030-21248 L+L: 20838

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

APPLICATION FOR MATERIAL LICENSE

03320

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED BY OMB
3150-0120
Expires: 5-31-87

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)*

- [X] A. NEW LICENSE
- [ ] B. AMENDMENT TO LICENSE NUMBER _____
- [ ] C. RENEWAL OF LICENSE NUMBER _____

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

Alicia Research & Testing Labs, Inc.
Stafford Forge Rd. RR1 Box 150AA
West Creek, N.J. 08092

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

Alicia Research & Testing Labs, Inc.
Stafford Forge Road RR1 Box 150AA
West Creek, N.J. 08092

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Michael Kozak, President

TELEPHONE NUMBER: (609) 296-0800

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. FACILIT

8507230368 850702
REG1 LIC30
29-20838-01 PDR

10. RADIATION SAFETY PROGRAM.

11. WASTE

12. LICENSEE FEES *(See 10 CFR 170 and Section 170.31)*
FEE CATEGORY: By-product material
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
[signature]	Michael Kozak	President	4/17/85

14. VOLUNTARY ECONOMIC DATA

a. ANNUAL RECEIPTS

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

b. NUMBER OF EMPLOYEES *(Total for entire facility excluding outside contractors)*: (6) Six

c. NUMBER OF BEDS: N/A

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)*

[X] YES [ ] NO

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS	APPROVED BY
APPL.	APR. 14	30	"OFFICIAL RECORD COPY" 03706	Frances Brown
AMOUNT RECEIVED	CHECK NUMBER		ML10 APR 23 1985	DATE 4/30/85
$700	1185			

PRIVACY ACT STATEMENT ON THE REVERSE

PRIVACY ACT STATEMENT

Pursuant to 5 U.S.C. 552a(e)(3), enacted into law by section 3 of the Privacy Act of 1974 (Public Law 93-579), the following statement is furnished to individuals who supply information to the Nuclear Regulatory Commission on NRC Form 313. This information is maintained in a system of records designated as NRC-3 and described at 40 Federal Register 45334 (October 1, 1975).

1. **AUTHORITY:** Sections 81 and 161(b) of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2111 and 2201(b)).

2. **PRINCIPAL PURPOSE(S):** The information is evaluated by the NRC staff pursuant to the criteria set forth in 10 CFR Parts 30, 32, 33, 34, 35 and 40 to determine whether the application meets the requirements of the Atomic Energy Act of 1954, as amended, and the Commission's regulations, for the issuance of a radioactive material license or amendment thereof.

3. **ROUTINE USES:** The information may be (a) provided to State health departments for their information and use; and (b) provided to Federal, State, and local health officials and other persons in the event of incident or exposure, for their information, investigation, and protection of the public health and safety. The information may also be disclosed to appropriate Federal, State, and local agencies in the event that the information indicates a violation or potential violation of law and in the course of an administrative or judicial proceeding. In addition, this information may be transferred to an appropriate Federal, State, or local agency to the extent relevant and necessary for an NRC decision or to an appropriate Federal agency to the extent relevant and necessary for that agency's decision about you.

4. **WHETHER DISCLOSURE IS MANDATORY OR VOLUNTARY AND EFFECT ON INDIVIDUAL OF NOT PROVIDING INFORMATION:** Disclosure of the requested information is voluntary. If the requested information is not furnished, however, the application for radioactive material license, or amendment thereof, will not be processed. A request that information be held from public inspection must be in accordance with the provisions of 10 CFR 2.790. Withholding from public inspection shall not affect the right, if any, of persons properly and directly concerned need to inspect the document.

5. **SYSTEM MANAGER(S) AND ADDRESS:** U.S. Nuclear Regulatory Commission
Director, Division of Fuel Cycle and Material Safety
Office of Nuclear Material Safety and Safeguards
Washington, D.C. 20555

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Book No. 1

03706

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item #4

Alicia Research & Testing Labs, Inc.

Item #4

Item 4 Specify the name and telephone number or the person who knows about your program. This should be a person who may be contacted and can answer questions concerning your program.

Michael Kozak 609-296-0800

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

BOOK ONE

ITEMS 5 - 11

CONTENTS

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item #5

Alicia Research & Testing Labs, Inc.

Item #5

Item 5

Radioactive Material

The sealed sources, including calibration sources that the applicant will possess and use, should be listed by radioisotope, manufacturer, and model number. The maximum amount of radioactivity in each source should be specified. The number of sources that the applicant will possess at any one time need not be specifically stated unless any one source contains more than 100curies of Cobalt-60.

5. Radioactive Material

A. Element and Mass Number..... Ir-192
B. Chemical and/or Physical Form..... Solid
C. Maximum amount possessed..... 100 Curies
D. Source assembly..... Tech/Ops A424-9
E. Radioactive exposure device..... Tech/Ops 660 Gamma Ray Projector
F. Source changer..... Mfg. - Tech/Ops Model No. 650
G. Tech/Ops Model 773 Instrument Calibration Device 165 m/ci of Cesium 137

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item #6

Alicia Research & Testing Labs, Inc.

Item #6

6. Purpose for which licensed material will be used.

A. Radiographic exposure devices will be used for industrial radiography in shielded R.T. installation at address shown in license application or at temporary job sites (100 curies of Iridium 192)

B. Calibration of radiation survey instruments using Tech/Ops model 773 Instrument Calibration Device. (Cesium 137, 165 millicuries)

C. Source chargers in Item #5 will be used for source exchange.

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item #7

Alicia Research & Testing Labs, Inc.

Item #7

7. Individual(s) responsible for Radiation Safety Program and their training and experience.

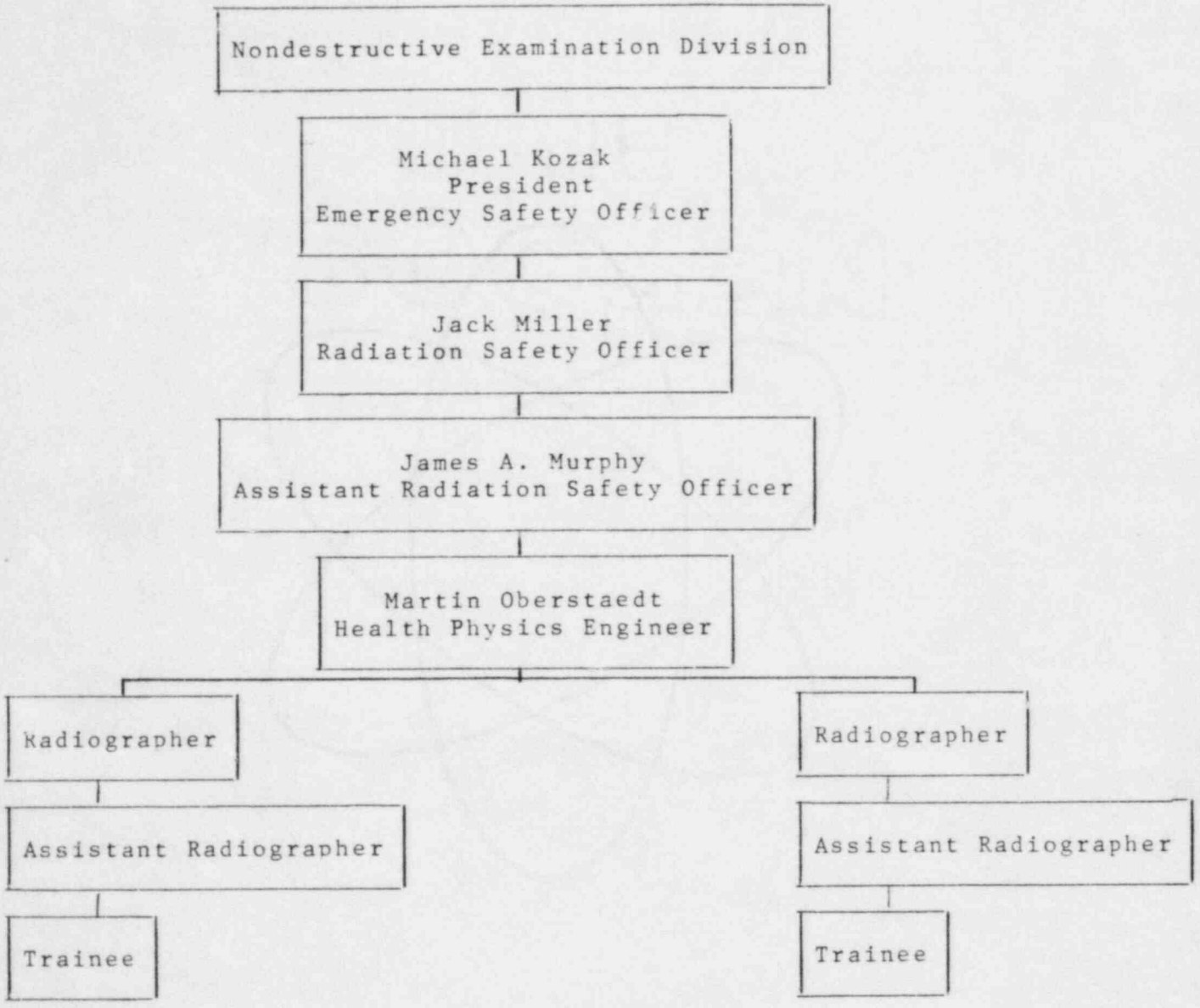
On the attached sheets of this section, are the following pieces of information needed to satisfy this requirement:

A. AR&T Labs organizational chart
B. Resume of Michael Kozak (responsible individual)
C. Resume of Martin Oberstaedt
D. Resume of James A. Murphy
E. Resume of Jack Miller

Alicia Research & Testing Labs, Inc.

Alicia Research & Testing Labs, Inc.

Organization Chart



Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item #7

Michael Kozak
President
Emergency Safety Officer

Training/Experience/Resume

Alecia Research & Testing Labs, Inc.

PERSONAL RESUME

NAME: Mich[illegible]l Kozak

ADDRESS: 112 Stillwater Road
Barnegat, N. J. 08005

PHONE NO.: (609) 698-2780
SOC. SEC. NO.: 151-38-2483
DATE OF LAST EYE EXAMINATION: December 1982
~~JAN 10 1984~~ KJS
January 14, 1985

SUBMITTED FOR POSITION AS:

Level III Technician/Examiner

EDUCATION

SCHOOL	LOCATION	COURSE	DATE		DEGREE
Irvington Tech.High Sch.	Irvington, N. J.	Auto Mech.	1962	1966	
/West Side High School	Newark, N. J.	Diploma		1966	Diploma
Bloomfield Tech.College (Inc. NDE)	Bloomfield, N.J.	Aircraft Mechanics	1966	1967	
Academy of Aeronautics Junior College	Yonkers, N. Y.	A & E Qualification	1967	1968	Diploma
Emery Riddle Universty	Datona Beach, Fla.	NDE & Helium Mass Spectrometer, Airspace Engineering	1969	1972	
Essex County College	Newark, N. J.	Admin.-Computer & Instrument Reading		1972	

TRAINING

COMPANY / SCHOOL	COURSE DESCRIPTION	NDE METHOD	HOURS
Emery Riddle University	NDE & Helium Mass Spectrometer, Airspace Engineering	Engineering	
Bloomfield Technical College	Welding, etc.		
International Testing Labs	Chemical and Physical Analysis		
International Testing Labs	Tensile and Sun Machines		
General Magnaplate	NDE Training	PT,MT,UT,RT	1 Year
Convair Home Study Courses		PT,MT,UT,RT,EC	

WORK EXPERIENCE (SEE ATTACHED SHEET)

[illegible] above information is, to the best of my knowledge, true and accurate.

Oct 27, 1982 — DATE

Wayne Dealinger — AR&T - LEVEL III - SIGNATURE

Michael Kozak — EMPLOYEE SIGNATURE

MICHAEL KOZAK

Ramsey Machine & General Brass Company
(Summers & Evenings - Part Time - 1963 to 1967)

Mr. Kozak worked as an operator using Bridgeport milling machines, turret lathes and internal and external grinders. At General Brass, Mr. Kozak was a tool and die trainee.

General Magnaplate Company
1972

Mr. Kozak was employed at General Magnaplate Company where he received his initial work and training and experience in NDE. At this firm, he accumulated approximately 2200 hours in UT, PT, RT and MT and was certified to Level II.

International Testing Labs
1972 to 1973

Mr. Kozak was an NDE Manager. As an NDE Manager, Mr. Kozak was responsible for the supervision of NDE personnel, preparation of bids and quotations for jobs involving NDE to include manpower estimates and performance of nondestructive examinations. Liquid penetrant, magnetic particle, ultrasonic and radiographic examinations were performed under MIL-Standard 271D and NAVSHIPS 0700-006-8010. While working for ITL, received training and performed eddy current examinations.

