NRC FORM 313
(1-84)
10 CFR 30, 32, 33, 34, 35 and 40

APPLICATION FOR MATERIAL LICENSE

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED BY OMB
3150-0120
Expires 8-31-87

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.

FEDERAL AGENCIES 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 JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION I
NUCLEAR MATERIAL SECTION B
631 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
MATERIAL RADIATION PROTECTION 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
MATERIAL RADIATION PROTECTION 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 37-02607-02

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

PDM Corporation
Neville Road
Neville Island, Pittsburgh, PA 15225

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

Temporary job sites in States subject to NRC's regulatory authority, or agreement States subject to their rules and regulations; and at 3400 Grand Avenue, Neville Island, Pittsburgh, Pennsylvania 15225

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Alfred J. Mueller, Jr.

TELEPHONE NUMBER: 412/331-3010

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: 3 Byproduct Mat'l. (O) AMOUNT ENCLOSED: $ 700.00

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
Alfred J. Mueller Jr.	Alfred J. Mueller, Jr.	Manager Safety & QC Radiation Safety Officer	7-18-86

14. VOLUNTARY ECONOMIC DATA

a. ANNUAL RECEIPTS

- [ ] <$250K
- [ ] $250K–$500K
- [ ] $500K–$750K
- [ ] $750K–1M
- [ ] $1M–3.5M
- [ ] $3.5M–7M
- [ ] $7M–10M
- [ ] >$10M

b. NUMBER OF EMPLOYEES *(Total for entire facility excluding outside contractors)*

c. NUMBER OF BEDS

d. WOULD YOU BE WILLING TO FURNISH COST INFORMATION *(dollar and/or staff hours)* ON THE ECONOMIC IMPACT OF CURRENT NRC REGULATIONS OR ANY FUTURE PROPOSED NRC REGULATIONS THAT MAY AFFECT YOU? *(NRC regulations permit it to protect confidential commercial or financial–proprietary–information furnished to the agency in confidence)*

- [ ] YES
- [ ] NO

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS	APPROVED BY
Renewal	Jul. 19	3O	ML10	S. Kimberly
AMOUNT RECEIVED	CHECK NUMBER		105859	DATE
$700	011584		JUL 22 1986	7/29/86

PRIVACY ACT STATEMENT ON THE REVERSE

ITEM 5 - RADIOACTIVE MATERIAL

SEALED SOURCES TO BE USED IN RADIOGRAPHY				RADIOGRAPHIC EXPOSURE DEVICES			
	By Product Material	Mfg. Name	Source Model No.	Mfg. Name	Model No.	Model No. for Source Changers	Max. Activity (Curries) per Source
A.	Cobalt 60	Automation Ind. Gamma Ind.	34500 B-2-C	Budd Co.(Now Automation Ind.) Gamma Ind.	Multitron C52	 C-8	10
B.	Iridium 192	Tech-Ops Gamma Ind.	A-424-1 T-1-T,T-1-A, T-1-G	Tech-Ops Gamma Ind.	T/O 490,T/O 533	650 C-10	100
C.	Iridum 192	Tech-Ops Gamma Ind.	A-424-9 T-3-T	Tech-Ops Gamma Ind.	T/O 660	650 C-10	100
D.	Iridium 192	Gamma Ind. A-2-TG,A-2-A,A-2-G Tech-Ops Automation Ind.	 848 39998	Gamma Ind. Tech-Ops Automation Ind.	Century	C-10 650 500SU	100
E.	Iridium 192	Gamma Ind.	GP	Gamma Ind.	Pipeliner #1	None	100
F.	Cesium 137	Gamma Ind.	TC-1	Tech-Ops Calibrator	T/O 571	None	.2
G.	Cobalt 60	Gamma Ind.	A-7-A	Gamma Ind.	Gammatron #20A	C-8	20
H.	Iridium 192	Tech-Ops	90003	Tech-Ops	Tech-Ops 920	T/O 850	200
I.	Iridium 192	Tech-Ops Gamma Ind.	A-58101-8 TP	Tech-Ops Gamma Ind.	Tech-Ops 616	None None	200
J.	Cesium 137	Tech-Ops	77302	T/O Calibrator	Tech-Ops 773	None	.16
K.	Iridium 192	Gamma Ind.	PL-2	Gamma Ind.	Pipeliner #201	None	200
L.	Cobalt 60	Gamma Ind.	A-8-A	Gamma Ind.	Gammaton 100A	C-8	100
M.	Cesium 137	Gamma Ind.		J. L. Sheppard	Calibrator: Model 28-5	None	.12
N.	Cesium 137	Gamma Ind.		J. L. Sheppard	Calibrator: Model 28-6A	None	1.2

T/O = Tech-Ops

ITEM 6 - Purposes for which licensed material will be used:

PDM will use the equipment listed in this license for the purposes of industrial radiography, source exchange and instrument calibration.

ITEM 7 - Individuals Responsible for Radiation Safety Program:

The chart shown on the following page shows the company organization as it relates to radiation safety. A Radiation Safety Officer exists at each location which maintains a license. The Radiation Safety Officer is responsible for the day to day conduct, management and supervision of the radiography program.

The following individuals are responsible for Radiation Safety:

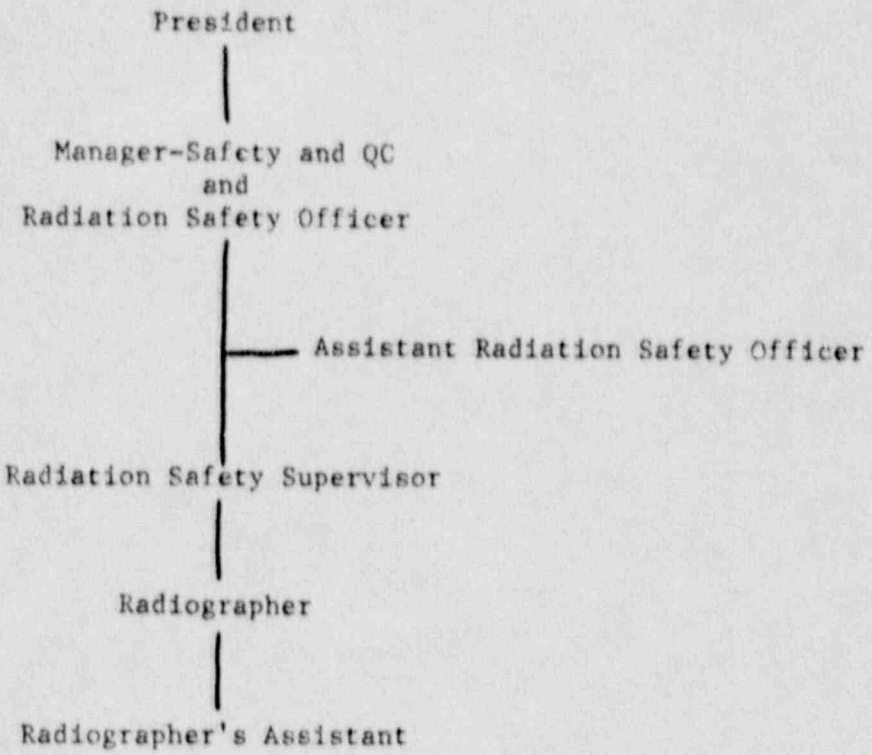
A. Mueller	Radiation Safety Officer (RSO)
J. Madden	Assistant Radiation Safety Officer (ARSO)
R. Stachel	Radiation Safety Supervisor (RSS)

The specific training and experience for the above named individuals is attached. Dates of training, where and by whom and on-job training specifics are also included.

ITEM 7

ATTACHMENT NO. 1

RADIATION SAFETY PROGRAM ORGANIZATION CHART



Alfred J. Mueller

Education

June 1954	Moon High School Coraopolis, Pa.
Technical Schools:	
April 3,1969	MAGNAFLUX CORPORATION Chicago, Ill. 15 hrs. Magnetic Particle
April 3, 1969	MAGNAFLUX CORPORATION Chicago, Ill. 15 hrs. Liquid Penetrant Inspection
April 11, 1969	PICKER NUCLEAR CORPORATION Cleveland, OH 40 hrs. Radioactive Isotopes
April 17, 1969	PICKER INDUSTRIAL CORPORATION Cleveland, OH 40 hrs. Industrial Radiography X-rays
PDM in House Training: Navships (250-1500-1) February-March 1971	Radiographic Testing to (250-1500-1) 10 hrs.
	Magnetic Particle Testing to (250-1500-1) 10 hrs.
	Liquid Penetrant Testing to (250-1500-1) 10 hrs.
	Visual & Dimensional Testing to (250-1500-1) 15 hrs.
November 1971	General Dynamics Instruction Book Self-instruction Programmed Test Radiography - 16 hrs.
November 1971	General Dynamics Instruction Book Self-instruction Programmed Test Magnetic Particle - 8 hrs.
December 1971	General Dynamics Instruction Book Self-instruction Programmed Test Liquid Penetrant - 6 hrs.

Alfred J. Mueller

Education

January 1972	Industrial Radiography Kodak Self-instruction Book 8 hrs.
August 1972 On-The-Job-Training: PITTSBURGH-DES MOINES STEEL COMPANY Pittsburgh Plant	Review procedures and instructions for Pressure Testing and Leak Detection of Vessel 10 hrs.
April 1973 to May 1973 On-The-Job-Training: PITTSBURGH-DES MOINES STEEL COMPANY PITTSBURGH PLANT	Read PDM Halide Leak Test Procedure, Section V Leak Testing of Welded Vessels, General Electric Publications 4540K15-001A, 4540K10-001B, 4540K52-001A and Customer Spec. 20 hrs.
	Read 1967 symposium on leak testing of welds. 8 hrs.
	Read PDM Vacuum Box Procedure, Section V, Article X, Leak Testing of Welded Vessels, Section of Leak Testing 4 hrs.
	Review procedures and instructions for pressure differential testing and bubble testing. 5 hrs.
	Reviewed procedures codes and instructions for Visual & Dimensional Inspection. 5 hrs.
April 1974	American Society For Nondestructive Testing - Pittsburgh, Pa. Specifications commonly used for NDT. 10 hrs.
April 1975	American Society for Nondestructive Testing - Pittsburgh, Pa. NDT Compliance, Documentation and Reporting. 10 hrs.
April 1975	Mobil Paint School Edison, N.J. Surface preparation and Coating Application. 40 hrs.

Alfred J. Mueller

Education

February 1976	Dupont Photo Technical Service Wilmington, Delaware X-Ray Processing Center Automatic Processing School 40 hrs.
February 1976	Course in Modern Supervisory Techniques From Applied Management Science, Inc. 20 hrs.
April 1977	AWS Welding Inspection Handbook Visual Inspection 6 hrs.
April 1977	Inspection Course Visual & Dimensional Inspection to include procedure spec., documentation inspections and equipment for welds. 3 hrs.
January 6, 1978 In house training: PITTSBURGH-DES MOINES STEEL CO. - Pittsburgh Plant	Radiation Safety Program Course by PDM entitled "Radiation Safety Program". 8 hrs.
January 11, 1978 In house training: PITTSBURGH-DES MOINES STEEL CO.- PITTSBURGH PLANT	Course in Managing For Motivation by Xerox Learning System (24 hrs.)
January 1978 In house training: PITTSBURGH-DES MOINES STEEL CO.-Pittsburgh Plant	General Dynamics Instruction Book Self-instruction Programmed Test for UT 20 hrs.
February 1978 In house training: PITTSBURGH DES-MOINES STEEL COMPANY - Pittsburgh Plant	General Dynamics Audiovisual Course In Ultrasonic Testing. 12 hrs.
February 21, 1978 To March 21, 1978	AWS Lecture Series "Review and explanation of Welding Code Requirements". This included AWS D1.1, ASME Section III and Section IX. 8 hrs.

Alfred J. Mueller

Education

April 11, 1978 to May 9, 1978	ASNT Magnetic Particle Course at Pittsburgh ASNT Section, taught by Johnny Johnson. 16 hrs.
March 1979 to April 1979	AWS Lecture Series Review and explanation of basic welding metallurgy in ferrous and non-ferrous metals. 10 hrs.
March 1979 to May 1979	Radiographic Inspection Course at Pittsburgh ASNT Section taught by Johnny Johnson. 10 hrs.
May 1979	New Dynamics Of Achievement Seminar William Penn Hotel Pittsburgh, Pa. Human Behavior Course 6 hrs.
October 1979	Krautkramer-Branson, Inc. Basic Ultrasonic Testing Course For Level I. 40 hrs.
April 7,8 & 10, 1980	Human Engineering Program by Victor Short 10 hrs.
February to March 1980 In house training: PITTSBURGH-DES MOINES STEEL CO.-Pittsburgh Plant	Training program for AWS Certification of Welding Inspectors. 23 hrs.
March 29, 1980 AWS TEST	Took test and have complied with the requirements of the AWS Standard for Qualification and Certification of Welding Inspectors, QC 1-80. 8 hrs.
January 1981 - March 1981	Dale Carnegie Course - Training in Effective Speaking and Human Relations at the William Penn Hotel at Pittsburgh, PA.
March 1981	Visual Testing of Welds. Course presented by ASNT Pittsburgh Section taught by Larry W. Taylor. 20 hours

Alfred J. Mueller

Job Experience

1962	Pittsburgh-Des Moines Steel Company Pittsburgh Plant NDT Technician using processes: Radiography, Dye Penetrant, Magnetic Particle, Vacuum Test, Pneumatic Test. Also visual weld and dimensional inspection. The NDT Process included establishing a procedure, making the test and evaluating the results. Listed below are some of the jobs that Mr. Mueller performed.
1962	Predicktown, N.J., two spherical double walled shell tanks for liquid hydrogen storage built to ASME VIII.
1963	Farmington, Long Island, a vacuum chamber for Republic Aircraft built to ASME VIII.
1963	Huntsville, Alabama, two LOX tanks at the Red Stone Arsenal for NASA built to ASME VIII.
1964	Huntsville, Alabama, a spherical double shell liquid hydrogen tank for NASA at Red Stone Arsenal built to ASME VIII.
1965	Avon Lake, Ohio, a single shell storage sphere for the B.F.Goodrich Chemical Co. built to ASME VIII.
1966	Clairton, Pa., four double shell anhydrous ammonia tanks built to API 620 requirements.
1967	Bayonner, N.J., four flat bottom API 650 Appendix D oil storage tanks for Standard Oil Company.
1968	Oswego, N.Y.,four aluminum tanks built to ASME Specifications, at the Nine Mile Point Power House.
1969	Cleveland, Ohio, a wind tunnel for NASA.
	There are many other NDT tests performed by A.J.Mueller as a NDT Technician. The NDT tests were radiography, magnetic particle, and liquid penetrant testing of low temp. pressure vessels.

Alfred J. Mueller

Job Experience

1969 - 1971	West Milton, N.Y., MARF Containment Vessel ASME Section III, Subsection B. Worked as a Level II NDT Technician performing NDT Test of radiography, magnetic particle, liquid penetrant testing and visual inspection. Calibrated equipment such as measuring tapes and KHO9 Mag. machines. Performed receipt inspection of material for the job, conducted weld wire control, supervised storage of construction material, and also checked fit-up and dimension.
1971 - 1973	West Milton, N.Y., MARF Containment Vessel ASME Section III, Subsection B. Worked as a Level III Supervisor. Qualified Navships 250-1500-1 to perform the duties of a NDT Supervisor in magnetic particle, liquid penetrant and visual inspector in April. Interpreted specifications and codes, designed particular test methods and techniques to be used, interpreted results and evaluated the results. Worked closely with the customer and Code Inspector to keep the job moving smoothly. Prepared for "N" Stamp Audit and was approved immediately. Also checked drawing distribution control, construction procedure sequences, receiving inspection of materials, storage of materials, fit-up of materials, welding, welder's qualifications, weld wire control and took care of deviation or variation reports to Project Manager and also minor discrepancies. Took care of calibration of tapes, KHO9 Mag. Machines, Y5 Yoke, some gauges, etc. Audited the performance of mechanical devices of the job. Audited Post Weld Heat Treatment to some inserts recorded as built dimensions. Audited pressure tests and leak detection tests of vessel. Took care of final documentation of the job.
March 1973 - July 1973	Shoreham, Long Island, N.Y. Containment Vessel ASME Section III. Performed the duties of Level III Supervisor of NDT in Magnetic Particle, Liquid Penetrant, Radiography, Leak Testing Methods and Visual and Dimensional Inspection Methods.

JOB EXPERIENCE

ALFRED J. MUELLER

August, 1973 to December, 1974	NDE Specialist Assistant Radiation Safety Officer Vendor Surveillance QA Audits QA Surveys Review Specifications Write and approve NDE procedures
January, 1975 to October, 1979	Division Field QA Manager Assistant Radiation Safety Officer Vendor Surveillance QA Audits QA Surveys Review Specifications Write and approve NDE procedures Supervised work of Eastern Division Field Quality Assurance Personnel. Conducted and supervised Radiographic, Magnetic Particle, Liquid Penetrant, Leak Testing, Visual Dimensional Inspection and documentation.
October, 1979 to June, 1980	Division QA Manager Radiation Safety Officer QA Audits and Surveys Review Specifications Write and approve NDE procedures Supervised work of Eastern Division and Field Quality Assurance Personnel. Also worked with Shop QA Manager in problem areas and assisted when needed. Conducted and supervised Radiographic, Magnetic Particle, Liquid Penetrant, Leak Testing, Visual Dimensional Inspector and documentation.
June, 1980 to October, 1981	Division Field QA Manager Radiation Safety Officer Vendor Surveillance QA Audits and Surveys Review Specifications Write and approve NDE procedures Supervised work of Eastern Division Field Quality Assurance Personnel. Conducted and supervised Radiographic, Magnetic Particle, Liquid Penetrant, Leak Testing, Visual Dimensional Inspection and documentation.

October, 1981 to July, 1985	Senior Welding & QA Manager Performed duties as QA audits, QA surveys, review specifications, write and approve NDE procedures. Supervised work of Eastern Division and Field Quality Assurance personnel. Also worked with Shop QA Manager in problem areas and assisted when needed. Conducted and supervised radiographic, magnetic particle, liquid penetrant, leak testing, visual-dimensional inspector and documentation working on new training programs plus amending license. Applied for new license with the NRC. Handle audits with ASME, customers and NRC.
July 1985 to Present	Manager of Safety & Quality Control. Performs duties such as audits, surveys, review specifications, write and approve NDE procedures. Supervises work of the field operation and Field Quality Control personnel. Also works with construction Dept. in problem areas and assists when needed. Conducts and supervises radiographic, magnetic particle, liquid penetrant, leak testing, visual-dimensional inspector and documentation working on new training programs plus amending license. Applies for new licenses with states and the NRC. Handles audits with ASME, customers and NRC. Also handles the Safety program for Pittsburgh-Des Moines Corporation.

NAME Joseph E. Madden (Page 1)

(1) NDT EXPERIENCE

JOB OR CONTRACT NO.	WORK LOCATION	DATE		PROFICIENCY LEVEL(S)												
		FROM	TO	RT	UT	MT	PT	VT	BT	PCMT	HDLT	MSLT	Rec Str	In Proc	Cal	Doct
API 620/Q 9% Ni. L.N.G	Holbrook, NY	Apr. 70	Oct. 70	X			X	X	X							
AWWA	Clarks Summit, PA	Oct. 70	Oct. 70	X												
AWWA	Pikepsie, NY	Oct. 70	Oct. 70	X												
API 620/Q 9% Ni. L.N.G	Rocky Hill, CT	Oct. 70	Dec. 71	X			X	X	X	X						X
AWWA	East Lime, CT	Oct. 70	Nov. 70	X												
AWWA	Windsor Locks, CT	Dec. 70	Jan. 71	X												
AWWA	Johnstown, NY	Jan. 71	Jan. 71	X												
API 620/Q 9% Ni. L.N.G.	Milford, CT	Jan. 72	Mar. 72	X				X	X							X
API 650 ASME Sec. VIII	Tullahoma, TN	Apr. 72	Oct. 72	II		II	II	II	II	X			X	X	X	X
AWWA-APD. C	Monroe County, NJ	Oct. 72	Nov. 72	II												
API 620/Q	Peach Bottom, PA	Nov. 72	Nov. 72	II												
API 650	Phillipsburgh, NJ	Dec. 72	Mar. 73	II												
AWWA	Henry County, VA	Dec. 72	Feb. 73	II												
AWWA	Radford, VA	Dec. 72	Feb. 73	II												
API 650	Aberdine, MD	Dec. 72	Feb. 73	II												
API 650	Schnectady, NY	Dec. 72	Feb. 73	II												

(1) Make separate entries for Certifications

2.0

NAME Joseph E. Madden (Page 2)

(1) NDT EXPERIENCE

JOB OR CONTRACT NO.	WORK LOCATION	DATE		PROFICIENCY LEVEL(S)												
		FROM	TO	RT	UT	MT	PT	VT	BT	PCMT	HDLT	MSLT	Rec Str	In Proc	Cal	Doct
API 620	Linden, NJ	Mar. 73	Mar. 73	II												
ASME III/VIII	Shoreham, NY	Mar. 73	Apr. 73	II		II	II	X	II		X		X	X	X	X
API 620/Q Alum L.N.G.	Farmingdale, NJ	Apr. 73	May 73	II			II	X	II					X		X
API 620/Q 9% Ni. L.N.G.	Chrlstadt. NJ	Jun. 73	Mar. 74	II			II	X	II							X
API 620 ASME III/VIII	Shoreham, NY	Mar. 74	Dec. 74	II		II	II	II	II		X		X	X	X	X
API 620 ASME Sec. VIII	3 mi. Island, PA	Dec. 74	Dec. 74	II			II	II	II							X
API 620/Q Alum L.N.G.	Cove Point, MD	Dec. 74	Dec. 75	II			II	II	II	X						X
ASME Sec. VIII	Huntington, WV	Jan. 76	Jan. 76	II				II								X
Pittsburgh Office	Pittsburgh, PA	Jan. 76	Mar. 76	II		II	II	II	II	II	II				X	X
API 620/R NH3	Luling, LA	Mar. 76	Jul. 76	II			II									
ASME VIII	Freeport, TX	May 76	Jun. 76	II												
API 620/Q NH3	Donaldsonville, LA	Jul. 76	Aug. 76	II				II	II				X			X
ASME III/VIII	Shoreham, NY	Aug. 76	Apr. 77	II		II	II	II	II	II	II		X	X	X	X
ASME III/VIII	Unit II Shippingport, PA	Apr. 77	Sep. 78	II	X	II	II	II	II	II	II		X	X	X	X
ASME III/VIII	Unit II Shippingport, PA	Sep. 78	Dec. 81	III	I	III	III	III	III	III	III		X	X	X	X
ASME III/XI	Unit I Shippingport, PA	Dec. 81	June 82	III	I	III	III	III	III	III	III		X	X	X	X

(1) Make separate entries for Certifications

2-1

NAME Joseph E. Madden

EDUCATION: GRAMMER SCHOOL Tunkhannock Joint Schools

HIGH SCHOOL Tunkhannock High School

COLLEGE OR TECH SCHOOL Allegheny Comm. College-2 yrs. Airco Technical School-6 months

Yrs./ Months

NDT CLASSES ATTENDED WITH DATES AND HOURS

NDT CLASS	LOCATION	DATES		CLASSROOM HOURS													
		FROM	TO	RT	UT	MT	PT	VT	BT	PCMT	HDLT	MSLT	Rec Str	In Proc	Cal	Doct	Code	Matl
O.J.T	Holbrook, NY	Sep. 70	Oct. 70	40			4	8	2							4		
O.J.T.	Rocky Hill, CT	Oct. 70	Dec. 71	20			4	4	2							2		
O.J.T Gen. Dyn.	Rocky Hill, CT	Dec. 71	Dec. 71	20		8	8	4	2						2			
Gen. Dyn.	Pittsburgh, PA	Mar. 72	Apr. 72	40		16	8	16	4	16								
O.J.T. PDM	Pittsburgh, PA	Mar. 72	Apr. 72										4	4	8	8		
R.T.	Picker Cleveland, OH	Mar. 72	Mar. 72	40														
O.J.T. PDM	Pittsburgh, PA	Mar. 73	Mar. 73							8	40				4	4		
O.J.T. PDM	Shorham, NY	Mar. 73	Apr. 73			8		8		8			16	16	16	16		
R.T.	Dupont Wilmington, DE	Apr. 75	Apr. 75	40														
M.T.	Magnaflux Pittsburgh, PA	Jan. 77	Jan. 77			16												
P.T.	ASNT Pittsburgh, PA	Aug. 77	Aug. 77				16											
U.T.	ASNT Pittsburgh, PA	Nov. 77	Dec. 77		40													
M.T.	ASNT Pittsburgh, PA	Apr. 78	Apr. 78			16												
AWS ASME	AWS Pittsburgh, PA	Apr. 78	May. 78														20	

1.0

NAME Joseph E. Madden

NDT CLASSES ATTENDED WITH DATES AND HOURS

NDT CLASS	LOCATION	DATES		CLASSROOM HOURS														
		FROM	TO	RT	UT	MT	PT	VT	BT	PCMT	HDLT	MSLT	Rec Str	In Proc	Cal	Doct	Code	Audit MTP
O.J.T Nat. Tech.	Pittsburgh, PA	May 78	Sep. 78						16	40	40	40						
Gen. Dyn.	Pittsburgh, PA	Feb. 79	Mar. 79		40													
R.T.	ASNT Pittsburgh, PA	Apr. 79	May 79	40														
Mtlgry.	AWS Pittsburgh, PA	Apr. 79	May 79														20	
Gen. Dyn.	Pittsburgh, PA	Apr. 80	Apr. 80															10
Mtlgry.	AWS Pittsburgh, PA	Apr. 81	Apr. 81														8	
O.J.T.	Shippingport, PA	Oct. 81	Nov. 81										16	16	16	16	16	
O.J.T.	Shippingport, PA	Mar. 86	Apr. 86		10													

NAME Joseph E. Madden (3)

(1) NDT EXPERIENCE

JOB OR CONTRACT No	WORK LOCATION	DATE FROM	DATE TO	PROFICIENCY LEVEL(S) RT	UT	MT	PT	VT	BT	PCMT	HOLT	MSLT	VIS	DIM	REC	STR	IST	
ASME III/VIII	Unit II Shippingport, PA	Jun. 82	Jun. 83	III	I	III	III	III	III	III	III		x	x	x	x	x	
ASME III/VIII	Unit II Shippingport, PA	Jun. 83	Jan. 84	III	I	III	III	III	III	III	III		x	x	x	x	x	
API 620/Q 9% NI LNG	Howell Twp., NJ	Feb. 84	Mar. 84	III			III											●
ASME VIII	W. Gloucester, RI	Mar. 84	May 84	III		III	III	III	III				x	x	x	x		
AWWA D-100-79	Fairview, NJ	May 84	Jul. 84	III														
AWWA D-100-79	New York, NY	Jul. 84	Jul. 84	III														
ASME VIII	Calvet City, KY	Jul. 84	Jul. 84	III		III		III		III			III	III	III			
AWWA D-100-79	Greenburgh, NY	Aug. 84	Aug. 84	III														
API 650	Wheatfield, IN	Aug. 84	Feb. 85	III		III	III	III										
AWWA D-100-79	Lordstown, OH	Mar. 85	Mar. 85	III														●
ASME III	Berwick, PA	Mar. 85	Jun. 85	III		III		III	III	III			III	III	III	III	III	
ASME III/VIII	Unit II Shippingport, PA	Jun. 85	Oct. 85	III	III	III	III	III	III	III	III		III	III	III	III	III	
ASME III	Seabrook, NH	Oct. 85	Jan. 86												III	III	III	
ASME III/VIII	Unit II Shippingport, PA	Jan. 86			I	III	III	III	III	III	III		III	III	III	III	III	

(1) Make separate entries for Certifications

EDUCATION AND TRAINING

Robert E. Stachel

June, 1970	Montour High School McKees Rocks, PA
September, 1970 to June, 1975	Old Dominion University Norfolk, AA B.S. Civil Engineering
August 14, 1978 PDM In-House Training	Radiography Safety - 8 hours Pittsburgh Plant
9-11-78 to 9-15-78	TECH OPS - MA RT Safety - 4o hours
12-4-78 to 12-15-78	KODAK - Rochester, NY Industrial RT - 80 hours
10-9-78 to 10-13-78	MAGNAFLUX - Hartford MT, PT - 40 hours
8-10-78 to 8-16-78 PDM In-House Training	VT - 24 hours Pittsburgh Plant
1-29-79 to 2-2-79	KODAK - Rochester, NY Film Interpretation - 40 hours
5-17-79	BT - 6 hours Instructor: A. J. Mueller Baltimore Plant
5-28-79 PDM In-House Training	VT slides - 4 hours Baltimore Plant
5-29-79 PDM In-House Training	PT slides - 4 hours Baltimore Plant
5-30-79 PDM In-House Training	MT slides - 4 hours Baltimore Plant
7-28-79 PDM In-House Training	UT - GENERAL DYNAMICS - 6 hours Baltimore Plant
7-29-79 PDM In-House Training	UT - GENERAL DYNAMICS - 10 hours Baltimore Plant
5-12-80 to 5-13-80	AMERICAN UNIVERSITY Improving Management Skills Seminar - 16 hours

EDUCATION AND TRAINING

Robert E. Stachel

7-10-80 to 7-18-80 PDM in House Training	UT - GENERAL DYNAMICS - 26 hrs. Programmed Instruction Handbook Volumes I, II, and III Basic Principles Baltimore Plant
7-21-80 to 7-25-80	KRAUTKRAMER-BRANSON, INC. Stratford, Conn. UT Level I - 40 hrs.
9-31-84 to 3-31-85	Robert Morris College Coraopolis, PA Completed 9 of 42 credits toward an MBA Degree
10-1-85 to 10-14-85	UT - GENERAL DYNAMICS - 10 hrs. Programmed Instruction Handbook Volumes I, II, and III Basic Principles Pittsburgh Plant

EXPERIENCE

Robert E. Stachel

May 1974 to Sept. 1974	PITTSBURGH-DES MOINES STEEL COMPANY Pittsburgh Plant Completed documentation packages for shipping pieces of various nuclear contracts.
May 1975 to July 1977	PITTSBURGH-DES MOINES STEEL COMPANY Pittsburgh Plant Designed many nuclear and non-nuclear assemblies with the aid of various computer programs.
July 1977 to March 1978	PITTSBURGH-DES MOINES STEEL COMPANY Limerick, Pa. Limerick Nuclear Power Plant Field Engineer for installation of pool liners. Duties included light design work and surveying.
March 1978 to July 1978	PITTSBURGH-DES MOINES STEEL COMPANY Pittsburgh Plant Designed L.N.G. and oil tanks.
July 1978 to Jan. 1979	PITTSBURGH-DES MOINES STEEL COMPANY Pittsburgh Plant Performed Magnetic Particle, Liquid Penetrant, Visual and Radiographic Testing on various nuclear contracts.
January 1979 to January 1982	PITTSBURGH-DES MOINES STEEL COMPANY Baltimore Plant QC Manager in charge of all NDE including: Magnetic Particle Testing, Liquid Penetrant Testing and Radiographic Testing; Visual Examination, Bubble Testing, UT Testing and associated documentation.
January 1982 to January 1983	PITTSBURGH-DES MOINES CORPORATION Pittsburgh Plant QC Manager in charge of all NDE including: Magnetic Particle Testing, Liquid Penetrant Testing and Radiographic Testing; Visual Examination, Bubble Testing, UT Testing and associated documentation.

