

U. S. NUCLEAR REGULATORY COMMISSION
MATERIALS LICENSE

This Copy Is For Your Files

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-433) and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purposes(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s); and to import such byproduct and source material. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee		
1. TRI-STATE INSPECTION & CONSULTANTS, INC.		3. License number 37-19640-01
2. P. O. Box 222 Coraopolis, Pennsylvania 15108		4. Expiration date October 31, 1986
		5. Docket or Reference No.
6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. See Condition 10	A. Sealed Sources	A. See Condition 10
9. Authorized use		
A. For use in industrial radiography.		

CONDITIONS

10. Sealed Sources, Exposure Devices and Source Changers authorized for use are as follows:

<u>Isotope</u>	<u>Manufacturer & Model No. of Source Assemblies</u>	<u>Maximum Activity per Source</u>	<u>Manufacturer & Model No. of Exposure devices</u>	<u>Manufacturer & Model No. of Source changers</u>
Iridium 192	Technical Operations A-424-1	100 curies	Technical Operations 533	Technical 414 or 650
Iridium 192	Gamma Industries T-1-T, T-1-A, or T-1-G	100 curies	Technical Operations 533	Gamma Industries C-10
Iridium 192	Technical Operations A-424-9	100 curies	Technical Operations 660	Technical Operations 414 or 650

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REG1 LIC30
37-19640-01 PDR

MATERIALS LICENSE

Supplementary Sheet

License Number 37-19640-01

Docket or
Reference No. _____

10. conditnued

<u>Isotope</u>	<u>Manufacturer & Model No. of Source Assemblies</u>	<u>Maximum Activity per Source</u>	<u>Manufacturer & Model No. of Exposure devices</u>	<u>Manufacturer & Model No. of Source changers</u>
Iridium 192	Gamma Industries T-3-T	100 curies	Technical Operations 660	Gamma Industries C-10
Iridium 192	Gamma Industries GP	100 curies	Gamma Industries Pipeliner #1	NONE
Cobalt 60	Gamma Industries A-7-A	20 curies	Gamma Industries Gammatron 20A	Gamma Industries C-8
Cobalt 60	Gamma Industries A-6-A or A-6-G	10 curies	Gamma Industries Gammatron 10A	Gamma Industries C-8

11. Licensed material may be stored at the licensee's facilities located at the corner of Island Avenue and Boquett Street, McKees Rocks, Pennsylvania and may be used at temporary job sites of the licensee anywhere in the United States where the U. S. Nuclear Regulatory Commission maintains jurisdiction for regulating the use of licensed material.
12. Licensed material shall be used by, or under the supervision of, Alfred J. Mueller, Michael H. Stiger or individuals who have completed the training described in application dated January 17, 1981 and letter dated October 5, 1981.
13. The licensee shall comply with the provisions of Title 10, Chapter 1, Code of Federal Regulations, Part 19, "Notices, Instructions and Reports to Workers; Inspections," Part 20, "Standards for Protection Against Radiation," and Part 34, "Licenses for Radiography and Radiation Safety Requirements for Radiographic Operations."
14. A. Pursuant to Section 34.25, 10 CFR 34, the licensee is authorized to perform tests for leakage or contamination of the sealed sources authorized by this license in accordance with procedures contained in application dated January 17, 1981 and letter dated October 5, 1981.
- B. Notwithstanding the periodic leak test required by Section 34.25(b), 10 CFR 34, such requirement does not apply to radiography sources that are stored and not being used. The sources excepted from this test shall be tested for leakage prior to any use or transfer to another person unless they have been leak tested within six months prior to the date of use or transfer.
15. The licensee is authorized to receive, possess, and use sealed sources of Iridium 192 or Cobalt 60 where the radioactivity exceeds the maximum amount of radioactivity specified in Item 8 of this license provided:

MATERIALS LICENSE

Supplementary Sheet

License Number 37-19640-01

Docket or

Reference No. _____

15. continued

- A. Such possession does not exceed the quantity per source specified in Item 8 by more than 20% for Iridium 192 or 10% for Cobalt 60;
- B. Records of the licensee show that no more than the maximum amount of radioactivity per source specified in Item 8 of the license was ordered from the supplier or transferor of the byproduct material; and
- C. The levels of radiation for radiographic exposure devices and storage containers do not exceed those specified in Section 34.21, 10 CFR 34.
16. Pursuant to Title 10, Chapter 1, Code of Federal Regulations, Part 40, "Domestic Licensing of Source Material," the licensee is authorized to possess, use, transfer, and import up to 999 kilograms of uranium contained as shielding material in the radiography exposure devices and source changers authorized by this license.
17. The licensee may transport licensed material or deliver licensed material to a carrier for transport in accordance with the provisions of Title 10, Code of Federal Regulations, Part 71, "Packaging of Radioactive Material for Transport and Transportation of Radioactive Material Under Certain Conditions."
18. Except as specifically provided otherwise by this license, the licensee shall possess and use licensed material described in Items 6, 7, and 8 of this license in accordance with statements, representations, and procedures contained in application dated January 17, 1981 and letter dated October 5, 1981. The Nuclear Regulatory Commission's regulations shall govern the licensee's statements in applications or letters, unless the statements are more restrictive than the regulations.