Alicia Research & Testing Labs
June 1973

Mr. Kozak was self-employed at this time and worked for various contractors performing NDE. Performed chemical and physical analysis and subcontracted to Magnaflux Corporation to perform ultrasonic testing on steel pilings under water using diving gear. Also performed under water visual examinations on tankers examining propeller blades 10" thick and 30' in diameter. Mr. Kozak has prepared UT procedures for ABS and Coast Guard for examining propeller shafts using lamb and Raleigh waves and has performed RT examinations under water taking CO-60 and IR-192 exposures using special techniques. He has also used and prepared procedures for liquid penetrant testing using all types of penetrant. Performed fluorescent and white light MT examinations using longitudinal, shear, lamb and Raleigh waves, special focus and compound wave, RT examinations using CO-60 and IR-192 sources using special film techniques and eddy current examinations of 1 to 3 inch pipe and condenser tubing using scope and graph techniques. As a contractor to Magnaflux Corporation, Mr. Kozak performed ISI services to Sec. XI of the ASME Code.

Universal Testing Labs, Inc.
1974 to 1982

Mr. Kozak was employed as an NDE Level III Examiner. Certified in all NDE methods, Mr. Kozak's experience includes six nuclear refueling outages in New Jersey and Pennsylvania, etc. Mr. Kozak was also involved in performing ultrasonic testing on feedwater nozzles with Breda Corporation at Vermont Yankee and Three Mile Island, and ultrasonic testing on CRD's and all structures and inservice inspection for Oyster Creek Nuclear Generating Station, utilizing all NDE methods. Mr. Kozak was assigned to the Oyster Creek Nuclear Generating Station for their 1977 refueling outage and was in charge of all ultrasonic

testing for inservice inspection. Was also involved in special development of adaptive learning networks for pipe inspection, defect versus geometrical reflectors discrimination in carbon and stainless steel by the variation of the dependence of a reflector on changes in frequencies. Mr. Kozak is certified as an ANSI-N45.2.6, Level III Inspector. Mr. Kozak was involved in R&D work, writing procedures for such work as embrittlement, IGSCC, feedwater nozzle inspection graphization, etc. Mr. Kozak was responsible for implementation of all ISI programs at Oyster Creek. As an ISI Engineer, he has written the 90-day inspection reports, and the 10-year ISI inspection program. Mr. Kozak designed and manufactured all the calibration blocks for Oyster Creek and other fossil and nuclear plants. He was also involved in the R&D research with APRI, Columbus, Ohio in the IGSCC (ISI) ultrasonic examination. While working for UTL as a contractor, performed eddy current examinations at Oyster Creek Nuclear Generating Station. Mr. Kozak was certified to Level III Eddy Current Inspector by UTL.

PT	4,000 Hours
MT	4,200 Hours
RT	4,000 Hours
UT	10,000 Hours
EC	1,000 Hours
Mass Spec.	200 Hours

Alicia Research & Testing Labs, Inc.
September 1982 to Present

Mr. Kozak is presently devoting full time to his own business, Alicia Research & Testing Labs, Inc., as President. In addition, he is certified in RT, PT, MT, UT, VT and ET by examination.

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item #7

Jack Miller
Radiation Safety Officer

Training/Experience/Resume

Alicia Research & Testing Labs, Inc.

Alicia Research & Testing Labs, Inc.

Training/Experience (Appendix D)

NAME: Jack Miller (051-07-3160)
Radiation Safety Officer

TRAINING: Refer to resume attached

EXPERENCE:

N.Y. Testing Labs, Westbury, New York	Radiographer	1952-1965
Consolidated Testing New Hyde Park, New York	Radiographer	1965-1966
General Magnaplate Linden, New Jersey	Radiation Safety Officer Radiographer Prepared NRC license	1966-1970
Int'l Testing Newark, New Jersey	Radiation Safety Officer Radiographer Prepared NRC license	1970-1976
Cornell/Underhill Hoboken, New Jersey	Q.A. Manager Radiation Safety Officer Prepared NRC license	1978-1979
Peabody/Magnaflux Little Ferry, New Jersey	Radiographer Asst. Lab Manager	1976-1978

Alicia Research & Testing, Inc.

RADIOGRAPHIC TEST METHOD

Engagement No. 1----------1 year

Engagement No. 2----------6 years

Engagement No. 3----------5 years

Engagement No. 4----------1 year

Engagement No. 5----------13 years

Engagement No. 6----------2 years

TOTAL----------28 Years

Jack Miller
10 Brighton 4 Road
Brooklyn, N. Y. 11235

Alicia Research & Assignment Number QB 733

NARRATIVE EXPERIENCE RECORD

Engagement No. 1 - 1977 - 1 year Peabody Testing Services, Little Ferry, N. J.

Job Title - N.D.T. Field Engineer

NDT METHOD
RADIOGRAPIC TEST

Duties: Ascertain type of radiography required including Radiation Service in the field site, as well as lab. site.
Create shooting sketches, and techniques.

Funtions: Liazon between the customer purchase order and completed N. D. T. process and N.D.T. specialist.

Level of Responsibility: Evaluate defects against acceptance standards. Make sure that technicians follow requirements of purchase order.

Procedure: Update radiographic procedures to reflect latest revisions. Create original procedures for all types of configuration that require radiographic techniques.

Specifications:

ASME Sect. 8	NTR-1D
ASME Sect. 5	Nav-0900-003-9000
MIL-STD-271E	MIL-C-6021
ASME 155	API-1104
ASME Sect.3	

Materials: Involved with the following materials:

a. Aluminum
b. Steel
c. Carbon Steel
d. Titanium
e. Wood
f. Silver/Bronze Braxing
g. Honeycomb
h. Solder

Equipment Used:
1100 Curies Cobalt 60 Tech ops
100 Curies Iridium 192 Tech ops
200KV-3MA- Boltospot X-Ray
300KV-15MA-Explorer EX-Ray

03706

Alicia Research & Testing Labs, Inc.

Engagement No. 2 - International Testing Labs, Newark, New Jersey

1970 thru 1976 - 6 years

RADIOGRAPHIC TEST METHOD

Job Title: Manager - Non-destructive Testing

Duties: Organized and built the original X-ray department. Trained personnel to operate equipment, Wrote procedures for all specs. including acceptance standards. Set-up shooting sketches, wrote opearting and emergency procedures for x-ray and alsoisotopes. Originated the first A.E.C. License for the company.

Accepted work in to the company in accordance with P. O. requirements.

Wrote a manual that was approved by the F.A.A. resulting in a F.A.A. Repair Station Status.

Was in complete charge of the x-ray department for 6 years.

Function: Chief inspector for all radiographic requirements.

Levels of Responsibility: My level of responsibility was to oversee the department maintain the S.N.T. Code of Ethics by personnel under my supervision, and sign all reports.

Procedures Used: MIL-STD-453

Specification Used:

MIL-STD-271D
NAV-0900-003-9000
NAV-250-692-2
API-1104
API-650
MIL-STD-248
MIL-STD-278
ASTM-155
ASME-Sect 8
ASME-Sect 5
ASME-Sect 3
NAV-250-1500-1
AMS 2645

Materials:

Aluminum
Stainless Steel
Carbon Steel
Iron
Wood
Titanium
Concrete
Solder
Silver/Bronze Brazing
Copper Nickel

Equipment Used:

Tech-ops Iridium 192 100 Curies
Tech-ops Cobalt 60 100 Curies
Androx 250 KV-8MA.
Kodak AA, M, T, K, Films
Gevaert D2 Film

Alicia Research & Testing Labs, Inc.

Engagement No. 3 - General Magnaplate Corp., Linden, N. J.

1965 - 1970 (5 years)

RADIOGRAPHIC TEST METHOD

Job Title:	Manager - Non-Destructive Testing
Duties:	Sole responsibility to perform x-ray work in accordance with purchase order requirements. Set safety standards, was responsible for A.E.C. License. Trained personnel in the use of x-ray equipment, signed all reports, and maintained F.A.A. Standards for x-ray.
Function:	Chief Inspector. Set-up techniques for all types of radiographic requirements. Training of Personnel.
Level of Responsibility:	Responsible for all R.T. Requirements, nuclear, F.A.A. including signing of all reports. Approved by Electric Boat
Procedure Used:	R.T. Procedures in accordance with MIL-STD-271D, NAV-Ships-250-1500-1, ASME Section 3.
Specification Used:	MIL-STD-453 ASME Section 8 ASME Section 5 ASME SECTION 3 MIL-STD-271D NAV-0900-003-9000 NAV-250-1500-1 AMS 2645 API 1105 API 650 ASTME 155 MIL-C-6021
Materials:	Aluminum Carbon Steel Stainless Steel Copper Nickel Wood Titanium Silver/Bronze Brazing Copper Braze Silicon
Equipment Used:	Techops Cobalt 60 Techops Iridium 192 Branson 200KV-8MA G.E. 250KV-15MA Branson 140KV-5MA Films: Kodak AA-T-M-R Gaveart - D2 Single Coat

Alicia Research & Testing Labs, Inc.

Engagement No. 4 - Consoli[illegible]ed Testing, New Hyde Park, N.

1964 - 1965 (1 Year)

Radiographic Test Method

Job Title:	N.D.T. Assistant to Manager
Duties:	Sales Engineer. NAV-250-1500-1 Film reader MIL-STD-750 Film reader (Nassa-Lockheed)
Function:	Evaluated job requirements
Level of Responsibility:	Liazon between client and lab.
Procedure Used:	Radiographic Test Methods Semi-conductors Carbon Nickel Castings Aluminum Castings Weldments
Specifications Used:	MIL-STD-271D NAV-250-1500-1 MIL-STD-750 API-1105 API 650 MIL-C-6021 ASME Section 8 ASME Section 3
Materials:	Carbon Steel Stainless Steel Aluminum Semi-Conductors Silver/Braze Copper/Braze Carbon Nickel
Equipment:	100 Curies Iridium 182 50 Curies Cobalt 60 300 KV-15 MA General Electric 200 KV-FMA-Branson Films: Kodak AA-T-M-R Gaveart D2 Single Coat

Engagement No. 5 - New York Testing Labs., Westbury, Long Island, N. Y.

Alicia Research & Testing Labs, Inc.

1951 - 1964 (13 Years)

Radiographic Test Method

Job Title:	Manager - Non-destructive Testing
Duties:	Train personnel. Film read for carbon nickel castings. Nav-ships 250-1500-1 radiographic supervisor. Film reader for Nasa and Lockheed semi-conductors. Created shooting sketches for carbon nickel castings for Electric Boat, Mare Island, and Westinghouse. Polaris Submarine Castings, Nautilis Submarine Program.
Function:	Supervise personnel for R.T. of Cu/Ni Castings. Training program. R.T. of semi-conductors. Liazon between client and lab. Sale responsibility for Radiographic Test Methods.
Level of Responsibility:	Responsible to President of Company.
Procedures Used:	Radiographic Test Methods. X-Ray of semi-conductors X-Ray of cu/ni castings Basic R.T. Test Method For x-ray machines Basic R.T. Test Method For Isotopes Electric Boat Procedures Westinghouse Procedures Military Standards AMS ASTM
Specifications Used:	Nav 250-1500-1 Nav 250-692-13 API 1104 API 650 ASME Section 8 Nasa Lockheed Electric Boat MIL-STD 453 MIL-I6865
Materials:	Carbon Nickel Stainless Steel Ferris Carbon Steel Wood Art Paintings Semi-conducted material Concrete Lead Film Emulsions
Equipment:	100 Curies Iridium 192 50 Curies Cobalt 60 300 KV-15MA-General Electric Andrex-250KV-8MA Film: Gevaert Dt, D4,D2,SC Kodak AA

Alicia Research Testing Labs, Inc.

Engagement No. 6 - Superior Bearing and Bronze, Greenpoint, N. Y.

1950 - 1951 (2 years)

Radiographic Test Methods

Job Title:	Supervisor - day, night shift.
Duties:	Trained personnel in use of x-ray machines. Set up R.T. Techniques, created shooting sketches for x-ray, evaluate radiographs for aircraft castings.
Function:	Liaison between film reader and x-ray technicians.
Level of Responsibility:	Responsible to General Manager for radiographic test method using x-ray machines only.
Procedure Used:	General Electric procedures for x-ray of aluminum castings.
Specification Used:	MIL-I-6865 MIL-STD-453
Materials:	Aluminum
Equipment:	General Electric - 250 KV-8MA Film: Kodak AA-M

Abcis Research & Testing Labs, Inc.

PERSONAL RESUME

NAME: Jack Miller

ADDRESS: 3105 Brighton 3rd St.
Brooklyn, NY 11235

PHONE NO.:

SOC. SEC. NO.: 051-07-3160

DATE OF LAST EYE EXAMINATION: 3-6-84

SUBMITTED FOR POSITION AS:
QA, QC, NDE Mechanical Inspector - Level II

EDUCATION

SCHOOL	LOCATION	COURSE	DATE	DEGREE

EDUCATION -- Columbia University, New York

TRAINING/COURSES COMPLETED

METHOD	COURSE DESCRIPTION	EMPLOYER/SCHOOL	HOURS
RT	NAV 250-1500-1	New York Testing/Ebasco Services	40
RT	RADIATION SAFETY	Int'l Testing/Picker X-ray	40
RT	NASA SPEC.	New York Testing/Lockheed	16
RT	ALUM CASTING	Gen'l X-ray/Republic Aircraft	16
UT	ASME CODE	Gen'l Magnaplate/Automation Ind.	40
PT	MIL-STD-271	Consul. Testing/Magnaflux Corp.	20
MT	MIL-STD-271	Consul. Testing/Magnaflux Corp.	20

WORK EXPERIENCE (SEE ATTACHED SHEET)

The above information is, to the best of my knowledge, true and accurate.

