III. **Radiation Mathematics - Using the Inverse Square Law**

IV. **Pertinent Federal Regulations**

A. Code of Federal Regulations Rules and Regulations for the Control of Radiation

1. 10 CFR 19, 10 CFR 20, and other applicable parts

B. Operating and Emergency Procedures

1. Notification of Personnel

2. Conditions and Limitations of License

V. **Final Written Examination**

Successful completion of this course is achieved by passing a written examination reviewed by the Radiation Protection Officer or his designee.

Module Descriptions (Continued)

Module VII: Kevex X-Site 9900 Practical Factors

This module requires successful completion of demonstration of the ability to properly operate the Kevex X-Site 9900 in accordance with the manufacturer's User's Manual and radiological safety practices (Materials License 06-01781-03).

1. Demonstrate procedures for the operation of the Kevex X-Site 9900.

2. Demonstrate the knowledge of source accountability (log out and in).

3. Demonstrate the proper use of dosimetry.

4. Demonstrate proper security of area and Kevex X-Site.

5. Demonstrate proper response to unusual situations.

BETWEEN:

LICENSE FEE MANAGEMENT BRANCH, ARM
AND
REGIONAL LICENSING SECTIONS

(FOR LFMS USE)
INFORMATION FROM LTS

PROGRAM CODE: 22120
STATUS CODE: 2
FEE CATEGORY: ~~1D~~ 1K - entered 7/88
EXP. DATE: 19880731
FEE COMMENTS: _____

LICENSE FEE TRANSMITTAL

A. REGION 1

1. APPLICATION ATTACHED
APPLICANT/LICENSEE: GENERAL DYNAMICS CORPORATION
RECEIVED DATE: 880627
DOCKET NO: 7000221
CONTROL NO.: 109130
LICENSE NO.: SNM-205
ACTION TYPE: RENEWAL

2. FEE ATTACHED
AMOUNT: 350.00
CHECK NO.: 29150

3. COMMENTS

SIGNED BP
DATE 6/30/88

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

1. FEE CATEGORY AND AMOUNT: ~~1D~~ 1K $350

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

3. OTHER _____
_____

SIGNED S. Kimberly
DATE 7/1/88