NOV 24 1981

Date _____

For the U. S. Nuclear Regulatory Commission

by Paul R. Quinn
Material Licensing Branch

B.4

Division of Fuel Cycle and
Material Safety
Washington, D.C. 20555

APPENDIX C

AGREEMENT STATES

RADIATION SAFETY MANUAL

APPENDIX C1.0 GENERAL1.1 Agreement States

1.1.1 Agreement States are states that have entered into an agreement with the United States Nuclear Regulatory Commission and have accepted regulatory authority over by-product materials within their respective state.

1.1.2 TSI&C may perform industrial radiography in an agreement state under our USNRC License for a certain period of time through reciprocity as specified by that specific State Regulation. Should radiographic activities exceed the reciprocity time period, TSI&C would be required to make application for a Radioactive Materials License in that state.

1.1.3 Agreement states require a "written notification" Prior to entering the state with radioactive material, even though we may have a Radioactive Material License in that state.

1.1.4 The following attachment, as published by the NRC, lists the Agreement States.

2.0 RESPONSIBILITIES

2.1 The RSO or ARSO shall be responsible for notifying agreement states prior to entering with radioactive material.

2.2 The Radiation Safety Officer shall be responsible for obtaining Radioactive Material Licenses with states as required.

April 21, 1986

AGREEMENT STATES

Became an
Agreement State
On-

10/1/66

Alabama 205-261-5313

Mr. Aubrey Godwin, Chief
Bureau of Radiological Health
Environmental Health Adminis.
Room 314, State Office Building
Montgomery, Alabama 36130

5/15/67

Arizona 602-255-4845

Mr. Charles F. Tedford, Director
Arizona Radiation Regulatory Agency
4814 South 40th Street
Phoenix, Arizona 85040

7/1/63

Arkansas 501-661-2301

Mr. Frank Wilson, Director
Div. of Radiation Control and
Emergency Management
Arkansas Dept. of Health
4015 West Markham
Little Rock, Arkansas 72205-3867

9/1/62

California 916-445-0931
Licensing & Inspection

Mr. Joe Ward, Chief - 916-322-2073
Radiologic Health Section
Department of Health
714 P Street, Room 498
Sacramento, California 95814

2/1/68

Colorado 303-320-8333
Ext. 6246

Amended
4/20/82

Mr. Albert J. Hazle, Director
Radiation Control Division
Office of Health Protection
Department of Public Health
4210 East 11th Avenue
Denver, Colorado 80220

7/1/64

Florida 904-487-1004

Lyle E. Jerrett, Ph.D., Director
Office of Radiation Control
Dept. of Health & Rehabilitative
Service
1323 Winewood Blvd.
Tallahassee, Florida 32301

12/15/69

Georgia 404-894-7610

Bobby G. Rutledge, Director
Radiological Health Section
Department of Human Resources
Room 600
878 Peachtree Street
Atlanta, Georgia 30309

10/1/68

Idaho 208-334-4107

Mr. Robert Funderburg, Supervisor
Radiation Control Section
Idaho Department of Health
and Welfare
Statehouse
Boise, Idaho 83720

1/1/86

Iowa 515-281-4928

Mr. John A. Eure, Director
Environmental Health Section
Iowa Department of Health
Lucas State Office Building
Des Moines, Iowa 50319

1/1/65

Kansas 913-862-9360 Ext. 284

Mr. David Ramono, Manager
Bureau of Air Quality and Radiation
Control
Dept. of Health & Environment
Building 740, Forbes Field
Topeka, Kansas 66620

3/26/62

Kentucky 502-564-3700

Mr. Donald Hughes, Manager
Radiation Control Branch
Dept. of Health Services
Cabinet for Human Resources
275 East Main Street
Frankfort, Kentucky 40621

5/1/67

Louisiana

504-925-4518
FTS-687-0598

Mr. William H. Spell, Administrator
Nuclear Energy Division
Office of Air Quality & Nuclear
Energy
P. O. Box 14690
Baton Rouge, Louisiana 70898

1/1/71

Maryland

301-225-6984

Mr. Robert E. Corcoran, Chief
Division of Radiation Control
Dept. of Health and Mental Hygiene -
201 W. Preston Street
Baltimore, Maryland 21201