Jack Miller

DATE

AR&TL - LEVEL III - SIGNATURE

EMPLOYEE SIGNATURE

WORK EXPERIENCE

METHOD	QUAL. LEVEL	CODE/STD./SPEC.	EMPLOYER	FROM	TO
QA/QC/ NDE	Level III	ANSI-N.45.2.6 ANSI-N.45.2.23 ASME SEC. III ASME SEC. XI	UNIVERSAL TESTING LABS A) LEAD AUDITOR B) SUSQUEHANNA STEAM/ELECTRIC C) QUALITY ASSURANCE ENGINEER	1981	1983
QA/QC/ NDE RT	Level III Level III	ANSI-N.45.2.6 10 CFR 50 ANSI-N.45.2.23 SNT-TC-1A (75)	UNIVERSAL TESTING LABS A) Q.A. ENGINEER (NUCLEAR) B) CON ED-NUCLEAR UNIT II (IND. PT.,NY) C) ASS'T Q.A. COORDINATOR (NUCLEAR)	1980	1981
RT,PT VT,MT QA/AC/NDE	Level III	ASME CODE GENERAL ELECTRIC	CORNELL & UNDERHILL A) Q.A. MANAGER	1978	1979
PT,RT MT	Level III	MIL-STD-271 ASME CODE	PEABODY/MAGNAFLUX A) ASS'T LAB MANAGER B) SALES MANAGER C) FIELD ENGINEER	1976	1978
RT,MT PV,VT	Level III	MIL-STD-271 ASME CODE F.A.A. N.R.C.	INT'L TESTING LABS A) LAB MANAGER B) RADIATION SAFETY OFFICER	1970	1976
RT,MT PT,VT	Level III	MIL-STD-271 ASME CODE F.A.A./N.R.C.	GEN'L MAGNAPLATE CORP. A) LAB MANAGER B) RADIATION SAFETY OFFICER	1966	1970
RT,MT PT,NDE	Level II Level II	NAV 250-1500-1 LOCKHEED/NASA	CONSOLIDATION TESTINC A) ASS'T LAB MANAGER	1965	1966
RT,PT, VT,MT QA/QC/ NDE NDE	Level II Level II Level II	NAV 250-1500-1 ANSI-N.45.2.6 WESTINGHOUSE NAV 250-1500-1 ASME CODE LOCKHEED/NASA	NEW YORK TESTING LABS A) CON EDISON - NUCLEAR (2) B) BROOKHAVEN - NUCLEAR (1) C) GEN'L DYNAMICS-NUCLEAR (10) D) WESTINGHOUSE-NUCLEAR (1) E) LAB MANAGER	1952	1965
RT	Level II	General Electric	GEN'L X-RAY LABS A) LAB SUPERVISOR	1950	1952

Abcli Research & Testing Labs, Inc.

EXPANDED RESUME

JACK MILLER - NUCLEAR QUALITY ASSURANCE - 1981 to 1983

1981 - CON EDISON INDIAN POINT GENERATING STATION
UNIT 2 - BUCHANAN, NEW YORK

ASSIGNMENT: NUCLEAR QUALITY ASSURANCE

PROJECTS:
1. Revised and updated CON EDISON QUALITY ASSURANCE MANUAL FOR NUCLEAR POWER PLANTS for the CONSTRUCTION DEPARTMENT.
2. Revised and updated a TRAINING MANUAL for ISI inspectors in accordance with ASME SECTION XI.
3. Performed audits of subcontractors on site.

1981 - SUSQUEHANNA STEAM AND ELECTRIC - BERWICK, PENNA.

ASSIGNMENT: NUCLEAR QUALITY ASSURANCE.

PROJECTS:
1. Inspected a CRD tubing in UNIT 1 and awarded certification as an INSPECTOR.
2. Performed in-depth audit of PEABODY TESTING RADIATION procedures in accordance with NRC requirements.
3. Performed audit of GENERAL ELECTRIC ULTRASONIC procedures.
4. Performed audit of NUCLEAR ENERGY SERVICES ULTRASONIC procedures.
5. Evaluated radiographs accepted by BECHTEL QUALITY CONTROL on a regular spot check basis.

1982 - SUSQUEHANNA STEAM AND ELECTRIC - UNIT 1 - BERWICK, PENNA.

ASSIGNMENT: NUCLEAR QUALITY ASSURANCE

PROJECTS:
1. Evaluated approximately 6000 radiographs for penny enhancement as a requirement of NRC BULLETIN.
2. Compiled a 40 hour training program for VISUAL EXAMINATION in accordance with ASME SECTION X1 including questions and answers for LEVEL I, LEVEL II and LEVEL III nuclear inspectors.
3. Maintained records of approximately 25 NDE inspectors including testing of personnel in MT, PT, RT, UT, and VISUAL methods.

03706

4. Completed approximately 25 audits of subcontractors on site.

5. Organized and created test papers for NDE methods in accordance with SNT TC IA975) edition for LEVEL I, LEVEL II and LEVEL III.

1983 - SUSQUEHANNA STEAM AND ELECTRIC - UNITS 1 and 2
BERWICK, PENNA.

ASSIGNMENT: NUCLEAR QUALITY ASSURANCE

PROJECTS:

1. Performed monthly evaluation of radiographs accepted by BECHTEL QUALITY CONTROL (10%).

2. Maintained records and tested personnel by written examination (GENERAL, SPECIFIC and PRACTICAL) for those personnel whose certifications had expired, such as MT, PT, RT, and VISUAL and the use of TRAINING MODULES.

3. Performed audits under supervision of PP&L AUDIT TEAM LEADERS.

4. Temporary assignment to INDIAN POINT for compiling a training program for CON EDISON inspectors.

5. Temporary assignment to UNIVERSAL TESTING LABS for training and written examinations in RADIOGRAPHIC EXAMINATION method LEVEL III with a passing grade of 90%.

6. Temporary assignment to UNIVERSAL TESTING LABS for training and written examinations in accordance with ANSI 45.2.6. Completed tests with a passing grade of 88% for LEVEL III certification.

7. Performed audit of BECHTEL QUALITY ASSURANCE program.

8. Performed audit of PEABODY TESTING QUALITY ASSURANCE program.

9. Witnessed ON SITE inspections of LIQUID PENETRANT and ULTRASONIC inspections performed by GENERAL ELECTRIC, PEABODY TESTING, and NUCLEAR ENERGY SERVICES. Witnessed calibration of instruments, certification of personnel, and requirement of their QUALITY CONTROL MANUALS.

I certify that the above information is true and correct to the best of my knowledge.

Jack Miller

NAME: Jack Miller

LOCATION: Brooklyn, New York

POSITION: Non-Destructive Testing Engineering

EDUCATION:

Columbia University - 2 years
New York School of Welding - 1 year
New York School of Photography - 2 years

TRAINING PROGRAMS:

40 Hours - Nuclear Radiography - Ebasco Services
40 Hours - Radiation Safety - Picker X-Ray
16 Hours - Radiography of Semi-Conductors - Lockheed
16 Hours - X-Ray Aluminum Castings - Republic Aviation
40 Hours - Ultrasonic Testing - Automation Industries
40 Hours - MT, PT - Magnaflux Corporation

PROFESSIONAL MEMBERSHIPS:

Member, American Welding Society
Member, American Society for Non-Destructive Testing
SNT-TC-1A Level III, RT, PT, MT, UT, 15 yrs. experience clause without examination

EXPERIENCE:

Date: June 1980 - present
Company: Universal Testing Labs, Inc.
Position: QA/NDE Engineering
Responsibilities:

1. Control of Personnel Qualification Records.
2. Training of personnel and refresher course training and testing of previous experienced personnel in accordance with SNT-TC-1A "Methods for Qualifying Personnel".
3. Control of radiation exposure records.
4. Supervise inspectors at nuclear power plants to conform to customer requirements and contract performance.
5. Update levels of personnel in accordance with SNT-TC-1A for experience, training and competence.
6. Audit and update QA and NDE Testing Procedures to conform with contract requirements and instruct personnel of changes to meet these requirements.

EXPERIENCE (cont'd):

Date: 1978-1979
Company: Cornell and Underhill
Position: QA Manager
Responsibilities: Quality Control; qualify and upgrade 80 welders; inspection of incoming and outgoing material; training of personnel; SNT-TC-1A Level III, RT, PT, UT, MT.

Date: 1976-1978
Company: Magnaflux Corp.
Position: Sales Engineer
Responsibilities: Sales and Customer Relations; training of personnel; SNT-TC-1A Level III, RT, PT, MT, UT.

Date: 1971-1976
Company: International Testing Labs
Position: Manager, NDT Section
Responsibilities: Radiation Safety Officer; Sales and Customer Relations; training of personnel; Supervisor Field Operations; F.A.A. Repairman; SNT-TC-1A Level III, RT, PT, MT, UT.

Date: 1967-1971
Company: General Magnaplate Corp.
Position: Manager
Responsibilities: Radiation Safety Officer; Sales and Customer Relations; training of personnel; Supervisor Field Operations; N.R.C. License; F.A.A. Repairman; SNT-TC-1A Level III, RT, PT, MT, UT.

Date: 1966-1967
Company: Consolidated Testing Labs
Position: Sales Engineer
Responsibilities: Sales and Customer Relations; film reader for Electric Boat and Lockheed - NASA Space Program.

Date: 1953-1966
Company: New York Testing Labs
Position: Manager
Responsibilities: Training of personnel (x-ray, gamma ray); sales and customer relations; F.A.A. Repairman; supervisor Lockheed - NASA Program for Semi-Conductors, includes film reader.

Date: 1951-1953
Company: General X-Ray Labs
Position: Supervisor
Responsibilities: Training of personnel (x-ray); film reader (aluminum castings)

EXPERIENCE (cont'd):

Date:	1949-1951
Company:	Sportsman Inc.,
Position:	Manager
Responsibilities:	Quality Control

PREVIOUS QUALIFICATIONS:

Radiation Safety Officer
F.A.A. Repairman Certification No. 1687640
NASA - Radiographic Testing - Qualification No. MSFC OXR 026
Lockheed - LMSC 1412315C, Type 2, Class A, No Limitation
Radiographic Testing - SNTC - Level III
Magnetic Particle Inspection - SNTC - Level III
Atomic Energy Commission License No. 29-11823-01
New York State License No. 1296-1570
New Jersey State License No. 60-100306
MIL-STD-410
MIL-STD-453
Penetrant Inspection - SNTC - Level III
NAVSHIPS 250-1500-1 - Radiographic Testing Supervisor
MIL-STD-271D, Radiographic Testing, Penetrant Inspection, Magnetic Particle Inspection and Ultrasonic Testing
Electric Boat Division - Radiographic Inspector Title 1269
Norfolk Naval Shipyards - Certification No. NY 6-4355, Radiographic Inspection X-Ray Isotopes
MIL-C-7701
Ultrasonic Testing - SNTC - Level III
ASME Code
API 1104 Standards

COMPLETED CONTRACTS:

Nuclear Piping

Mr. Miller evaluated more than 10,000 radiographs of Nuclear Power Plant Welding for Westinghouse Electric Corp.

Nuclear Castings

Approved by General Electric Corp. and Mare Island Naval Shipyards, California, as qualified to accept and reject casting radiography for the Polaris and Nautilus submarine programs.

Semi-Conductors for Space Program

Approved by General Dynamics-Astronautical, NASA, Lockheed

COMPLETED CONTRACTS (cont'd):

and General Electric to accept and reject semi-conductors for the Space Missile Programs, using X-Ray as the source of inspection up to and including the Apollo Moon Program.

Author of NDT Procedures

Mr. Jack Miller is the author of the following procedures:

Procedure No. 1: Welding of Monel Pipe
Procedure No. 5: Iridium 192 NAVSHIPS 250-1500-1
Procedure No. 6: X-Ray NAVSHIPS 250-1500-1
Procedure No. 7: Cobalt 60 - NAVSHIPS 250-1500-1
Procedure No. 8: Basic Rules for Industrial X-Ray
Procedure No. 9: Magnetic Particle Inspection, Wet Continuous Method
Procedure No. 10: Dry-Powder Method Fluorescent Penetrant Inspection
Procedure No. 11: X-Ray of Semi-Conductors
Procedure No. 12: Calibration of Survey Meters
Procedure No. 15: Liquid Penetrant Inspection, NAVSHIPS 250-1500-1
Procedure No. 26: Ultrasonic Inspection - Pipe, Plate, Bars

Author of Radiation Safety Manuals

Mr. Jack Miller is the author of the following manuals on radiation safety:

Operating and Emergency Procedures
Radiation Training Program
Radiation Safety

Service Maintenance of Jet Aircraft

Mr. Miller was responsible for initiating an NDT Program at Kennedy Airport, NY, for the X-Ray service maintenance of Boeing 707 jets in accordance with F.A.A. and Boeing, Renton, Washington specifications. Pan American World Airways, American Airlines and Trans-World Airlines were some of the major airlines serviced at this time.