EXPERIENCE

Robert E. Stachel

January 1983 to April 1985	PITTSBURGH-DES MOINES CORPORATION Pittsburgh Office Contracting Engineer and Estimator for Technical Products Group. Determined general inspection plan and associated costs.
April 1985 to Present	PITTSBURGH-DES MOINES CORPORATION Pittsburgh Plant QC Manager in charge of all NDE including: Magnetic Particle Testing, Liquid Penetrant Testing and Radiographic Testing; Visual Examination, Bubble Testing, UT Testing and associated documentation.

ITEM 8 - Training Provided to Other Users:

PDM's Radiation Safety training is covered by the following procedures, (which are attached):

1. RST - Radiation Safety Training - General
2. RSTP-1 - Radiation Safety Training - Radiographer's Assistant; and,
3. RSTP-2 - Radiation Safety Training - Radiographer.

These procedures outline the training and instructions to be given to prospective Radiographers' Assistants and Radiographers and the length of time to be spent on each topic. Copies of examinations and the correct answers are also included, as well as the passing grade. A description of the field (practical) examination is included in procedure RSTP-2. The requirements for evaluating individuals with previous experience is included in the General Radiation Safety Training Procedure, RST.

The identification and specific information of individuals who will instruct and train prospecti radiographers and radiographers' assistants is given in previou tem 7 under the designation of the Radiation Safety Officer (RSO) and Assistant Radiation Safety Officer (ARSO).

RST - RADIATION SAFETY TRAINING - GENERAL

1.0 SCOPE

1.1 This procedure shall provide the general training and qualification requirement steps for personnel involved with radiography.

1.2 This procedure shall be used in conjunction with PDM Radiation Safety Training Procedures RSTP-1 and RSTP-2.

2.0 DEFINITIONS

2.1 Trainee - An individual who is inexperienced in radiography.

2.2 Radiographer's Assistant - An individual who has satisfactorily completed the necessary requirements to assist in the radiography process.

2.3 Radiographer - An individual who has satisfactorily completed the necessary requirements to perform radiography.

3.0 QUALIFICATION PROCEDURE

3.1 An individual who is inexperienced in the field of radiography will be classed as a trainee until such time as he becomes an radiographer's assistant. He may serve as an aid under the direct supervision of a qualified radiographer.

While serving as an aid, he may perform the following radiographic duties:

a. Process Film
b. Keep restricted areas under surveillance
c. Position signs and barricades
d. Set up film for exposures
e. Carry equipment to restricted areas

A Trainee will be advised of the above conditions of his duties and instructed in the use of personnel monitoring devices. At no time is a Trainee permitted to operate radiographic exposure devices or survey meters during the operation of industrial radiography. He is permitted to operate exposure devices and survey meters for training only and then only under the personal direction of a qualified "instructor".

RST - RADIATION SAFETY TRAINING - GENERAL (Con't)

3.2 Radiographer's Assistant

An individual, who is not exempt as given in Paragraph 4.0 below, hired by PDM is considered a trainee until they complete the requirements of Radiographer's Assistant.

After completing the requirements of RSTP-1, the individual is considered sufficiently trained to handle and operate the equipment in the presence of a Radiographer.

3.2.1 The steps required for qualification to Radiographer's Assistant are as follows:

3.2.1.1 Complete the classroom training,

3.2.1.2 Pass the written examination.

3.3 Radiographer

After the Assistant Radiographer has spent three months successfully performing in the capacity of a Radiographer's Assistant he would become eligible to undertake the additional responsibility of a Radiographer.

3.3.1 The steps required for qualification to Radiographer, who is not exempt as given in paragraph 4.0 below, are as follows:

3.3.1.1 Successfully complete the 40 hour training course,

3.3.1.2 Spend three (3) months as a Radiographer's Assistant; and

3.3.1.3 Successfully pass the written and field examination for Radiographer.

4.0 EXPERIENCED PERSONNEL

4.1 If a new employee has had previous experience in radiography while with another employer, he will be required to give evidence of the extent of his experience and training. He will then be given such training as necessary to familiarize him with the PDM Radiation Safety Program. He will be given appropriate written and practical examinations to evaluate his familiarity with the PDM Radiation Safety Program, license and equipment, and to further evaluate his previous experience and training for the purpose of classifying him as a Radiographer's Assistant or Radiographer.

RST - RADIATION SAFETY TRAINING - GENERAL (Con't)

4.2 An individual who has had previous training in a curriculum that meets the requirements outlined in 10CFR Part 34 Appendix A, will be evaluated as such.

4.3 Courses offered by The Radiation Product Division of Tech OPS, Inc. or Gamma Industries, a Division of Nuclear Services, Incorporated, or other courses that the instructor deems comparable and acceptable may be accepted in replacement of completing the 40 hour in-house training course offered by PDM.

4.4 If the new applicant is unfamiliar with PDM's equipment, the individual will be trained in the same manner as that given to new personnel during their training to become a Radiographer's Assistant.

5.0 PERIODIC TRAINING

5.1 Periodic training will be conducted by the RSO or ARSO at least annually for all Radiographers and Radiographer's Assistants. The periodic training will provide a review of radiation safety principles, regulations, PDM procedures and policies with respect to radiation safety practices. A discussion of any new regulations or requirements will also be provided.

5.2 A performance review will be conducted quarterly in accordance with RSP-13 of the Radiation Safety Manual.

RSTP-1 - RADIATION SAFETY TRAINING - RADIOGRAPHER'S ASSISTANT

1.0 SCOPE

This Procedure establishes the minimum requirements for the initial and periodic training, testing and qualification of Radiographer's Assistants.

2.0 RESPONSIBILITIES

The Radiographer's Assistant shall, under the direct supervision of a Radiographer, use radiographic exposure devices and radiation monitoring devices. He is responsible for performing these duties in accordance with the requirements of PDM Radiation Safety Manual.

3.0 TRAINING AND TESTING

3.1 The prospective Radiographer's Assistant will be instructed and tested on the operating and emergency procedures as contained in the Radiation Safety Manual to demonstrate his understanding.

3.2 Training outline:

		Time*
a.	Personnel monitoring equipment and usage	1/2 HR
b.	Radiation surveys and posting	1 HR
c.	Procedures for use of radiation survey instruments	1/2 HR
d.	Procedures for use of radiographic exposure devices	1 HR
e.	Procedure for locking and securing radiographic exposure devices	1/2 HR
f.	Emergency procedures	1/2 HR
g.	Practical instruction in the use and handling of radiographic exposure devices and radiation survey and detection instruments	2 HRS
	Total	6 HRS

* Minimum hours of instruction on each item

3.3 Testing

a. A written examination containing a minimum of 25 questions based on the outline in Paragraph 3.2.

RSTP-1 - RADIATION SAFETY TRAINING - RADIOGRAPHER'S ASSISTANT (Con't)

3.3.1 The grade achieved for the examination shall be 80% or greater to be designated as a Radiographer's Assistant .

3.3.1.1 Failure to meet these grade requirements will require additional training and retesting.

3.3.1.2 Re-instruction on all questions incorrectly answered during testing shall be provided and noted on the test by the instructor.

3.3.2 Completed tests will be maintained in PDM's Personnel Training Files.

4.0 CERTIFICATION

After satisfactory completion of the requirements, the applicant shall be certified as a Radiographer's Assistant by the RSO.

RSTP-2 - RADIATION SAFETY TRAINING - RADIOGRAPHER

1.0 SCOPE

1.1 This Procedure establishes the minimum requirements for the initial and periodic training, testing and qualification of Radiographers.

1.2 The prerequisites for becoming a Radiographer include:

a. Completion of approximately 40 hours of training in isotope radiation safety,
b. Successfully performing in the capacity as a Radiographer's Assistant for three (3) months; and,
c. Successfully completing a written examination on subjects covered in the training course and a practical examination on the use of the equipment.

2.0 RESPONSIBILITIES

The Radiographer is responsible for performing radiography and/or personally supervising radiographic operations. He is directly responsible for all exposure devices and related equipment assigned to him. He is responsible for implementing the operating procedures in compliance with applicable Federal, State and Local regulations.

3.0 TRAINING AND TESTING

3.1 The prospective Radiographer will be instructed and tested on the operating and emergency procedures as contained in the Radiation Safety Manual to demonstrate his understanding.

3.2	Training Outline	*Time(HR)
3.2.1	Fundamentals of radiation safety:	10

a. Characteristics of ionizing radiation.

b. Units of radiation dose (mrem) and quantity of radioactivity (curie).

c. Hazards of exposure to radiation.

1. Radiation protection standards.
2. Biological effects of radiation dose.

RSTP-2 - RADIATION SAFETY TRAINING - RADIOGRAPHER (Con't)

		*Time(HR)
	d. Levels of radiation from sources of radiation.	
	e. Methods of controlling radiation dose.	
	1. Working time. 2. Working distances. 3. Shielding.	
3.2.2	Radiation detection instrumentation to be used:	4
	a. Use of radiation survey instruments.	
	1. Operation. 2. Calibration. 3. Limitations.	
	b. Survey techniques.	
	c. Use of personnel monitoring equipment.	
	1. Film badges. 2. Pocket dosimeters. 3. Thermoluminescent dosimeters.	
3.2.3	Radiographic equipment to be used:	8
	a. Remote handling equipment.	
	b. Radiographic exposure devices and sealed sources.	
	c. Storage containers.	
	d. Operation and control of X-ray equipment.	
3.2.4	The requirements of pertinent federal and state regulations.	4
3.2.5	PDM's written operating and emergency procedures.	12
3.2.6	Case histories of radiography accidents.	2

*Minimum hours of instruction on each item.

3.3 Testing

3.3.1 Testing will consist of:

a. A written examination containing approximately fifty (50) questions based on the outline in Paragraph 3.2.

RSTP-2 -RADIATION SAFETY TRAINING - RADIOGRAPHER (Con't)

b. A practical examination conducted under the supervision of a radiographer to demonstrate competency to use and handle radiographic exposure devices, personnel monitoring equipment and radiation survey instruments. (See Practical examination description.)

3.3.2 The grade achieved for each examination shall be 70% or greater with the combined average grade for both examinations of 80% or greater to be designated as a Radiographer.

3.3.2.1 Failure to meet these grade requirements will require additional training and retesting.

3.3.2.2 Re-instruction on all questions incorrectly answered during testing shall be provided and noted on the test by the instructor.

3.3.3 Completed tests will be maintained in PDM's Personnel Training Files.

4.0 CERTIFICATION

After satisfactory completion of the requirements, the Assistant Radiographer shall be certified as a Radiographer by the RSO.

RSTP-2 - RADIATION SAFETY TRAINING - RADIOGRAPHER (Con't)

RADIOGRAPHER'S PRACTICAL EXAMINATION DESCRIPTION

It is of the utmost importance that each Radiographer's Assistant receive instructions to operate in a safe and efficient manner so that radiation exposure will be kept to a minimum. He will be instructed in accordance with the outline for each type of radioactive exposure device and its specific source changer.

He must make a complete set-up of a radiographic operation using a gamma exposure device. This exam is to be done under the personal supervision of a radiographer who will observe and grade the Radiographer's Assistant with assistance from the RSO on the following points:

1. Adequate posting of radiation area at all walkways and entrances to restricted area.
2. Restricted area posted with signs "Caution: Radiation Area" and the "Caution: High Radiation Area" sign at the location of the exposure source tube.
3. Rigid blocking or mounting of the exposure device to prevent movement and possible damage to source tube.
4. Substantial source tube mounting.
5. Radiation survey of exposure device before and after exposure.
6. Smooth drive cable operation and connection.
7. Is individual wearing film badge and dosimeter?
8. Is individual maintaining continuous surveillance of restricted area?
9. Is operating procedure being followed?
10. Are documentation records made on the proper form?

RADIATION SAFETY

NAME _____ BRANCH _____

DATE _____ GRADE _____

1) Gamma and X-radiation damage human body tissue by a process known as _____.

2) When a body tissue cell is damaged by radiation,

a) The cell may lose its ability to reproduce
b) The cell may die
c) Damage is caused by knocking an electron out of the orbit of its parent atom
d) All of the above

3) The basic difference between X-rays and gamma rays is

a) Their RBE
b) Their origin
c) Their ability to damage cells of human tissue
d) That gamma rays are electromagnetic radiation

4) Radiation hazard to humans exists from

a) Natural radiation
b) Primary and scattered radiation
c) Primary beams only
d) All types of radiation except electromagnetic radiation.

5) Materials exposed to gamma rays and X-rays become radioactive and dangerous to handle.

True ( ) False ( )

6) A person who becomes contaminated with radioactive material can spread contamination to other persons.

True ( ) False ( )

7) An X-ray machine presents an internal radiation hazard.

True ( ) False ( )

8) The most penetrating radiation from radioisotopes is

a) Beta particles
b) Alpha particles
c) Gamma rays
d) X-rays

9) Radioactive (or physical) half-life is

a) The time is takes one-half of the atoms of a radioisotope to disintegrate.
b) The time it takes one-half of a radioactive material to be passed from the body as waste material.
c) The time needed to rid the body of one-half of a radioactive material by a combination of biological elimination of biological elimination and radioactive decay.

10) Biological half-life is

a) The time it takes one-half of the atoms of a radioisotope to disintegrate.
b) The time it takes one-half of a radioactive material to be passed from the body as waste material.
c) The time needed to rid the body of one-half of a radioactive material by a combination of biological elimination and radioactive decay.

11) The basic unit of measure used to express gamma or X-radiation exposure is the

a) rem
b) rad
c) roentgen
d) RBE

12) The abbreviation "r" stands for _____.

13) The abbreviation "mr" stands for _____.

14) The term "rad" stands for _____ _____ _____.

15) The term "rem" stands for _____ _____ _____.

16) The roentgen is a measure of

a) Alpha radiation
b) X-rays and gamma rays
c) Radiation damage to human cells
d) All of the above

17) The unit which is a measure of absorbed dose in tissue is the

a) rem
b) rad
c) roentgen
d) RBE

18) An exposure of one roentgen of gamma radiation equals an absorbed dose of one rad.

True ( ) False ( )

19) An exposure of 5r of gamma or X-radiation equals _____ rem.

20) The time rate at which a radiation dose is received is called _____ _____.

21) The whole-body radiation dose must normally be limited to a dose of

a) 1 1/4 rems per calendar quarter
b) 18 3/4 rems per calendar quarter
c) 7 1/2 rems per calendar quarter
d) 5 rems per calendar quarter

22) A given radiation dose will cause less damage if it is received over a very short period of time than if it is received over a long period of time.

True ( ) False ( )

23) The most serious radiation exposure is to the

a) Whole Body
b) Feet and ankles
c) Skin
d) Hands and forearms

24) A person who is 10 years old would be subject to greater radiation damage from a given exposure than a person age 27.

True ( ) False ( )

25) A person must be _____ years old to be allowed to work in a radiation area.

26) Permissible accumulated dose is

a) The occupational dose received by a person in any calendar year
b) The occupational dose a person could have been permitted in relation to his current age
c) The radiation dose recorded on his records for any reporting period
d) The total radiation dose a person has received during his lifetime

27) The formula for finding permissible accumulated dose is

a) 12 (n-18)
b) 18 (5+N)
c) 5 (N-18)
d) 12 (N+18)

28) The permissible accumulated dose for a person who is 35 years old is _____.

29) If a person does not exceed his permissible accumulated dose, he is allowed to receive a whole-body dose of

a) 5 rems per year
b) 18 3/4 rems per year
c) 12 rems per year
d) Any balance that he has in his radiation bank account

30) For each year a person is past age 18, how many rems are deposited in his radiation bank account for whole-body exposure?

a) 18 3/4 rems
b) 12 rems
c) 1 1/4 rems
d) 5 rems

31) The earliest indications of radiation damage may be detected in the

a) Nerve cells
b) Skin cells
c) Bone cells
d) Blood cells

32) The radiation effects which can be passed on to the offspring or to a later generation of a person receiving radiation are called

a) Future effects
b) Genetic effects
c) Somatic effects
d) Radiosensitive effects

33) It is possible to receive a dose considerably above the regulatory limits without showing detectable radiation effects.

True ( ) False ( )

34) Portable instruments used to monitor radiation areas are called

a) Film badges
b) Survey meters
c) Personnel monitoring devices
d) Area meters

35) Devices attached to the clothing of people working in radiation areas for measurement of radiation are called

a) Survey instruments
b) G-M counters
c) Personnel monitoring devices
d) Portable rate meters

36) Radiation measuring devices operate on the principle of ionization.

True ( ) False ( )

37) Two types of personnel monitoring devices are _____ _____ and _____ _____.

38) Two types of survey meters are _____ _____ and _____ _____.

39) Personnel monitoring devices provide cumulative readings of radiation exposure.

True ( ) False ( )

40) Survey meters provide

a) Cumulative readings of radiation exposure
b) Radiation exposure rate readings
c) Readings which must be checked on a separate reading device
d) Only readings of gamma radiation

41) Pocket dosimeters depend upon a _____ for their indication.

a) G-M tube.
b) Battery to provide electrical power
c) Quartz fiber electroscope
d) Theory that like charges attract and unlike charges repel

42) The normal operating range of a pocket dosimeter is

a) 0 to 200 mr
b) 50 to 500 mr
c) 0 to 75 r/hr
d) 25 to 250 r

43) The film badge operates on the principle that _____ exposes film.

a) Light
b) Heat
c) Ionizing radiation
d) Alpha particles

44) Which statement about the film badge is true?

a) It has the advantage of providing an immediate indication of radiation exposure
b) It is easily exposed by alpha particles
c) It has the advantage of providing a permanent record
d) All of the above

45) The pocket dosimeter has the advantage of

a) Being more accurate than the film badge
b) Providing a permanent record of radiation exposure
c) Providing an immediate indication of radiation exposure
d) All of the above

46) When wearing a pocket dosimeter, there is no need to wear a film badge at the same time.

True ( ) False ( )

47) How many electrodes does the ionization chamber survey meter have?

a) 2
b) 3
c) 4
d) 6

48) The Geiger-Mueller counter uses the G-M tube to

a) Slow down the ion flow to make detection easier
b) Provide electrical power for operation of the meter
c) To amplify the effects of the radiation entering the tube
d) To read extremely high levels of radiation

49) When reading low levels of radiation, the _____ (G-M counter or ion chamber meter) is more effective.

50) The standard dose rate of a radioisotope is expressed in

a) Roentgens per hour per curie at any standardized distance not exceeding 75 feet
b) Roentgens per hour per curie per foot
c) Roentgens per hour per curie at a distance of one foot
d) None of the above

ANSWER SHEET
VOL II - RADIATION SAFETY

		REF. NO.
1)	ionization	
2)	d	1.9
3)	b	1.9
4)	b	1.10
5)	False	1.16
6)	True	1.18
7)	False	1.18
8)	c	1.27
9)	a	1.30
10)	b	1.30
11)	c	2.1
12)	Roentgen	2.1
13)	Milliroentgen	2.4
14)	Radiation Absorb Dose	2.7
15)	Roentgen Equivalent Man	2.18
16)	b	2.3
17)	b	2.7
18)	True	2.11
19)	5	2.24
20)	Dose rate or Exposure rate	2.26
21)	a	3.4
22)	False	3.11
23)	a	3.6
24)	True	3.14
25)	18	3.16
26)	b	3.31
27)	c	3.32
28)	85	3.32
29)	c	3.41
30)	d	3.44
31)	d	4.3
32)	b	4.7
33)	True	4.6
34)	b	5.1
35)	c	5.1
36)	True	5.3
37)	Film badges, dosimeters	5.6
38)	Ionization chambers G-M counters	5.36
39)	True	5.6
40)	b	5.35
41)	c	5.7
42)	a	5.18
43)	c	5.22
44)	c	5.28
45)	c	5.29
46)	False	5.31
47)	a	5.38
48)	c	5.42
49)	G-M counter	5.42
50)	c	6.2

RADIOGRAPHER'S SAFETY EXAMINATION

Fundamentals of Radiation Safety

Name _____ Examiner _____

Date _____ Grade _____

1. There are three (3) fundamental principles involved when controlling exposure to radiation. List the three (3) and give brief descriptions of how they protect you from receiving radiation.

   (a)

   (b)

   (c)

2. Define the following terms:

   (a) "Half-life" -

   (b) Curie -

   (c) Roentgen -

   (d) Dose -

   (e) Dose Rate -

   (f) Restricted Area -

   (g) Inverse Square Law -

3. Matching

_____1.	Half life period for ^{60}Co	A. 3 months
_____2.	The gamma dose rate of 100 Ci of ^{192}Ir at 2 feet is	B. greater than 2 mR/hr.
_____3.	half life period for ^{192}Ir	C. greater then 5 R/hr.
_____4.	A dosimeter pencil measures	D. 9 months
_____5.	An exposure device must be leak tested every	E. 14.5 R/hr.
_____6.	The range of your survey meter for industrial radiography	F. greater than 5 mR/hr.
_____7.	The gamma dose rate of 1 Ci of ^{60}Co at 1 foot is	G. Dose rate
_____8.	A survey meter must be calibrated every	H. 5.9 R/hr.
_____9.	Survey meter measures	I. 148 R/hr.
_____10.	If a survey meter has a check source it must be leak tested every	J. less than 2 mR/hr.
_____11.	A milliroentgen is how much of a roentgen?	K. 75 days
_____12.	Radiation Area	L. 30 days
_____13.	Restricted Area	M. greater than 100 mR/hr.
_____14.	Unrestricted Area	N. 1.25 years
_____15.	High Radiation Area	O. 1/10,000
		P. radiation received
		Q. 1 mR to 1 R
		R. 0.5 mR to 5 R
		S. 2.7 inches
		T. 5.25 years
		U. greater than 100 R/hr.
		V. 6 months
		W. 1/1,000

4. What is the purpose of a Strontium 90 source in a survey meter?

5. What would you do if during radiographic operations on a field project you discovered your survey meter was not working?

6. Describe exactly at what intervals you utilize your survey meter after arriving at a radiographic assignment.

7. When a survey meter is removed for radiographic operations, how do you know that the instrument has been calibrated within the required limits?

8. What are the required range limits per AEC Regulations that your survey meter must be able to detect radiation?

9. Describe in detail, exactly what steps must be taken after your exposure time has elapsed when using a remote exposure device.

10. Describe how you would make an exposure with a Gaama Century exposure device.

11. Why is it necessary to survey the front (source tube side of unit) after each exposure? Explain in detail.

12. How often must a radioisotope be leak tested and what are the required limits of contamination?

13. How do you secure an exposure device on a field radiographic project when going to lunch?

14. How do you know the activity of your radioisotope in your exposure device?

15. Vehicles hauling radioactive materials:

    (a) What type warning signs are required?

    (b) Where should they be placed?

    (c) What is the maximum allowable radiation outside your vehicles?

16. What would you do if you dropped your film badge near a source while your exposure was is the "ON" position and what must you do in the event that you do not discover it until the exposure has been completed?

17. What action would you take if you knew your source was loose in the source tube?

18. What would you do if your dosimeter pencil went off-scale during radiographic operations and you were 200 miles away from your home office?

19. What is the range of your dosimeter pencil and where must it be worn?

20. Do your procedures permit you to leave a restricted area unattended during an exposure?

ANSWERS

RADIATION SAFETY EXAM

1. a. Distance - the further away the less radiation you will receive.

   b. Time - the less time you are near the source, the less radiation you will receive.

   c. Shielding - the more you are shielded from the source, the less radiation you will receive.