7/1/62

Mississippi

601-354-6657/6670

Mr. Eddie S. Fuente, Director
Division of Radiological Health
State Board of Health
Felix J. Underwood Building
2423 North State Street
P. O. Box 1700
Jackson, Mississippi 39205

10/1/66

Nebraska

402-471-2168

Mr. Harold Borchert, Director
Division of Radiological Health
State Department of Health
301 Centennial Mall South
P. O. Box 95007
Lincoln, Nebraska 68509

7/1/72

Nevada

702-885-5394

Mr. John Vaden, Supervisor
Radiological Health
Consumer Health Protection Services
Room 103 Kinkead Bldg.
Capitol Complex
Carson City, Nevada 89710

5/16/66

New Hampshire

603-271-4587

Ms. Diane Tefft, Program Manager
Radiological Health Program
Bureau of Environmental Health
Division of Health Services
Health & Welfare Bldg., Hazen Drive
Concord, New Hampshire 03301

5/1/74

New Mexico 505-827-2939

Mr. Michael Brown, Acting Chief
Radiation Protection Bureau
Environmental Improvement Div.
Department of Health and Environment
P. O. Box 968
Santa Fe, New Mexico 87504-0968

10/15/62

New York 518-474-2178
3-1986
474-2178

Mr. Jay Dunkleberger, Director
Bureau of Nuclear Operation
New York State Energy Office
Agency Building 2
2 Rockefeller Plaza
Albany, New York 12223

8/1/64

North Carolina 919-733-4283

Mr. Dayne H. Brown, Chief
Radiation Protection Section
Division of Facility Service
701 Barbour Drive
Raleigh, North Carolina 27603

9/1/69

North Dakota 701-224-2348

Mr. Dana Mount, Director
Div. of Environmental Engineering
Radiological Health Program
State Department of Health
1200 Missouri Avenue
Bismarck, North Dakota 58501

7/1/65

Oregon 503-229-5797

Mr. Ray Paris, Manager
Radiation Control Section
Dept. of Human Resources
1400 South West Fifth Avenue
Portland, Oregon 97201

1/1/80

Rhode Island 401-277-2438

Mr. James E. Hickey, Chief
Div. of Occupational Health
and Radiation Control
Rhode Island Dept. of Health
Cannon Building
75 Davis Street
Providence, Rhode Island 02908

9/15/69

South Carolina 803-758-5548

Mr. Heyward Shealy, Chief
Bureau of Radiological Health
State Department of Health and
Environmental Control
J. Marion Sims Building
2600 Bull Street
Columbia, South Carolina 29201

9/1/65

Tennessee 615-741-7812

Mr. Michael H. Mobley, Director
Division of Radiological Health
Department of Public Health
Cordell Hull State Office Building
Nashville, Tennessee 37219

3/1/63

Texas 512-835-7000

Mr. David K. Lacker, Chief
Bureau of Radiation Control
Texas Department of Health
1100 W. 49th Street (mail only)
Austin, Texas 78756

Amended
3/24/82

4/1/84

Utah 801-538-6734

Mr. Larry Anderson, Director
Bureau of Radiation Control
State Department of Health
State Office Building
Box 16700
Salt Lake City, Utah 84116-0700

12/31/66

Washington 206-753-3459

Mr. Terry R. Strong, Head
Radiation Control Section
Department of Social and Health
Services
Mail Stop LF-13
Aindustrial Park
Olympia, Washington 98504

Amended
2/19/82

RADIATION SAFETY MANUAL

APPENDIX D

NRC FORMS:

NRC Form 3

NRC Form 4

NRC Form 5

NOTICE TO EMPLOYEES NRC-3

UNITED STATES NUCLEAR REGULATORY COMMISSION
Washington, D.C. 20555

NOTICE TO EMPLOYEES

STANDARD FOR PROTECTION AGAINST RADIATION PART III: NOTICE, INSTRUCTIONS AND
REPORTS TO WORKERS INSPECTIONS PART III: EMPLOYEE PROTECTION



WHAT IS THE NUCLEAR REGULATORY COMMISSION?

The Nuclear Regulatory Commission is an independent Federal regulatory agency established by Congress to regulate the use of nuclear energy and to protect the public health, safety, and environment from the hazards of radiation.

WHAT DOES THE NRC DO?

The NRC's primary responsibility is to ensure that nuclear power is used safely and that the public is protected from the hazards of radiation. The NRC also regulates the use of nuclear energy for other purposes, such as research and development, and the use of nuclear materials for non-energy purposes.

WHAT RESPONSIBILITY DOES MY EMPLOYER HAVE?

Any company that conducts activities regulated by the NRC must comply with the NRC's regulations. The NRC's regulations are designed to ensure that nuclear energy is used safely and that the public is protected from the hazards of radiation.

WHAT IS MY RESPONSIBILITY?