Piping in Atomic Power Plants

Mr. Miller spent 2 years during the building of the first atomic generating station for Con Edison at Indian Point, NY, radiographing over 2,000 pipe joints of various sizes, using Iridium 192 and X-Ray equipment.

Mr. Miller was also assigned by Con Edison to evaluate over 200,000 radiographs of nuclear piping radiographed by contractors.

COMPLETED CONTRACTS (cont'd):

Piping in Atomic Power Plants (cont'd)

Mr. Miller radiographed and evaluated approximately 5,000 radiographs of pipe joints at the Atomic Reactor at Brookhaven National Laboratories, Upton, Long Island, NY.

Construction of NDT Laboratories

Mr. Miller designed, supervised construction and set up a complete NDT Laboratory at Westbury, Long Island in 1963, and in Linden, NJ in 1966, including X-Ray and Isotope Chambers approved by the Atomic Energy Commission, the State of New York Radiological Department and the State of New Jersey Department of Labor, as meeting all Code requirements for radiation safety.

Author of NDT Technical Manual

Mr. Jack Miller created a 32-page technical manual for the Gevaert Company of America in the use of Industrial X-Ray films for industrial applications. Mr. Miller created the format, supplied all of the photography and wrote all of the technical data.

The information contained in this resume is, to the best of my knowledge, true and accurate.

Date: 9/24/80 Signature: Jack Miller

Date: 9/24/80 Witnessed: Glenda Kinney

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item #7

James A. Murphy
Assistant Radiation Safety Officer

Training/Experience/Resume

03106

Alicia Research & Testing Labs, Inc.

PERSONAL RESUME

NAME: James A. Murphy

ADDRESS: 51 Tuckerton Mobile Court
Tuckerton, New Jersey 08087

PHONE NO.: 609 296-7279
SOC. SEC. NO.: 185-12-5593
DATE OF LAST EYE EXAMINATION: 4-24-84

SUBMITTED FOR POSITION AS:
QA Assistant Manager Level III

4-2-84

EDUCATION

SCHOOL	LOCATION	COURSE	DATE	DEGREE
Mt Lebanon High School	Mt Lebanon, PA		1942	Diploma
Hiram College	Hiram, OH	Math, Physics	1947	B.A.
Penn State University	University Park, PA	Physics Thesis: Micro-wave Resonant Cavity	1950	M.S.

TRAINING

COMPANY / SCHOOL	COURSE DESCRIPTION	NDE METHOD	HOURS
General Electric Company Physics Program Trainee (1951)	NDT Labs Division	UT	400
		PT	36
		MT	18
	Measurements Laboratory	MIL/SPEC	100
Alicia Research & Testing Labs, Inc.	Classroom Training Level II	QC, QA	40
		PT	12
	as per AR&T Course Outline	MT	10
		UT	60
		VI	4
	Introduction to NDT	NDT	3
	Classroom Training (LevelI)	RT	20

WORK EXPERIENCE (SEE ATTACHED SHEET)

The above information is, to the best of my knowledge, true and accurate.

4-2-84 — Richard Logan — James A Murphy

DATE — PRINT NAME/SIGN HERE — EMPLOYEE SIGNATURE

ART-5

SYNOPSIS OF RESUME OF:

JAMES A. MURPHY

1950 - 1957	DEVELOPMENT ENGINEER (Power Tubes) General Electric Company, Schenectady, N.Y.
1957 - 1960	DESIGN ENGINEER (Microwave Passive Components Microphase Corporation, Greenwich, Ct.
1960 - 1963	ASSISTANT PRODUCT ENGINEER (Large Power Tubes) The Machlett Laboratories, Inc., Springdale, Ct. (Division of Raytheon Company)
1963 - 1964	INSTRUCTOR - TECHNOLOGY Palm Beach Junior College, Lake Worth, Fl.
1964 - 1966	LANDSCAPER/ESTIMATOR - HVAC & PLUMBING Peter K. Van Tol, White Plains, N.Y. Mechanical Associates, Long Island City, N.Y.
1966 - 1970	CAREER POSTAL CLERK US Post Office, Scarsdale, N.Y.
1971 - 1977	LANDSCAPE CONTRACTOR/SCHOOL BUS DRIVER House & Yard, Blue-jacket Avenue, Manahawkin, N.J. Southern Regional High School, Manahawkin, N.J.
2/78 - 7/82	HARDWARE INSTALLER Viking Yacht, Inc., New Gretna, N.J.
7/82 - 12/82	QA, QC, NDE TRAINEE Alicia Research & Testing Labs, Inc. West Creek, N.J.
1/83 - 7/83	TEACHER/GREEN THUMB WORKER Southern Regional High School, Manahawkin, N.J. Green Thumb of New Jersey, Inc., Trenton, N.J.
8/83 - 3/84	SHEET METAL WORKER Custom Sales and Service, Inc., Hammonton, N.J.
4/84 - Present	ASSISTANT MANAGER, QA Alicia Research & Testing Labs, Inc. West Creek, N.J.

1950 - 1957
GENERAL ELECTRIC COMPANY

As a Physics Program Trainee, Mr. Murphy completed three-month assignments as follows: (1) Ultrasonic test methods; (2) Aviation fuel system; (3) Missile control system; (4) Receiving tube design (10/50-10/51).

(1) UT techniques were applied, in conjunction with PT and MT findings, at NDT Laboratories, Lynn River Works, MA; examples of specimens searched were: pipe welds, turbine rotor blades, plate rolled and bar stock. Various transducer materials and couplants, CRT patterns and techniques were studied to find if ultrasound could replace or complement other NDT methods. Reports went to interested company divisions. Mr. Murphy estimates he completed over 400 hours in UT, 36 hours PT and 18 hours MT applications while at this station.

(2) While at Measurements Laboratory, Lynn MA, Mr. Murphy assisted in prototype development and test of a remote indicating aircraft fuel gauge. The unit was subjected to environmental MIL/SPEC testing, to determine its ability to deliver accurate fuel quantity measurement under conditions of vibration, shock, maneuvering and temperature-humidity variations. Vibration analysis, use of accelerometer and viscosimeter readings were utilized.

(3) Mr. Murphy assisted in data-taking and plotting of response characteristics of a missile flight control system. An analog computer was used to provide input to a breadboard mock-up.

(4) High purity nickel base metals for use in receiving tubes were studied by Mr. Murphy at the Advanced Development Tube Laboratory, Schnectady, NY. He aged tubes in simulated life-test under operating conditions.

As Development Engineer, Mr. Murphy perfected a pulse-activation method adaptable to passive base oxide cathodes for use in receiving tubes. In addition, he developed practical metallic (Zirconium and Titanium) gas reservoirs for hydrogen thyratrons. He assisted in studies of: gas clean-up in hydrogen thyratrons; thermionic cathodes for pulse modulator service, gas-filled tubes; design and test of ignitron tubes for AC control and rectifier service.

1957 - 1960
MICROPHASE CORPORATION

Mr. Murphy designed, developed and tested low-pass, band-pass and hi-pass RF filters. He assisted in the prototype development and qualification testing to MIL/SPECS Standards of a telemetering multiplexer.

1960 - 1963
THE MACHLETT LABORATORIES

Initially employed as Production Engineer, Mr. Murphy was assigned to QC inspection of sub-assemblies and final units, planar cathode small power triodes. Promoted to Design Engineering, he supervised and conducted tube characteristics test (by pulse static method) of medium - to large-power triodes. Plate-current vs grid-voltage curves for tubes in development and in production were used to prepare technical data specification sheets and catalog data.

Special assignments included mock-up tests to resolve certain customer applications. Mr. Murphy procured equipments such as: pulse drivers, transformers, power supplies, non-inductive load, air and/or oil-cooled ancillary components. He was responsible for equipment calibration, testing and analysis of results. Corrective action was taken where improvements in product reliability and safety resulted.

1963 - 1964
PALM BEACH JUNIOR COLLEGE

Mr. Murphy instructed day and evening classes in Mechanical Drawing and Blueprint Reading.

1964 - 1966
PETER K. VAN TOL
MECHANICAL ASSOCIATES

Mr. Murphy was employed as helper to Mr. Van Tol in the contracted care of residential and commercial properties. Lawn mowing, tree surgery and removal, also general clean-up work were routine assignments.

As an estimator and take-off man, HVAC and Plumbing, Mr. Murphy was employed full-time during the last half of 1964 by Mechanical Associates. This work consisted of phone and personal vendor contacts, familiarity with plumbing, electrical and heating plans, specifications and applicable codes. He prepared construction bids on behalf of his company to Port Authority of New York City and other metropolitan locations.

1966 - 1970
UNITED STATES POST OFFICE

As a Clerk, Finance Section, Mr. Murphy served at a public window of the Scarsdale, NY central post-office. Responsibilities included acceptance and dispatch of registered, certified and all classes of US Mail.

Rigid adherence to Postal Regulations Code Manuals and cash-drawer daily accountability are noted.

In addition, to his other duties, Mr. Murphy qualified with a score of 100% in sorting mail to the entire city scheme of street addresses (encompassing more than 800 separate items committed to memory), a requirement of the position as career postal clerk.

1971 - 1977
HOUSE & YARD

SOUTHERN REGIONAL HIGH SCHOOL

Mr. Murphy operated his own landscaping and small-jobs contracting firm. He met with and prepared estimates for the public. Visual assessments of work contracted gave a basis of efficient time and methods management to assure the client of satisfaction.

During this [illegible]d, Mr. Murphy qualified for and was employed as a Substitute Sc[illegible] Bus Driver on a part-time basis, to add to his income.

2/78 - 7/82

VIKING YACHT COMPANY

While at Viking Yacht, Mr. Murphy was responsible for QC procedures while in final assembly-hardware stage. Acceptance standards were applied in the installation and re-work, where necessary, of interior and exterior hardware, furnishings, carpet, surface finish and accessories. Check lists were maintained to assure standards compliance in the preparation of each luxury-class vessel for customer acceptance and delivery. He received class instruction in fiberglass reinforced plastics and in fiberglasshull construction.

7/82 - 12/82
ALICIA RESEARCH & TESTING LABORATORIES, INC.

Mr. Murphy has added to his knowledge and skills in the NDT field during the period of August 1 thru November 30, 1982 by enrolling in QA, QC and NDE training with Alicia Research & Testing Labs, Inc. He has completed general and specific requirements in the following disciplines at NDT Levels I and II: QA, QC, VT, PT, MT, UT and RT. He has acquired practical hours applied in MT, PT and UT.

1/83 - 7/83
SOUTHERN REGIONAL HIGH SCHOOL
GREEN THUMB OF NEW JERSEY, INC.

As a qualified substitute teacher, Mr. Murphy was called, as needed, to render classroom services for middle and high school grades. He is certified in Ocean County, N.J. until 1986.

Mr. Murphy was employed part time in March, 1983 as a worker by Green Thumb of N.J., a federally funded project to assist mature citizens not gainfully employed. He was made leader, and directed the services of three other part-time Green Thumb workers in a community glass, metal and paper-recycling project.

8/83 - 3/84
CUSTOM SALES AND SERVICE, INC.

Mr. Murphy obtained full-time work in July, 1983 as a sheet-metal worker. After an introductory period of training, he operated a 12 foot Cincinnati power-snear and completed cutting order work assignments as they were scheduled and needed. He was responsible for safey rules, movement of materials and general housekeeping in his immediate work area.

4/84 - Present
ALICIA RESEARCH & TESTING LABORATORIES, INC.

Mr. Murphy is currently employed by AR&T Labs, Inc. in the position of QA Assistant Manager, Level III. He is certified to Level II Mechanical QA/QC Inspection in accordance with ANSI N 45.2.6 and is qualified to perform inspection to NDE Level II-R, PT and UT.

Lvl III Documentation 4-2-84

James A Murphy

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item #7

Martin Oberstaedt
Health Physics Engineer

Training/Experience/Resume

Alpha Research & Testing Labs, Inc.

PERSONAL RESUME

NAME: Martin F. Oberstaedt

ADDRESS: 408 Constitution Ave.
Forked River, NJ 08731

PHONE NO.: 609-693-8782

SOC. SEC. NO.: 151-34-9513

DATE OF LAST EYE EXAMINATION:

SUBMITTED FOR POSITION AS:

Level II Health Physics, Mechanical, ~~Radwaste~~

EDUCATION

SCHOOL	LOCATION	COURSE	DATE		DEGREE
Middletown Twp. High S. Brookdale Community College Ocean County College					

TRAINING

COMPANY / SCHOOL	COURSE DESCRIPTION	NDE METHOD	HOURS
Rutgers University	Supervisory Training Prog.		
Scott Aviation	Respirator Maintenance		
General Dynamics	ALARA Engineering		
NUS Corp.	Advanced Technician		
University of North Carolina	ALARA Seminar		
Monmouth County/Earle Naval Base	Fire Training School		
Dynatech Frontier Corp.	Quantative Fit Testing		
Bell Telephone Labs	Drafting & Design		

WORK EXPERIENCE (SEE ATTACHED SHEET)

The above information is, to the best of my knowledge, true and accurate.