2. a. Half-Life - the period of time in which a given quantity of a specific radioactive isotope will decay to an activity equal to one-half (1/2) of the original acitivity.

   b. Curie - the unit of activity for measuring the quantity of a radioactive material.

   c. Roentgen - the unit of measure of radioactive material received.

   d. Dose - amount of radiation received.

   e. Dose Rate - amount of radiation received per hour.

   f. Restricted Area - any area greater than 2 MR/HR.

   g. Innerse Square Law - as the distance is doubled, the radiation is reduced to 1/4 the original level.

3. MATCHING:

1. T	6. Q	11. W
2. I	7. E	12. F
3. K	8. A	13. B
4. P	9. G	14. J
5. V	10. V	15. M

4. Strontium 90 is used as a check source to determine if meter is capable of detecting ionizing radiation.

5. Stop all operations.

Check dosimeter pencil for radiation exposure.

Notify RSO for replacement meter.

6. 2 MR area

After each exposure.

Assignment is completed, therefore survey vehicle.

7. The survey meter should have a sticker on it indicating last calibration date and the calibration due date.

8. 0 MR/HR to 1 R/HR

9. Turn crank counter-clockwise until the source is returned to the camera. Survey exposure device. Survey the entire tube. Lock camera.

10. Making an exposure with a Gamma Century exposure device:

a. Remove safety plug from lock box.

b. Pull out pigtail 1/2 inch and connect control cable to pigtail.

c. Thread control cable to lock box.

d. Remove safety plug from source tube side of unit and thread on source tube.

e. Unlock unit and crank clockwise to expose source.

f. After exposure time has elapsed, crank source back in counter-clockwise and lock source in position.

g. Survey unit and source tube.

11. The source may not be fully retracted into the unit.

12. Every six (6) months. 0.005 microcuries.

13. Lock the source in the camera and lock the camera inside the vehicle. Chain it to a steel beam and post warning signs around source.

14. Decay curve or 75 day half-life.

15. Vehicles hauling radioactive materials:

    a. Signs required: CAUTION --- Radioactive Material or Radioactive

    b. Placement: Outside the vehicle on both sides and rear

    c. Maximum allowable radiation outside vehicle: 2 MR/HR.

16. Stop operations immediately, contact RSO, and send film badge in for immediate processing. Get new badge and make a statement of facts.

17. Return to the control cable and turn the hand crank clockwise and counter-clockwise trying to bring the pigtail back into the unit. If this is not successful, then the area should be secured and posted as a Restricted Area, and the RSO should be called.

18. Notify RSO immediately.

19. 0 to 200 MR. It must be worn where it will pick up the maximum amount of radiation while you are working on job assignment.

20. No.

NON-DESTRUCTIVE TRAINING QUIZ

NO. II

Name: _____

Date: _____

Branch: _____

Grade: _____

1. The fundamental particles which are of primary concern in Atomic Theory are:

   A. _____

   B. _____

   C. _____

   D. _____

2. When referring to $_{92}U^{238}$, the subscript refers to

   a. Number of protons in the nucleus
   b. Atomic number of the element
   c. Nuclear charge of the nucleus
   d. All of the above

3. List the mass and weight of ga[illegible]adiation

   a. Mass = _____

   b. weight = _____

4. X-Rays and gamma rays are dis-similar in that X-rays are electromagnetic radiation and gamma rays are not.

   a. True
   b. False

5. The _____ is an electron accelerator which uses magnetic induction to accelerate electrons in a circular path. A varying magnetic field is used to provide the orbital acceleration.

   a. X-ray tube
   b. linear accelerator
   c. betatron
   d. Van de Graaff Generator

6. Of the first 92 elements, how many have had Radioisotopes obtained from them?

   _____

14. Describe an ion pair.

15. What particles of radiation might be filtered out by the stainless steel source capsule?

16. List the three processes by which X and Gamma rays lose their energy.

    a.
    b.
    c.

17. Define the "Inverse Square Law".

18. A 60 Curie source of IR-192 is to be used at 10 feet from a group of workmen. (a) What dose rate will they receive? (b) What dose will they receive in 8 hours? (c) At what distance would the group of men receive only 2 MR/hr?

    Note that the dosage rate for IR-192 is 5.9 r/hr/c at 1 foot.

19. A radiographer plans to make a radiograph in a location where it is necessary for people to work periodically as close as 40 feet to a 20 curie source of IR-192. He plans to reduce the dose rate to less than 4 MR/hr by placing a portable lead shield between the radiographic set up and the work area. What thickness shield would be needed to attenuate the gamma radiation to the required level, calculated to the nearest half value layer?

    Note that the half value layer for lead, when used with IR-192, is 0.19 inches.

20. What is the radiation level in the work area in the problem above?

21. List and define the three principals for controlling body exposure to sources

    1.

    2.

    3.

7. When a reactor is used as a power plant, it (the reactor) is considered primarily as a source of _____energy.

   a. heat
   b. electrical
   c. kinetic
   d. hydrostatic

8. The bombarding of atoms with neutrons so that their nucleus capture neutrons and become radioactive without changing to another material or element is a principal method of obtaining _____

   a. electrical energy
   b. radioisotopes
   c. steam
   d. natural radioactive salts

9. A curie is defined as the amount of any radioisotope that gives _____disintegrations per second.

   a. 3.7×10^{-7}
   b. $.37 \times 10^{10}$
   c. 37×10^{10}
   d. 3.7×10^{10}

10. The number of disintegrations which a given amount of a radioisotope has during a given length of time is called the _____of the isotope.

    a. activity
    b. daughter
    c. strength
    d. none of the above

11. A 100 Curie Source of IR^{192} was purchased on May 1, 1975. Plot a decay curve for that source and determine the source strength on September 20, 1975. Graph paper is supplied for this problem.

12. A free electron, not attached to any parent atom, is called a _____.

    a. ion pair
    b. positive ion
    c. ionizing particle
    d. negative ion

13. An alpha particle may strike an orbital electron in an atom and cause the electron to leave its orbit. This action is called _____.

    a. ionization
    b. secondary ionization
    c. impact
    d. any of the above are correct

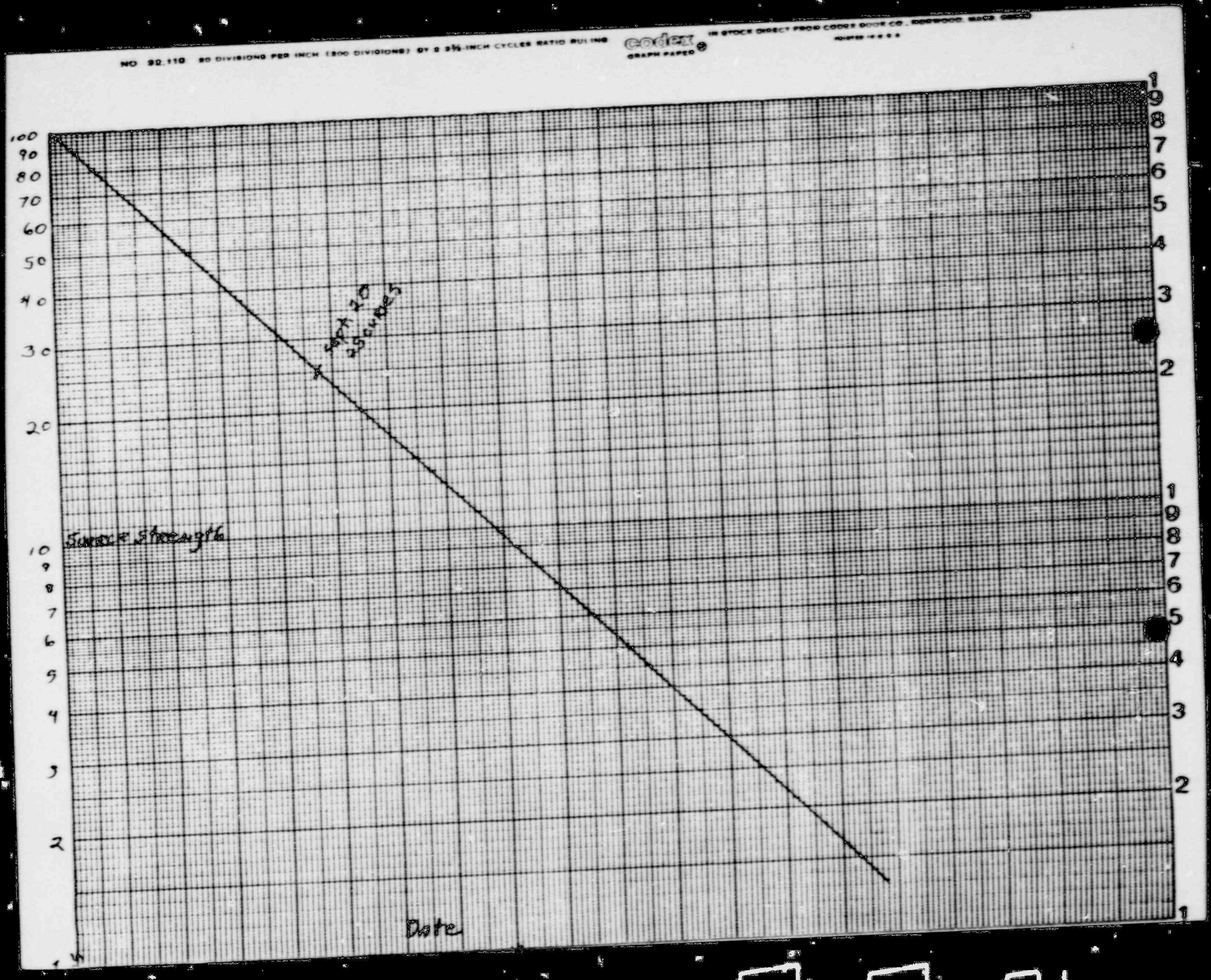
22. A small fabricating shop produces a welded product that requires 40 radiographs each week. A 75 curie IR-192 source is needed to make each exposure in 4 minutes. Only a small shop floor area is available. This requires that the radiographer work within 20 feet of the exposed source. Determine the lead shield thickness that must be provided to prevent the radiation workers from receiving more than 100 MR/week.

23. Briefly describe how an ionization chamber survey meter works.

24. How may a dosimeter pencil be used to determine approximate source strength?

25. Which type of instrument should be used to measure low intensity radiation levels?

    a. Ionization chamber instruments
    b. Dosimeter pencil
    c. Geiger counters
    d. Film badge


NO 92.110 90 DIVISIONS PER INCH (300 DIVISIONS) BY 2 2½-INCH CYCLES RATIO RULING
codex
GRAPH PAPER
IN STOCK DIRECT FROM CODEX BOOK CO., NORWOOD, MASS. U.S.A.
100
90
80
70
60
50
40
30
20
10
9
8
7
6
5
4
3
2
1
Sept 20
25 cycles
Surface Strength
Date

ANSWERS: Nondestructive Training Quiz No. II

1. a. Proton
   b. Neutron
   c. Electron
   d. Positron

2. d

3. a - Zero, or none

   b - Zero, or none

4. b

5. c

6. 92, or all

7. a

8. b

9. d

10. a

11. See attached decay curve

12. d

13. a

14. When an electron is dislodged from an atom, it becomes a free electron, or negative ion. The original atom now has a positive charge and is a positive ion. The free electron and positive ion are an ion pair. Also, if the free electron combines with another atom, this becomes a negative ion and is an ion pair with the positive ion.

15. Alpha and beta particles

16. a. Compton effect
    b. photoelectric absorption
    c. pair production

17. The intensity of radiation is inversely proportional to the square of the distance from the source.

18. a. 3.54 r/hr or 3540 mr/hr

    b. 28.32 r/hr

    c. 420.7

ANSWERS: Nondestructive Training Quiz No. II

19. Intensity is 118,000 mr/hr at 1 foot, 73.75 mr/hr at 40 feet. Five half value layers (.95 inches) reduces radiation levels to 2.3 mr/hr.

20. 2.3 mr/hr

21. 1. Time-less time spent near source - less radiation received.

    2. Distance - greater distance from source - less radiation received.

    3. Shielding - behind shielding from source, less radiation received.

22. 40 exposures at 4 min. each equals 2.67 hrs per week.

    100 mr/hr ÷ 2.67 equals 37.4 mr/hr maximum exposure.

    75 curies times 5900 mr/hr times $(1/20)^2$ equals 1106.25 mr/hr

    Five half value layers reduces 1106.25 mr/hr to 34.57 mr/hr.

    Ans. .95 inches of lead.

23. Ionization occurs in the chamber in the presence of an electrical field, the ions going to the electrode having the charge of the opposite sign, current flow through the batteries supplying the electrical field are measured and interpreted in terms of radiation intensity.

24. Exposure is made to a dosimeter pencil at a measured distance for a known period of time. The radiation received is computed to mr/hr. This value, the distance from the source, and the know dose rate for the isotope are used to determine source strength with the "Inverse Square Law".

25. c

NONDESTRUCTIVE TRAINING QUIZ

NO. III

Name: _____

Date: _____

Branch: _____

Grade: _____

1. Miners in Uranium mines have developed long cancer after inhaling gases with a high concentration of Radon. For this reason, breathing of air near an encapsulated source of C_o-60 should be avoided.

   a. True
   b. False

2. Give the complete name for the abrevations listed below

   a. r_____

   b. rem_____

   c. rad_____

   d. RBE_____

3. List three of the four common ways in which it is possible to get radioactive materials into the body.

   a._____

   b._____

   c._____

4. Define "Biological Half-life".

5. Select the radiation dose that corresponds with the classifications listed:

_____a.	Mild dose	1. 50-200 rem
_____b.	Moderate dose	2. 0-50 rem
_____c.	Median leathal dose	3. 600-800 rem
_____d.	Leathal dose	4. 200-600 rem

6. The average long term exposure limit for industrial radiographers should not exceed _____rem per quarter.

   a. .125 rem
   b. .5 rem
   c. 1.25 rem
   d. 5 rem

7. When a body tissue cell is damaged by radiation,

   a) The cell may lose its ability to reproduce.

   b) The cell may die

   c) Damage is caused by knocking an electron out of the orbit of its parent atom.

   d) All of the above.

8. There is always a small amount of contamination when working with radioisotope sources.

   a. True
   b. False

9. The annual whole body dose for the general population should not exceed:

   a. .125 rem
   b. .5 rem
   c. 1.25 rem
   d. 5 rem

10. Use the formula for determining the occupational exposure limit for yourself. You must show your work for credit, not just the answer.

ANSWERS: Nondestructive Training Quiz No. III

1. b

2. a. Roentgen
   b. Roentgen equivalent man
   c. Radiation absorbed dose
   d. Relative biological effectiveness

3. a. breathing
   b. swallowing
   c. through breaks in the skin
   d. absorption through the skin

4. That period of time which it takes for one-half the element to be excreted from the body by natural processes.

5. a. 2
   b. 1
   c. 4
   d. 3

6. c

7. d

8. b

9. b

10. Exposure limit = 5(N-18) N = Age in years

ITEM 9 - Facilities and Equipment:

The license covers the use of radioactive sealed sources of Cesium 137, Iridium 192 and Cobalt 60 in shielded devices and shielded sources changers. There is no permanent radiography room; all operations will be conducted in the plant, or adjacent areas owned and controlled by PDM, or field locations where PDM is authorized by the owner to enter and control radiographic activities for the purposes of fabricating, erecting and radiographing structures. All radiography (exposure of licensed sealed sources) will conform and adhere to provisions of the license, and local regulatory requirement (agreement states).

Principal storage and use at:

Pittsburgh-Des Moines Corporation (PDM)
Neville Road
Neville Island
Pittsburgh, Pennsylvania 15225

or

PDM
3400 Grand Avenue
Neville Island
Pittsburgh, Pennsylvania 15225

Temporary use in all States of the United States and territory of Puerto Rico, subject to the regulatory requirements of the State or territory.

Projectors, sources, storage containers and source changers will be kept in a locked enclosure when not in use. The exterior confines of the storage enclosure will be surveyed with each use to ensure a radiation level of less than 2.0 mr/hr at contact. Exterior confines and access compartment will be posted with magenta and yellow signs displaying the standard radiation warning symbol and the legend "CAUTION-RADIOACTIVE MATERIAL". Entry will be restricted by lock and key at all times.

ITEM 10 - Radiation Safety Program:

PDM's Radiation Safety Program is enclosed in total with the application and it contains the necessary procedures required for compliance to the applicable regulatory rules.

10.1 Personnel Monitoring Equipment is covered by Procedure RSP-2.

10.2 Radiation Detection Instruments is covered by Procedures RSP-3 and RSP-4.

10.3 Internal Inspection Program is covered by Procedure RSP-13. The Radiation Safety Officer or his assistant for the applicable license shall conduct the inspection.

10.4 Operating and Emergency Procedures are covered in the balance of the procedures as given in the Table of Contents from PDM's Radiation Safety Manual, as attached to this Item 10.

10.5 Leak Testing:

PDM shall use one of the following commercial Leak Test Kits:

A. Kit Model Number: Mark V
Name: Applied Health Physics
Address: 2986 Industrial Boulevard
Box 197
Bethel Park, Pennsylvania 15102
License Number: 37-09135-01

B. Kit Model Number: Kowipe
Name: Gamma Industries
Address: 2255 Ted Dunham Avenue
Baton Rouge, Louisiana 70802
License Number: LA-0006-L01

C. Kit Model Number: 518
Name: Tech-Ops
Address: 40 North Avenue
Burlington, Massachusetts 01803
License Number: 20-00277-03

The following people are authorized to perform this test:

Alfred J. Mueller
Joseph E. Madden
Robert E. Stachel
John D. Freeman

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

ITEM 11 - Waste Management:

PDM will dispose of licensed material by transfer to the original supplier or to another licensee authorized by license or registration certificate to possess the licensed material. Transfer to another licensee shall only be performed after receipt and acceptable review of the applicability of the current license of the prospective licensee.

PDM
Pittsburgh-Des Moines Corporation
P.O. Box 9308 Neville Island Pittsburgh, PA 15225 412/331-3010

RADIATION SAFETY MANUAL

1996 EDITION

37-02607-02

"OFFICIAL RECORD COPY"

NAME: ML10

CONTROL NUMBER: 105859

TELEX: 846-468 TELEFAX: (412) 331-2279

PDM
Pittsburgh-Des Moines Corporation

P.O. Box 9308 Neville Island Pittsburgh, PA 15225 412/331-3010

POLICY STATEMENT

The procedures contained herein are designed to provide the Radiographers and Radiographer's Assistants with the necessary instructions to assure an adequate Radiation Safety Program for field Radiographic Operations.

The Pittsburgh-Des Moines Corporation, which engages in isotope radiography and has a License for such radiography, has appointed a Radiation Safety Officer. The Radiation Safety Officer has my support and the authority for implementing the requirements contained in this manual.

Failure to comply with the procedures and regulations set forth in this manual will be just cause to apply appropriate disciplinary action.

PITTSBURGH-DES MOINES CORPORATION

G. J. Warner 7/18/86
G. J. Warner Date
President

TELEX 846-468 TELEFAX (412) 331-2279

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

1986 EDITION

R J Mueller Jr.
Radiation Safety Officer

July 18, 1986
Date

LOG OF REVISIONS

PAGE	REVISION LEVEL
i	0
0.1.1	0
0.1.2	0
0.1.3	0
0.2.1	0
0.2.2	0
0.2.3	0
0.2.4	0
1.1	0
1.2	0
1.3	0
1.4	0
1.5	0
1.6	0
2.1	0
2.2	0
2.3	0
2.1.1	0
3.1	0
3.2	0
3.3	0
3.4	0
3.5	0
3.6	0
3.7	0
3.8	0
4.1	0
4.2	0
4.1.1	0
4.2.1	0
4.3.1	0
4.3.2	0

LOG OF REVISIONS (CONTINUTED)

PAGE	REVISION LEVEL
4.4.1	0
4.4.2	0
5.1	0
5.2	0
5.1.1	0
5.1.2	0
5.1.3	0
5.1.4	0
5.2.1	0
5.2.2	0
5.3.1	0
5.3.2	0
5.4.1	0
5.4.2	0
5.5.1	0
5.5.2	0
5.6.1	0
5.6.2	0
5.7.1	0
5.7.2	0
5.8.1	0
5.8.2	0
5.8.3	0
5.9.1	0
5.9.2	0
5.10.1	0
5.10.2	0
5.11.1	0
5.11.2	0
6.1	0
7.1	0
7.2	0
7.3	0

LOG OF REVISIONS (CONTINUED)

PAGE	REVISION LEVEL
8.1	0
8.1.1	0
8.1.2	0
8.2.1	0
8.2.2	0
8.2.3	0
8.3.1	0
8.3.2	0
8.4.1	0
8.4.2	0
8.5.1	0
8.5.2	0
9.1	0
9.2	0
9.3	0
9.4	0
9.5	0
9.6	0
9.7	0
9.8	0
9.9	0
9.10	0
10.1	0
11.1	0
11.2	0
12.1	0
12.2	0
12.3	0
13.1	0
14.1	0
14.2	0
14.3	0
15.1	0
15.2	0

LOG OF REVISIONS (CONTINUED)

PAGE	REVISION LEVEL
15.3	0
15.4	0
15.5	0
15.6	0
15.7	0
15.8	0
15.9	0
15.10	0
15.11	0
15.12	0
15.13	0
16.1	0
16.2	0

The Appendices are not controlled pages within the Radiation Safety Manual.

RSP-1 RADIATION SAFETY ADMINISTRATION

1.0 SCOPE

1.1 This procedure describes the Administration of the Radiation Safety Program as established by PDM to comply with established Federal, State and Local Radiation Safety Requirements.

2.0 ORGANIZATION

2.1 Attachment No. 1 outlines the organizational structure with reference to Management, Radiographers and Radiographer's Assistants as contained in the Radiation Safety Program.

2.2 Radiation Safety Officer (RSO)

The Radiation Safety Officer is appointed by and reports to the President.

2.3 Assistant Radiation Safety Officer(s) (ARSO)

The Assistant Radiation Safety Officers are appointed by the Radiation Safety Officer.

2.4 Radiation Safety Supervisor(s) (RSS)

The Radiographer Foremen at a particular location serves as the Radiation Safety Supervisors.

3.0 QUALIFICATIONS

3.1 Radiation Safety Officer

The Radiation Safety Officer will be appointed by virtue of a resume submitted to the President. He shall be thoroughly familiar with all phases of radiographic operations and applicable Federal, State and Local regulations.

3.2 Assistant Radiation Safety Officer(s)

The Assistant Radiation Safety Officer shall be thoroughly versed in all phases of Radiographic Operations, shall have had a minimum of two (2) years experience as a Radiographer in industrial radiography, and must demonstrate a thorough understanding of applicable Federal, State and Local regulations.

3.3 Radiation Safety Supervisor(s)

The Radiation Safety Supervisor(s) shall be trained and certified in Radiation Safety as required in PDM's Radiation Safety Manual.

4.0 RESPONSIBILITIES

4.1 Radiation Safety Officer (RSO)

The Radiation Safety Officer is responsible for the administration of the PDM Radiation Safety Program as required by Federal, State and Local regulations. His duties include but are not limited to the following:

4.1.1 Preparing, maintaining and controlling the Radiation Safety Manual (RSM).

4.1.2 Administering the Radiation Safety Training Program.

4.1.3 Serving as PDM's liaison officer with the Nuclear Regulatory Commission and/or Agreement States on license matters.

4.1.4 Maintaining control of procurement and of licensed material.

4.1.5 Developing and maintaining up-to-date operating and emergency procedures.

4.1.6 Establishing and maintaining a personnel monitoring program.

4.1.7 Establishing and maintaining an internal inspection system.

4.1.8 Establishing and conducting a survey instrument calibration program.

4.1.9 Controlling and instituting corrective action in emergency situations.

4.1.10 Investigating causes of incidents and determining necessary preventive action.

4.2 Assistant Radiation Safety Officer(s) (ARSO)

The Assistant Radiation Safety Officer is directly responsible for Radiation Safety within his respective area. If an ARSO does not exist in the organization, the duties listed below shall be performed by the RSO. Their duties include but are not limited to the following:

4.2.1 Procuring and maintaining radiation survey instruments.

4.2.2 Establishing and maintaining radio-isotope storage facilities.

4.2.3 Maintaining exposure devices, radiography facilities and associated equipment.

4.2.4 Conducting and recording quarterly inventories (Form RR-11, RSP-15, Page 15.13) and maintaining Source Utilization Reports (Radiographic Operations Report, Form RR-2) for his respective organization.

4.2.5 Maintaining all reports, records and correspondence relating to Radiation Safety and control for his organization.

4.2.6 Forwarding copies of reports and records to the Radiation Safety Officer.

4.2.7 Reporting to the Radiation Safety Officer as required.

4.2.8 Examining and determining competency of Radiographers and Radiographer's Assistants.

4.2.9 Establishing and maintaining a leak testing program.

4.3 Radiation Safety Supervisor(s)

The Radiation Safety Supervisor is responsible for administering PDM's Radiation Safety Program. He is responsible to assure that all radiographic operations are conducted in a safe manner and in accordance with the Radiation Safety Manual (RSM).

4.4 Radiographer

A Radiographer is an employee who performs radiography and/or personally supervises radiographic operations. He is directly responsible for all sources and equipment assigned to him. He is responsible for implementing the operating procedures of PDM's Radiation Safety Manual in compliance with applicable Federal, State and Local regulations.

4.5 Radiographer's Assistant

A Radiographer's Assistant is an employee who, under the direct supervision of a Radiographer, uses radiographic exposure devices and radiation monitoring devices. He is responsible for performing his assigned duties in accordance with the operation procedures of PDM's RSM in compliance with applicable Federal, State and Local regulations.

5.0 RADIATION SAFETY MANUAL

5.1 Structure

5.1.1 The Radiation Safety Manual (RSM) is comprised of operating procedures which define the Radiation Safety Administration Program and the Operating and Emergency Procedures for implementing and maintaining an adequate Radiation Safety Program within PDM.

5.1.2 The appendices included in the RSM contain:

5.1.2.1 USNRC TITLE 10 CFR Parts 19, 20, 21, 30, 34, 40 and 71.

5.1.2.2 USNRC License and conditions as applicable.

5.1.2.3 RECIPROCITY AND NOTIFICATION REQUIREMENTS AS APPLICABLE TO AGREEMENT STATES WHEREIN RADIOGRAPHIC OPERATIONS ARE CONDUCTED. (Other than USNRC or State Licence.)

5.1.2.4 USNRC Forms 3, 4, and 5 and APPLICABLE STATE FORMS.

5.1.2.5 Glossary of Terms.

5.2 Manual Control and Assignment

All manuals will be assigned a control number. The control number and name of the individual to whom the manual is assigned will be identified on the cover page. A master control log containing the manual control number and the name of the person to whom the manual is assigned will be maintained by the Radiation Safety Officer.

5.3 Radiation Safety Manual Revisions

5.3.1 When revisions are made, the affected Log of Revisions pages and the revised pages only shall be reissued.

5.3.2 Revisions to a page shall be indicated by a revision letter in the left hand margin adjacent to the revised paragraph.

5.3.3 Revised procedures shall be submitted, as required, to the Nuclear Regulatory Commission and/or Licensed Agreement State for approval prior to release to the manual holder.