You, as an employee, are responsible for following the NRC's regulations and for reporting any violations to the NRC. You are also responsible for ensuring that you and your fellow employees are protected from the hazards of radiation.

HOW DO I REPORT VIOLATIONS?

If you believe that a violation of the NRC's regulations has occurred, you should report it to the NRC as soon as possible. You can report a violation by calling the NRC's toll-free hotline or by writing to the NRC's Office of Enforcement.

WHAT IF I WORK IN A RADIATION AREA?

If you work in a radiation area, you must follow the NRC's regulations and must wear the appropriate protective equipment. You must also be trained in the proper use of this equipment and in the proper handling of radioactive materials.

WHAT IF I TALK WITH AN NRC INSPECTOR?

If an NRC inspector visits your facility, you should cooperate with the inspector and provide all the information requested. You should also ensure that the inspector is given access to all the areas and personnel necessary for the inspection.

WHAT IF I REQUEST AN INSPECTION?

If you believe that a violation of the NRC's regulations has occurred, you can request an inspection from the NRC. You should provide the NRC with as much information as possible about the alleged violation.

WHAT FORMS OF DISCRIMINATION ARE PROHIBITED?

No employer may discriminate against an employee on the basis of race, color, sex, religion, or national origin. This prohibition applies to all employers, regardless of the size of the company.

HOW AM I PROTECTED FROM DISCRIMINATION?

The NRC's regulations provide that any employee who reports a violation of the NRC's regulations or who participates in an investigation of such a violation is protected from discrimination. This protection applies to all employees, regardless of their position or status.

CAN I BE FIRED FOR TALKING TO THE NRC?

No. You cannot be fired for talking to the NRC. The NRC's regulations provide that any employee who reports a violation of the NRC's regulations or who participates in an investigation of such a violation is protected from discrimination. This protection applies to all employees, regardless of their position or status.

WHAT CAN THE EMPLOYER DO?

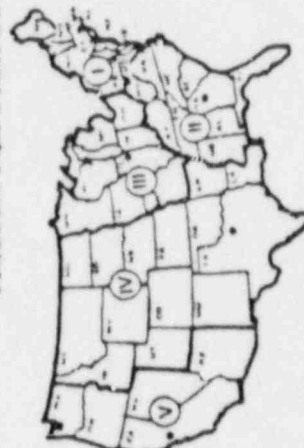
The employer must ensure that the employee is protected from discrimination and that the employee is given the opportunity to report a violation of the NRC's regulations without fear of retaliation.

WHAT WILL THE NRC DO?

The NRC will investigate any report of a violation of the NRC's regulations and will take appropriate action if a violation is found. The NRC will also ensure that the employee who reported the violation is protected from discrimination.

UNITED STATES NUCLEAR REGULATORY COMMISSION REGIONAL OFFICE LOCATIONS

A representative of the Nuclear Regulatory Commission can be contacted at the following address and telephone numbers. The Regional Office will accept written complaints with employees who wish to report violations of the NRC's regulations and to request an inspection.



REGION	ADDRESS	TELEPHONE
1	U.S. Nuclear Regulatory Commission 1215 22nd Avenue Boulder, Colorado 80502	303 440-1000
2	U.S. Nuclear Regulatory Commission 1000 North 17th Street Albuquerque, New Mexico 87102	505 271-4000
3	U.S. Nuclear Regulatory Commission 1000 North 17th Street Albuquerque, New Mexico 87102	505 271-4000
4	U.S. Nuclear Regulatory Commission 1000 North 17th Street Albuquerque, New Mexico 87102	505 271-4000
5	U.S. Nuclear Regulatory Commission 1000 North 17th Street Albuquerque, New Mexico 87102	505 271-4000

NRC FORM 3
9-84

RADIATION SAFETY MANUAL

OCCUPATIONAL EXTERNAL RADIATION EXPOSURE HISTORY NRC-4

NRC Form 4
(12-4-77)
18 CFR 23

U. S. NUCLEAR REGULATORY COMMISSION

Approved by: DRI
7/60-000
Revised 4-80-80

OCCUPATIONAL EXTERNAL RADIATION EXPOSURE HISTORY

See Instructions on the Back

IDENTIFICATION

1 NAME (PRINT - LAST, FIRST, AND MIDDLE)	2 SOCIAL SECURITY NO.
3 DATE OF BIRTH (MONTH, DAY, YEAR)	4 AGE IN FULL YEARS (N)

OCCUPATIONAL EXPOSURE - PREVIOUS HISTORY

5 PREVIOUS EMPLOYMENTS INVOLVING RADIATION EXPOSURE - LIST NAME AND ADDRESS OF EMPLOYER	6 DATES OF EMPLOYMENT (FROM - TO)	7 PERIODS OF EXPOSURE	8 WHOLE BODY (REM)	9 RECORD OF CALCULATED (INSERT ONE)