DATE _____ [illegible] SIGNATURE _____ EMPLOYEE SIGNATURE

Mr. Oberstaedt is presently employed by Alicia Research and Testing Labs, Inc.

Military Experience

US Army Reserve, 7 years. Sergeant E6, 824th Signal Battalion, Heavy Construction, Pole Lineman. Honorable Discharge.

Occupational Background Synopsis

June 1961 to August 1962
Bell Telephone Laboratories
Holmdel, NJ
Draftsman in EPBX Systems Dept.

August 1962 to April 1964
Electronics Associates, Inc.
North Long Branch, NJ
Draftsman/designer in Computer Engr. Dept.

May 1964 to April 1970
Jersey Central Power & Light Co.
Morristown, NJ
Senior Draftsman in Substation Engr. Dept.

May 1970 to December 1970
Oyster Creek Nuclear Generating Station
Forked River, NJ
Radiation Protection/Chemistry Jr. Technician

January 1971 to August 1978
Oyster Creek Nuclear Generating Station
Forked River, NJ
Radiation Protection Senior Technician

September 1978 to December 1979
Oyster Creek Nuclear Generating Station
Forked River, NJ
Radiation Protection Group Supervisor

January 1980 to March 1981
Oyster Creek Nuclear Generating Station
Forked River, NJ
Radiological/ALARA Senior Technical Analyst

March 1981 to February 1983
Quality Management, Inc.
Toms River, NJ
Health Physics Manager/Radiological Engr.

March 1983 to August 1983
Nuclear Support Services
Susquehanna Steam Electric Station
Berwick, PA
Health Physics Supervisor

September 1983 to April 1984
Nuclear Support Services
Susquehanna Steam Electric Station
Berwick, PA
Health Physics Specialist
Internal Dosimetry/Respiratory Protection

Occupational Background Synopsis, Cont.

April 1984 to Present
Radiation Protection Services, Inc.
Health Physics Manager
Alicia Research & Testing Labs, Inc.
Contracts Administrator
West Creek, NJ

June 1961 to August 1962
Bell Telephone Labs
Holmdel, NJ
Draftsman
Responsibilities: Assigned to the EPBX Systems Department. Logic Diagrams, Schematics, Printed Circuit Board and Mechanical Components Drafting.

August 1962 to April 1964
Electronics Associates, Inc.
West Long Branch, NJ
Draftsman/Designer
Responsibilities: Employed in the Digital/Analog Computer Engineering Department. Logic Diagrams, Schematics, Printed Circuit Board Layout, Design, and Artwork, Rack Layouts, Wiring Diagrams, Mechanical Component Drafting.

May 1964 to April 1970
Jersey Central Power & Light Co.
Morristown, NJ
Senior Draftsman
Responsibilities: Performed the following services in the 500/230/34.5KV Substation Engineering Department - Layout and Design of Substations, Topography Maps, cut and fill calculations, property maps, cable and conduit schedules, schematics, one-line diagrams, foundation plans, structural steel design, control building layouts, ground grid layouts, in-field inspections of construction work.

July 1964 to June 1971
United States Army Reserve
824th Signal Battalion
Attained rank of Sergeant E-6 in Field Communications Heavy Construction Company. Pole Lineman. pole line and H-Frame construction, instructor in field communications systems and components, weapons instructor, pole climbing and construction techniques instructor.

May 1970 to August 1978
Oyster Creek Nuclear Generating Station
Forked River, NJ
Radiation Protection Technician
Responsibilities: Radiological surveying, environmental monitoring, radwaste shipping, instrumental calibration, TLD and SRD spiking, general employee training, RWP job coverage, directing work of assistant technicians, directing work of contractor technicians, count room operations, off-site emergency monitoring, respiratory program upkeep.

September 1978 to December 1979
Oyster Creek Nuclear Generating Station
Forked River, NJ
Radiation Protection Group Supervisor
Responsibilities: Scheduling and directing the activities of 12 senior and 6 junior radiation protection technicians, manager of respiratory protection program, manager of general employee training program, supervisor of contractor technicians, development of programs and procedures, charter member of Oyster Creek ALARA committee.

January 1980 to March 1981
Oyster Creek Nuclear Generating Station
Forked River, NJ
Health Physics Senior Technical Analyst
Responsibilities: Development of programs and procedures incorporating ALARA concepts and designs, design of special containments, evaluations of health physics equipment, review of engineering procedures and plant modifications, development and writing of radioactive work practices manual, design and fabrication of special tools for airborne contamination control, RWP/ALARA Worksheets, Surveillance Inspection Reports, setting Man-Rem goals, maintenance and upkeep of ALARA photo library, review of unusual incident reports.

March 1981 to February 1983
Quality Management, Inc.
Toms River, NJ
Health Physics Manager
Responsibilities: Development and writing of health physics programs and procedures, review of HP audits performed at nuclear power plants, managing HP personnel in the field, working on emergency plans, recruitment and qualification of contractural personnel at nuclear facilities, public relations and marketing, development and evaluation of bid requests, development and upgrading of programs and service manuals, maintenance of reference material, establishing communications with NRC and other Federal agencies. Worked on the following projects:

La Crosse	- Emergency Planning Procedures
Calvert Cliffs	- Emergency Plan
Shoreham	- ALARA Audit of as-built design
Indian Point	- Diver Over-Exposure Audit
	- Surveillance Inspection Audit
Arkansas Nuclear One	- Refueling Outage Coordinator
	- Policy and Procedure Writing

March 1983 to August 1983
Nuclear Support Services
Susquehanna Steam Electric Station
Berwick, PA
Health Physics Field Operations Consultant
Responsibilities: Assigned to Susquehanna Steam Electric Station HP Field Operations Department during initial operational stages of plant. Wrote HP procedures and HP instructions. Performed HP surveillances for Radiological Deficiencies in plant. Consultant to HP Operations Foreman. Internal Dosimetry and Respiratory Protection Specialist, Health Physics Supervisor, and ALARA Specialist.

September 1983 to April 1984
Nuclear Support Services
Susquehanna Steam Electric Station
Berwick, PA
Health Physics Specialist
Responsibilities: Assigned by the Health Physics Supervisor to assume control of the Respiratory Protection and Internal Dosimetry Programs at Susquehanna. Developed procedures and work instructions. Evaluated and purchased new equipment for plant including 11 Del-Monox Air Purification Units, Dynatech/Frontier Dual Fit Booth for Respirator Fit Testing, MSA 4500, 1 Hour SCBAS and Canberra/RMC Fast-Scan abd Acu-Scan Whole Body Counters. Developed training programs for Quantative Fit Testing and Qualified Corporate Safety Consultants in use of test equipment. Upgraded Respiratory Protection Training Program. Supervised day-to-day in plant Respiratory Program including Respiratory Decon Facility. Grade "D" Breathing Air Quality Certification and Air Compressor Usage. Supervised day-to-day operations of Whole Body Counting activities and Respirator Fit Test Facility.

April 1984 to Present
Radiation Protection Services, Inc.
Health Physics Manager
Alicia Research & Testing Labs, Inc.
Contracts Administrator
West Creek, NJ
Responsibilities: Procedure and Policy writing, administrator of $3,000,000.00 Quality Control Contract as Susquehanna Steam Electric Station in Baerwick, PA, preparation of Nuclear Regulatory Commission License for Radiography Source Licensing, bid evaluations and proposals, public relations, marketing, services manual preparation.

I certify the information contained herein to be both true and complete to the best of my knowledge.

10-19-84
Date

Martin F. Oberstaedt

Alara Research & Testing Labs, Inc.

RESUME OF : MARTIN F. OBERSTAEDT

SOCIAL SECURITY # 151-34-9513

DATE OF BIRTH: 11-8-43

MARITAL STATUS: Married 18 years, 3 children.

ADDRESS: 408 Constitution Drive
Forked River, NJ 08731

PHONE: 609-693-8782

PRESENT POSITION: Health Physics Consultant for
NSS INC. Susquehanna SES.

EDUCATIONAL BACKGROUND

Middletown Twp. High School, NJ
Brookdale Community College
Ocean County College
utgers University Supervisory Training Program
Scott Aviation Respirator Maintenance Course
General Dynamics ALARA Engineering Course
NUS Corp. Advanced Technician Training Course
University of North Carolina ALARA Seminar
Monmouth County/Earle Naval Base Fire Training School
Dynatech Frontier Corporation Quantatative Fit Testing Course

MILITARY EXPERIENCE

US Army Reserve, 7 years. Sergeant E6, 824th Signal Battalion, Heavy Construction, Pole Lineman. Honorable Discharge.

ASSOCIATIONS AND SOCIETY MEMBERSHIPS

Naticnal Health Physics Society, Plenary Member.
New Jersey Health Physics Society.
New Jersey Jaycees, Past & Honorary Member.
New Jersey School Boards Association, Past Member.

OCCUPATIONAL BACKGROUND SYNOPSIS

Bell Telephone Laboratories — July 1961 - August 1962
Holmdel, NJ
Draftsman in EPBX Systems Dept.

Electronics Associates, Inc. — September 1962 - April 1964
North Long Branch, NJ
Draftsman/designer in Computer Engr. Dept.

Jersey Central Power & Light Co. — May 1964 - April 1970
Morristown, NJ
Senior Draftsman in Substation Engr. Dept.

Oyster Creek Nuclear Generating Station — May 1970 - December 1970
Forked River, NJ
Radiation Protection/Chemistry Jr. Technician

Oyster Creek Nuclear Generating Station — January 1971 - August 1978
Forked River, NJ
Radiation Protection Senior Technician

Oyster Creek Nuclear Generating Station — September 1978 - December 1979
Forked River, NJ
Radiation Protection Group Supervisor

Oyster Creek Nuclear Generating Station — January 1980 - March 1981
Forked River, NJ
Radiological/ALARA Senior Technical Analyst

Quality Management, Inc. — March 1981 - February 1983
Toms River, NJ
Health Physics Manager/Radiological Engr.

Nuclear Support Services — March 1983 - August 1983
Susquehanna Steam Electric Station
Berwick, PA
Health Physics Supervisor

Nuclear Support Services — September 1983 - Present
Susquehanna Steam Electric Station
Berwick, PA
Health Physics Specialist
Internal Dosimetry/Respiratory Protection

NUCLEAR BACKGROUND SPECIFICS

Radiation Protection Technician — May 1970 - August 1978

Duties included: radiation surveys, contamination surveys, air sampling, environmental surveys, radwaste shipments, instrument calibrations, TLD and SRD spiking, respirator repair, lecturing and training of new employess in radiation protection procedures, directing the work of assistant technicians, directing the work of contractor technicians, running the count room, off-site emergency monitoring, member of the station fire brigade.

Radiation Protection Group Supervisor — September 1978 - December 1979

Duties included: Scheduling and directing the activities of 12 senior and 6 junior technicians, Managed the respirator protection program, managed general employee training, performed off-site training of first aid and fire companies, supervised contractural HP personnel, developed programs and procedures, charter member of OCNGS ALARA Committee and wrote by-laws of the committee, supervised environmental monitoring teams at TMI during 1979 incident.

Senior Technical Analyst — January 1980 - March 1981

Duties included: writing of programs and procedures incorporating ALARA concepts, design of special containments and associated ventillation systems, review of RWP's, review of engineering procedures and plant modifications, development and writing of radioactive work practices, design and fabrication of counting system components, design and fabrication of special tools for airborne and whole body exposure control, unusual incident critiques, RWP/ALARA Worksheets, Surveillance Inspection Reports, set Man-Rem goals, set up and maintained technical and ALARA photo libraries, evaluated ultrasonic decontamination systems.

Health Physics Manager — March 1981 - February 1983

Duties included: Development and writing of health physics programs and procedures, review of HP audits performed at nuclear plants, managing HP personnel in the field, working on emergency plans, recruitment and qualification of contractural personnel at nuclear facilities, public relations and marketing, development and evaluation of bid requests, development and upgrading of programs and service manuals, maintenance of reference material, establishing communications with NRC and other Federal agencies.

Worked on the following projects;

La Crosse - Emergency Planning Procedures
Calvert Cliffs - Emergency Plan
Shoreham - Alara Audit of as-built design
Indian Point - Diver Over-exposure Audit
Surveillance Inspection Audit
Arkansas Nuclear One - Refuelling outage coordinator.
Policy and Procedure writing

Health Physics Supervisor — March 1983 - August 1983

Duties include: Consultant to the Health Physics Operations Foreman at Susquehanna Steam Electric Station during initial operational stages of the plant. Writing technical procedures, instructions, and reviewing overall program. Procedure input into ALARA and Respiratory Protection Programs. Performed surveillances of in-plant conditions and made recommendations for change in operating policies of department. Development of new programs.

Health Physics Specialist, Internal Dosimetry/Respiratory Protection — Sept. 1983

Duties include: Supervisor of internal dosimetry and respiratory protection program at Susquehanna. Development and implementation of all procedures and programs. Specific programs included evaluation of air purification units for Grade "D" breathing air, corn oil aerosol fit booths, vendor whole body counting services, corporate respiratory protection programs (non-nuclear), training and qualification programs and respiratory cleaning facilities. Was also appointed to the plant superintendant's task force on development of health physic's radioactive work practices and radiological assessment.