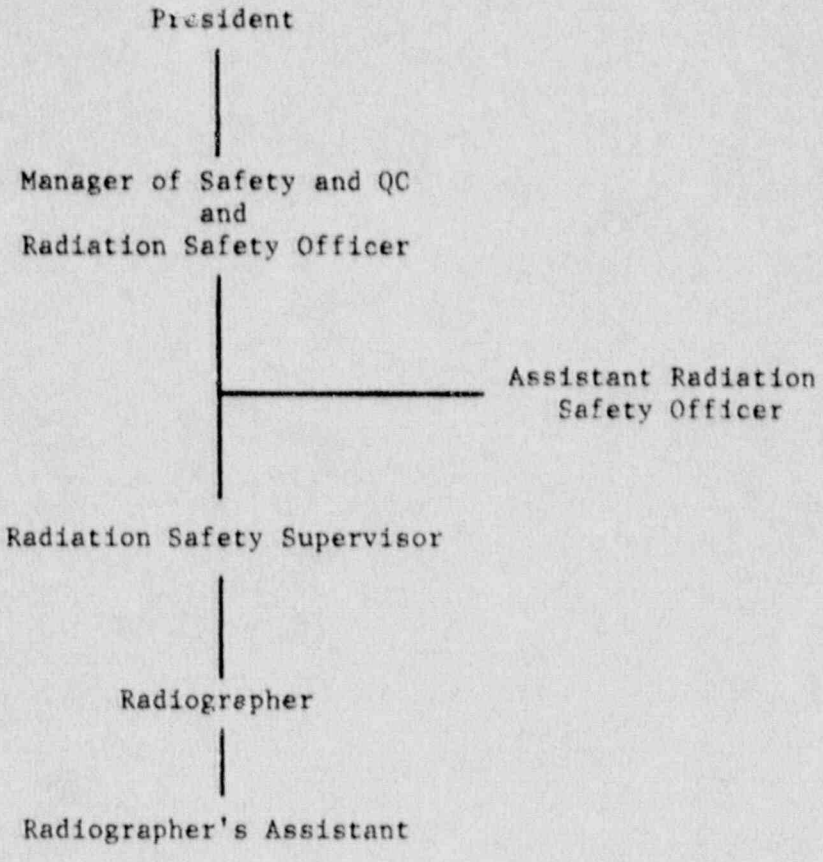
5.3.4 Appendices and/or Procedural Attachment Revisions will be issued without USNRC and/or Licensed Agreement State approvals.

5.3.5 Should Licensed Agreement State Regulations differ from USNRC Regulations, an Addendum will be issued to the affected operating procedure(s) to cover the specific requirement(s). Addendas will be revised, issued and controlled in the same manner as this manual.

5.3.6 A Manual Revision Transmittal and Receipt Form, as shown in RSP-15, page 15.2, shall accompany all manual revisions to manual holders. It will be the responsibility of the manual holder to incorporate the revision changes in his manual. The statement of receipt on the Transmittal and Receipt Form shall be completed and returned to the Radiation Safety Officer.

ATTACHMENT NO. 1

RADIATION SAFETY PROGRAM ORGANIZATION CHART



RSP-2 - PERSONNEL MONITORING EQUIPMENT AND USAGE

1.0 SCOPE

1.1 This procedure shall govern the use of Personnel Monitoring Devices.

1.2 This procedure shall be used in conjunction with the PDM's procedure entitled Radiation Safety Records, RSP-14 and Calibration Procedure for Dosimeters, RSP-2.1.

2.0 EQUIPMENT

2.1 Dosimeter - direct reading from 0 to 200 MR.

2.2 Dosimeter Charger.

2.3 Film Badge.

2.4 Eberline Rad-Tad or equivalent.

3.0 USE

3.1 Dosimeters

3.1.1 Dosimeters are to be zeroed at the beginning of each work day by inserting the dosimeter into the socket on the Dosimeter Charger, and adjusting the knob until the indicator in the Dosimeter reads "0".

3.1.2 All Radiographers and Radiographer's Assistants shall wear a pocket dosimeter at all times during working hours. Dosimeters shall be worn on the clothing adjacent to the film badge in the chest area.

3.1.3 Dosimeters shall be read at frequent intervals during the work day so that you are aware of the exposure received during the course of radiographic activities.

3.1.4 Dosimeters shall be read at the end of each working day for which radiographic activities were performed, and the reading shall be recorded on PDM's Radiographic Operations Report, RR-2. (See RSP-15, Page 15.3.) Dosimeters are delicate instruments, and should be treated as such. Jarring or dropping the instrument may cause a high reading. If your dosimeter does not operate properly, notify your supervisor and have it replaced.

3.1.5 In the event that a dosimeter becomes discharged beyond its capacity of 200 MR due to unknown circumstances in which the possibility exists that an excessive radiation exposure may have occurred, the individual shall contact the Radiation Safety Officer, Radiation Safety Supervisor or Assistant Radiation Safety Officer for instructions. In addition, he will not be permitted to engage in radiographic operations until the results of a film badge processing are acceptable.

3.1.6 Dosimeters shall be calibrated annually in accordance with PDM procedure RSP-2.1, Calibration Procedure for Dosimeters, to assure proper operation.

3.2 Film Badges

3.2.1 Film badges shall be assigned to and worn by only one individual.

3.2.2 Film badges will be forwarded to the radiographer by the Radiation Safety Officer or his designee so that the radiographer will have these in his possession at the beginning of the month.

3.2.3 Film badges shall be worn by all radiographic personnel during work hours and placed adjacent to the dosimeter on the clothing in the chest area. Care should be taken to prevent the film badge from becoming wet or mutilated.

3.2.4 In the event that:

a) an individual's dosimeter is discharged beyond its capacity or 200 MR due to unknown circumstances in which the possibility exists that an excessive radiation exposure may have occurred.
b) an individual's film badge becomes lost or mutilated.
c) An individual has reason to believe that his film badge may indicate a dosage that he may not have received,

the individual shall notify his Radiation Safety Officer, Radiation Safety Supervisor or Assistant Radiation Safety Officer so that he may disposition the situation. In addition, the applicable section(s) of an Incident Data Report (Form RR-3) (See RSP-15, Page 15.4) shall be completed by the individual within 24 hours of the occurrence and the report forwarded to the Radiation Safety Officer. If the possibility exists that an excessive radiation exposure may have occurred, the individual shall not be permitted to engage in radiographic operations until the results of a film badge processing are satisfactory and he is issued another film badge.

3.2.5 Control film badges are not to be worn by a radiographer.

4.0 RECORDS

4.1 Dosimeter readings must be recorded on Radiographic Operations Form No. RR-2, for days on which radiographic activities were performed.

4.2 At the end of the work week Radiographic Operations Reports are to be returned to the Radiation Safety Supervisor for transmittal to the Radiation Safety Officer.

4.3 At the end of the month, the film badges are to be returned to the Radiation Safety Officer, who will send them to the film badge processor for reading, recording and reporting the dosage.

RSP-2.1 - CALIBRATION PROCEDURE FOR DOSIMETERS

1.0 SCOPE

1.1 This procedure shall govern the calibration of dosimeters.

2.0 PROCEDURE

2.1 Charge the dosimeter to a value of zero.

2.2 Place the dosimeter in a low radiation area such as near the surface of the isotope camera, using shielding material or distance to obtain a known radiation intensity of approximately 20 MR/HR.

2.3 After 4 hours of exposure at this rate the dosimeter should be checked. The reading should be four times the original intensity or within plus or minus 30% of the original intensity.

2.4 After another 4 hours of exposure at this same intensity, check the dosimeter. The reading should be eight times the original intensity or within plus or minus 30% of the original intensity.

3.0 STICKER

3.1 If the dosimeter meets the above requirements it will have a sticker attached to it showing the date calibrated, serial number of the dosimeter and the date the next calibration is due.

3.2 If the dosimeter does not meet the requirements of plus or minus 30%, it shall be removed from service!

4.0 RESULTS

4.1 The results shall be recorded on the Dosimeter Calibration Record (Form RR-9, RSP-15, Page 15.12).

5.0 ALTERNATIVES

5.1 As an alternative, this calibration may be performed by an outside agency and a record of their calibration results shall be obtained and maintained. In this case, the results, as required in 4.0, need not be recorded by PDM.

RSP-3 - RADIATION SURVEYS AND POSTING

1.0 SCOPE

1.1 This procedure shall govern methods of performing Radiation Surveys and define Posting Requirements as outlined and established in USNRC Title 10 CFR Parts 20 and 34 and/or applicable established Licensed Agreement State Regulations.

1.2 This procedure shall be used in conjunction with PDM's procedure entitled:

RSP-4 GENERAL PROCEDURE FOR USE OF RADIATION SURVEY INSTRUMENTS.

RSP-4.1 OPERATING INSTRUCTION FOR USE OF VICTOREEN MODEL 592B and 492 SURVEY METER.

RSP-4.2 OPERATING INSTRUCTIONS FOR USE OF EBERLINE 130G GEIGER COUNTER.

RSP-4.3 OPERATING INSTRUCTIONS FOR USE OF GAMMA INDUSTRIES MODEL 250B AND 252B SURVEY METER.

RSP-4.4 OPERATING INSTRUCTIONS FOR USE OF VICTOREEN MODEL 740B SURVEY METER.

2.0 POSTING OF NOTICES TO WORKERS

2.1 The Radiation Safety Supervisor shall post the following documents in the Mobile Laboratory, Plants and Sites to permit individuals, frequenting the area where radiographic operations take place, to observe them:

2.1.1 Form USNRC-3, NOTICE TO EMPLOYEES, Appendix D, or when performing under a specific state license, the applicable state form shall be posted instead of Form USNRC-3.

2.1.2 PDM Notice (Attachment Number 1).

2.1.3 Violation Notices, as described in 10 CFR 19.11, paragraph(a)(4) shall be posted immediately upon receipt from the Radiation Safety Officer.

3.0 ESTABLISHING RADIATION AREAS

3.1 The use of Radiation survey instruments allows the radiographer and/or radiographer's assistant to establish safety perimeters where applicable posting requirements can be accommodated and barricades can be established as required. (See RSP-15, Page 15.3 and Attachment Number 3.)

4.0 POSTING OF RESTRICTED AREAS AND SECURING REQUIREMENTS FOR RADIOGRAPHIC OPERATIONS

4.1 Each exposure set-up must be posted to assure prevention of unauthorized access to a radiation area. The exposure at the perimeter of the posted area must be such that the total quantity of radiation in any one hour does not exceed 2 MR.

4.2 Signs used at the perimeters of the radiation area and high radiation area must comply with USNRC and/or applicable licensed Agreement State requirements and must be posted as follows:

4.2.1 Radiation Area

An area within which the radiation level exceeds 2 MR/HR. The signs posted conspicuously at the perimeters of this area must read "CAUTION - RADIATION AREA". (See Attachment Number 2, Figure 2.)

4.2.2 High Radiation Area

A Survey need not be made to determine the high Radiation Area since this would result in unnecessary exposure to the radiographer or radiographer's assistant. Instead, the signs should be posted at the perimeter of an area in which there is a calculated radiation level in excess of 100 MR/HR. (See Attachment Number 2, Figure 3.)

4.3 The radiographer and/or radiographer's assistant must be in continuous surveillance of a radiation area to prevent unauthorized entry.

5.0 REQUIRED RADIATION SURVEY

5.1 A physical radiation survey must be made to establish radiation areas for posting as required in Section 3 of this procedure and the results of this survey are to be recorded on Radiographic Operations Report, Form RR-2. (See RSP-15, Page 15.3.)

5.2 After each radiographic exposure, a physical radiation survey must be made to determine that the source has returned to the safe position of the projector. (NOTE: This survey should be made at the same location relative to the projector for every survey and must include the area at the front of the projector near the port.)

5.3 At the conclusion of each radiographic operation and at the time of securing the source, a physical radiation survey must be made to determine that the source is in the safe position. This survey is to be made after the source has been disconnected and locked in the projector at the time of storage. Records of this survey must be recorded on Radiographic Operations Report, Form RR-2 (see RSP-15, Page 15.3) and retained for review by the USNRC and/or applicable licensed agreement state.

5.4 After the projector has been placed in the area designated for storage, another survey is required at the surface of the storage container, box, building or mobile lab which must be posted "CAUTION - RADIOACTIVE MATERIAL" (see Attachment Number 2, Figure 1). The surface reading must be such that if a person were continually present, he would not receive in excess of 2 MR in any given hour. THE SURVEY MUST INDICATE 2 MR/HR READING OR LESS.

ATTACHMENT NUMBER 1

NOTICE

THE FOLLOWING DOCUMENTS ARE AVAILABLE FOR REVIEW AT THE JOBSITE, MOBILE LABORATORY OR IN THE PLANT QC OFFICE

1.0 USNRC RULES AND REGULATIONS

- 1.1 10CFR 19.
- 1.2 10CFR 20.
- 1.3 10CFR 21.
- 1.4 10CFR 30.
- 1.5 10CFR 34.
- 1.6 10CFR 40.
- 1.7 10CFR 71.
- 1.8 NRC-3.

2.0 APPLICABLE STATE REGULATIONS, AS REQUIRED.

3.0 PDM's RADIATION SAFETY MANUAL (RSM) WHICH INCLUDES:

- 3.1 OPERATION AND EMERGENCY PROCEDURES.
- 3.2 USNRC AND/OR APPLICABLE STATE LICENSE AND AMENDMENTS.

4.0 NOTICE OF VIOLATION PER 10CFR 19 (19.11, a, 4).

5.0 NRC-3, NOTICE TO EMPLOYEES.

ATTACHMENT NO. 2

FIGURE 1

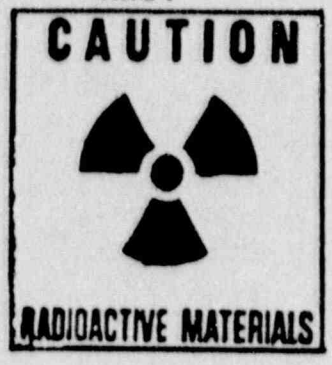
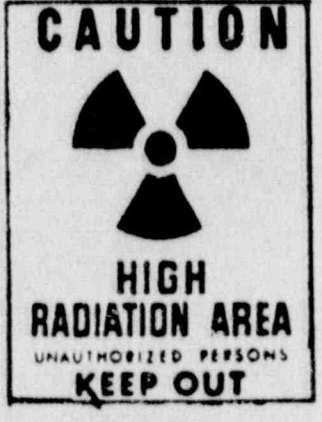


FIGURE 2

FIGURE 3



ATTACHMENT NUMBER 3

Chart to be used for determining half-value layers for reducing radiation intensity.

	COBALT 60	IRIDIUM 192
Lead	1/2"	1/4"
Steel	1"	1/2"
Cement	3"	2"
Water	7"	4"

CHARTS FOR DETERMINING RADIATION LIMITS OF UNSHIELDED SOURCES

COBALT 60

Total Exposure Time in Any 1 hour	Distance from source to the perimeter of restricted area	Allowable MR/HR Reading On Meter
1 Curie (Unshielded)		
60 minutes	90 feet	2
30 minutes	65 feet	4
10 minutes	40 feet	12
5 minutes	30 feet	24
1 minute	15 feet	120
3 Curies (Unshielded)		
60 minutes	150 feet	2
30 minutes	110 feet	4
10 minutes	65 feet	12
5 minutes	45 feet	24
1 minute	20 feet	120
5 Curies (Unshielded)		
60 minutes	195 feet	2
30 minutes	140 feet	4
10 minutes	80 feet	12
5 minutes	60 feet	24
1 minute	25 feet	120
10 Curies (Unshielded)		
60 minutes	275 feet	2
30 minutes	195 feet	4
10 minutes	115 feet	12
5 minutes	80 feet	24
1 minute	35 feet	120

COBALT 60

Total Exposure Time in Any 1 hour	Distance from source to the perimeter of restricted area	Allowable MR/HR Reading On Meter
20 Curie (Unshielded)		
60 minutes	385 feet	2
30 minutes	275 feet	4
10 minutes	160 feet	12
5 minutes	115 feet	24
1 minute	50 feet	120
50 Curies (Unshielded)		
60 minutes	600 feet	2
30 minutes	425 feet	4
10 minutes	245 feet	12
5 minutes	175 feet	24
1 minute	80 feet	120
100 Curies (Unshielded)		
60 minutes	855 feet	2
30 minutes	605 feet	4
10 minutes	350 feet	12
5 minutes	250 feet	24
1 minute	110 feet	120

IRIDIUM 192

Total Exposure Time in Any 1 hour	Distance from source to the perimeter of restricted area	Allowable MR/HR Reading On Meter
10 Curies (Unshielded)		
60 minutes	175 feet	2
30 minutes	125 feet	4
10 minutes	75 feet	12
5 minutes	50 feet	24
1 minute	25 feet	120
20 Curies (Unshielded)		
60 minutes	245 feet	2
30 minutes	175 feet	4
10 minutes	100 feet	12
5 minutes	70 feet	24
1 minute	35 feet	120
50 Curies (Unshielded)		
60 minutes	390 feet	2
30 minutes	275 feet	4
10 minutes	160 feet	12
5 minutes	115 feet	24
1 minute	50 feet	120
100 Curies (Unshielded)		
60 minutes	545 feet	2
30 minutes	385 feet	4
10 minutes	225 feet	12
5 minutes	160 feet	24
1 minute	70 feet	120
150 Curies (Unshielded)		
60 minutes	665 feet	2
30 minutes	470 feet	4
10 minutes	275 feet	12
5 minutes	195 feet	24
1 minute	85 feet	120
200 Curies (Unshielded)		
60 minutes	770 feet	2
30 minutes	545 feet	4
10 minutes	315 feet	12
5 minutes	225 feet	24
1 minute	100 feet	120

RSP-4 - GENERAL USE OF RADIATION SURVEY INSTRUMENTS

1.0 SCOPE

1.1 This procedure shall govern the use of Survey Instruments authorized by PDM.

1.2 This procedure shall be used in conjunction with the PDM's procedure entitled Radiation Surveys and Posting, RSP-3.

2.0 EQUIPMENT

2.1 The survey instruments must be capable of measuring from 0 MR/HR through 1 R/HR.

3.0 CALIBRATION

3.1 No radiation survey instrument can be used without the evidence of quarterly calibration shown on a sticker placed on the side of the instrument indicating when the instrument was calibrated by either PDM, using a USNRC or state approved procedure, or by a designated representative who used a USNRC or state approved procedure, (see RSP-5.4, 5.10, 5.11, as applicable).

3.2 Instruments with evidence of calibration and showing no indication of malfunction can be used for three (3) months after the date of calibration.

3.3 Calibration certification will be retained in PDM's Main Office and at the office where the survey instrument is being used.

4.0 USE

4.1 Survey instruments, since they are delicate, must be handled and used with utmost care to avoid damage.

4.2 Precautionary measures must be taken to avoid exposure of the instrument to excessive moisture and/or dirt.

4.3 Use of survey instruments in prolonged periods of excessive cold should be avoided since batteries may prove inefficient at colder temperatures.

4.4 Batteries should be replaced when their condition becomes questionable.

5.0 STORAGE

5.1 After use, survey instruments are to be turned to the "OFF" position and stored to preclude tampering. Additionally, the instruments are to be stored in a clean, dry environment.

RSP-4.1 - OPERATING INSTRUCTIONS FOR USE OF SURVEY METERS

VICTOREEN MODEL 592B and 492

1.0 SCOPE

1.1 This procedure describes the operation of the Victoreen 592B and 492 survey meters.

1.2 This procedure shall be used in conjunction with the PDM's procedure entitled General Use of Radiation Survey Instruments, RSP-4.

2.0 RANGE

2.1 The Victoreen 592B and 492 have three (3) scales covering the following ranges:

a) 1 x SCALE - 0 to 10 MR/HR
b) 10 x SCALE - 10 to 100 MR/HR
c) 100 x SCALE - 100 to 1000 MR/HR

3.0 OPERATION

3.1 Warm-Up

The instrument should be allowed to have a two (2) minute warm-up period with the selector switch set at the 1 x scale.

3.2 Zeroing (592B)

Turn the selector switch to the position marked ZERO. With the switch set at zero position, make an adjustment of the zeroing knob so that the meter needle (MR/HR INDICATOR) indicates zero (0).

3.3 Battery Check (492)

Turn selector switch to BAT. Position or press BAT. Check button. The dial indicator must reach the area in the scale labeled BAT.

3.4 Use

The meter should now be ready for use by turning the selector switch to the desired intensity range and reading the radiation intensity indicated by the meter.

3.5 After Use

Turn off the meter when it is not being used to preserve the batteries.

RSP-4.2 - OPERATING INSTRUCTIONS FOR USE OF SURVEY METERS

EBERLINE MODEL E-130G GEIGER COUNTER

1.0 SCOPE

1.1 This procedure described the operation of the Eberline Model No E-130G Geiger Counter.

1.2 This procedure is to be used in conjunction with PDM's procedure entitled General Use of Radiation Survey Instruments, RSP-4.

2.0 RANGE

2.1 The Eberline Model No. E-130G Geiger Counter has three (3) scales covering the following ranges:

a) 1 x SCALE - 0 to 10 MR/HR
b) 10 x SCALE - 10 to 100 MR/HR
c) 100 x SCALE - 100 to 1000 MR/ HR

3.0 OPERATION

3.1 Warm-up

The instrument should be allowed to have a two (2) minute warm-up period with the selector switch set at the 1 x scale.

3.2 Battery Check

After the warm-up period, turn the selector knob to the "BATTERY" position. If the meter needle does not fall within the area marked "BATTERY OK" on the right side of the meter face, the batteries are defective and the meter is considered inoperable until either the batteries are replaced or maintenance is performed.

3.3 Use

If the battery check is successful, the selector knob should be turned to the desired intensity range and the radiation level read from the meter indication.

3.4 After Use

The selector knob should be turned to the "OFF" position so that the batteries are preserved.

RSP-4.3 - OPERATING INSTRUCTIONS FOR USE OF SURVEY METERS

GAMMA MODEL 250B and 252B SURVEY METERS

1.0 SCOPE

1.1 This procedure describes the operation of the Gamma Model 250B and 252B survey meters.

1.2 This procedure is to be used in conjunction with PDM's procedure entitled General Use of Radiation Survey Instruments, RSP-4.

2.0 RANGE

2.1 The Gamma 250B and 252B has three (3) scales covering the following ranges:

a) 1 x SCALE - 0 to 10 MR/HR
b) 10 x SCALE - 10 to 100 MR/HR
c) 100 x SCALE - 100 to 1000 MR/HR

3.0 OPERATION

3.1 Battery Check

To determine if there is a sufficient charge in the batteries, turn the selector knob past the position of "Battery Check" to one of the scales X1, X10, or X100, after this is done, turn the selector knob back to battery check and check to see if the needle falls into the area marked on the scale as "Batter OK". If it falls into this area then the batteries have sufficient charge. If the needle does not fall into this area then the batteries should be replaced.

3.2 Use

If the battery check is successful, the selector knob should be turned to the desired intensity range and the radiation level read from the meter indication.

3.3 After Use

After use the selector knob should be turned to the "OFF" position so that the batteries are preserved.

3.4 Dosimeter Charger

The model 252B which has a dosimeter charger, must have the selector knob turned to one of the scales X1, X10, or X100 in order for the dosimeter charger to function. Refer to RSP-2 for the proper procedure for charging (zeroing) dosimeters.

RSP-4.4 - OPERATING INSTRUCTIONS FOR USE OF SURVEY METERS

VICTOREEN MODEL 740B

1.0 SCOPE

1.1 This procedure describes the operation of the Victoreen 740B survey meter.

1.2 This procedure shall be used in conjunction with the PDM's procedure entitled General Use of Radiation Survey Instruments, RSP-4.

2.0 RANGE

2.1 The Victoreen 740B has four (4) scales covering the following ranges:

a) 1 x SCALE - 0 to 25 MR/HR
b) 10 x SCALE - 25 to 250 MR/HR
c) 100 x SCALE - 250 to 2500 MR/HR
d) 1000 x SCALE - 2500 to 25,000 MR/HR

3.0 OPERATION

3.1 Warm-Up

The instrument should be allowed to have a one (1) minute warm-up period with the selector switch at zero set.

3.2 Zero Adjust

Turn the selector switch to the position marked Zero Set. With the switch set at zero set position, make an adjustment of the zeroing knob so that the meter needle (MR/HR INDICATOR) indicates zero (0).

3.3 Battery Check

Turn selector switch to "Battery" position. The dial indicator must read anywhere in the region labeled "Batt. Check O.K.".

3.4 Use

The meter should now be ready for use by turning the selector switch to the desired intensity range and reading the radiation intensity indicated by the meter.

3.5 After Use

Turn off the meter when it is not being used to preserve the batteries.

RSP-5 - GENERAL USE OF RADIOGRAPHIC EXPOSURE DEVICES

1.0 SCOPE

1.1 This procedure provides instructions to radiographers and radiographer's assistants for the use of all radiographic exposure devices licensed by PDM.

1.2 This procedure shall be used in conjunction with the PDM's procedure entitled Radiation Surveys and Posting - RSP-3 and the applicable procedure governing each specific radiographic exposure device.

2.0 EQUIPMENT

2.1 Only exposure devices authorized for use by PDM as approved and stipulated on the USNRC and/or applicable agreement state(s) radioactive material license(s) may be used.

2.2 At least one (1) calibrated and operable survey instrument must be present during radiographic activities for radiation monitoring.

3.0 QUALIFICATION OF PERSONNEL

3.1 Only personnel qualified as radiographers and radiographer's assistants shall be authorized to use radiographic exposure devices and sealed sources licensed by PDM.

4.0 GENERAL PROCEDURE

4.1 The radiographer and/or radiographer's assistant shall perform the following prior to engaging in radiographic operations.

4.1.1 Conduct the inspection as required in Procedure RSP-7 and record results on Radiography Operations Report described in Procedure RSP-14.

4.1.2 Perform all the necessary radiographic setups.

4.1.3 Establish the restricted area as described in Procedure No. RSP-3.

4.2 Assemble exposure device in accordance with specific operating procedure.

4.3 Prior to exposing the source, check the established restricted area to assure that no one has entered.

4.4 Expose source for radiographic exposure.

4.5 Conduct a physical radiation survey during the exposure to assure that the radiation level at the established restricted area is not in excess of 2 MR/HR as described in Procedure No. PSP-3. The results of this survey shall be recorded on Radiographic Operations Report.

4.6 Maintain direct surveillance during each radiographic exposure to preclude entry into the restricted area by unauthorized personnel.

4.7 After the desired exposure time has elapsed, retract source to the stored position.

4.8 A physical radiation survey of the projector and guide tube (if applicable) shall be conducted after each radiographic exposure to assure that the source is returned to its properly shielded position.

4.9 After conducting the physical radiation survey, lock and secure the projector as stipulated in the applicable operating procedure.

4.10 At the completion of radiographic activities and prior to storing the projector, a final survey shall be made to determine again that the source is in its properly shielded position.

4.11 The results of the survey required in Paragraph 4.10 of the procedure shall be recorded on Radiographic Operations Report Form as described in Procedure RSP-3.

RSP-5.1 - EXPOSURE DEVICES OPERATING INSTRUCTIONS

TECHNICAL OPERATIONS MODELS 533, 660 and 920 PROJECTORS

1.0 SCOPE

1.1 This procedure shall govern the specific operation of Technical Operations Models 533, 660 or 920 Projectors.

1.2 This procedure shall be used in conjunction with the PDM's general procedure RSP-5 entitled General Use of Radiographic Exposure Devices.