10 REMARKS	11 ACCUMULATED OCCUPATIONAL DOSE - TOTAL
------------	--

13 CALCULATIONS - PERMISSIBLE DOSE WHOLE BODY

- (A) PERMISSIBLE ACCUMULATED DOSE = 5 IN - 18 REM
- (B) TOTAL EXPOSURE TO DATE (FROM ITEM 11) REM
- (C) UNUSED PART OF PERMISSIBLE ACCUMULATED DOSE (A-B) REM

12 CERTIFICATION: I CERTIFY THAT THE EXPOSURE HISTORY LISTED IN COLUMNS 5, 6, AND 7 IS CORRECT AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

EMPLOYEE'S SIGNATURE _____ DATE _____

14 NAME OF LICENSEE _____

RADIATION SAFETY MANUAL

CURRENT OCCUPATIONAL EXTERNAL RADIATION EXPOSURE NRC-5

NRC Form 5
(10-81)
16 CFR 70

U.S. NUCLEAR REGULATORY COMMISSION

Approved by OMB
7158-0014

CURRENT OCCUPATIONAL EXTERNAL RADIATION EXPOSURE

See Instructions on Back

IDENTIFICATION

1 NAME (PRINT - Last, first and middle)		2 SOCIAL SECURITY NO.	
3 DATE OF BIRTH (Month, day, year)		4 NAME OF LICENSEE	
5 DOSE RECORDED FOR (Specify: Whole body, skin of whole body, or hands and forearms, feet and ankles)		6 WHOLE BODY DOSE STATUS (rem)	
		7 METHOD OF MONITORING (e.g. Film Badge - Pb Pocket Chamber - PC Calculations - Calc.) X OF GAMMA _____ BETA _____ NEUTRONS _____	

8 PERIOD OF EXPOSURE (From - To)	DOSE FOR THE PERIOD (rem)				12 RUNNING TOTAL FOR CALENDAR QUARTER (rem)
	9 X OF GAMMA	10 BETA	11 NEUTRON	12 TOTAL	

LIFETIME ACCUMULATED DOSE

13 PREVIOUS TOTAL (rem)	14 TOTAL QUARTERLY DOSE (rem)	15 TOTAL ACCUMULATED DOSE (rem)	16 PERM. ALL DOSE IN 18 (rem)	17 UNLTD PART OF PERM. ALL ACCUMULATED DOSE (rem)

RADIATION SAFETY MANUAL

APPENDIX E

RADIATION SAFETY MANUAL

GLOSSARY

AGREEMENT STATE	A state which has accepted regulatory authority over by-product material from the USNRC.
ALPHA PARTICLE	A positively charged particle emitted by certain radioactive materials. It is made up of two (2) neutrons and two (2) protons, hence it is identical to the nucleus of a helium atom.
ASSISTANT RADIATION SAFETY OFFICER	An individual appointed by the Radiation Safety Officer to be responsible for the Administration of the Company's Radiation Safety Program in his respective area.
ATOM	A particle of matter indivisible by chemical means. It is the fundamental building block of chemical elements.
ATOM NUMBER	Denotes the number of protons in the nucleus, the number of positive charges in the nucleus, and the number of orbiting electrons.
AUTHORIZED PERSONNEL	As used in this part means personnel qualified as radiographers and radiographer's assistants in accordance with USNRC 10CFR Part 34 or applicable licensed state regulations.
BACKSCATTER	Radiation scattered from the floor, walls, equipment, and other items in the area of a radiation source.
BETA PARTICLE (Beta Ray)	An elementary particle emitted from a nucleus during radioactive decay. It has a single electrical charge and a mass equal to 1/1840 that of a proton. Beta particles are easily stopped by a thin sheet of metal. A negatively charged beta particle is physically identical to the electron. If the beta particle is positively charged, it is called a positron. Beta radiation may cause skin burns, and beta emitters are harmful if inhaled or ingested.

RADIATION SAFETY MANUAL

BY-PRODUCT MATERIAL

In atomic energy law, any radioactive material (except source or fissionable material) obtained in the process of producing or using source or fissionable material. Includes fission products and many other radioisotopes produced in nuclear reactors.

CALIBRATION

As used in this part means to check the accuracy of radiation measuring instruments against a known standard and correct as required.

CESIUM-137

A radioisotope of the element Cesium.

COBALT-60

A radioisotope of the element Cobalt.

COLLIMATOR

A beam shaping device which utilizes shielding material to restrict the direction in which radiation is emitted.

COMPTON SCATTERING

A process in which a photon transfers a portion of its energy to an orbital electron in matter and a lower energy photon is scattered at an angle to the original photon path.

CONTAMINATION

The presence of unwanted radioactive material, or the "soiling" of objects or materials with "radioactive dirt".