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item #8

Alicia Research & Testing Labs, Inc.

Item #8

8. Training for individuals working in or frequenting restricted areas.

On the attached sheets of this section are the following pieces of information needed to satisfy this requirement:

A. Procedure ART-NDE-A-01, Section 8 - Training Program

B. Radiation Safety Training Program

C. Sample Test Questions
   1. Radiographer
   2. Assistant Radiographer

D. Procedure ART-ASNT/APQC-01

E. Instructors resume

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item #8

Training

(8A)
ART-NDE-A-01
Training Program

SECTION 8 - TRAINING PROGRAM

8.1 Responsibility

8.1.1 The Vice President of Training & Education shall be responsible for conducting the training programs, giving the examinations and qualifying radiographers and assistant radiographers.

8.2 Initial Training

8.2.1 The radiographer shall be certified as a Level II in radiography after having met the requirements of ART-ASNT/A PQC-01 which requires as a minimum the following:

A. Completion of the 60 hr. ART-TP 2 training course on radiographic testing.

B. 1575 hours of RT work time experience

C. Having passed a written and practical examination.

8.2.1.1 At the discretion of V.P. of Training and Education, training administered by others may be accepted, however, Section 5 of ART-TP-2 "Personnel Safety & Radiation Protection" must be completed by all radiographers, this will consist of 12 hours of instructions.

8.2.2 The assistant radiographer shall be certified as Level I in radiography after having met the requirements of ART-ASNT/A PQC-01 which requires as a minimum the following:

A. Completion of the 20 hr. ART-TP-2 training course on radioactive testing.

B. 525 hours of RT work time experience.

C. Having passed a written and practical examination.

8.2.2.1 Paragraph 8.2.1.1 shall apply except the hours of instruction shall be reduced to 5 hours.

3706

SECTION 8 - TRAINING PROGRAM

8.3 Periodic Training

8.3.1 Annual refresher training shall be given to all radiographers and radiographer's assistants. This training shall consist of seven hours of classroom instructions followed by a written test. The seven hours of instruction will review parts of the classroom work accomplished during initial training.

8.3.2 The R.S.O. shall also provide training and instruction to radiographic personnel whenever changes in the radiography program are made. This shall include any changes in N.R.C. regulations, Radiation Safety and Control Manual Procedures and in equipment. This shall be documented on Form 258.

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item #8

Training

(8B)
Radiation Safety Training
Program

Atlas Research & Testing Labs, Inc.

RADIATION SAFETY TRAINING PROGRAM

Alicia Research & Testing Labs, Inc.

A. SCOPE

The purpose of this procedure is to establish a safety program for training, qualifying and maintaining the competancy of individuals who perform or assist in the performance of industrial radiographic operations.

B. TESTING AND QUALIFICATION

Qualification of radiographic personnel will be established by a combinationof written tests and a practical demonstration of understanding of the care, use, and limitations of the equipment by physically performing each of the steps necessary in normal operation without assistance and under the direct supervision of a radiation operations supervisor or radiation protection officer. Proper survey procedures and an understanding of possible malfunctions of equipment are emphasized in the practical evaluation.

C. OUTLINE OF TRAINING PROGRAM

The radiation safety officer will prepare a test to be administered at the end of the classroom instruction. A minimum grade of 80% will be considered satisfactory to permit on-the-job training under the direct supervision of a radiographer.

Following successful completion of the written and practical examinations, all examination questions missed or practical test items incorrectly performed shall require oral review and reinstruction as required to assure understanding by the candidate before certification is granted.

TYPICAL RECOMMENDED STUDY MATERIALS INCLUDE:

RADIOGRAPHY IN MODERN INDUSTRY - Kodak
ISOTOPE RADIOGRAPHY 10-0110 - Tech/Ops
INDUSTRY RADIOGRAPHY MANUAL OE-84036 - U.S. Government Printing Office
NDT-RADIOGRAPHY HANDBOOK H55- Department of Defense

Allela Research & Testing Labs, Inc.

THE FOLLOWING IS AN OUTLINE OF THE CLASSROOM INSTRUCTION:

1. Fundamentals of Radiation Safety

This portion of the instruction is intended to familiarize radiation workers with the fundamental nature of radiation, the correct terminology and understanding of the controls required for the safe use of radioactive isotopes.

A. Characteristics of Gamma Radiation

a. Atomic structure - isotopes
b. Radioactivity - electomagnetic waves
c. Ionizing radiation
   Photoelectric effect
   Compton effect
   Pair production
d. Radioactive decay
   Half life
   Alpha, Beta, Gamma radiation

B. Units of measurement

a. Radiation dose
   Roentgen
   Rad
   R.B.E.
   Rem (mRem)
b. Disintegration Activity
   Curie

C. Hazards of exposure - biological effects

a. Sources of information on effects
b. Nature of radiation damage
c. Somatic effects
d. Genetic effects
e. Levels of exposure and resultant symptons

D. Permissable levels of radiation from licensed materials

a. Allowable cumulative occupational dose
b. Restricted areas
c. Radiation areas
d. High radiation areas

E. Methods of Controlling Radiation Dose

a. Working time in radiation area
b. Working distance-inverse square law
c. Shielding-half value layers-tenth value layers

2. Radiation Detection Instrumentation To Be Used

A. Radiation Survey Instruments
Ionization Chamber Detector
Geiger Counter Detectors
Geiger Mueller Tube Detectors

a. Principles of operation, each type
b. Calibration
Methods of calibration
Required frequency
c. Limitations of each type
Range, saturation

B. Survey Techniques

Physical survey of exposure device, before and after use.
Establishment adjustment and surveillance of perimeter of restricted area.
Physical radiation survey of device and guide tube after completion of individual exposures.
Physical radiation survey of exterior surface of transporting vehicles.
Record keeping.

C. Use of Personnel Monitoring Equipment

a. Film badges and thermoluminescent dosimeters-advantages and disadvantages of each.
b. Pocket dosimeters
Charging and frequent reading
Action if off-scale

3. Radiographic Equipment To Be Used

This portion of the instruction will cover equipment used in handling radioactive materials for industrial radiography, with emphasis on the specific equipment. The design of the equipment and its intended use shall be explained. The correct operating procedure for each type of equipment that the individual is being qualified to operate will be covered, step by step. A practical walk through demonstration of each type of equipment that the individual will be expected to operate will be conducted. Types of equipment explained and demonstrated categorically include:

A. Remote Handling Equipment

B. Radiographic Exposure Devices

C. Storage Containers

4. Inspection and Maintenance Performed by the Radiographer

Candidates for certification as a radiographer shall be instructed in the details of the required inspection of radiographic devices prior to each use. Specific instructions are contained in the operating procedures for each device.

Periodic preventative maintenance of source devices is conducted by the radiation protection officer quarterly, or more frequently, if required.

5. Case Histories of Radiographic Accidents.

Case histories of radiographic incidents will be reviewed with full discussion of the incident, the exposure received by participants, the cause, and the proper procedures for preventing the exposure. Typical source material for this instruction is NUREG-0495, December 1978.

6. Requirements of Pertinent Regulations

This instruction will include a paragraph by paragraph review of the pertinent Nuclear Regulator Commission regulations, 10CFR19, 10CFR20, 10CFR21, and 10CFR34, as well as relevant State Board of Health regulations and local regulations which establish restrictions on the use of radioactive material in industrial radiography.

7. Operating and Emergency Procedures.

Instruction will be given to provide a complete review and understanding of the operating and emergency procedures.

D. Specific Training Requirements

The specific minimum training requirements for each category of personnel are set forth in the following paragraphs. The training requirements have been established to provide for safety in the use of radiographic materials and to satisfy the requirements of the pertinent regulations. However, the following schedule does not preclude providing additional safety training during the indoctrination period (e.g. providing the complete program to a candidate for the classification of assistant radiographer) to better utilize manpower scheduling.

1. Assistant Radiographer

A candidate for the classification of assistant radiographer shall receive, as a minimum, a total of 16 hours of classroom and field training in the following areas:

A. Specific instruction shall be provided for the radiographic equipment to which the candidate will be assigned.

B. Emergency procedures.

C. Case histories of radiation accidents. The discussion of the case histories will stress the requirements for proper survey procedures.

2. Radiographer

A candidate for the classification of radiographer shall receive a total of 40 hours of classroom and field training in the following areas:

A. Fundamentals of radiation safety

B. Detection instruments

C. Radiographic equipment

D. Inspection and Maintenance Procedure

E. Case Histories

F. Requirements of Regulations

G. Specific instruction shall be provided for the radiographic equipment to which the candidate will be assigned.

H. Emergency Procedures

3. Personnel with Previous Radiographic Experience

Personnel with previous radiographic experience as a radiographer shall receive a total of 16 hours of classroom and field training in the following areas:

A. Operating Procedures. Specific instruction shall be provided for the equipment to which the candidate will be assigned.

B. Emergency procedures.

C. Case Histories.

E. Periodic Training

Radiography personnel will receive updated instruction whenever changes occur in the equipment used or procedures to be followed. The purpose of this instruction is to give radiographers and assistant radiographers an understanding of all changes affecting their work so that they will be competant to use new equipment, instruments and procedures. Periodic training shall be conducted at least annually.

F. On-The-Job Training

Alicia Research & Testing Labs, Inc., recognizes its responsibility for safe operation of radiographic equipment, and therefore, requires a thorough training of assistant radiographers on-the-job under the direct supervision of a qualified radiographer.

An individual will not be considered for certification to the level of assistant radiographer prior to one month experience as a trainee. During this period, the trainee will observe the radiographer in the performance of his duties and assist where possible. The trainee will not be permitted to operate licensed equipment until he has been certified as an assistant radiographer.

An individual lacking previous experience in radiography will not be considered for certification to the level of radiographer prior to the completion of at least two months experience as an assistant radiographer. This experience is in addition to the training required for certification as an assistant radiographer.

The radiation safety officer shall be responsible for the administration of a written or oral examination at the completion of the on-the-job training program. The monitoring and grading of the examinations may be performed by a radiation operations supervisor, subject to the approval of the radiation officer. The examination will cover the following areas which will be included in the on-the-job training program:

I. Physical Operation of Source Devices

A. Physical Layout
B. Mapping Area and Location of Equipment

II. Actual Use of Survey Meters

A. Survey of Source Devices
B. Determination of Isodose Line
C. Inverse Square Law

III. Posting Areas

A. Radiation area, definition of, and method of posting signs.
B. High radiation area, definition of, and method of posting signs.

IV. Movement of Sources

A. Actual movement of sources and equipment will be performed. Planning and execution of movement of sources and equipment.
B. Securing sources and equipment in vehicle to prevent damage and tampering.

V. Emergency Procedures Review

A. How to follow through with emergency procedures in various situations that may arise in the field.

The radiation protection officer must be satisfied that the candidate for certification as a radiographer has a thorough understanding of all procedures and sufficient proficiency in handling all the equipment for which the individual will be qualified. Any observed deficiencies or examination questions that are answered incorrectly require additional reinforcement training and demonstration of capability before the candidate may be qualified. A written record of the training and subsequent testing shall be maintained.

3106

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item #8

(8C)
50 Sample Test Questions/Answers

Radiographer

Alaska Research & Testing Labs, Inc.

SAMPLE TEST QUESTIONS FOR RADIOGRAPHERS (AND ACCEPTABLE ANSWERS)

1. What is the difference between X-ray and Gamma ray?

   Source of energy, X-ray electrical; Gamma rays nuclear.

2. What is the atomic weight of an atom?

   The sum of the neutrons and protons.

3. Name the three (3) main types of energy loss when ionizing radiation strikes matter?

   (A) photo electric effect
   (B) compton effect
   (C) pair production

4. Define a roentgen.

   Radiation, either X-ray or Gamma, necessary to produce 2,083 x 10^9 ion pairs in 1 cubic centimeter of dry air at standard conditions.

5. Define a curie.

   (A) Unit of strength for radioactive isotopes, or
   (B) 37 billion atoms disintegrating per second.

6. Define "half life" and provide and example relative to radiography.

   Half life is the time in which half the atoms in a radioactive source disintegrate. A 100 curie source of Iridium 192 will disintegrate to a strength of 50 curies in its half life of 74 days.

7. What is the unit of radiation exposure to personnel, and how is it determined?

   A Rem is the unit of exposure dose of ionizing radiation which produces the same biological effect as a unit of absorbed dose of X-rays (Roentgen Equivalent Man).

8. Name three (3) possible biological effects of high chronic radiation doses.

   (A) Cancer
   (B) Cataracts
   (c) Leukemia

9. Define the difference between Somatic effects and Genetic effects of radiation.

Somatic effects are those acting on the exposed individual. Genetic effects are those resulting in mutation (changes) in cell structure of subsequent generations.

10. What three (3) factors govern the damage resulting from radiation exposure of an individual?

The amount of radiation received.
The rate at which it was received.
The part of the body receiving it.