2.0 OPERATING INSTRUCTIONS

2.1 Refer to general procedure, RSP-5, for instructions prior to assembly of projector for radiographic activities.

2.2 NOTE: Monitor all operations with a calibrated survey meter.

2.3 Locate projector at desired distance from specimen to be radiographed.

2.4 Remove shipping plug from the front of the projector.

2.5 Attach the guide tube to the projector position guide tube for making the radiographic exposure.

2.5.1 DO NOT SUBJECT GUIDE TUBE TO ANY SHARP BENDS WHICH WOULD RESTRICT MOVEMENT OF THE SOURCE IN GUIDE TUBE.

CAUTION

NEVER OPERATE THE SYSTEM WITH MORE THAN THREE (3) GUIDE TUBE SECTIONS (INCLUDING THE GUIDE TUBE WITH STOP). WHEN USING PIPE POSITIONER NO MORE THAN TWO (2) GUIDE TUBE SECTIONS SHALL BE USED.

2.6 Arrange the control assembly as follows:

2.6.1 Determine the operating site of the control unit for maximum distance from the projector.

2.6.2 Lay out control unit as straight as possible directing the connector end to the rear of the projector.

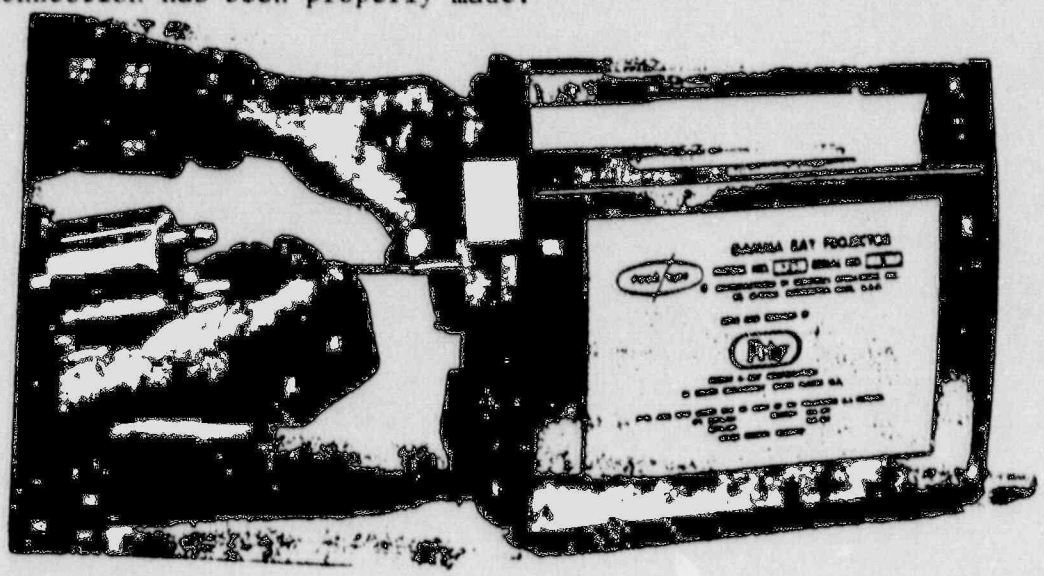
2.6.3 Do not subject control cable to any sharp bends which may restrict free movement of drive cable.

TECHNICAL OPERATIONS MODELS 533, 660 and 920 PROJECTOR (CONT)

2.7 Unlock projector and rotate selector ring on control cable connector from the "LOCK" position to "CONNECT" position which will disengage the storage cover. Remove the storage cover holder.

2.8 Connection for Tech-Ops Model No 533

Engage the male and female portions of the swivel connector by depressing the spring loaded locking pin toward the projector with thumbnail. Release the locking pin and test that the connection has been properly made.

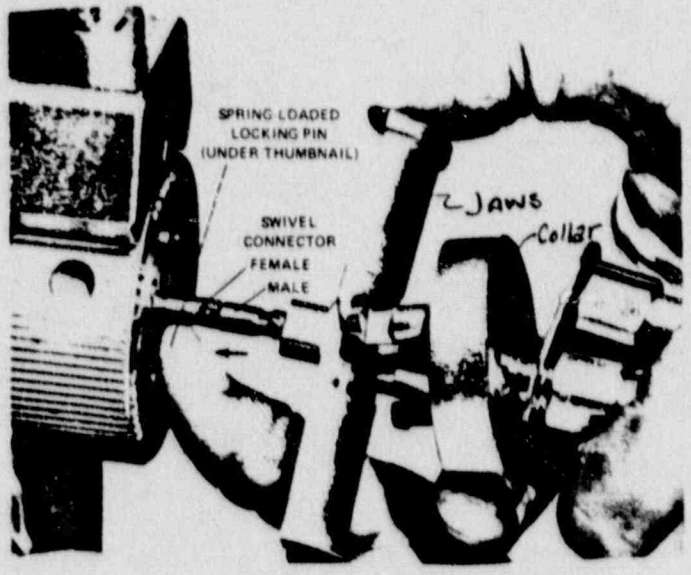


2.8.1 Insert control cable plug into projector control cable connector. Rotate selector ring from "CONNECT" position to "LOCK" position.

TECHNICAL OPERATIONS MODELS 533, 660 and 920 PROJECTOR (CONT)

2.9 Connection for Tech-Ops Model No. 660 and 920

Slide the control cable collar back and open the jaws of the control cable connector. This exposes the male portion of the swivel connector as shown.
Engage the male and female portions of the swivel connector as shown by depressing the spring-loaded locking pin toward the projector with the thumbnail. Release the locking pin and test that the connection has been properly made.
Close the jaws of the control cable connector over the swivel-type connector.



2.9.1 Rotate selector ring from "CONNECT" position to "LOCK" position.

2.10 Check the restricted area to assure that the area is clear of personnel.

2.11 Rotate the selector ring from "LOCK" position to the "OPERATE" position. Also on the Tech-Ops 920, lift the source position indicator to allow source to be released.

2.12 Rapidly, rotate the hand crank in the "EXPOSE" (counter-clockwise) direction to move the source out of the projector to the end of the guide tube stop.

2.13 Monitor operation with calibrated survey meter in accordance with general procedure RSP-5.

TECHNICAL OPERATIONS MODELS 533, 660 and 920 PROJECTOR (CONT)

2.14 After desired exposure time has elapsed, rapidly turn the hand crank in the "RETRACT" (Clockwise) direction. Continue to rotate until the source reaches the properly stored position.

2.15 After each exposure, monitor with calibrated survey meter as described in general procedure, RSP-5.

2.16 At the completion of radiographic activities, disassemble projector as follows:

2.16.1 Remove the control cable plug by rotating the selector ring from the "OPERATE" position to the "CONNECT" position.

2.16.2 Disconnect the drive cable from projector in the same manner as described in Paragraph 2.8 or 2.9 for engaging.

2.16.3 Replace the storage cover in the control cable connector and rotate the selector ring from the "CONNECT" position to the "LOCK" position. Engage and lock to secure projector.

2.16.4 Remove guide tube from the source tube connector of the projector and install shipping plug.

2.17 Conduct final radiation survey and record as required in general procedures RSP-5 and RSP-3.

RSP-5.2 - EXPOSURE DEVICES OPERATING INSTRUCTIONS

TECHNICAL OPERATIONS MODEL NO. 490 PROJECTOR

1.0 SCOPE

1.1 This procedure shall govern the specific operation of Technical Operations Model No. 490 projector.

1.2 This procedure shall be used in conjunction with the PDM's general procedure No. RSP-5 entitled General Use of Radiographic Exposure Devices.

2.0 OPERATING INSTRUCTIONS

2.1 Refer to general procedure, RSP-5, for instructions prior to assembly of projector for radiographic activities.

2.2 Monitor all operations with a calibrated survey meter.

2.3 Locate projector a desired distance from specimen to be radiographed.

2.4 Unreel the control cable as straight as possible to a place of maximum safety.

2.5 Remove shipping plug from the exposure device and attach the guide tube. Lay out guide tube as straight as possible. Position the guide tube for making the radiographic exposure. DO NOT SUBJECT GUIDE TUBE TO ANY SHARP BENDS WHICH WOULD RESTRICT MOVEMENT OF SOURCE IN GUIDE TUBE.

CAUTION

NEVER OPERATE THE SYSTEM WITH MORE THAN THREE (3) GUIDE TUBE SECTIONS (INCLUDING THE MASTER OR STOP).

2.6 Check the restricted area for presence of unauthorized personnel as required in RSP-5.

2.7 Rotate the hand crank in the "EXPOSE" direction to move the source out of the projector until it reaches the end of the snout.

TECHNICAL OPERATIONS MODEL No. 490 PROJECTOR (CONT)

2.7.1 If cranking becomes difficult at any time during the operation, stop, reverse the direction of the cranking to return the source to the stored position in the projector. Monitor the area with a survey meter to ensure that the source is properly stored. Then check the control and guide tube for excessively small bend radii and repeat the step.

2.8 Monitor the operation with calibrated survey meter in accordance with general procedures RSP-5 and RSP-3.

2.9 After desired exposure time has elapsed, rapidly turn the crank in the "RETRACT" direction. Continue to rotate until the source reaches the properly stored position.

2.10 After each exposure, monitor with calibrated survey meter as described in RSP-5.

2.11 At completion of radiographic activities, disassemble the projector as follows:

2.11.1 Disconnect the source tube and install the plug in the front of the unit and lock.

2.11.2 Roll up the guide tube and control cable and place in the cart with the unit.

2.12 Conduct final radiation survey and record as required in the general procedures RSP-5 and RSP-3.

2.13 Return projector to the storage area.

RSP-5.3 - EXPOSURE DEVICES OPERATING INSTRUCTIONS

GAMMA PIPELINER #1

1.0 SCOPE

1.1 This procedure shall govern the specific operation of Gamma's Pipeliner #1 Exposure Device.

1.2 This procedure shall be used in conjunction with PDM's general procedure, RSP-5, entitled General Use of Radiographic Exposure Devices.

2.0 OPERATING INSTRUCTIONS

2.1 Refer to general procedure, RSP-5, for instructions prior to assembly of projector for radiographic activities.

2.2 NOTE: Monitor all operations with a calibrated survey meter.

2.3 Place jigs or fixtures to receive the pipeliner unit at the exposure area and place unit in position.

2.4 Check the restricted area to assure that the area is clear of personnel.

2.5 Unlock plunger lock.

2.6 Using remote control, turn flexible shaft clockwise 180° to expose the source. (Observe the higher readings of the survey meter.) Unit may be operated by hand, using the knurled knob as the on-off control. (See caution notes below.)

2.7 Monitor operation with calibrated survey meter in accordance with general procedure, RSP-5.

2.8 After desired exposure time has elapsed, turn the remote control of knurled knob 180° counter-clockwise until position indicator and survey meter shows the source is in safe position, then lock the unit.

2.9 After each exposure monitor with calibrated survey meter as described in general procedure, RSP-5.

2.10 At the completion of radiographic activities, lock unit and roll up control cable.

GAMMA PIPELINER #1 (CONT)

2.11 Conduct final radiation survey and record as required in general procedures RSP-5 and RSP-3.

CAUTION

NCTE 1 Operate the knob with the body turned away from the unit and the arm fully extended.

NOTE 2 Stand at the front of the unit, the knurled knob side, or the side with the indicator pin while turning the unit "on" and "off". This operation should take less than 3 seconds.

NOTE 3 Always move quickly to and from the unit.

RSP-5.4 - EXPOSURE DEVICES OPERATING INSTRUCTIONS

TECHNICAL OPERATIONS No. 571

1.0 SCOPE

1.1 This procedure shall govern the specific operating instruction for Technical Operations Model 571 Exposure Device for calibration of survey meters.

1.2 This procedure shall be used in conjunction with PDM's general procedure, RSP-5, entitled General Use of Radiographic Exposure Devices.

2.0 OPERATING INSTRUCTIONS

2.1 Refer to general procedure, RSP-5, before assembling the exposure device for calibration activities.

2.2 Monitor all operations with a calibrated survey meter.

2.3 Zero the survey meter to be calibrated outside the RESTRICTED AREA.

2.4 Place the T/O 571 on a flat surface and lay out six (6) separate locations away from the T/O 571 exposure device using the DOSE/DISTANCE CALCULATOR or DECAY CHART and INVERSE SQUARE LAW.

2.5 These six locations should be in the proximity of:

3.0 MR/HR
8.0 MR/HR
30.0 MR/HR
80.0 MR/HR
300.0 MR/HR
800.0 MR/HR

2.6 Place the uncalibrated survey meter in the 3.0 MR/HR location.

2.7 Unlock the padlock on the T/O 571 and remove the locking pin.

2.8 Pull the source control rod up to expose the source and record the meter reading on the Calibration Record (Form RR-10, RSP-15, Page 15.11).

TECHNICAL OPERATIONS MODEL No. 571 (CONT)

2.9 Repeat step 2.8 for each of the six (6) locations.

2.10 A deviation of 10% or less of the meter range will be considered acceptable. For each scale the maximum deviation will be:

SCALE	DEVIATION
x 1	1 MR/HR
x 10	10 MR/HR
x 100	100 MR/HR

2.11 A meter reading within the acceptable limits will have a calibration sticker applied indicating the date of calibration, and date for recalibration (three months hence).

2.12 A deviation of more than 10%, but less than 20%, is also acceptable provided the variations are recorded and attached directly to the meter.

2.13 Meter readings beyond the acceptable limits shall be repaired, or replaced and calibrated using the above procedure.

2.14 After the calibration activity has been completed, the locking bar on the T/O 571 will be replaced above the control rod and secured with a padlock.

2.15 Survey the unit to be sure the source is stored properly.

2.16 Replace the T/O 571 to the storage area.

RSP-5.5 - EXPOSURE DEVICES OPERATING INSTRUCTIONS

MULTITRON C52

1.0 SCOPE

1.1 This procedure shall govern the specific operation of Budd Co. Multitron C52 exposure device.

1.2 This procedure shall be used in conjunction with PDM's general procedure, RSP-5, entitled General Use of Radiographic Exposure Devices.

2.0 OPERATING INSTRUCTIONS

2.1 Refer to general procedure, RSP-5, for instruction prior to assembly of projector for radiographic activities.

2.2 NOTE: Monitor all operations with a calibrated survey meter.

2.3 Place jigs, fixtures or collimator to receive the end of the source guide tube.

2.4 Locate projector at desired distance from specimen to be radiographed.

2.5 Lay out control cable as straight as possible away from the unit to a place of maximum safety.

2.6 Mount end of source tube in receptable as provided in Step 2.3.

2.7 Lay out tube as straight as possible to exposure area avoiding short radii and sharp kinks.

2.8 Remove plug from the front of multitron and connect source guide tube.

2.9 Check the restricted area to assure that the area is clear of personnel.

2.10 Unlock the barrel type lock in lock box.

2.11 Turn hand crank steadily in the exposure direction to move source into guide tube. (Observe higher readings of survey meter.)

2.12 As source approaches exposure position, slow down cranking speed so that undue impact at snout end or collimator is avoided.

MULTITRON C52 (CONT)

2.13 Monitor operation with calibrated survey meter in accordance with general procedure, RSP-5.

2.14 After desired exposure time has elapsed, rapidly turn hand crank in the retract direction until source position indicator and the survey meter indicates the source is in the stored position.

2.15 After each exposure, monitor with calibrated survey meter as described in general procedure, RSP-5.

2.16 At the completion of radiographic activities, lock the unit, disconnect source guide tube and replace plug in front end of unit.

2.17 Roll up the control cable on the cart handle for storage.

2.18 Conduct final radiation survey and record as required in general procedures RSP-5 and RSP-3.

RSP-5.6 - EXPOSURE DEVICES OPERATING INSTRUCTIONS

GAMMA INDUSTRIES GAMMATRON 100A and 20A PROJECTOR

1.0 SCOPE

1.1 This procedure shall govern the specific operation of Gamma Industries Gammatron 100A and 20A projector.

1.2 This procedure shall be used in conjunction with PDM's general procedure, RSP-5, entitled General Use of Radiographic Exposure Devices.

2.0 OPERATING INSTRUCTIONS

2.1 Refer to general procedure, RSP-5, for instructions prior to assembly of projector for radiographic activities.

2.2 NOTE: Monitor all operations with a calibrated survey meter.

2.3 Locate projector at desired distance from specimen to be radiographed.

2.4 Remove safety plug from the front of the projector.

2.5 Attach the guide tube to the projector outlet nipple, test to insure proper connection.

2.5.1 DO NOT SUBJECT GUIDE TUBE TO ANY SHARP BENDS WHICH WOULD RESTRICT MOVEMENT OF THE SOURCE IN GUIDE TUBE.

2.6 Arrange the control assembly as follows:

2.6.1 Determine the operating site of the control unit for maximum distance from the projector.

2.6.2 Lay out control unit as straight as possible directing the connector end to the rear of the projector.

2.6.3 Do not subject control cable to any sharp bends which may restrict free movement of drive cable.

2.7 Inspect lockbox assembly for damage and misalignment.

2.8 Check the restricted area to assure that the area is clear of personnel.

GAMMA INDUSTRIES GAMMATRON 100A and 20A PROJECTOR (CONT)

2.9 Rotate key and unlock plunger. Unlock the unit by pulling back on the crank handle (counter-clockwise) which will permit the unit to be unlocked--only "A" models require that the handle be pulled back.

2.10 RAPIDLY rotate the hand crank in the "EXPOSE" (clockwise) direction to move the source out of the exposure device to the end of the guide tube stop.

2.11 Monitor operation with calibrated survey meter in accordance with General Procedure, RSP-5.

2.12 After desired exposure time has elapsed, rapidly turn the hand crank in the "RETRACT" (Counter-clockwise) direction. Continue to rotate until the source reaches the properly stored position.

2.13 After each exposure, monitor with calibrated survey meter as described in general procedure, RSP-5.

2.14 Turn crank back (counter-clockwise) and depress lock plunger--only "A" models require that the handle be pulled back.

2.15 At the completion of radiographic activities:

2.15.1 Roll up the control cable on the handle of the projector.

2.15.2 Remove guide tube from the outlet nipple by the use of the quick disconnect and and insert safety plug.

2.16 Conduct final radiation survey and record as required in general procedures RSP-5 and RSP-3.

RSP-5.7 - EXPOSURE DEVICES OPERATING INSTRUCTIONS

GAMMA PIPELINER #201

1.0 SCOPE

1.1 This procedure shall govern the specific operation of Gamma's Pipeliner #201 Exposure Device.

1.2 This procedure shall be used in conjunction with PDM's general procedure, RSP-5, entitled General Use of Radiographic Exposure Devices.

2.0 OPERATING INSTRUCTIONS

2.1 Refer to general procedure, RSP-5, for instructions prior to assembly of projector for radiographic activities.

2.2 NOTE: Monitor all operations with a calibrated survey meter.

2.3 Place jigs or fixtures to receive the pipeliner unit at the exposure area and place unit in position.

2.4 Check the restricted area to assure that the area is clear of personnel.

2.5 Remove the protective cap from the end of the handle revealing the control cable connector.

2.6 Crank the controls drive cable out to approximately twelve (12) inches and connect the controls drive cable connector to the control cable connector of the device.

2.7 Crank the control drive cable in so that the male connecting threads can be screwed into the control cable housing (handle).

2.8 Screw the swivel adaptor into the device handle.

2.9 Stretch the control cable away from the exposure area in as straight a line as possible.

2.10 Unlock the unit using the key supplied with it.

2.11 USING REMOTE CONTROL ONLY, turn the crank handle of the controls clockwise 180° to expose the source. (Observe the higher readings of the survey meter.) (See caution notes below.)

GAMMA PIPELINER #201 (Con't)

2.12 Monitor operation with calibrated survey meter in accordance with general procedure, RSP-5.

2.13 After desired exposure time has elapsed, turn the remote control 180° counter-clockwise until position indicator and survey meter shows the source is in safe position, then lock the unit.

2.14 After each exposure monitor with calibrated survey meter as described in general procedure, RSP-5.

2.15 At the completion of radiographic activities, lock unit, depress lock plunger, disconnect the swivel adapter and the drive cable, replace the protective cap and roll up control cable.

2.16 Conduct final radiation survey and record as required in general procedures RSP-5 and RSP-3.

CAUTION

NOTE 1 AFTER THE SOURCE HAS DECAYED TO 120 CURIES OR LESS, THE UNIT MAY BE OPERATED BY HAND, USING THE ON-OFF CONTROL.

NOTE 2 Operate the knob with the body turned away from the unit and the arm fully extended.

NOTE 3 WHEN OPERATING THE UNIT BY HAND, STAND AT THE FRONT OF THE UNIT OR THE KNURLED KNOB SIDE WHILE TURNING THE UNIT "ON" AND "OFF". This operation should take less than 3 seconds.

NOTE 4 Always move quickly to and from the unit.

RSP-5.8 - EXPOSURE DEVICES OPERATING INSTRUCTIONS

GAMMA INDUSTRIES CENTURY PROJECTOR

1.0 SCOPE

1.1 This procedure shall govern the specific operation of Gamma Industries Century exposure device.

1.2 This procedure shall be used in conjunction with PDM's general procedure RSP-5 titled General Procedure For Use of Radiographic Exposure Devices.

2.0 OPERATING INSTRUCTION

2.1 Refer to General Procedure RSP-5 for instructions prior to assembly of projector for radiographic activities.

2.2 NOTE: Monitor all operations with a calibrated survey meter.

2.3 Locate projector at desired distance from specimen to be radiographed.

2.4 Remove shipping plug from the front of the projector.

2.5 Attach the guide tube to the projector quick disconnect coupling.

2.5.1 DO NOT SUBJECT GUIDE TUBE TO ANY SHARP BENDS WHICH WOULD RESTRICT MOVEMENT OF THE SOURCE IN GUIDE TUBE.

2.6 Arrange the control assembly as follows:

2.6.1 Determine the operating site of the control unit for maximum distance from the projector.

2.6.2 Lay out control unit as straight as possible directing the connector end to the rear of the projector.

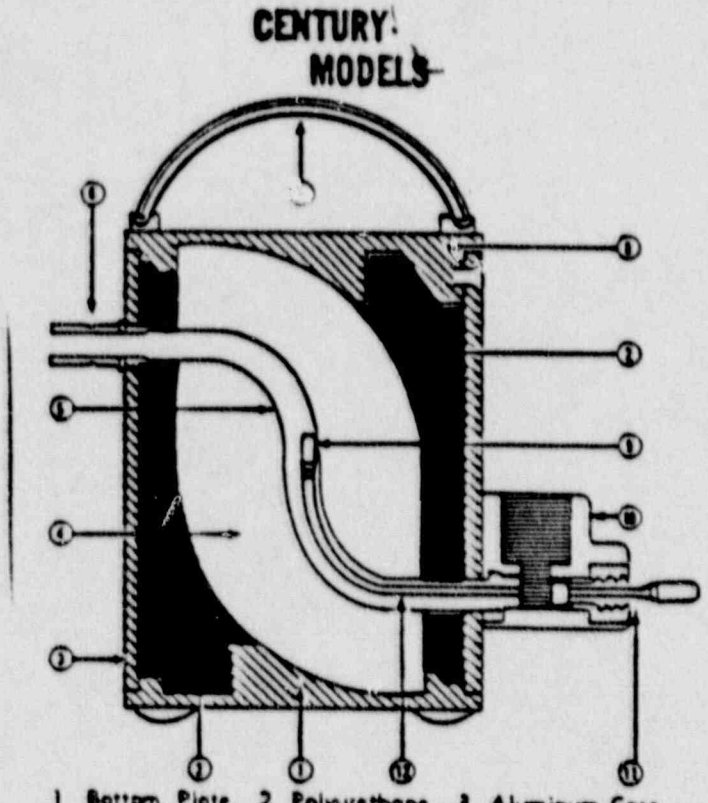
2.6.3 Do not subject control cable to any sharp bends which may restrict free movement of drive cable.

2.7 Remove the protector cap from the lock box thereby exposing the Saf-T-Key coupling.

2.8 Crank the control cable to a length of approximately 12 inches and connect control cable to the Saf-T-Key coupling.

GAMMA INDUSTRIES CENTURY PROJECTOR (Con't)

2.9 Crank control cable in so that the male connecting thread can be screwed into the lock box. Screw the control cable into the lock box.



1 Bottom Plate, 2 Polyurethane, 3 Aluminum Case, 4 Shield, 5 Zircaloy Tube, 6 Quick Disconnect Coupling, 7 Leather Handle, 8 Top Plate, 9 IR-192 Capsule, 10 Lock Box, 11 Saf-T-Key Coupling, 12 Pigtail.

GAMMA INDUSTRIES CENTURY PROJECTOR (Con't)

7.10 Check restricted area to assure that the area is clear of personnel.

2.11 Unlock the key mechanism and move back to the crank handle.

2.12 Back crank the handle until the key retainer pops up then rotate the hand crank in the "exposed" direction to move the source out of the projector to the end of the guide tube stop.

2.13 Monitor operation with calibrated survey meter in accordance with General Procedure RSP-5.

2.14 After desired exposure time has elapsed rapidly turn the hand crank in the "RETRACT" direction. Continue to rotate until the source reaches the properly stored position.

2.15 After each exposure monitor with calibrated survey meter as described in General Procedure RSP-5.

2.16 At the completion of radiographic activities disassemble projector as follows:

2.16.1 Depress the plunger on the lock box to lock the radioactive capsule in the safe position.

2.16.2 Disconnect the drive cable from projector in the same manner as described in Paragraph 2.8 and 2.9 for engaging and replace the safety cap.

2.16.3 Remove guide tube from the projector quick disconnect coupling and install shipping plug.

2.17 Conduct final radiation survey and record as required in General Procedure RSP-5 and RSP-3.

RSP-5.9 - EXPOSURE DEVICES OPERATING INSTRUCTIONS

TECHNICAL OPERATIONS MODEL NO. 616 PROJECTOR

1.0 SCOPE

1.1 This procedure shall govern the specific operation of Technical Operations Model 616 Projector.

1.2 This procedure shall be used in conjunction with the PDM's general procedure no. RSP-5 entitled General Use of Radiographic Exposure Devices.

2.0 OPERATING INSTRUCTIONS

2.1 Refer to general procedure, RSP-5, for instructions prior to assembly of projector for radiographic activities.

2.2 NOTE: Monitor all operations with a calibrated survey meter.

2.3 Locate projector at desired distance from specimen to be radiographed and attach unit to stand.

2.4 After the projection is positioned, the flexible tube to the control should be plugged into the port on the actuator housing.

2.5 Lay out control cable as straight as possible from the unit to a place of maximum safety.

2.6 Caution all personnel immediately outside of the restricted area of the duration of the exposure and check the restricted area to assure that the area is clear of personnel.

2.7 Unlock the projector.

2.8 Set control valve to OFF.

2.9 Stroke the pump handle until the gage indicates a vacuum of 20 inc.

2.10 Initiate the exposure by putting the control valve in the ON position.

2.11 Monitor operation with calibrated survey meter in accordance with General Procedure RSP-5.

TECHNICAL OPERATIONS MODEL NO. 616 PROJECTOR (CONT)

2.12 Terminate the exposure when desired by putting the control valve in the OFF position.

2.13 After each exposure, monitor with calibrated survey meter as described in General Procedure, RSP-5.

2.14 Lock projector.

2.15 Disconnect the control cable from the port on the actuator housing.

2.16 Conduct final radiation survey and record as required in General Procedures RSP-5 and RSP-3.

RSP-5.10 - EXPOSURE DEVICES OPERATING INSTRUCTIONS

TECHNICAL OPERATIONS No. 773

1.0 SCOPE

1.1 This procedure shall govern the specific operating instruction for Technical Operations Model 773 Exposure Device for calibration of survey meters.