CURIE

The basic unit used to describe the intensity of radioactivity in a sample of material. One (1) curies equals 37 billion disintegrations per second, or approximately the radioactivity of (1) gram of Radium.

DECAY

The spontaneous radioactive transformation of one (1) nuclide into a different energy state of the same nuclide. Every decay process has a definite half-life (See HALF-LIFE).

DECONTAMINATION

The removal of radioactive contaminants from surface, as by cleaning and washing with chemicals.

DOSE

The amount of ionizing radiation energy absorbed per unit mass of irradiated material at a specific location; such as, a part of the human body. Measured in rems and rads.

RADIATION SAFETY MANUAL

DOSE RATE	The radiation does delivered per unit time and measured, for instance, in rems per hour. (See DOSE.)
DOSIMETER	A device that measures radiation dose. It contains an ionization chamber.
DOSIMETER CHARGER	A device used to charge a dosimeter.
ELECTROMAGNETIC RADIATION	Radiation consisting or electric and magnetic waves that travel at the "speed of light". Examples: light, radiowaves, gamma rays, x-rays. All can be transmitted through a vacuum.
ELECTRON	An elementary particle with a unit negative electrical charge and a mass 1/1840 that of the proton. Electrons surround the atom's positively charged nucleus and determines the atom's chemical properties.
ELEMENT	One of the 104 known chemical substances that cannot be divided into simpler substances by chemical means. Examples: Hydrogen, Lead, Uranium.
EMERGENCY PROCEDURE	Procedure to be followed by Radiographers and Radiographer's Assistants in the event of an accident, equipment malfunction or uncontrolled condition which happens while engaging in radiographic activities.
ENCAPSULATION	The process of sealing radioactive materials to prevent contamination.
EXPOSURE	Radiation intensity multiplied by time.
FILM BADGE	A package of photographic film worn like a badge by workers in the nuclear industry to measure exposure to ionizing radiation. The absorbed dose can be calculated by the degree of film darkening caused by the irradiation.

RADIATION SAFETY MANUAL

GAMMA RAYS

High-energy short-wavelength electromagnetic radiation emitted by a nucleus. Energies of gamma rays are usually between 0.010 and 10 Mev. X-rays also occur in this energy range, but are not of nuclear origin. Gamma radiation usually accompanies alpha and beta emissions and always accompanies fission. Gamma rays are very penetrating and are best attenuated by dense materials like lead and depleted uranium.

GEIGER COUNTER

Radiation detection and measuring instrument. It contains a gas-filled tube which discharges electrically when ionizing radiation passes through it. Discharges are counted to measure the radiation's intensity.

GENETIC EFFECTS OF RADIATION

Effects that produce changes in those cells of organisms which give rise to egg or sperm cells and therefore affect offspring of the exposed individuals.

GOVERNMENT AGENCY

Means any Executive Department, Commission, Independent Establishment, Corporation, Wholly or Partly Owned by the United States of America, which is an instrumentality of the United States, or any Board, Bureau, Division, Service, Office, Officer, Authority, Administration, or other Establishment in the Executive Branch of the Government.

HALF-LIFE

The time in which half the atoms in a radioactive substance disintegrate. Half-lives vary from millionths of a second to billions of years.

HALF-LIFE, BIOLOGICAL

The time required for a biological system, such as a man or an animal, to eliminate by natural processes, half the amount of a substance which has entered it.

HALF-LIFE LAYER

Is that thickness of material required to absorb one-half of the impinging radiation.

HIGH RADIATION AREA

Means any area accessible to personnel in which there exists radiation originating in whole or in part within licensed material at such levels that a major portion of the body could receive an any one (1) hours a dose in excess of 100 millirem.

RADIATION SAFETY MANUAL

HOT CELLS	A heavily shielded enclosure in which radioactive materials can be handled remotely through the use of manipulators and viewed through shielded windows so that there is no danger to personnel.
INDUCED RADIOACTIVITY	Radioactivity that is created by bombarding a substance with neutrons is a reactor or with charged particles produced by particle accelerators.
INVERSE SQUARE LAW	(At a distance from a point source.) The intensity of radiation received varies as the inverse square of the distance of the source.
ION	An atom or molecule that has lost or gained one or more electrons. By such "ionization" it becomes electrically charged.
IONIZATION	The process of adding electrons to, or knocking electrons from, atoms or molecules, thereby creating ions. High temperatures, electrical discharges, and nuclear radiation can cause ionization.
IONIZATION CHAMBER	An instrument that detects and measures ionizing radiation by observing the electrical current created when radiation ionizes gas in the chamber, making it a conductor of electricity.
IONIZING RADIATION	Any radiation that directly or indirectly displaces electrons from the orbital shell of atoms. Examples: Alpha, Beta, Gamma Radiation.
IRIDIUM-192	A radioisotope of the element Iridium.
ISOTOPE	Atoms with the same atomic number (same chemical element) but different atomic weights. An equivalent statement is that the nuclei have the same number of protons but different numbers of neutrons. Thus, ^{13}C and ^{14}C are isotopes of the element carbon, the subscripts denoting their common atomic numbers, the superscripts denoting the varying atomic weights.
LEAK TEST	A test on sealed sources to assure that radioactive material is not being released.