11. What is the range of exposure considered to be the median lethal dose of radiation (possibility of up to 50% mortality)?

200-600Rem

12. What is the current allowable occupational whole body exposure for radiographic workers in each calendar quarter?

In each calendar year?

1250 mRem/quarter 5 Rem/year

13. What is the difference between "radiation dose" and "radiation dose-rate", and how is each measured?

Dose is the total quantity of radiation absorbed, expressed in mRem , Rem, and measured with a film badge or direct reading dosimeter. Dose-rate is the radiation level at a given location, expressed in mRem/ hr or Rem/hr., and measured with a survey meter.

14. What is a high radiation area? Radiation Area? Restricted area?

Areas with radiation levels where a person continuously present could receive an exposure in one hour in excess of

100 mRem for high radiation area
5 mRem for radiation area
2 mRem for restricted area

15. Which of the following best illustrates the concept of protection from external radiation?

(A) Lead, concrete, and steel (B) time, distance, and shielding (C) survey meters, dosimeters, and film badges

Abels Research & Testing Labs, Inc.

16. What is a half value layer?

The thickness of any absorber that will reduce the intensity of a beam of radiation to one-half its initial value.

17. What two type of radiation detection instruments must workers wear at all times when conducting radiographic operations?

Film badge and direct-reading dosimeter

18. What is the primary purpose of a film badge?

To provide a permanent record of dosage for the Nuclear Regulary Commission.

19. What is the range required for a dosimeter?

0-200 mr

20. Describe two types of survey meters.

Ionization chamber instruments, with constant voltage applied across gas filled chamber. Ionizing radiation penetrating chamber causes current flow which is amplified and displayed on a micro-ammeter. Has relatively flat energy response.
Geiger-meuller chamber, dependent upon gas multiplication of ions to provide reading. Efficient at low levels.

21. A survey meter must have a range of_____ mRem/hr to_____ mRem/hr in order to comply with regulations.

2 mRem/hr to 1000 mRem/hr

22. How often must a survey meter be calibrated?

Every 90 days or after being repaired.

23. Who is authorized to calibrate survey meters:

Personnel specifically authorized on the license granted by N.R.C.

24. When must a radiographic exposure device be locked?

When not under the direct surveillance of an assistant radiographer or radiographer.

25. List the surveys, in order of their occurance, which must be conducted, starting from before the source leaves the storage area until after it is returned. Assume that the source is carried a short distance to the operational area and no accidents occur.

1. Survey device before removal from storage area.
2. Survey area during initial exposure to verify restricted area.
3. Survey device and source tube after each exposure to verify withdrawl to shielded position.
4. Survey area perimeter each time source location is changed.
5. Survey device after return to storage area.

26. Describe the proper procedure for approaching a source device after retracting the source to a shielded position following an exposure.

Approach the device with a calibrated survey meter, observing the meter reading.
Survey the full perimeter of the source device, including the full length of the source guide tube to insure that the source has been fully retracted into the shielded position.
Lock the device.

27. What is the Gamma output per curie or Iridium 192 at a distance of one foot? Of Cobalt 60?

5900 mR/hr 14500 mR/hr

28. Using a 30 curie Iridium 192 source, show calculations to determine the radiation level at a distance of fifty (50) feet in open air.

$$I_A \times D_A^2 = I_B \times D_B^2$$

$$(5900 \text{ mR/hr}) \quad (30 \text{ curies})(1 \text{ ft.})^2 = I_B \times (50 \text{ ft.})^2$$

$$177{,}000 \text{ mR/hr} = I_B \times 2500$$

$$70.8 \text{ mR/hr} = I_B$$

29. What is the half value layer of steel for Iridium 192? What thickness of steel used as a shield is required to reduce the radiation level of question 28 to 5 mR/hr?

Half value layer steel for Iridium 192 is approximately ½ inch.
1 HVL reduces 70.8 mR/hr to 35.4 mR/hr
2 HVL reduces 70.8 mR/hr to 17.7 mR/hr
3 HVL reduces 70.8 mR/hr to 8.85
4 HVL reduces 70.8 mR/hr to 4.43

30. What is the radiation level 25 feet from a 100 curie Iridium 192 source? What is the level with 4 inches of steel shielding? How long could a person remain at that distance and receive 100 mRem? Show all calculations.

$$\frac{(100)\ (5900)}{(25^2)} = \frac{590000}{625} = 944 \text{ mR/hr}$$

$$\frac{(944)\ (.005*)}{} = 4.72 \text{ mR/hr}$$

* from chars

$$\frac{100}{4.72} = 21.2 \text{ hours}$$

31. A radiographer is working in a radiation area with an intensity of 32 mRem/hr. To reduce his exposure rate of 2 mRem/hr he should increase his distance from the source by:

(A) 2X (B) 3X (C) 4X (D) 8X (E) 16X

32. If it takes 15 seconds to crank out or retract the source, and you retreat to a shielded position during the exposure, the dose you will receive per exposure will be what fraction of the average field intensity at the control handle?

(A) 1/30
(B) 1/60
(C) 1/120
(D) 1/240

33. Describe the pre-operation inspection of a source device equipped with a control cable and guide tube.

Inspect for:

1. Change in device operating characteristics.
2. Proper operation of the crank mechanism.
3. Proper operation of the locking mechanism.
4. Damaged or worn guide tube, control cables and connector wear or damage.
5. Rust, dirt or sludge build-up in the source tube.
6. Survey the device to assure proper location of the source in the shielded position.
7. Proper connection of all mating components
8. Damage to the device which may impair its operation.
9. Proper labeling.
10. Soruce and drive cable wear or damage.

If all satisfactory, enter in radiation report and log book.

34. List the steps for set-up procedure.

a. Notify appropriate persons at the job site that radiography is about to be performed.
b. Unload radiographic equipment with exception of the source device and restrict the calculated "Radiation Area" with ropes or barricades. Post the "Caution Radiation Area" signs conspicuously.
c. Using a calibrated and operable survey meter, survey the surface of the source device to make sure that the source is in the shielded position.
d. Unload the source device and place the control cables guide cable to make maximum advantage of shielding and distance.
e. Check to see that all required persons are properly monitored with a film badge and self-reading dosimeter.
f. Unlock the source device.
g. Source devices which necessitate hook-up of the control cables will use the following procedures:

    1. Set the source device in the "connect" position which exposes the source connector.
    2. Manipulate the control cables to expose about 1½ inch of the cable connector.
    3. Connect the control cable to the source and move the connected cables to insure a positive connection.
    4. Push the source device and control cable's adapter into position in the lock box and then set the source device to the "operate" position.

h. Remove the plug from the fitting on the face of the head shield and thread the guide cable into place.

35. List the steps for exposure operation.

a. Check the "Radiation Area" for any unauthorized personnel.
b. Manipulate the source to the "exposed" or "On" position.
c. Use of survey meter to verify that the "Radiation Area" boundaries are proper, or readjust the boundries not to exceed 5 mRem in one(1) hour or 100 mRem in any seven (7) consecutive days.
d. Use survey meter to verify that any workers adjacent to the "Radiation Area" are not receiving in excess of 2 mRem in one (1) hour or 100 mRem in any seven (7) consecutive days.
e. When the exposure has reached the proper time, return the source to the "stored" or "shielded" position.
f. Use survey meter to determine that the source is in a shielded position.
g. Secure source in shielded position.
h. Check dosimeter reading.

36. List the steps for conclusion of Radiography.

a. Survey the surfaces of the source device including the guide tube to determine that the source is in a shielded position.
b. Lock the source and record the survey reading on the radiation report.
c. Secure the source device in the transportation vehicle or its storage area.
d. Load radiographic equipment and lock the vehicle if left unattended.
e. Notify persons in charge and workers near the "Radiation Area": that Radiography is concluded.

37. How is a dosimeter to be used?

1. Dosimeter must be charged and set to zero before each shift.
2. Dosimeter readings are to be made after each exposure.
3. Total dosimeter reading is to be recorded at the end of the work day.

38. What have you been instructed to do if your dosimeter is suddenly found off-scale?

Stop work and notify supervisor immediately.

39. The walls of a thick steel tank may be considered part of the necessary whielding in a panoramic exposure.

(A) True (B) False

40. In exposure devices equipped with an odometer on the control cable, when you have returned the odometer to "Zero" you may omit the survey of the exposure device.

(A) True (B) False

41. In a field set-up, a radiographer must operate his 50 curie Iridium 192 source from a distance of 20 feet, unshielded. Assuming 15 seconds for running in and operating his source either in or out what is the maximum number of exposures he could make in a day, assuming his maximum daily dose should not exceed 50 mRem. During the exposure, he can retire to a well shielded area. Assume that the <u>average</u> intensity at the control handle is 50% of the intensity as the source leaves the device. Show all calculations.

$$\frac{(50)\quad(5900)}{(20)^2} = \frac{(50)\quad(5900)}{(400)} = 737.5 \text{ mR/hr}$$

$$\frac{(50)\quad(60)\quad(60)}{(737.5)\quad(\frac{1}{2})} = 488 \text{ seconds exposure allowed}$$

$$\frac{(488)}{(15+15)} = 16.3 \quad 16 \text{ exposures/day}$$

42. When must an assistant radiographer be under the personal supervision of a radiographer?

    1. When using radiographic exposure devices.
    2. When conducting the survey of a radiographic exposure device to assure that the source has been returned to the shielded position.

43. What is the permissable whole body dose permitted for a person under 18 year of age? Why?

    10% of normal 1250 mRem per calendar quarter. The cells of a person under 18 are in an accelerated stage of reproduction.

44. You are making an exposure on a job-site when a fire breaks out adjacent to the exposure area. What should you do?

    Return the source to the shielded position and survey the source device to assure that the source is in the shielded position. Remove control cables and guide tubes and insert safety plugs. Remove the source device from the danger area and secure it, either in the storage area or a locked vehicle. Notify the supervisor.

45. What should you do if the source device is damaged such as being struck by a falling object?

    Return the source to the shielded position if possible. Conduct a survey to assure that the source is in the fully shielded position and lock the device. Notify the supervisor.

46. What should you do if you are unable to retract the source because of damage to the guide tube?

    Verify the restricted area. Do not permit anyone to enter the area. Notify the supervisor, who will advise the radiation protection officer. The radiation protection officer will determine action to be taken.

47. What should you do if despite all precautions, a workman somehow enters the restricted area during an exposure?

Retract the source immediately, survey the device to assure that the source is in the shielded position and lock the device. Notify the supervisor of the incident. The supervisor will obtain all pertinent facts and notify the radiation protection officer, who will determine the course of action.

48. You are traveling to a job-site when you are involved in a vehicular accident. The source device appears to be damaged. What should you do?

If the survey meter is operating, use it to determine if the source is in the shielded position. If it is not, use the survey meter to establish the perimeter of the restricted area.

If the survey meter is also damaged, calculate the perimeter of the restricted area assuming the source is in the exposed position.

In either case, notify the supervisor immediately after establishing the restricted area.

49. In the case histories discussed, what was the single most significant factor which caused over exposure?

Failure to make proper use of a survey meter.

50. How much radiation exposure is too much for a radiographer?

Any exposure in excess of what is necessary.

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item #8

(8C)
25 Sample Test Questions/Answers

Assistant Radiographer

Alicia Research & Testing Labs, Inc.

SAMPLE TEST QUESTIONS FOR ASSISTANT RADIOGRAPHERS (AND ACCEPTABLE ANSWERS)

1. What markings must be on a radiographic exposure device in addition to the manufacturer's identification?

   1. Caution Radiographic material, with standard radiation caution symbol.
   2. Identification of radioactive material, number of curies, and date determined.
   3. Current leak test and maintenance labels.

2. How frequently must a survey meter be calibrated, assuming it has been working normally?

   Survey meters must be calibrated every three months, or after repair.

3. What should you do if your survey meter suddenly becomes inoperative?

   Cease radiographic operations until a calibrated and operable survey meter is available.

4. List at least three occasions when the use of a survey meter is required.

   1. Each time a source is retracted into the shielded position.
   2. When confirming the boundries of a restricted area.
   3. When returning a source device to the starage area.
   4. Exterior surface of transport vehicle.

5. What are the boundry limits for personnel continuously present for one hour for the following?

   A. High radiation area - MR/hr
   B. Radiation area - MR/hr
   C. Unrestricted area - MR/hr

   A. 100 MR/hr
   B. 5 MR/hr
   C. 2 MR/hr

6. What three signs must be used when using and/or storing radioactive materials?

   A. Radioactive material sign on source device, storage area.
   B. Radiation area sign at perimeter of 5 mRem/hr area.
   C. High radiation area sign at perimeter of 100 mRem/hr area.

7. What is meant by "personnel monitoring"?

   The determination of accumulated radiation exposure as measured by a direct reading dosimeter and a film badge which must be worn at all times during radiographic operations.

8. What is the purpose of a film badge?

   To provide a permanent record of personal exposure to radiation.

9. What is the purpose of a pocket dosimeter?

   To provide a readily accessible reading of accumulated radiation exposure.

10. How is a dosimeter to be used?

    Dosimeter must be charged and set to zero before each shift.
    Dosimeter readings are to be made after each exposure with a new set-up.
    Total dosimeter reading is to be recorded at the end of the work day.