1.2 This procedure shall be used in conjunction with PDM's general procedure, RSP-5, entitled General Use of Radiographic Exposure Devices.

2.0 OPERATING INSTRUCTIONS

2.1 Refer to general procedure, RSP-5, before assembling the exposure device for calibration activities.

2.2 Monitor all operations with a calibrated survey meter.

2.3 Zero the survey meter to be calibrated outside the RESTRICTED AREA.

2.4 Place the T/O 773 on a flat surface and lay out six (6) separate locations away from the T/O 773 exposure device using the DOSE/DISTANCE CALCULATOR or DECAY CHART and INVERSE SQUARE LAW.

2.5 These six locations should be in the proximity of:

3.0 MR/HR
8.0 MR/HR
30.0 MR/HR
80.0 MR/HR
300.0 MR/HR
800.0 MR/HR

2.6 Place the uncalibrated survey meter in the 3.0 MR/HR location.

2.7 Unlock the handle of the Model 773. Remove the shipping plate and all the attenuators from the radiation beam.

TECHNICAL OPERATIONS MODEL No. 773 (CONT)

2.8 Standing away from the radiation beam, expose the source by manually raising the source rod. CAUTION: Do not enter the area of the radiation beam while the source is exposed. The radiation level at the source rod when the source is in the "operate" position is approximately 50 mr/hr. Movement of the source rod should be accomplished as expediously as practicable.

2.9 Place and remove the attenuators as needed for calibration, checking and recording 2 points on each range on the Calibration Record, Form RR-10, RSP-15, Page 15.11.

2.10 A deviation of 10% or less of the meter range will be considered acceptable. For each scale the maximum deviation will be:

SCALE	DEVIATION
x 1	1 MR/HR
x 10	10 MR/HR
x 100	100 MR/HR

2.11 A meter reading within the acceptable limits will have a calibration sticker applied indicating the date of calibration, and date for recalibration (three months hence).

2.12 A deviation of more than 10%, but less than 20%, is also acceptable provided the variations are recorded and attached directly to the meter.

2.13 Meter readings beyond the acceptable limits shall be repaired, or replaced and calibrated using the above procedure.

2.14 After the calibration activity has been completed, replace attenuators, shipping plate and lock the projector.

2.15 Survey unit thoroughly to be sure source is stored properly.

2.16 Replace the T/O 773 to the storage area.

RSP-5.11 - EXPOSURE DEVICES OPERATING INSTRUCTIONS

J. L. SHEPPARD MODEL 28-5 OR 28-6A

1.0 SCOPE

1.1 This procedure shall govern the specific operating instruction for J. L. Sheppard Model 28-5 or 28-6A Exposure Device for calibration of survey meters.

1.2 This procedure shall be used in conjunction with PDM's general procedure, RSP-5, entitled General Use of Radiographic Exposure Devices.

2.0 OPERATING INSTRUCTIONS

2.1 Refer to general procedure, RSP-5, before assembling the exposure device for calibration activities.

2.2 Monitor all operations with a calibrated survey meter.

2.3 Zero the survey meter to be calibrated outside the RESTRICTED AREA.

2.4 Place the calibrator on a flat surface and lay out six (6) separate locations away from the calibrator exposure device using the DOSE/DISTANCE CALCULATOR or DECAY CHART and INVERSE SQUARE LAW.

2.5 These six locations should be in the proximity of:

3.0 MR/HR
8.0 MR/HR
30.0 MR/HR
80.0 MR/HR
300.0 MR/HR
800.0 MR/HR

2.6 Place the uncalibrated survey meter in the 3.0 MR/HR location.

2.7 Unlock and remove the padlock on the calibrator.

2.8 To expose the source, grasp the black operating knob (while standing behind calibrator, opposite beam port) and raise it until the spring loaded pin engages the depression on the operating shaft. Record the meter reading on the Calibration Record, Form RR-10, RSP-15, Page 15.11.

J. L. SHEPPARD MODEL 28-5 OR 28-6A (Con't)

2.9 Repeat step 2.8 for each of the six (6) locations.

2.10 A deviation of 10% or less of the meter range will be considered acceptable. For each scale the maximum deviation will be:

SCALE	DEVIATION
x 1	1 MR/HR
x 10	10 MR/HR
x 100	100 MR/HR

2.11 A meter reading within the acceptable limits will have a calibration sticker applied indicating the date of calibration, and date for recalibration (three months hence).

2.12 A deviation of more than 10%, but less than 20%, is also acceptable provided the variations are recorded and attached directly to the meter.

2.13 Meter readings beyond the acceptable limits shall be repaired, or replaced and calibrated using the above procedure.

2.14 After the calibration activity has been completed, push the operating knob down until the pin on the shaft strikes the stop on calibrator top. Secure it with the padlock.

2.15 Survey unit to be sure source is stored properly.

2.16 Replace the calibrator to the storage area.

RSP-6 - LOCKING AND SECURING RADIOGRAPHIC EQUIPMENT

1.0 SCOPE

1.1 This procedure shall govern the methods of locking and securing radiographic exposure devices, storage containers and sealed sources used by PDM.

1.2 This procedure conforms to the requirements of USNRC Title 10CFR Parts 34.22 and 34.23 and any applicable licensed agreement state regulations.

2.0 CONTROL

2.1 Each radiographic exposure device used by PDM shall be provided with a lock to prevent unauthorized or accidental removal or exposure of a sealed source and shall be kept locked at all times except when under the direct surveillance of a radiographer or radiographer's assistant.

2.2 Radiographic exposure devices and storage containers located in the plant or at field sites shall be stored in a designated storage area and sufficient means shall be used to limit access to this area to AUTHORIZED PERSONNEL.

3.0 SECURING STORAGE CONTAINERS

3.1 In a mobile laboratory, plant or at a construction site, storage containers housing radiographic exposure devices shall be sufficiently attached and/or secured so as to preclude unauthorized and/or accidental removal.

4.0 TEMPORARY FIELD CONSTRUCTION SITES

4.1 All Field construction sites shall have either a company tool storage building, an office trailer or a trailer used to store radiographic devices.

4.2 Each exposure device is kept locked at all times when not in use and is stored in either a shipping barrel or a specially constructed steel box which is also padlocked.

4.3 The storage building or trailer used to store radiographic devices is also padlocked at the end of the work day.

4.4 After the projector has been placed in the area designated for storage, another survey is required at the surface of the storage building or mobile lab, which also must be posted "CAUTION: RADIOACTIVE MATERIAL". This survey must indicate 2 MR or less. Records of this survey must be recorded on Radiographic Operations Report - Form RR2.

RSP-7 - INSPECTION/MAINTENANCE OF RADIOGRAPHIC EQUIPMENT

1.0 SCOPE

1.1 This procedure shall establish guidelines for inspection and maintaining radiographic exposure devices under PDM's Radioactive Material USNRC and/or Agreement State Licenses.

1.2 This procedure shall be used in conjunction with the PDM's procedures entitled Radiation Survey and Posting, RSP-3 and General Use of Radiation Survey Instruments, RSP-4.

2.0 GENERAL

2.1 If any portion of an inspection or maintenance check reveals defective equipment, this equipment must be repaired and/or replaced before its return to service.

3.0 PROJECTOR INSPECTION AND MAINTENANCE

3.1 The following items will be checked by the radiographer to whom the projector has been assigned prior to use during a work shift:

3.1.1 INSPECT CABLE FOR CUTS, BREAKS AND BROKEN FITTINGS.

3.1.2 INSPECT SOURCE TUBES FOR BUTS, CRUSHING AND BROKEN FITTINGS. SUPERFICIAL CUTS ON CABLE COVERING SHOULD BE TAPED.

3.1.3 SURVEY PROJECTOR FOR EXCESSIVE RADIATION LEVELS.

3.1.4 INSPECT SHIELD FOR DAMAGE TO FITTINGS, LOCK FASTENERS AND LABELS.

3.1.5 INSPECT CRANK FOR DAMAGE AND LOOSE HARDWARE.

3.1.6 CHECK OPERATION OF CABLE CONNECTION.

3.1.7 CHECK OPERATION OF CONTROL FOR FREEDOM OF SOURCE MOVEMENT.

3.2 The Radiation Safety Supervisor or a qualified radiographer designated by the Radiation Safety Supervisor, shall be responsible for inspection and maintaining the radiographic exposure devices at intervals not to exceed three (3) months, in accordance with the following:

3.2.1 Control Assembly

Remove the drive cable from the control assembly by cranking control in "EXPOSURE" direction. Examine cable for kinks, fraying, broken wires or rust. Minor bends in the cable may be straightened out by hand. DO NOT USE PLIERS! A cable with frayed or broken wires must be replaced. Light rust may be removed by HAND wire brushing. DO NOT use a powered brush or abrasives. Heavy rust that has penetrated into the cable will cause unsatisfactory operation or complete failure. Replace cable.

Clean the cable by immersing the coil in solvent. A heavy accumulation of dirt laden lubricant may require more than one (1) washing.

Examine the connector. Use the Tech-Ops Model 550 Connector Gage to check for wear. Replace if connector fails at any gaged dimension. If connector is satisfactory, examine cable attachment to connector for straightness and evidence of looseness. A loose attachment or bend at this point mandates replacement.

Lubricate the cable with Texaco "UNITEMP" grease or equivalent. This is the most satisfactory lubricant for this purpose. Common greases can cause gumming and unsatisfactory operation. Take care in handling the cable to avoid picking up dirt or grit.

3.2.2 Control Crank

Inspect control cable housing for excessive wear. Check crank unit for excessive wear. Clean inside of housing and gear assembly by syringing a few ounces of solvent into housing and blowing out with low pressure air (not more then 20 psi). Check for excessive wear of the housing, crank unit or internal galling, which would indicate the need for replacement of the control crank unit.

Lubricate internal gear housing with "UNITEMP" grease.

3.2.3 Control Cable Housings

Examine carefully for internal damage by flexing the housings by hand. Internal damage to the reinforcing braid or flexible metallic tube will be evidenced by a crunch feeling when the cable housing is flexed. Cut, flattened or burnt cable housings should be replaced. Superficial cuts or burns may be sealed and

reinforced with tape. Clean housings by syringing a few ounces of solvent into bore and blowing out with a low pressure air, (Not more than 20 psi.) Do not allow solvent to remain. Do not soak in solvent. Check end fittings for secure attachment.

3.2.4 Source Guide Tubes

Check for cuts, burns or crushed tubes. Check fittings for secure attachment. Examine and test screw threads for function. Clean bore of tube with water or solvent and drain out promptly. Do not soak in solvent.

3.2.5 Shield Assembly

Check exterior for loose or missing hardware. Replace or tighten as required. Examine source exit fitting. Examine the source function selector lock assembly in rear of projector for proper operation.

Examine the shield assembly for complete labels and warning symbol. Replace obliterated or illegible marking.

3.2.6 Final Inspection

Reassemble system, connect control cables and source guide tubes to shield. Operate machine several times to be sure of proper functioning. Check operation of the source position indicator system, if applicable.

Conduct a physical radiation survey to insure that radiation levels do not exceed the following:

3.2.6.1 AT ONE METER (39 inches) NOT MORE THAN 0.066 MR PER CURIE (EXCLUDING THE PIPELINER).

3.2.6.2 AT SIX INCHES FROM THE SURFACE NOT MORE THAN 0.33 MR PER CURIE (EXCLUDING THE PIPELINER).

3.2.6.3 PIPELINER ONLY: PIPELINE SIX INCHES 50 MR MAXIMUM, ONE METER 10 MR MAXIMUM.

3.2.7 If the inspection reveals no discrepancies, an inspection and maintenance label (see RSP-15, Page 15.5) shall be signed and dated by the person performing this inspection and securely attached to the projector. In addition, a record of this inspection shall be maintained by the PDM RSO.

3.2.7.1 A copy of the Completed inspection label shall be sent to the Radiation Safety Officer as record of inspection.

RSP-8 - EXCHANGING SEALED SOURCES PROCEDURE

1.0 SCOPE

1.1 This procedure shall govern the exchange of sealed sources by PDM's radiographers.

1.2 This procedure shall be used in conjunction with the PDM's procedure entitled Radiation Surveys and Posting, RSP-3 and the specific procedure governing the operation of the applicable source changer.

2.0 EQUIPMENT

2.1 Only source changers authorized for use by PDM as approved and shown on the USNRC and/or applicable Agreement State(s) License(s) may be used.

3.0 QUALIFICATION OF RADIOGRAPHERS TO PERFORM SOURCE CHANGES

3.1 Only qualified radiographers, who have been instructed in the operation of source changers and have demonstrated satisfactory performance of a source exchange to the cognizant Assistant Radiation Safety Officer and/or Radiation Safety Supervisor, as evidenced by documentation on PDM's Source Change Certification (See RSP-15, Page 15.6), may conduct such source exchanges.

4.0 LEAK TEST

4.1 No sealed source will be put into a projector without evidence of a currently valid leak test. New sources show evidence of a leak test on the source decay curve. Sources that are more than six (6) months old will show evidence of the leak test on a Leak Test Record supplied by the organization who evaluates the Leak Test. Also complete Source Transfer Record, RR-7 (See RSP-15, Page 15.7).

5.0 SURVEY METER

5.1 A calibrated and operable survey meter must be used during all source exchanges.

RSP-8.1 - T/O MODEL NO. 650 SOURCE CHANGER INSTRUCTIONS

1.0 SCOPE

1.1 This procedure shall govern the operation of the Technical Operations (T/O) Model No. 650 Source Changer.

1.2 This procedure shall be used in conjunction with the PDM's procedure entitled Exchanging Sealed Sources Procedure, RSP-8.

2.0 DESCRIPTION

2.1 The T/O Model No. 650 Source Changer has a capacity of containing two (2) sources, each one up to 100 curies of Iridium 192.

2.2 The T/O Model No. 650 is a DOT type "B" approved container for shipping.

3.0 INSTRUCTIONS FOR USE

3.1 POSITION THE PROJECTOR AND SOURCE CHANGER IN AN AREA WHERE THE SOURCE CAN BE EXPOSED.

3.2 PLACE THE PROJECTOR AND SOURCE CHANGER IN A RELATIONSHIP TO MINIMIZE ANY BENDS IN THE SOURCE GUIDE TUBE AND CONTROL CABLE. USE A SEVEN (7) FOOT SECTION OF GUIDE TUBE.

3.3 SET PROJECTOR AS FOR AN EXPOSURE AND OPEN SOURCE CHANGER. (TO REMOVE COVER, BREAK SEAL AND UNBOLT. TO REMOVE SOURCE, HOLD DOWN CAP, BREAK SEAL AND UNBOLT.)

Note: When cap is removed, the source connection is exposed and special care must be taken to prevent dislodging a source when handling the changer in this condition.

3.4 CONNECT SOURCE GUIDE TUBE FROM PROJECTOR TO THE FITTING ABOVE THE EMPTY CHAMBER, AVOIDING ANY SHARP BENDS.

3.5 CLOSE AND LATCH THE SOURCE GUIDES.

3.6 WHILE MONITORING THE RADIATION SURVEY METER, CRANK THE SOURCE INTO THE SOURCE CHANGER. INSURE THAT THE SOURCE COMPLETELY TRANSFERRED FROM THE PROJECTOR TO THE CHANGER.

3.7 MAKE A RADIATION SURVEY OF THE CHANGER TO ASSURE THAT THE SURFACE READING IS LESS THAN 200 MR/HR.

3.8 OPEN SOURCE GUIDES AND DISCONNECT CABLE FROM SOURCE ASSEMBLY. (DISCONNECTION IS ACCOMPLISHED IN THE SAME MANNER AS DISCONNECTING THE DRIVE CONTROL FROM THE PROJECTOR.)

3.9 DISCONNECT THE GUIDE TUBE FROM THE CHANGER.

3.10 CONNECT THE GUIDE TUBE TO THE CHAMBER CONTAINING THE NEW SOURCE.

3.11 CRANK THE DRIVE CABLE UNTIL THE CONNECTOR BUTTS THE SOURCE CONNECTOR.

3.12 CONNECT THE DRIVE CABLE TO THE NEW SOURCE. CHECK SOURCE CONNECTOR FOR PROPER FIT WITH DRIVE CABLE. WARNING: DO NOT MOVE SOURCE MORE THAN ½" FROM ITS STORED POSITION!

3.13 CLOSE AND LATCH THE SOURCE GUIDES.

3.14 WHILE MONITORING THE RADIATION SURVEY METER, CRANK SOURCE TO FULL RETRACTION WITHIN PROJECTOR.

3.15 MAKE A RADIATION SURVEY OF THE PROJECTOR TO ASSURE THAT THE SURFACE READING IS LESS THAN 200 MR/HR.

3.16 DISCONNECT THE SOURCE GUIDE TUBE FROM THE CHANGER.

3.17 AFFIX NEW SOURCE IDENTIFICATION (ID) TO PROJECTOR AND OLD SOURCE ID TO SOURCE CHANGER HOLD DOWN CAP.

3.18 BOLT HOLD DOWN CAP IN PLACE AND SEAL WITH MATERIAL PROVIDED.

3.19 INSERT LEAK TEST EVIDENCE AND OLD SOURCE DECAY CHART ALONG WITH A COPY OF THE SOURCE CHANGER INSTRUCTIONS IN THE CHANGER COVER, BOLT COVER IN PLACE AND SEAL WITH THE MATERIAL PROVIDED.

3.20 LABEL WITH APPROPRIATE "RADIOACTIVE YELLOW LABEL" AS REQUIRED IN RSP-9 IN PREPARATION FOR SHIPMENT.

RSP-8.2 - GAMMA INDUSTRIES MODEL NO. C-10 INSTRUCTIONS

1.0 SCOPE

1.1 This procedure shall govern the operation of the Gamma Industry Model No. C-10 Source Changer.

1.2 This procedure shall be used in conjunction with the PDM's procedure entitled Exchanging Sealed Sources Procedure, RSP-8.

2.0 DESCRIPTION

2.1 The C-10 Source Changer has a capacity of containing up to 200 curies of Iridium 192.

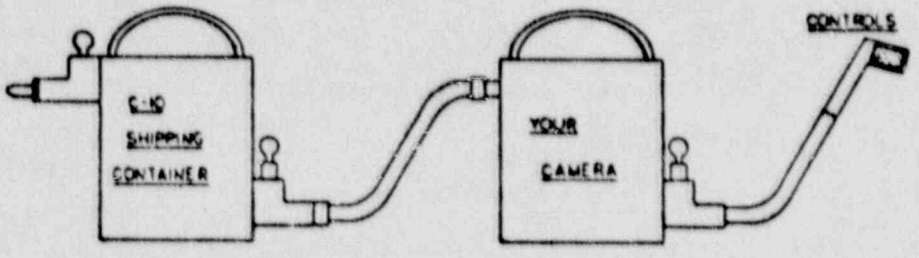
2.2 The C-10 is shipped in a container that is a DOT Type "B" approved container for shipping.

3.0 INSTRUCTIONS FOR USE

3.1 SURVEY THE C-10 SHIPPING CONTAINER WITH METER. THE RADIATION INTENSITY SHOULD NOT EXCEED 10 MR/HR AT 39 INCHES FROM ANY SURFACE OF THE C-10.

3.2 OPEN THE LOWER LOCK OF THE C-10 SHIPPING CONTAINER. REMOVE THE SAFETY PLUG.

3.3 CONNECT ONE END OF SHORT EXCHANGE TUBE (PROVIDED IN THE SHIPPING BARREL) TO THE LOWER LOCKBOX OF THE C-10 SHIPPING CONTAINER. ATTACH THE OTHER END OF THE SHORT EXCHANGE TUBE TO YOUR CAMERA.



3.4 CRANK YOUR OLD SOURCE INTO THE C-10 SHIPPING CONTAINER UNTIL IT REACHES A DEFINITE STOP.

3.5 SURVEY TO ASSURE THAT THE OLD SOURCE HAS REACHED A SAFE POSITION.

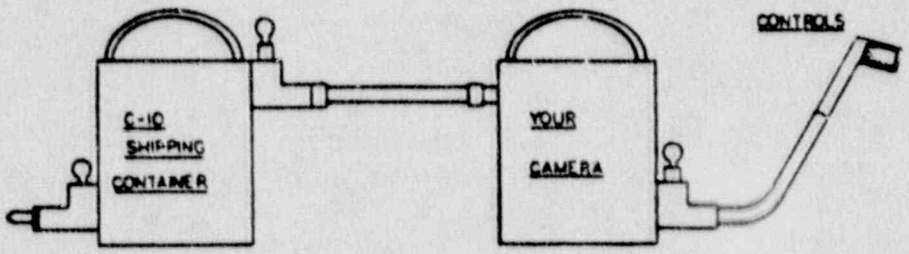
3.6 LOCK THE LOWER LOCK OF THE C-10 SHIPPING CONTAINER ONTO THE OLD PIGTAIL LOCKING BALL. YOU MUST BE AWARE THAT THE SOURCE COULD BE REMOVED FROM THE OPEN END OF THE LOCKBOX IF THE LOWER LOCK IS NOT LOCKED.

3.7 REMOVE THE SHORT EXCHANGE TUBE FROM THE C-10 SHIPPING CONTAINER. DISCONNECT THE CONTROL CABLE FROM THE OLD PIGTAIL. (ATTEMPT TO MOVE THE PIGTAIL INTO AND OUT OF THE C-10 SHIPPING CONTAINER TO ASSURE THE LOCK IS DEPRESSED UPON THE PIGTAIL LOCKING BALL. IF THE PIGTAIL CAN BE MOVED, THEN OPEN THE LOWER LOCK, CAREFULLY MOVE THE PIGTAIL, AND LOCK THE LOCK UPON THE PIGTAIL LOCKING BALL. THIS WILL ASSURE THAT THE OLD SOURCE WILL REMAIN PROPERLY LOCKED AND SHIELDED DURING THE RETURN SHIPMENT.

3.8 REMOVE THE SOURCE PROTECTOR CAP FROM THE UPPER LOCKBOX AND ATTACH THE SOURCE PROTECTOR CAP OVER THE OLD SOURCE PIGTAIL IN THE LOWER LOCKBOX.

3.9 ATTACH THE CONTROL CABLE TO THE NEW PIGTAIL WHICH IS IN THE UPPER LOCKBOX.

3.10 ATTACH SHORT EXCHANGE TUBE TO THE C-10 SHIPPING CONTAINER UPPER LOCKBOX.



3.11 UNLOCK THE UPPER LOCK FROM THE NEW SOURCE.

3.12 STANDING AS FAR AWAY AS POSSIBLE, CRANK THE NEW SOURCE FROM THE C-10 SHIPPING CONTAINER INTO YOUR CAMERA.

3.13 SURVEY.

3.14 LOCK YOUR CAMERA LOCK.

3.15 REMOVE THE SHORT EXCHANGE TUBE FROM YOUR CAMERA. REMOVE THE SHORT EXCHANGE TUBE FROM THE C-10 SHIPPING CONTAINER.

3.16 INSERT THE SAFETY PLUG INTO THE UPPER TUBE OF THE C-10 SHIPPING CONTAINER. LOCK THE UPPER LOCK OF THE C-10 SHIPPING CONTAINER.

3.17 SURVEY.

3.18 PLACE THE C-10 INTO THE BARREL IN THE SAME ORIENTATION WHICH IT WAS RECEIVED. PLACE THE SHORT EXCHANGE TUBE INTO THE BARREL. PLACE THE TOP ON THE BARREL AND SECURE WITH THE LOCKING RING.

3.19 INSERT A SAFETY SEAL INTO THE BARREL LOCKING RING.

3.20 SURVEY. (THE RADIATION INTENSITY SHOULD NOT EXCEED 200 MR/HR AT ANY BARREL SURFACE OR 10 MR/HR AT 39 INCHES FROM ANY BARREL SURFACE).

RSP-8.3 - GAMMA INDUSTRIES MODEL NO. C-8 INSTRUCTIONS

1.0 SCOPE

1.1 This procedure shall govern the operation of the Gamma Industry Model No. C-8 Source Changer.

1.2 This procedure shall be used in conjunction with the PDM's procedure entitled Exchanging Sealed Sources Procedure, RSP-8.

2.0 DESCRIPTION

2.1 The C-8 Source Changer has a capacity of containing up to 100 curies of Cobalt 60.

2.2 The C-8 is a DOT Type "B" approved container for shipping.

3.0 INSTRUCTIONS FOR USE

3.1 SURVEY THE C-8 CHANGER WITH METER. (SURFACE READING SHOULD NOT EXCEED 200 MR/HR AND 10 MR/HR AT 39 INCHES FROM THE SURFACE).

3.2 UNLOCK THE PLUNGER TYPE LOCK ON OLD SOURCE SIDE OF THE CHANGER AND REMOVE THE SAFETY PLUG.

3.3 CONNECT THE SHORT SOURCE EXCHANGE TUBE TO THE EMPTY LOCKBOX OF THE C-8. CONNECT THE OTHER END OF THE SOURCE EXCHANGE TUBE TO THE GAMMATRON OUTLET NIPPLE.

3.4 CONNECT THE CONTROL DRIVE CABLE TO THE OLD SOURCE IN YOUR GAMMATRON.

3.5 RELEASE THE LOCK TUMBLER FROM THE SOURCE ASSEMBLY.

3.6 CRANK THE OLD SOURCE FROM YOUR CAMERA INTO THE SOURCE CHANGER UNTIL IT STOPS, WHILE STANDING AT LONGEST POSSIBLE DISTANCE FROM THE GAMMATRON.

3.7 SURVEY THE C-8 CHANGER TO BE SURE THAT THE SOURCE HAS REACHED A SAFE POSITION.

3.8 DEPRESS THE LOCK PLUNGER. CHECK TO ASSURE THAT THE LOCK PLUNGER HAS ENGAGED THE LOCKING BALL AND THAT THE SOURCE CANNOT MOVE IN EITHER DIRECTION BY GENTLY CRANKING IN BOTH DIRECTIONS. DETACH THE SOURCE EXCHANGE TUBE AND PULL AWAY FROM THE SOURCE CHANGER SLOWLY, WHILE CRANKING FORWARD THE ADDITIONAL DRIVE CABLE FOR CLEARANCE. CONTINUE TO MONITOR WITH THE SURVEY METER TO BE CERTAIN THAT THE SOURCE IS LOCKED IN THE SAFE POSITION. THE OLD SOURCE CABLE AND SAF-T-KEY CONNECTORS SHOULD COME INTO VIEW AT THIS POINT.

3.9 RECHECK POSITION OF THE SOURCE LOCKING BALL TO ASCERTAIN THAT THE BALL IS DIRECTLY UNDER THE LOCK PLUNGER AND THAT THE SOURCE CANNOT MOVE IN EITHER DIRECTION. DISCONNECT THE CONTROL CABLE FROM THE SOURCE PIGTAIL.

3.10 AT THIS POINT, ATTACH THE SAFETY CAP INTO THE OLD SOURCE LOCKBOX TO PROTECT THE SOURCE ASSEMBLY AND FURTHER CONTAIN IT FROM REMOVAL IF THE LOCK TUMBLER WERE RELEASED.