RADIATION SAFETY MANUAL

LICENSED MATERIAL	Source material, special nuclear material, or by-product material received, possessed, used, or transferred under a general or special license issued by the NUCLEAR REGULATORY COMMISSION.
MASS NUMBER	The sum of the neutrons and protons in a nucleus. The mass number of Uranium-235 is 235. It is the nearest whole number to the atom's actual atomic weight.
MAXIMUM PERMISSIBLE DOSE (MPD)	That dose of ionizing radiation which competent authorities have established as the maximum that can be absorbed without undue risk to human health. (5 x (N-18)).
MEV	Million electron volts.
MILLI	A prefix that divides a basic unit by one thousand.
NEUTRON	An uncharged elementary particle with a mass nearly equal to that of the proton. The isolated neutron is unstable and decays with a half-life of about 13 minutes into an electron, proton, and neutrino. Neutrons sustain the fission chain reaction in a nuclear reactor.
NUCLEUS	The small, positively charged core of an atom. It is only about 1/10,000 the diameter of the atom but contains nearly all the mass. Except for ordinary hydrogen, all nuclei contain both protons and neutrons.
OCCUPATIONAL DOSE	Includes exposure of an individual to radiation (1) in a restricted area; or (2) in the course of employment in which the individual's duties involve exposure to radiation; provided that "OCCUPATIONAL DOSE" shall not be deemed to include any exposure of an individual to radiation for the purpose of medical diagnosis or medical therapy of such individual.

RADIATION SAFETY MANUAL

OPERATING PROCEDURE(S)	As used in this part instructions to be <u>strictly</u> followed for radiographic activities.
PERSON	Means (1) any Individual, Corporation, Partnership, Firm, Association, Trust, Estate, Government Agency other than Commission, and State, any Foreign Government or Nation or any Political Subdivision of any such Government or Nations, or other entity; and (2) any Legal Successor, Representative, Agent or Agency of the foregoing.
PERSONNEL MONITORING EQUIPMENT	Means devices designed to be worn or carried by an individual for the purpose of measuring the dose received (e.g., film badges, pocket chambers, pocket dosimeter, film rings, etc.)
PHOTOELECTRIC EFFECT	A process by which electromagnetic radiation imparts energy to matter.
PHOTON	A discrete quantity of electromagnetic energy. Photons have momentum but no mass or electrical charge.
PROJECTOR	As used in this part a radiographic exposure device containing a licensed radioactive isotope for Industrial Radiography applications.
PROTON	An elementary particle with a single positive electrical charge and a mass approximately 1840 times that of the electron. The atomic number of an atom is equal to the number of protons in its nucleus.
RAD	Radiation absorbed dose. The basic unit of absorbed dose of ionizing radiation. One rad is equal to the absorption of 100 ergs of radiation energy per gram of matter.

RADIATION SAFETY MANUAL

RADIATION

The propagation of energy through matter of space in the form of waves. In atomic physics, the term has been extended to include fast moving particles (alpha and beta rays, free-neutrons, etc.). Gamma rays and x-rays, of particular interest in atomic physics, are electromagnetic radiation in which energy is propagated in packets called photons.

RADIATION AREA

Means any area accessible to personnel in which there exists radiation originating in whole or in part within licensed material, at such levels that a major portion of the body could receive in any one (1) hour a dose in excess of five (5) MR or in any five (5) consecutive days, a dose in excess of one-hundred (100) millirems.

RADIATION SAFETY SUPERVISOR

An individual appointed by the Radiation Safety Officer who is responsible for implementation of the Company's Radiation Safety Program.

RADIATION SAFETY OFFICER

An individual engaged in the practices of providing Radiation Protection. He is the Representative appointed by the licensee for liaison with the Nuclear Regulatory Commission.

RADIATION SURVEY

The process of using an instrument (survey meter) to measure the presence of ionizing radiation.

RADIATION SURVEY METER

An instrument that instantly measures radiation rate or intensity. Used for monitoring radiation area.

RADIOACTIVE

Atoms which are energetically unstable and decay to a stable condition by emitting radiation are said to be radioactive.

RADIOGRAPHER

Means any individual who performs or who, in attendance at the site where the sealed source or sources are being used, personally supervises radiographic operations and who is responsible to the licensee for assuring compliance with the requirements of these regulations and the conditions of the license.

RADIATION SAFETY MANUAL

RADIOGRAPHER'S ASSISTANT	Means any individual who, under the personal supervision of the radiographer, uses radiographic exposure devices, sealed sources or related handling tools, or survey instruments in radiography.
RADIOGRAPHIC EXPOSURE DEVICE	Means any instrument containing a sealed source, fastened or contained therein, in which the sealed source or shielding thereof may be moved, or otherwise changed, from a shielded to unshielded position for purposes of making a radiographic exposure. This may also refer to machines which produce ionizing radiation.
RADIOGRAPHY	Means the examination of the structure of materials by non destructive methods utilizing sealed sources of byproduct material and other sources of ionizing radiation.
RADIOISOTOPE	An unstable isotope of an element that decays or disintegrates spontaneously, emitting radiation. More than 1300 natural artificial radioisotopes have been identified.
REDUCTION FACTOR	Dose rate without a shield divided by the dose rate with a shield interposed between a source and a point at which radiation is measured.
REGISTRATION STATES	States that do <u>not</u> have jurisdictional licensing control of radioactive material but are governed by the USNRC Regulatory Requirements. However, these states require that radiation producing devices used within their state be <u>registered</u> .
RELATIVE BIOLOGICAL EFFECTIVENESS, (RBE)	The relative effectiveness of a given kind of ionizing radiation in producing a biological response as compared with 250,000 electron volt gamma rays.
REM	Roentgen equivalent man. A unit of absorbed radiation dose in biological matter. It is equal to the absorbed dose in rads multiplied by the relative biological effectiveness of the radiation.

RADIATION SAFETY MANUAL

RESTRICTED AREA	Means any area to which access is controlled by the licensee.
ROENTGEN	A unit of exposure dose of ionizing radiation. It is that amount of gamma or x-rays required to produce ions carrying one (1) electrostatic unit of electrical charge in one (1) cubic centimeter of dry air under standard conditions.
SCATTERING	A process that changes a particle's or photon's trajectory. Scattering is caused by collisions with atoms, nuclei, and other particles. If the scattered particle's energy is unchanged by the collision, elastic scattering prevails; if there is a change in energy, the process is called <u>INELASTIC SCATTERING</u> .
SEALED SOURCE	Means any by-product material that is encased in a capsule designed to prevent leakage or escape of the by-product material.
SHIELD	A layer of mass of material used to reduce the passage of ionizing radiation.
SOURCE	A radioactive material packaged so as to produce radiation for experimental or industrial use. In this manual, the term "SOURCE" also refers to the "TARGET" of an x-ray tube.
STABLE ISOTOPE	A nuclide that does not undergo radioactive decay.
STORAGE AREA	Means any location, facility, or vehicle which is used to store, to transport, or to secure a radiographic exposure device, a storage container, or a sealed source when it is not in use and which is locked or has a physical barrier to prevent accidental exposure, tampering with, or unauthorized removal of the device, container, or source.
STORAGE CONTAINER	Means a device in which sealed sources are transported or stored.

RADIATION SAFETY MANUAL

SURVEY	Means an evaluation of the radiation hazards incident to the production, use, release, disposal, or presence of radioactive materials or other sources of radiation under a specific set of conditions. When appropriate, such evaluation includes a physical survey of the location of materials and equipment, and measurements of levels of radiation.
SURVEY METER	A portable instrument which measures dose rate of exposure or radiation intensity.
UNRESTRICTED AREA	Means any area into which entry is not controlled by the licensee, and any area used for residential quarters.
USNRC	United States Nuclear Regulatory Commission.
WASTE, RADIOACTIVE	Equipment and materials (from nuclear operations) which are radioactive and for which there is not further use.
X-RAY	Penetrating electromagnetic radiation emitted when the inner orbital electrons of an atom are excited and release energy. Thus, the radiation is not nuclear in origin and is generated in practice by bombarding a metallic target with high-speed electrons.

BETWEEN: William O. Miller, Chief
License Fee Management Branch
Office of Administration

John E. Glenn, Chief
Nuclear Materials Section B
Division of Engineering and
Technical Programs

30-19014
03320
10/86

LICENSE FEE TRANSMITTAL

A. REGION

1. APPLICATION ATTACHED

Applicant/Licensee:

Application Dated:

Control No.:

License No.:

Tri-State Inspection & Consultants

10-15-86

106300

37-19640-01

2. FEE ATTACHED

Amount:

Check No.:

\$700

7362

Came in box
certified mail.

3. COMMENTS

Signed

Date

SLJ

10-22-86

B. LICENSE FEE MANAGEMENT BRANCH

1. Fee Category and Amount:

2. Correct Fee Paid. Application may be processed for:

Amendment

Renewal

License

30

Signed

Date

S. Kimberly

10/29/86