3.11 MOVE THE GAMMATRON TO NEW SOURCE END OF THE C-8 CHANGER.

3.12 REMOVE THE SAFETY CAP FROM THE LOCKBOX MARKED NEW SOURCE.

3.13 CONNECT THE CONTROL DRIVE CABLE TO THE NEW SOURCE AND SCREW THE SOURCE EXCHANGE TUBE INTO THE LOCKBOX.

3.14 UNLOCK THE NEW SOURCE LOCK TUMBLER.

3.15 STAND AS FAR AWAY AS POSSIBLE AND DRAW THE NEW SOURCE INTO THE GAMMATRON UNTIL IT COMES TO THE SAFE POSITION.

3.16 SURVEY THE LOCKED NEW SOURCE IN THE GAMMATRON.

3.17 DISCONNECT THE CONTROL CABLE FROM THE SOURCE AND GAMMATRON.

3.18 REMOVE THE SOURCE EXCHANGE TUBE FROM THE GAMMATRON AND C-8 SOURCE CHANGER.

3.19 SCREW THE SAFETY PLUG INTO THE C-8 SOURCE CHANGER LOCKBOX MARKED NEW SOURCE AND LOCK.

3.20 SURVEY THE SOURCE CHANGER TO BE SURE THAT THE SURFACE RADIATION DOES NOT EXCEED 200 MR/HR, or 10 MR/HR AT 39 INCHES FROM THE SURFACE.

RSP-8.4 - TECH OPS MODEL NO. 850 INSTRUCTIONS

1.0 SCOPE

1.1 This procedure shall govern the operation of the Tech Ops Model No. 850 Source Changer.

1.2 This procedure shall be used in conjunction with the PDM's procedure entitled Exchanging Sealed Sources Procedure, RSP-8.

2.0 DESCRIPTION

2.1 The T/O 850 Source Changer has a capacity of containing up to 200 curies of Iridium 192.

2.2 The T/O 850 container that is a DOT Type "B" approved container for shipping.

3.0 INSTRUCTIONS FOR USE

3.1 Set up projector unit as for an exposure and place source changer nearby, but surveying both units prior to moving to make certain the source is in the safe position. Radiation level should be less than 200 MR/HR at contact with any surface.

3.2 Connect source transter tube to the camera and connect the other end of source tube to the empty chamber in the changer.

3.3 Connect control cable assembly to source and camera, then run decayed source into source changer by turning control handle until source stops in changer.

NOTE: Source meter will go to full scale when source is in tube and then return to near zero when source is safe in the source changer.

3.4 Survey projector and changer to be sure source has transferred. Projector and guide tube should show no radiation, changer should be less than 200 MR/HR at contact with any surface.

3.5 Disconnect source transfer tube from changer and reconnect to new source side.

3.6 Pull source into camera by cranking control cable assembly in retract direction until it stops.

3.7 Survey projector, guide tube and changer to be sure new source is safety stored in projector. Radiation level of projector should be less than 200 MR/HR at contact with any surface.

3.8 Disconnect transfer tube from changer and camera, replace all plugs, dust caps, locks, and seal wires on source changer.

3.9 Survey changer at 39 inches from top and all sides. The highest reading is the transport index. Refer to Procedure RSP-9 for the proper radioactive labels to apply. Apply two of the proper labels to opposite sides of the container and follow the shipping instructions.

RSP-8.5 - AUTOMATION INDUSTRIES MODEL 500-SU

1.0 SCOPE

1.1 This procedure shall govern the operation of the Automation Industries Model No. 500-SU Source Changer.

1.2 This procedure shall be used in conjunction with the PDM's procedure entitled Exchanging Sealed Sources Procedure, RSP-8.

2.0 DESCRIPTION

2.1 The 500-SU Source Changer has a capacity of containing up to 100 curies of Iridium 192.

2.2 The 500-SU is a DOT Type "B" approved container for shipping.

3.0 INSTRUCTIONS FOR USE

3.1 Having an operating SURVEY METER ON HAND, unlock the access cover plate.

3.2 Locate the Source Changer within two feet of the shielded head.

3.3 Remove plug or source tube from your machine outlet.

3.4 Remove ROUND PLUG from Source Changer. Save (new) source number plate.

3.5 Connect the short change tube supplied, to your machine outlet, and to the Source Changer outlet. (Empty hole.)

3.6 Connect Source Position Indicator control to your machine lockbox and extend control, so that operator is positioned full 25 feet from machine. (Now unlock your machine.)

3.7 Run decayed source into Source Changer, by turning control handle clockwise until source stops in the changer.

3.8 At this point, the survey meter MUST be employed to insure that source has been SAFELY LOCATED IN SHIELDED POSITION.

3.9 Disconnect short change tube at Source Changer, and disengage disconnects, being careful not to pull out source.

3.10 Replace ROUND PLUG, securing decayed source in Changer.

3.11 Remove HEX HEAD PLUG from Source Changer, being careful not to pull out source cable inside. (This is your new source.)

3.12 Carefully pull the source cable disconnect only enough to allow joining of disconnect.

3.13 Join disconnects on control cable and source cable.

3.14 Connect short Change tube to Source Changer outlet.

3.15 Pull source into machine by turning control handle counter clockwise. (Check Radiation Levels and Lock your Machine.)

3.16 After a MONITOR CHECK HAS BEEN MADE WITH A SURVEY meter, remove short change tube.

3.17 Replace HEX HEAD PLUG on empty Source Changer hole.

3.18 Remove decayed source number plate from plate holder on your machine, and replace with new source number plate attached to lead seal wire. Attach old source number plate to Source Changer cap plug, by lacing seal wire provided through number plate when sealing returned source.

3.19 A Lead Seal wire has been furnished with your new source. It is to be used for re-sealing Source Changer cap plugs and attaching old source number plate.

3.20 Two DOT style shipping labels are included in the envelope. These are to be pasted over the similar labels on the shipping box. The blank spaces should be filled in as follows:

Principal Radioactive Content - SPELL OUT:
Iridium-192
(Not IR-192)

Activity of Contents - - - - - Number of Curies

Transportation Index - - - - - (by radiation survey)
mr/hr at 39 inches

3.21 Place the short Change Tube within the compartment, close the hinged cover, and secure with the padlock.

3.22 Return the Source Changer, with freight PREPAID, as instructed.

IMPORTANT: If this Source Changer is used as a temporary Storage Container, the hinged cover plate must be locked, using the padlock provided, and the entire container must be placed and stored within a storage vault or metal box, which is maintained under lock and key.

RSP-9 - TRANSPORTATION OF RADIOACTIVE MATERIAL

1.0 SCOPE

1.1 This procedure describes the shipping paper, packaging, marking, labeling and placarding requirements for Transportation of Radioactive Material via PDM's vehicle and common carrier.

1.2 This procedure conforms to the requirements of USNRC Title 10 CFR Part 71 and the Department of Transportation, Title 49 Parts 171 to 177.

1.3 This procedure shall be used in conjunction with PDM's procedures entitled Radiation Surveys and Posting, RSP-3 and General Use of Radiation Survey Instruments, RSP-4.

2.0 PACKAGING

2.1 Projectors and source changers shall be packaged as described below:

PACKAGING REQUIREMENTS

Exposure Device(ED) or Source Changer(SC)	Maximum Activity And Source Type	Minimum Type of Over-Pack or Container
T/O 490 (ED)	100 curies, IR-192	None required
Gamma Ind. Pipeliner #1 (ED)	100 curies, IR-192	Barrel 821-1005-006
T/O 650 (SC)	200 curies, IR-192 (two 100 curie sources)	None required
T/O 533 (ED)	100 curies, IR-192	715 Shipping Barrel
Multitron C52(ED)	10 curies, CO-60	Special Shipping Container
Gamma Ind. C-10 (SC)	200 curies, IR-192	Shipping Barrel
Gamma Ind. C-8 (SC)	100 curies, CO-60	None required
T/O 660 (ED)	100 curies, IR-192	None required
Gammatron 20A (ED)	20 curies, CO-60	None required

Exposure Device(ED) or Source Changer(SC)	Maximum Activity And Source Type	Minimum Type of Over-Pack or Container
Century (Gamma Ind)	100 curies, IR-192	Shipping Barrel
T/O 571 (ED)	.2 curies, CS-137	None Required
T/O 920 (ED)	200 curies, IR-192	None Required
T/O 850 (SC)	200 curies, IR-192	None Required
T/O 616 (ED)	200 curies, IR-192	715 Shipping Barrel
T/O 773 (ED)	.16 curies, CS-137	None Required
Gamma Ind. Pipeliner #201 (ED)	200 curies, IR-192	Shipping Barrel
Gammatron #100A (ED)	100 curies, CO-60	None Required
J. L. Sheppard Calibrator 28-5	.12 curies, CS-137	None Required
J. L. Sheppard Calibrator 28-6A	1.2 curies, CS-137	None Required
Automation Ind. 500-SU (SC)	100 curies, IR-192	None Required

2.2 When shipping a source changer or exposure device containing a source, assure that the source is in the properly stored position.

2.3 The exposure device or source changer shall be prepared for shipment as follows:

2.3.1 Exposure Device - Assure that the shipping plug is securely in place and sealed and the device is locked.

2.3.2 Source Changer - Assure that the source hold down and cover are properly bolted on and sealed.

3.0 MARKING

3.1 Each package of radioactive material prepared for transport shall contain the following information marked on the exterior surface of the package.

3.1.1 Proper Shipping Name

Source Changer or Package Containing Exposure Device	Proper Shipping Name/ Identification Number
A) Containing source	Radioactive Material Special Form N.O.S.; UN2974
B) Empty (except lead shielded devices)	Mfg'd. from natural or depleted uranium; UN2909

3.1.2 The name and address of PDM.

3.1.3 The USNRC Compliance Number or Type of Package. (See RSP-15, Page 15.7.)

4.0 LABELING

4.1 Survey the package to determine the proper shipping label as described in the following:

Maximum Radiation Level at Surface & 39 Inches From Surface of Package	Required Label
A) Radiation level not exceeding 0.5 MR/HR at surface.	RADIOACTIVE WHITE I (see attachment #1, Figure A)
B) (1) Radiation level greater than 0.5 MR/HR at the surface and (2) not greater than 1.0 MR/HR at 39 inches.	*RADIOACTIVE YELLOW II (see attachment #1, Figure B)
C) (1) Radiation level greater than 50 MR/HR, but not exceeding 200 MR/HR at the surface and (2) greater than 1.0 MR/HR but not greater than 10 MR/HR at 39 inches.	*RADIOACTIVE YELLOW III (See attachment #1, Figure C)

*NOTE: The transport index is the highest radiation level in millirem per hour at 39 inches from any accessible external surface of the package. This number shall be expressed in the next highest tenth and written in the transport index box on the RADIOACTIVE YELLOW II and III LABELS, (e.g., 1.01 millirem, 1.1 millirem. Enter 1.1 in transport index).

4.2 Complete two (2) appropriate labels indicating the contents, Iridium 192, Cobalt 60 and the number of curies. For RADIOACTIVE II and III labels, record the transport index in the box (See Note above). The label shall be attached to opposite sides of the package, one being placed near the shipping label

4.3 Empty exposure devices or source changers do not require labeling, if the following conditions exist:

4.3.1 THE RADIATION LEVEL AT THE SURFACE IS LESS THEN 0.5 MR/HR.

4.3.2 THERE IS NO MEASURABLE RADIATION LEVEL AT 39 INCHES FROM THE SURFACE.

4.3.3 IF THE ABOVE CONDITIONS EXISTS, THE PACKAGE LABEL SHALL BE BLANK OR AN EMPTY LABEL AND THE FOLLOWING STATEMENT SHALL BE ATTACHED TO THE PACKAGE:

"THIS PACKAGE CONFORMS TO THE CONDITIONS AND LIMITATIONS SPECIFIED IN 49CFR 173.424 FOR EXCEPTED RADIOACTIVE MATERIALS, ARTICLES MANUFACTURED FROM DEPLETED URANIUM; UN2909."

5.0 SHIPPING PAPERS

5.1 Shipments via commercial carrier:

5.1.1 A separate bill of lading or air bill shall be completed for EACH PACKAGE of radioactive material. The bill shall be marked in the Hazardous Material (HM) column.

5.1.2 The proper shipping name as described below shall be entered on the bill of lading or air bill for each package.

Package Containing Exposure Device or Source Changer (including an empty device)	Proper Shipping Name/ Identification Number
A) Containing Source	RADIOACTIVE MATERIAL, Special Form, N.O.S.; UN2974
B) Empty Device	RADIOACTIVE MATERIAL, Mfg'd. from natural or depleted uranium; UN2909

5.1.3 The bill of lading or air bill shall contain two (2) copies of Source Transfer Records described in Paragraph 6.

5.2 These requirements shall be followed even if the device is empty.

6.0 SHIPPING/SOURCE TRANSFER RECORD

6.1 As a minimum, four (4) copies of the Source Transfer Record shown in RSP-15, Page 15.7 shall be completed for each package of radioactive material. Distribution shall be as follows:

6.1.1 Two (2) copies shall be attached to the bill of lading or air bill.

6.1.2 One (1) copy forwarded to the Radiation Safety Officer.

6.1.3 A copy is to be placed in the shipping container.

6.2 The Source Transfer Record shall be certified in accordance with 49CFR 172.204.

7.0 TRANSPORTING RADIOISOTOPES VIA PDM's AUTHORIZED VEHICLE

7.1 Three (3) copies of the Source Transfer Record (RR7) shown in RSP-15, Page 15.7 shall be completed for each package of radioactive material. One copy is to be placed in the container, one in driver's compartment near the driver and one to be forwarded to the Radiation Safety Officer.

7.2 On completion of temporary assignments, the Source Transfer Record (RR7), indicating the permanent transfer of the sealed source, shall be completed and distributed. When radiographers are moving from jobsite to jobsite on a daily/weekly basis, PDM will use Form RP9-Radioactive Material Transportation Record instead of the Source Transfer Record (RR7).

7.3 The radioactive device shall be either blocked, braced or strapped to prevent shifting within the vehicle during transport.

7.4 The requirements of Paragraphs 1.0, 2.0 3.0 and 4.0 shall apply with additional requirements as follows:

7.4.1 A calibrated, operable survey meter shall be located in the vehicle near the driver.

7.4.2 A radiation survey shall be conducted to insure that the radiation level at the external surface of the vehicle and at the driver's seat is 2 MR/HR or less.

7.4.3 Each vehicle, while transporting a radio-isotope requiring a RADIOACTIVE YELLOW III Label, (See Attachment No. 1, Figure C), shall display on the front, back and both sides of the vehicle, placards displaying the word "RADIOACTIVE"; (see Attachment 4).

7.4.3.1 These PLACARDS shall be removed or covered when the vehicle does not contain the article for which such marking is required (D.O.T. 49, Part 177.823, a).

7.4.4 Each vehicle requiring placards as specified in Paragraph 7.4.3 above, shall have posted in a conspicuous place as shown in Attachment No. 2 notifying authorities who to contact in the event of an accident.

8.0 SHIPMENT BY CARGO AIRCRAFT

8.1 In addition the the requirements of Paragraphs 1.0 through 6.0, the following requirements shall also apply for shipment of radioactive material via cargo aircraft.

8.1.1 The package shall have a "CARGO AIRCRAFT ONLY" label as shown on Attachment #3 affixed to the exterior surface.

ATTACHMENT NUMBER 1

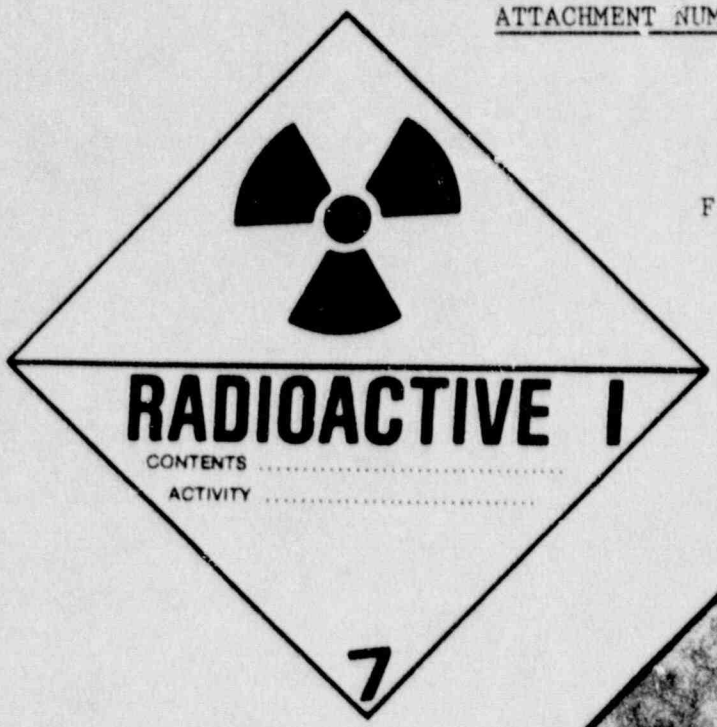


Figure A

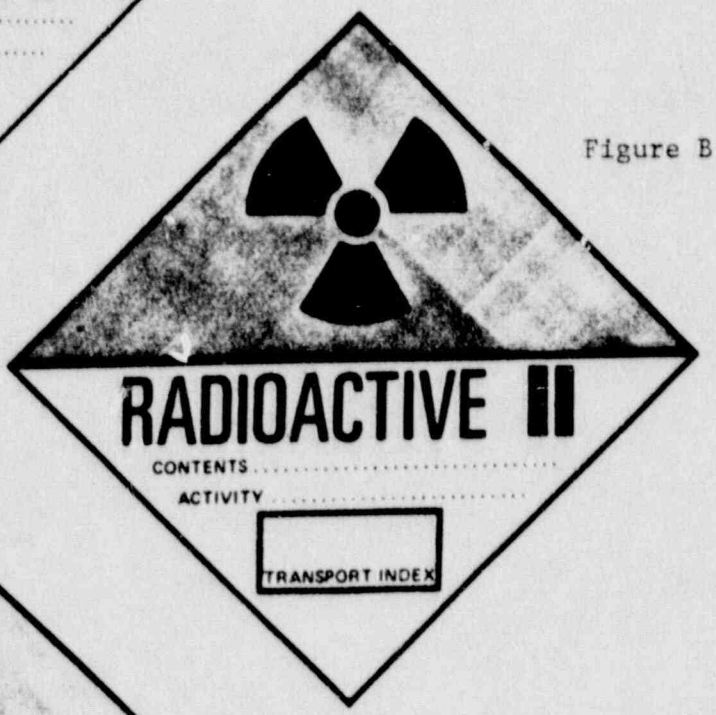


Figure B

Figure C

ATTACHMENT NUMBER 2

NOTICE

In case of an accident involving this vehicle

IMMEDIATELY NOTIFY

PDM
Neville Island
Pittsburgh, PA 15225
(412) 331-3010, ext. 600

NIGHTS
SUNDAYS CALL:
HOLIDAYS

Radiation Safety Officer

Name: Alfred J. Mueller
Business Phone: (412) 331-3010, ext. 600
Home Phone: (412) 457-7565

Radiation Safety Supervisor

Name: Robert E. Stachel
Business Phone: (412) 331-3000, ext. 555
Home Phone: (412) 787-7175

ATTACHMENT NUMBER 3

DANGER!

DO NOT LOAD ON PASSENGER AIRCRAFT

ATTACHMENT NUMBER 4

VEHICLE PLACARD

RSP-10 - RECEIPT OF RADIOACTIVE MATERIAL PACKAGES

1.0 SCOPE

1.1 This procedure shall establish guidelines for receiving and opening packages containing radioactive materials.

1.2 This procedure conforms to the requirements of Title 10 CFR Part 20.205 and Title 49 CFR and applicable licensed agreement state regulations.

1.3 This procedure shall be used in conjunction with the PDM's procedure entitled General Use of Radiation Survey Instruments, RSP-4.

2.0 GENERAL

2.1 Packages containing radioactive materials are to be received in accordance with USNRC Title 10 CFR Part 20.205, Paragraphs A and C and/or applicable agreement state regulations.

2.2 Only qualified radiographers and assistant radiographers may survey or open packages containing radioactive material.

2.3 If a radiation survey conducted in accordance with USNRC Title 10 CFR Part 20.205C or applicable agreement state regulations reveals a radiation level in excess of allowable limits, the package shall be segregated, roped off, barricaded or otherwise stored so as to preclude unnecessary exposure above 2 MR/HR, and the cognizant Radiation Safety Supervisor or Assistant Radiation Safety Officer shall be notified immediately.

3.0 RECEIPT OF PACKAGE CONTAINING RADIOACTIVE MATERIAL

3.1 Surveyed in accordance with USNRC Title 10 CFR Part 20.205C or applicable agreement state regulations.

3.2 Examined for proper labeling, classification, evidence of activity and leak test and the applicable sections of a PDM "Radioactive Material Receiving Report", Form RR-4 (see RSP-15, Page 15.8) completed.

3.2.1 IF ANY OF THE ABOVE ITEMS ARE IN NONCOMPLIANCE, THE COGNIZANT RADIATION SAFETY OFFICER OR RADIATION SAFETY SUPERVISOR SHALL BE NOTIFIED.

RSP-11 - CONDUCTING A LEAK TEST OF SEALED SOURCES

1.0 SCOPE

1.1 This procedure shall govern the method of performing Leak Test on radioisotopes used by PDM.

1.2 This procedure conforms to the requirements of USNRC Title 10 CFR Part 34.25 and applicable licensed agreement state regulations.

1.3 This procedure shall be used in conjunction with the PDM's procedure entitled Radiation Safety Records, RSP-14.

2.0 GENERAL

2.1 Only those personnel authorized to perform leak tests by PDM as documented on PDM's Leak Tests Certification (see RSP-15, Page 15.6) may perform such test.

2.2 One of the following leak test kits shall be used for wipe testing sealed sources possessed by PDM:

2.2.1 Applied Health Physics Mark V Leak Test Kit.

2.2.2 Tech Ops Model 518 Leak Test Kit.

2.2.3 Gamma Industries Kowipe Leak Test Kit.

2.3 Each sealed source shall be tested for leakage at intervals not to exceed six (6) months while in use. Sources exempted from this test during storage, shall be tested for leakage prior to any use or transfer.

2.4 Applicable radiation safety precautions shall be maintained throughout the performance of this test.

3.0 PERFORMANCE OF TEST

3.1 The wipe test shall be performed in accordance with the supplier's instructions, a copy of which is included in each kit.

3.2 If indicated surface activity of the wipe test sample exceeds .005 microcuries, the cognizant Assistant Radiation Safety Officer or Radiation Safety Supervisor should be notified immediately.

4.0 RECORDS

4.1 Records of leak test results shall be kept in units of microcuries and maintained for inspection of the USNRC or applicable agreement state.

RSP-12 - EMERGENCY PROCEDURE

1.0 SCOPE

1.1 The procedure as defined herein shall govern the steps to be taken by the radiographer and radiographer's assistant in the event of an emergency situation concerning radiation producing equipment. This procedure is designed to comply with Federal, State and Local requirements concerning emergency situations.

2.0 RESPONSIBILITIES

2.1 It is the radiographer's responsibility to notify PDM of any emergency situation wherein he feels that an emergency situation exists whether it be in the transportation, use and/or storage of source material.

2.2 The Administrative personnel at PDM to be notified via telephone "COLLECT" are:

2.2.1 Pittsburgh, PA:

Telephone Number (412) 331-3010, Ext. 600 (Office)

RADIATION SAFETY OFFICER
A. J. Mueller (412) 457-7565 (Residence)
or
RADIATION SAFETY SUPERVISOR
R. E. Stachel (412) 787-7175 (Residence)

3.0 EMERGENCY SITUATION

3.1 Emergency situations are defined but not limited to the following:

3.1.1 DOSIMETER GOES OFF 200 MR SCALE.

3.1.2 RADIOACTIVE SOURCE BECOMES STUCK IN SOURCE GUIDE TUBE.

3.1.3 SOURCE PROJECTOR IS DROPPED IN RIGGING TO WORK LOCATION.

3.1.4 RADIATION SURVEY INSTRUMENT DOES NOT FUNCTION PROPERLY (CHECK BACK-UP RADIATION SURVEY INSTRUMENT FIRST).

3.1.5 ACCIDENT IN TRANSPORTATION OF SOURCE MATERIAL VIA MOBILE LABORATORY OR COMPANY CAR.

NOTE: In the event of a radiographer becoming incapacitated during an accident, placards should be in an appropriate place in the vehicle to inform Local, State and/or Civil authorities who they should contact.

NEVER LEAVE THE SCENE OF THE ACCIDENT UNLESS YOU NEED MEDICAL ATTENTION until you are sure of the security of source material.

3.1.6 FIRE IN STORAGE BUILDING WHERE SOURCES ARE TEMPORARILY STORED AT CONSTRUCTION SITES. YOU AS A RADIOGRAPHER SHALL POST THE TELEPHONE NUMBER WHERE YOU CAN BE REACHED BY SITE MANAGEMENT PERSONNEL AND/OR THE LOCAL FIRE DEPARTMENT.

3.1.7 BROKE CONNECTOR OF SOURCE MATERIAL TO DRIVE CABLE PREVENTING RETRACTING OF SOURCE TO ITS SHIELDED POSITION.

3.1.8 LOST OR STOLEN SOURCE MATERIAL.

3.1.9 ANY SITUATION WHEREIN YOU AS A RADIOGRAPHER HAVE REASON TO BELIEVE THAT AN OVEREXPOSURE TO RADIATION HAS OCCURRED TO RADIATION WORKERS AND/OR NON-RADIATION WORKERS OR ANY PROPERTY DAMAGE OCCURRING OUT OF SOURCE MATERIAL.

4.0 EMERGENCY SITUATION ASSESSMENT

4.1 In the event of an emergency situation, the radiographer shall assess the sitation as follows:

4.1.1 RESTRICT AND POST THE RADIATION OR SUSPECTED RADIATION AREA TO A 2 MR/HR LEVEL. THIS CAN BE DONE EITHER WITH A RADIATION SURVEY INSTRUMENT OR BY CALCULATIONS.

4.1.2 "CALM" REVIEW AND ASSESS THE SITUATION. For example:

1) You have reason to believe that an individual has received an over-exposure (over 100 MR). Calculate the exposure based on time-distance and the source activity. If your calculation shows 1 R or more, the individual shall be scheduled for an immediate blood test.

2) Damage of source material projector controls due to accident. They can become damaged by cranes, etc.

3) Crushed source material guide tubes (something fell on them).

4.2 After assessment, "IMMEDIATELY" notify via telephone "COLLECT" the respective Radiation Safety Supervisor for direction and resolution of the situation.

5.0 REPORTING/NOTIFICATION

5.1 It shall be the responsibility of the Radiation Safety Officer (Company RSO) to file with the appropriate regulatory body reports as required for emergency situations.

5.2 In the event that the radiographer cannot locate the Radiation Safety Supervisor or the Radiation Safety Officer, he shall be required to notify the appropriate Federal and/or State Radiation Control Board by telephone. The telephone number of the USNRC Compliance Region can be found on USNRC Form 3 and/or the equivalent for respective agreement states which shall be posted in the laboratory or field location. Phone number for licensed agreement states will be recorded on the applicable State Notice To Employees Form.

5.3 After any emergency situation involving source material or equipment, you shall complete the Incident Data Report (RSP-15, Page 15.4) to this procedure giving detailed information as required concerning the emergency situation.

RSP-13 - RADIOGRAPHERS PERFORMANCE REVIEW

1.0 SCOPE

1.1 This procedure establishes the guidelines for reviewing an individual's performance to assure compliance with PDM's Operating and Emergency Procedures and applicable USNRC and/or state regulations.

2.0 RESPONSIBILITIES

2.1 Performance reviews shall be conducted by the Radiation Safety Officer and/or Assistant Radiation Safety Officer.

3.0 PERFORMANCE REVIEWS

3.1 Performance reviews shall be conducted on an announced and unannounced basis at the discretion of the auditor.

3.2 A quarterly review shall be conducted on each radiographer and/or assistant radiographer for compliance with the requirements contained in this manual.

3.3 The elements to be audited are listed in the Radiographer's Performance Review, Form RR-1 (See RSP-15, Page 15.9).

3.4 The auditor shall observe an actual radiographic operation.

4.0 DISQUALIFICATION/UPGRADING

4.1 If an individual cannot demonstrate thorough understanding of the items listed in the Radiographer's Performance Review, (RSP-15, Page 15.9) he shall:

4.1.1 Be disqualified from working with radioactive material until he:

a) COMPLETES ADDITIONAL TRAINING IN THE DEFICIENT AREAS.

b) DEPENDING UPON THE SEVERITY OF THE DEFICIENCY, BE DISCIPLINED.

5.0 RECORDS

5.1 A record of each radiographer's performance review shall be completed and retained by the Assistant Radiation Safety Officer and copies sent to the Radiation Safety Officer.

RSP-14 - RADIATION SAFETY RECORDS

1.0 SCOPE

1.1 This procedure shall govern the maintenance of reports and records that each radiographer is required to generate as applicable and retain in compliance with the USNRC and/or state regulations.

1.2 The following reports and records are included in this procedure not only in text but, also in RSP-15:

1.2.1 Radiograher's Performance Review (RSP-15, Page 15.9).

1.2.2 Radiographic Operations Report, RR-2 (RSP-15, Page 15.3).

1.2.3 Source Change and Leak Test Certification Record (RSP-15, Page 15.6).

1.2.4 Incident Data Report (RSP-15, Page 15.4).

1.2.5 Radioactive Material Receiving Report (RSP-15, Page 15.8).

1.2.6 Source Transfer Record (RSP-15, Page 15.7)

1.2.7 Radioactive Material Transportation Record (RSP-15, Page 15.10).

1.2.8 Survey Meter Calibration Record (RSP-15, Page 15.11).

1.2.9 Dosimeter Calibration Record (RSP-15, Page 15.12).

1.2.10 Quarterly Inventory Record (RSP-15, Page 15.13).

2.0 INTENT

2.1 It is the intent of this procedure to provide a ready reference to a radiographer showing the reports that he is responsible for completing. Since many of the reports are self-explanatory, no specific instruction are given for detailed completion. If the report is to be completed after the performance of an operation for which there is a PDM procedure, that procedure will be referenced in the applicable part of this procedure and any special instructions for the use of that report will be found in the referenced procedure.

3.0 REPORTS

3.1 Radiographic Operations Report (See PDM procedure entitled Personnel Monitoring Equipment and Usage, RSP-2). A Radiographic Operations Report (See RSP-15, Page 15.3) must be completed by personnel daily when they are performing radiography activities. At the end of the work week, these reports must be forwarded to the respective Assistant Radiation Safety Officer for transmittal to the Radiation Safety Officer.

3.2 PDM Radiographic Operations Report

The PDM Radiographic Operations Report (See RSP-15, Page 15.3) is to be completed as applicable for each time a source is transported or used. This report consists of:

3.2.1 SOURCE UTILIZATION RECORD AS REQUIRED BY USNRC TITLE 10 CFR PART 34.27 AND APPLICABLE LICENSED STATE REGULATIONS.

3.2.2 A MAINTENANCE AND INSPECTION OF THE RADIOGRAPHIC EXPOSURE DEVICE AS REQUIRED BY USNRC TITLE 10 CFR PART 34.28 AND APPLICABLE LICENSED STATE REGULATIONS.

3.2.3 A RADIATION SURVEY OF RADIOGRAPHIC OPERATIONS SHOWING SOURCE LOCATIONS AND RADIATION LEVELS AT BOUNDARIES OF RESTRICTED AREAS.

3.2.4 A SURVEY RECORD PRIOR TO SECURING A SOURCE FOR STORAGE AS REQUIRED BY USNRC TITLE 10 CFR PART 34.43, PARAGRAPH C AND APPLICABLE LICENSED STATE REGULATIONS.

3.2.5 A VEHICLE SURVEY RECORD TO ASSURE COMPLIANCE WITH DEPARTMENT OF TRANSPORTATION REGULATIONS CONTAINED IN TITLE 49 CFR PARTS 171 THROUGH 177 AND APPLICABLE USNRC AND/OR STATE REGULATIONS.

The PDM Radiographic Operations Report is to be completed in duplicate, one (1) copy of which is sent to the respective Assistant Radiation Safety Officer at the end of the work week and one (1) copy of which is sent to and maintained by the Radiation Safety Supervisor.

3.3 Source Change and Leak Test Certification Record

A Source Change and Leak Test Certification Record (See RSP-15, Page 15.6) shall be completed, as applicable, in accordance with instructions contained in PDM's procedure entitled Conducting a Leak Test, RSP-11 or Exchanging Sealed Sources Procedure, RSP-8.

3.4 Incident Data Report, Form No. RR-3)

An Incident Data Report (See RSP-15, Page 15.4) shall be completed in the circumstance that:

3.4.1 A DOSIMETER IS DISCHARGED BEYOND ITS CAPACITY AND IMMEDIATE PROCESSING OF A FILM BADGE IS REQUIRED.

3.4.2 A FILM BADGE BECOMES WET, LOST OR MUTILATED.

3.4.3 A FILM BADGE MAY INDICATE AN EXCESSIVE EXPOSURE WHICH THE USER DID NOT RECEIVE.

3.4.4 A problem or incident has occurred which must be reported.

3.4.5 The completed report shall be sent to the Radiation Safety Officer as soon as possible.

3.5 Radioactive Material Receiving Report

A Radioactive Material Receiving Report (See RSP-15, Page 15.8) shall be completed in accordance with PDM's Procedure entitled Receipt of Radioactive Material Packages. These reports are to be completed in duplicate, one (1) copy to be sent to the RSO and one (1) to be retained by the Radiation Safety Supervisor.

3.6 Source Transfer Record

A Source Transfer Record (See RSP-15, Page 15.7) shall be completed in accordance with PDM's procedure entitled, Transportation of Radioactive Materials, RSP-12. In addition, when a source is being transported over the road from job to job, the Radioactive Material Transportation Record (see RSP-15, Page 15.10) shall be completed by the radiographer.

3.7 Quarterly Inventory Record

The Quarterly Inventory Record (see RSP-15, Page 15.13) shall be completed in accordance with PDM's procedure entitled Radiation Safety Administration, RSP-1.

3.8 Dosimeter Calibration Record

The Dosimeter Calibration Record (see RSP-15, Page 15.12) shall be complete in accordance with PDM's procedure entitled Calibration Procedure for Dosimeters, RSP-2.1.

3.9 Survey Instruments Calibration Record

The Survey Meter Calibration Record (see RSP-15, Page 15.11) shall be completed in accordance with the requirements of the applicable operating instruction for calibrators, RSP-5.4, 5.10 and 5.11.

INDEX OF FORMS

MANUAL REVISION TRANSMITTAL AND RECEIPT FORM

FORM 17986
REV. 9-85

PDM

CONTROLLED DOCUMENT TRANSMITTAL

TO: DATE:

CONTROL NO:

* *

INSTRUCTIONS:

The below listed document is being transmitted to you for your custody, control and use. Please acknowledge receipt by signing, dating, and returning this form as indicated below. All superseded pages are to be destroyed or marked VOID.

DOCUMENT DESCRIPTION:

REMARKS:

* *

-DO NOT DETACH-

RECEIPT ACKNOWLEDGEMENT (to be completed by document holder):

My controlled document has been updated to include the above document and all superseded pages have been destroyed or marked VOID.

SIGNATURE _____ DATE _____

RETURN TO:

RADIOGRAPHIC OPERATIONS REPORT (RR-2)

Page _____ of _____ Form RR-2
Date _____ Rev 07/01/86
NRC License No _____
Expires on _____

PDM

RADIOGRAPHIC OPERATIONS REPORT

"WARNING" - INTENTIONAL FAILURE TO RECORD INFORMATION ACCURATELY ON THIS FORM CAN RESULT IN TERMINATION

LOCATION: CITY _____ STATE _____ CONTRACT No _____

TYPE OF RADIATION:

X-RAY _____ MODEL No _____ SERIAL No _____ KV _____ MA _____

GAMMA-RAY CONTAINER _____ MODEL No _____ SERIAL No _____

ISOTOPE SOURCE _____ MODEL No _____ SERIAL No _____ CURIES _____

LEAK TEST DUE DATE _____

SURVEY INSTRUMENT USED

A. MAKE _____ MODEL _____ SERIAL No _____

B. RECALIBRATION DUE DATE _____

RADIOGRAPHIC EQUIPMENT INSPECTED FOR THE FOLLOWING CHECK LIST

INDICATE OK or NOT APPLICABLE (N/A) or REPAIR (R)

If (R) is indicated Contact the Radiation Safety Supervisor before proceeding with work.

A. SURVEY PROJECTOR FOR EXCESSIVE RADIATION LEVELS.
B. PROJECTOR INSPECTED FOR DAMAGE TO FITTINGS, LOCK, FASTENERS & LABELS.
C. CONTROL CABLE INSPECTED FOR CUTS, BREAKS, BROKEN OR LOOSE FITTINGS.
D. CRANK INSPECTED FOR LOOSENESS.
E. GUIDE TUBE INSPECTED FOR CUTS, CRUSHING AND BROKEN OR LOOSE FITTINGS.
F. COLLIMATOR, IF USED, CHECKED FOR SECURE ATTACHMENT.
G. OPERATION OF CONTROL CHECKED TO ASSURE FREEDOM OF SOURCE MOVEMENT.
H. SOURCE RETURNED TO _____ SHOP CAGE

Comments: _____

_____

_____

Inspection completed by: _____

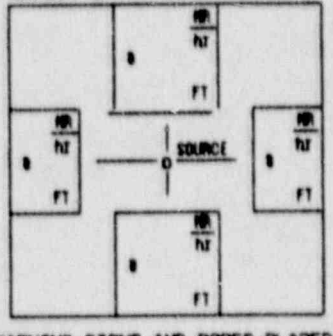
_____ Date: _____

RECORD OF PHYSICAL SURVEY MADE TO DETERMINE SOURCE IS IN SHIELDED POSITION PRIOR TO SECURING EXPOSURE DEVICE.

_____ MR/HR @ SURFACE OF EXPOSURE DEVICE

SURVEY OF STORAGE AREA _____ MR/HR

"RESULT OF PHYSICAL SURVEY"



BARRING SIGNS AND ROPES PLACED AS REQUIRED YES ☐

CONSTANT SURVEILLANCE YES ☐

COMMENTS _____

_____

_____

THE CONTAINER SURVEY AFTER EACH EXPOSURE WAS _____ MR/HR

_____
Radiographer

LENGHT OF EXPOSURE _____

NUMBER OF EXPOSURES _____

RADIOGRAPHER _____ BADGE No _____ DATE _____ DOSIMETER _____ MR

RADIOGRAPHER'S ASST. _____ BADGE No _____ DATE _____ DOSIMETER _____ MR

REVIEWED BY _____ DATE _____
RADIATION SAFETY SUPERVISOR

COPY - RADIATION SAFETY OFFICER

COPY - RADIATION SAFETY SUPERVISOR/ASSISTANT RADIATION SAFETY OFFICER

INCIDENT DATA REPORT (RR-3)

"INCIDENT DATA REPORT" Form RR 3

THIS REPORT IS TO BE COMPLETED WITHIN 24 HOURS IN THE EVENT THAT:

A. Your Dosimeter is discharged beyond 200 MR due to unknown circumstances in which the possibility of an excessive exposure to radiation exists.

B. Your Film Badge becomes wet, mutilated or lost.

C. You have reason to believe that your Film Badge may indicate an excessive exposure that you may not have received.

SECTION 1 - (Complete All Items)

1. NAME:_____ SIGNATURE:_____

2. WORK LOCATION:_____
Plant Site City State

3. DID YOU STOP RADIOGRAPHIC OPERATIONS IMMEDIATELY: YES_____NO_____

4. DID YOU NOTIFY YOUR RADIATION SAFETY SUPERVISOR_____

ASSISTANT RADIATION SAFETY OFFICER_____

5. WHEN? DATE:_____TIME:_____

6. WHICH OF THE ITEMS OCCURRED? A._____(COMPLETE SECTION 2)

B._____(COMPLETE SECTION 3) C._____(COMPLETE SECTION 4)

SECTION 2 - (To be Completed in the Event that "A" Above Occurred)

1. WHEN WERE YOU AWARE THAT YOUR DOSIMETER WENT OFF SCALE? DATE:_____
TIME:_____

2. IF POSSIBLE OVER-EXPOSURE OCCURRED, AT WHAT DISTANCE WERE YOU FROM THE SOURCE? _____ FOR WHAT LENGTH OF TIME?_____

_____

3. PROJECTOR DEVICE EMPLOYED - MAKE AND MODEL_____S/N_____

4. SOURCE TYPE: IR-192_____CO-60_____SOURCE S/N_____ACTIVITY_____
CURIES

5. SURVEY METER: MODEL_____SERIAL NUMBER_____

6. EXPLAIN IN DETAIL EXACTLY EVERYTHING THAT OCCURRED. (Use Reverse Side)

SECTION 3 - (To be Completed In the Event That "B" Above Occurred)

1. EXPLAIN IN DETAIL HOW YOUR FILM BADGE BECAME WET, MUTILATED OR LOST. (Use Reverse Side)

SECTION 4 - (To Be Completed In The Event That "C" Above Occurred)

1. WHERE WAS YOUR FILM BADGE LOCATED WHEN YOU BELIEVE IT WAS EXPOSED TO RADIATION?_____

2. HOW MUCH RADIATION DO YOU BELIEVE YOUR FILM BADGE RECEIVED?
20 to 100 MR_____100 to 300 MR_____
300 to 600 MR_____Above 600 MR_____
Unknown_____

3. WHY WERE YOU NOT WEARING YOUR FILM BADGE?_____

_____

4. EXPLAIN EXACTLY EVERYTHING THAT OCCURRED. (Use Reverse Side of Sheet)

5. ON THE REVERSE SIDE INCLUDE ANY OTHER INFORMATION WHICH YOU FEEL IS PERTINENT.

White - Radiation Safety Officer Yellow - Assistant Radiation Safety Officer Pink - Radiation Safety Supervisor

MAINTENANCE INSPECTION STICKER

PDM

MAINTENANCE INSPECTION
In accordance with Proc. RSP-7

Camera No._____ Date _____

Inspection due date _____

Inspection performed by _____

_____

SOURCE CHANGE AND LEAK TEST CERTIFICATION

SOURCE CHANGE CERTIFICATION

This is to certify that:

MR _____ POSITION _____

WAS GIVEN A DEMONSTRATION OF SOURCE CHANGES USING THE FOLLOWING AUTHORIZED SOURCE CHANGERS:

- ☐ T/O 650 Capacity _____ Curies of Iridium 192
- ☐ T/O 850 Capacity _____ Curies of Iridium 192
- ☐ Gamma Ind. C-10 _____ Curies of Iridium 192
- ☐ Gamma Ind. C-8 _____ Curies of Cobalt 60
- ☐ Auto. Indust. 500SU _____ Curies of Iridium 192

THE ABOVE MENTIONED EMPLOYEE HAS DEMONSTRATED COMPETENCE IN CHANGING OF THESE SOURCES USING THE APPLICABLE PDM PROCEDURE(S) RSP-8, RSP-8.1, RSP-8.2, RSP-8.3, RSP-8.4 AND RSP-8.5. THE CHANGE WAS SUPERVISED BY THE ASSISTANT RADIATION SAFETY OFFICER OR RADIATION SAFETY SUPERVISOR.

DATE: _____

_____

Assistant Radiation Safety Officer Radiation Safety Supervisor

---

LEAK TESTS CERTIFICATION

This is to certify that:

MR _____ POSITION _____

HAS BEEN GIVEN A DEMONSTRATION TO PERFORM A LEAK TEST USING _____ LEAK TEST KIT. THIS TEST IS TO BE PERFORMED UNDER THE PROVISIONS OF THE PDM LICENSE AND LEAK TEST PROCEDURE RSP-11. THE ABOVE TEST HAS BEEN SUPERVISED BY THE ASSISTANT RADIATION SAFETY OFFICER OR RADIATION SAFETY SUPERVISOR.

DATE: _____

_____

Assistant Radiation Safety Officer Radiation Safety Supervisor

SOURCE TRANSFER RECORD (RR-7)

PDM

SOURCE TRANSFER RECORD

DATE _____
NRC License _____
Amendment _____ FORM RR-7
Expires on _____ REV 07/01/86

OLD SOURCE: ☐ Iridium 192 ☐ Cobalt 60

Mfr _____ Source Model No _____
Source Serial No _____ Curies _____
Container Model No _____
Container Serial No _____
Last Leak Test date _____

TRANSFERRED TO:

Container Model No _____ Serial No _____
MR/HR at surface of container _____
MR/HR at 1 m (39") from container _____
Survey Meter used: Make _____
Model No _____ Serial No _____
Last Calibrated ___ within 3 mo Yes ☐ No ☐

SENT TO: _____

RADIOACTIVE MATERIAL, SPECIAL FORM, N.O.S.

NATURE AND QUANTITY OF CONTENT				PACKAGE		
RADIONUCLIDE		FORM	ACTIVITY	CATEGORY	TRANSPORT INDEX	TYPE
NAME OF PRINCIPAL RADIOACTIVE CONTENT	INDENT NUMBER	EITHER CHEMICAL FORM PLUS GAS/ LIQUID SOLID OR SPECIAL FORM	NUMBER OF CURIES OR MILLICURIES	I-WHITE II-YELLOW III-YELLOW LABEL	FOR YELLOW LABEL CATEGORY	TYPE A OR TYPE B
	UN2974	SPECIAL FORM			MR/HR AT 39 IN	TYPE B

Does shipping container have proper radioactive material label ? Yes ☐ No ☐
Has container been sealed with device, not readily breakable, which indicates that the container has not been opened ? Yes ☐ No ☐
Sealed exchanger cap plugs & attached D.O.T. labels ? Yes ☐ No ☐

NEW SOURCE: ☐ Iridium 192 ☐ Cobalt 60

Mfr _____ Source Model No _____
Source Serial No _____ Curies _____
Exchanger Serial No _____
Leak Test date _____
MR/HR at surface of Exchanger when received _____

TRANSFERRED TO:

Container Model No _____ Serial No _____
MR/HR: _____
at surface of exposure device after exchange
_____
Exchanged old source label for new source label
Yes ☐ No ☐

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

I hereby certify that the contents of this consignment are fully and accurately described above by proper shipping name, and are classified, packed, marked and labeled and in proper condition for carriage by air according to applicable national governmental regulations.
This shipment is within the limitations prescribed for cargo aircraft only.

SIGNATURE _____ DATE _____
Radiographer or Supervisor

COPIES TO: 1 - COPY CARRIER
1 - COPY IN SHIPPING CONTAINER
1 - COPY - FILE AT JOB SITE/PLANT
1 - COPY - SHIPPER
1 - COPY - RSO

RADIOACTIVE MATERIAL RECEIVING REPORT (RR-4)

PDM

Form RR-4

RADIOACTIVE MATERIAL RECEIVING REPORT

I. RECEIVING DATE: _____ TIME RECEIVED: _____

II. LOCATION: (Plant or Project Location) _____

III. MATERIAL RECEIVED FROM: _____

IV. CARRIER: _____

V. RADIOACTIVE MATERIAL TYPE: _____

_____ Iridium 192 _____ Cobalt 60 Other _____

SOURCE SERIAL NO. _____ _____ ACTIVITY _____

REMARKS: _____

VI. CONTAINER TYPE:

1. SOURCE CHANGER _____ MODEL NO. _____ SERIAL NO. _____
2. EXPOSURE DEVICE _____ MODEL NO. _____ SERIAL NO. _____

VII. PHYSICAL RADIATION SURVEY OF CONTAINER: *

1. Radiation Level @ External Surface: _____ MR/HR
2. Radiation Level @ 39 inches From External Surface _____ MR/HR
3. RADIOACTIVE YELLOW _____ LABEL
   TRANSPORT INDEX _____

VIII. IS SOURCE ACCOMPANIED BY:

1. Decay Curve: _____ Yes _____ No (Optional)
2. Evidence of Leak Test: ____ Yes _____ No

IX. If Source is Received in Source Changer, what Device is Source to be installed in ?

1. EXPOSURE DEVICE: MODEL NO.: _____ _____ SERIAL NO. _____

X. *NOTES: 1. The container shall be surveyed within three(3) hours after receipt during regular working hours, or within eighteen(18) hours if received after regular working hours.

2. Radiation levels should not exceed the following:
   a. 200 MR at the surface of the container.
   b. 10 MR at 39 inches from the surface of the container.
   c. IMMEDIATELY NOTIFY THE RADIATION SAFETY SUPERVISOR IF THE RADIATION LEVEL EXCEEDS THE LEVELS SPECIFIED IN NOTE 2a OR 2b.

Signed _____ Date _____

Radiation Safety Supervisor or Radiographer

WHITE COPY - Radiation Safety Officer YELLOW COPY - File

RADIOGRAPHER'S PERFORMANCE REVIEW (RR-1)

PDM

RADIOGRAPHER'S PERFORMANCE REVIEW Form RR 1

UNANNOUNCED ( ), ANNOUNCED ( ) Rev 07/01/86

LOCATION _____ DATE _____

RADIOGRAPHER _____ FILM BADGE No _____

ASSIST. RADIOGRAPHER _____ FILM BADGE No _____

X-RAY ( ) SURVEY METER No _____ CALIB. DUE _____

IRIDIUM 192 ( ) PROJECTOR No _____ SOURCE No _____

COBALT 60 ( ) PROJECTOR No _____ SOURCE No _____

	1	2	3
1. Placement of fixture or collimator			
2. Layout of restricted area			
3. Placement of "Caution-Radiation Area" signs			
4. Placement of "Caution-High Radiation Area" signs			
5. Layout of control cable in an orderly manner			
6. Layout of source tube (Avoiding kinks)			
7. Securing projector when not in use			
8. Notification of personnel beyond restricted area			
9. Manipulation of cranking mechanism			
10. Method of survey of restricted area			
11. Continuous surveillance at source exposure			
12. Survey of projector after exposure			
13. Orderly storing of cables and equipment			
14. Survey of storage area (Prior-completion) work			
15. Inspection of projector for valid leak test			
16. Dosimeter used as required			
17. Operating and emergency procedures available			
18. Preparation of radiation survey record			
19. Preparation of maintenance inspection record			
20. Radiation survey meter in proper working order and calibrated			

REMARKS: _____

_____

NAME: _____

ASST. RADIATION SAFETY OFFICER RADIOGRAPHERS ACKNOWLEDGMENT

1-Acceptable 2-Needs Corrective Action 3-Not Applicable

RADIOACTIVE MATERIAL TRANSPORTATION RECORD (RR-8)

PDM RADIOACTIVE MATERIAL TRANSPORTATION RECORD

Form RR-8
07-03-86

CONTAINER INFORMATION

NRC License No: _____

Proper Shipping Name : Radioactive Material, Special Form, N.O.S., (UN2974)
Type of Container : Type B
Physical Description : Special Form
Transport Group : Special Form

Weight : _____
Nuclide : Iridium 192 ☐ Co 60 ☐
Curies : _____
Label : Radioactive _____

SHIPPER'S (PDM'S) CERTIFICATION

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Container or Radioactive device has been secured to prevent shifting or movement during transportation.

YES ☐ NO ☐

RADIOGRAPHER: _____ DATE: _____

MATERIAL ORIGIN	MATERIAL DESTINATION	ACT.	CONTAINER SURVEY		VEHICLE SURVEY		TRANSPORT	DATE
		Curies	MR/HR Surface	MR/HR 39inches	MR/HR CAB	MR/HR Exterior	INDEX	

SURVEY METER CALIBRATION RECORD (RR-10)

Form RR-10
07-10-86

PDM

SURVEY METER CALIBRATION RECORD

CALIBRATION STANDARD CS 137 SOURCE SERIAL NUMBER _____ MODEL _____ SERIAL NUMBER _____	METER MANUFACTURER _____ MODEL _____ SERIAL NUMBER _____ _____

CALIBRATOR OUTPUT		METER READING
X-1	3	
	8	
X-10	30	
	80	
X-100	300	
	800	

REMARKS _____

BY _____ DATE _____

DOSIMETER CALIBRATION RECORD (RR-9)

PDM DOSIMETER CALIBRATION RECORD

Form RR-9
Rev 07-10-86

Dosimeter Serial No	Date	4 Hr Resp	8 Hr Resp	Results	By	Next Calib Due Date

QUARTERLY INVENTORY RECORD (RR-11)

PDM

Form RR-11
Rev 07-10-86

LOCATION _____ DATE _____

NRC License No _____ ☐ 1st Quarter - March 31

Amendment _____ ☐ 2nd Quarter - June 30

Expires on _____ ☐ 3rd Quarter - September 30

State License/Registration _____ ☐ 4th Quarter - December 31

_____ BY _____

QUARTERLY INVENTORY RECORD
EXPOSURE DEVICES AND SOURCES

EXPOSURE DEVICE/SN	SOURCE MODEL	SOURCE S.N.	SOURCE ORIGINAL CURIES	SOURCE DATE	PRESENT CURIES	DATE	LEAK TEST DUE DATE
			IRIDIUM 192				
			COBALT 60				
			CESIUM 137				

RSP-16 - REPORTING OF DEFECT, MALFUNCTIONS AND NONCOMPLIANCES

1.0 SCOPE

1.1 This procedure is provided to assure that all information necessary for the reporting of defects, malfunction, or nonconformances in equipment or materials is reported to Management, the Companies involved, and to the regulatory agency overseeing the items involved.

1.2 This procedure conforms to the requirements of the 10CFR21.

1.3 This procedure shall be used in conjunction with all PDM Procedures within the Radiation Safety Manual.

2.0 REPORTING OF DEFECTS, MALFUNCTIONS, OR NONCOMPLIANCES

2.1 During operations being performed under the controls established by PDM Radiation Safety Manual ANY defect, malfunction or noncompliance discovered in equipment or materials shall be reported in writing to the Radiation Safety Officer by the Radiographer in charge at the time of discovery.

2.2 The written report shall include but not be limited to the following:

a. Date and Time defect, malfunction, or noncompliance first became evident.

b. Names and Positions of ALL individuals involved.

c. Description of defect, malfunction, or noncompliance in detail;

1. If equipment is defective or malfunctioning, list:

a. Manufacturer
b. Part description i.e., part name and identification or catalog number.

d. If a radiation hazard took place complete all necessary forms including an INCIDENT DATA REPORT Form RR-3 (See page 15.4) and notify the RSO listed in RSP-12.

2.3 After the written report and all required forms have been completed by the Radiographer in charge, the information shall be transmitted to the Radiation Safety Officer.

3.0 Reporting to appropriate agencies is the responsibility of the Radiation Safety Officer and shall be done in accordance with the procedures outlined in 10CFR21.

APPENDIX A

RULES & REGULATIONS

10 CFR 19
10 CFR 20
10 CFR 21
10 CFR 30
10 CFR 34
10 CFR 40
10 CFR 71

"OFFICIAL RECORD COPY"

ML18.

105859

The above listed documents are not included in the Radiation Safety Manual submitted with the license application. They will be included with controlled manuals.

APPENDIX B

PDM'S NRC LICENSE