11. What have you been instructed to do if your dosimeter is suddenly found off scale?

    Stop work and notify supervisor immediately.

12. What is the difference between dose and dose-rate?

    Dose is the total quantity of radiation absorbed, expressed in mRem or Rem.
    Dose-rate is the radiation level at a location, expressed in mR/hr or Rem/hr.

13. What is the effect of exposure <u>time</u> on the radiation dose?

    The less time spent in a radiation area, the less the dose absorbed.

14. What is the effect of <u>distance</u> from the source on the radiation dose?

    The radiation intensity is inversely proportional to the square of the distance from the source (inverse square law).

15. What records must be retained of radiographic operations?

    A. Utilization log for source devices.
    B. Personnel accumulated dose.
    C. Survey Readings.
    D. Leak tests
    E. Calibration

16. What is a utilization log?

The required record of the usage of a radiographic device, which shall identify the exposure device, the assigned radiographer, the location and date of use.

17. Show the calculations required to determine the radiation level 40 feet from a 30 curie source of Iridium 192.

$I_1 = (30)\ (5900) = 177000$

$\frac{I}{I} = \frac{D_2^2}{D_1^2} \qquad \frac{177000}{I_2} = \frac{(40)^2}{(I)^2}$

$I_2 = \frac{(177000)}{(1600)}\ (1) = 110.6$ mR/hr

18. What would be the total absorbed dose by a man in the preceding example with a radiographic exposure lasting 3 minutes?

$(110.6)\ \frac{(3)}{(60)} = 5.5$ mRem

19. In the case histories discussed, what was the single most significant factor leading to personnel over exposure?

Failure to use the survey meter properly.

20. List the sequence of actions to be taken by the radiographer in the event of a fire or other plant emergency in an area adjacent to the exposure device while an exposure is being made.

Return the source to the shielded position. Survey the device to assure that the device is in the shielded position. Remove control and guide cables and lock the device.
Remove source device from the danger area.
Notify the supervisor.

21. What must be done in the event of a plant accident to the source device and the source can not be retracted to the shielded position?

Establish or verify the restricted area.
Do not permit any one to enter this area.
Notify supervisor.
Continue to restrict entry into the restricted area.
Action will be taken by the radiation protection officer.

22. You are in the process of making an exposure when you notice that a workman has somehow gotten into the restricted area. What should you do?

Retract the source immediately to the shielded position. Survey the source device to assure full shielding and lock the device. Advise workman to clear the area. Notify the radiation protection officer.

23. What should you do in the event of a vehicular accident while on the way to a job location with a source device in the vehicle?

If damage to the source device is obvious or verified by a survey meter, establish a restricted area using the survey meter. If the survey meter is inoperable, establish the restricted area by calculation, assuming the source is in the exposed position. After establishing restricted area, notify the supervisor. Action will be determined by the radiation protection officer.

In case of a minor accident where it can be determined that the source is in the shielded position, no restricted area is required.

24. When is it permissible for a source device to be unlocked?

Only when the device is under the direct supervision of an assistant radiographer or a radiographer.

25. What are the security requirements for an exposure device, even when it is locked?

If the exposure device can not be returned to locked storage area, or otherwise physically secured, an assistant radiographer or radiographer must be assigned to establish and maintain a restricted area around the device.

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item #8

Training

(8D)
Procedure ART-ASNT/APQC-01

Personnel Qualification and Certification for N.D.E.

ALICIA RESEARCH & TESTING LABS, INC.

Subject:	Procedure No.	Page 1 of 8 Pages
PERSONNEL QUALIFICATION AND CERTIFICATION FOR N.D.E.	ART-ASNT/A-PQC-01	
	Revision No. 1	Date 1/25/83

RADIOGRAPHIC TESTING

1. Objectives:

Objectives of radiographic method of nondestructive testing are stated below:

I. The Trainee should:

A. Understand the principles governing the radiographic testing process.
B. Be familiar with the various types of parts which are commonly inspected with radiation.
C. Be cognizant of the routine procedures involved in accomplishing the test.
D. Understand the requirements for a specific technique and be able to select the technique.
E. Understand the advantages and disadvantages of the test.
F. Understand and be familiar with the safety precautions pertinent to radiation hazards.

II. The Trainee will be able to:

A. Use typical equipment peculiar to radiographic processes. Use should be confined to the softer ray tests unless special requirements dictate otherwise.
B. Comply with local, state and federal radiation safety codes.
C. Use the attachments and accessories pertinent to routine testing.
D. Use the X-ray technique in locating discontinuities.
E. Use the gamma-ray technique when this technique is required.
NOTE: The trainee should be familiarized with the gamma-ray test and should be given the opportunity to perform some of these tests.
F. Differentiate among the several patterns of discontinuities.
G. Analyze the specific and total situation.
H. Evaluate the total inspection situation.
I. Accept or reject the specific indications.

III. The Trainee will be required to:

A. Attend the minimum classroom training hours for each level.
B. Take notes, self-study and spend practical training time in the use of equipment and techniques taught in the classroom.
C. Participate in hands-on experience in the classroom.
D. Take classroom quizzes and at the completion of the course take a written General Examination covering the basic test principles, a written Specific Examination covering equipment, operating procedures and techniques and a Practical Examination demonstrating proficiency in the applicable method in the evaluation of sample parts.

IV. The Trainee will receive:

A. Upon satisfying the requirements in Parts. III and achieving a composite grade of 80% or higher in the examinations, the Trainee will be awarded a certificate for successfully completing the course in Radiography.

ATTACHMENT #4

RADIOGRAPHIC TESTING

		Min. Instruction Hours					
		LEVEL I			LEVEL II		
		*	**	***	*	**	***
1.0	INTRODUCTION	.9	1.5	6.0	1.0	1.0	5.0
	1.1 History of industrial radiography						
	1.2 General principles of examination of materials with penetrating radiation.						
	1.3 Relationship of penetrating radiation, radiography, and radiometry						
	1.4 Comparison with other methods						
	1.5 General areas of application: 1. Imaging 2. Metrological 3. Product						
2.0	PHYSICAL PRINCIPLES	1.2	2.0	8.0	5.0	5.0	20.0
	2.1 Nature of penetrating (all types briefly, X-ray, and gamma detailed). 1. Particles 2. Wave properties 3. Electromagentic waves 4. Electrical theory of matter 5. Fundamentals of radiation physics 6. Sources of radiation: a. Electronic b. Isotopic c. Other						
	2.2 Interaction between penetrating radiation and matter 1. Absorption 2. Scatter 3. Pair production 4. Other secondary emission						

ATTACHMENT #4

		Mini. Instruction Hours					
		LEVEL I			LEVEL II		
		*	**	***	*	**	***
2.3	Radiography						
	1. Imaging by film						
	2. Imaging by fluorescent materials						
	3. Imaging by electronic devices						
2.4	Radiometry						
	1. Physics of detection devices						
2.5	Glossary of terms and units of measure						
3.0	RADIATION SOURCES	1.8	3.0	12.0	3.0	3.0	6.0
3.1	Electronic Sources						
	1. X-ray sources						
	a. Generators and tybes as an integrated system						
	b. Electron sources:						
	Cold cathode						
	Hot cathode						
	Beam focusing						
	Field emission						
	Other						
	c. Accelerating potential:						
	General						
	Telsa coils						
	Mechanical rectifiers						
	Metal core transformers						
	Resonant coil transformers						
	Electrostatic						
	d. Targets:						
	Material						
	Configuration						
	Heat dissipation						
	e. Equipment design considerations						
	Generating wave shape						
	Window design						
	Duty cycle						
	Roentgen output						
	Tube shielding						
	Installation-fixed, mobile, etc.						

ATTACHMENT #4

Mini. Instruction Hours

	LEVEL I			LEVEL II		
	*	**	***	*	**	***
2. Particulate radiation sources						
a. Electrons						
b. Neutrons						
c. Other (alpha, deutrons, etc.)						
3.2 Isotopic Sources						
1. Gamma						
a. Types						
b. Spectra						
c. Activity including self-absorption						
d. Handling						
2. Beta						
3. Bremsstrahlung						
4. Neutron						
4.0 RADIATION DETECTION	1.8	3.0	12.0	3.0	3.0	7.(
4.1 Imaging						
1. Film-principles-properties						
a. Material examination						
b. Monitoring						
2. Fluoroscopy						
a. Fluorescent screen						
b. Image amplification						
c. Cine techniques						
3. Direct TV viewing						
4. Solid state devices						
a. Xeroradiography						
b. Ionography						
c. Solid state viewer						
d. Other						
5. Special instrumentation associated with above						
4.2 Non-imaging Devices						
1. Solid state						
a. Scintillometers						
b. Photoresistive						
c. Other						
2. Gaseous						
a. Proportional counters						
b. Geiger counters						
c. Ionization chambers						
d. Other cells						
e. Other						

ATTACHMENT #4

		Mini. Instruction Hours					
		LEVEL I			LEVEL II		
		*	**	***	*	**	***
3.	Instrumentation						
	a. Rate meters						
	b. Counters						
	c. Amplifiers and pre-amplifiers						
	d. Recording readouts						
	e. Other						
5.0	PERSONNEL SAFETY & RADIATION PROTECTION	1.5	2.5	10.0	3.0	3.0	7.0
5.1	Hazard of excessive exposure						
5.2	Methods of controlling radiation dose						
	1. Time						
	2. Distance						
	3. Shielding						
5.3	Specific Equipment Requirements						
	1. X-ray						
	2. Gamma handling						
	3. Survey						
	4. Recording						
	5. Exposure shields and/or rooms						
	a. Operation						
	b. Alarms						
5.4	Operation and emergency procedures						
5.5	Federal, State & Local regulations						
6.0	THE RADIOGRAPHIC PROCESS	3.0	5.0	20.0	12.0	12.0	27.0
6.1	Basic imaging considerations						
	1. Definition of sensitivity (including penetrameters)						
	2. Contrast and definition						
	a. Relation of kilovoltage or wavelength to contrast and definition						
	3. Geometric principles						
	4. Intensifying screens						
	a. Fluorescent						
	b. Metallic						
	5. Generation and control of [illegible]						

ATTACHMENT #4

7. Choice of film
8. Use of exposure curves and how to make them
9. Fluoroscopic inspection
   a. Theory of operation
   b. Applications
   c. Limitations
10. Film Processing
   a. Darkroom procedures
   b. Darkroom equipment and chemicals
   c. Film processing do's & don'ts
11. Viewing of radiographs
   a. Illuminator requirements
   b. Background lighting
   c. Judging quality of radiograph
12. Causes and correction of unsatisfactory radiographs
   a. High film density
   b. Insufficient film density
   c. High contrast
   d. Low contrast
   e. Poor definition
   f. Fog
   g. Light leaks
   h. Artifacts
13. Arithmetic of exposure and of other factors affecting test

6.2 Miscellaneous applications
1. Blocking and filtering
2. Multifilm techniques
3. Enlargement and projection
4. Stereoradiography
5. Triangulation methods
6. Autoradiography
7. Neutron radiography
8. Flash radiography
9. "In motion" radiography & fluoroscopy
10. Backscatter radiography
11. Microradiography
12. Causes of "diffraction" effects and minimization of interference with test
13. Determination of focal point

ATTACHMENT #4

	Mini. Instruction Hours					
	LEVEL I			LEVEL II		
	*	**	***	*	**	***
14. Panoramic techniques						
15. Altering film for contrast and for density						
16. Gaging & control processes						
7.0 TEST RESULT INTERPRETATION	1.8	3.0	12.0	13.0	13.0	28.0
7.1 Basic factors						
1. General aspects						
2. Effects on measurement and interpretation of test						
3. Administrative control of test quality by interpreter						
4. Familiarization with image						
7.2 Material considerations						
1. Metallurgy or other material discipline as it affects use of item and test results						
2. Materials processing effects on use of item and test results						
3. Discontinuities, their causes and effects						
4. Radiographic appearance of discontinuities						
TOTAL MINIMUM HOURS:	12.0	20.0	80.0	40.0	40.0	100.0

NOTE: Each student shall be made familiar with the Applicable Codes, Standards, ART Specifications, ART Procedures and ART N.D.E. personnel qualification and certification requirements.

* Completion with a passing grade of at lease two (2) years of engineering or science study at a university, college, or technical school.

** High school graduation, diploma or its equivalent.

*** Grammar school graduation, or demonstrated proficiency, or additional training.

REFERENCE MATERIAL:

Nondestructive Testing Series
Radiography Handbook H55
Office of the Assistant Secretary of Defense

Radiography Method Training Program
The American Society for Nondestructive Testing

Audio-Visual Course in Nondestructive Testing
Radiographic Testing
General Dynamics/Convair Aerospace Division

Nondestructive Examination (NDE) Techniques I, Course 26
Fundamentals of Radiography
Center for Occupational Research & Development, Inc.

McMaster, R.D., ed. - Nondestructive Testing Handbook, Vols. I-II
The Ronald Press Company, New York, 1959

Radiographic Testing, Classroom Training Handbook (CT-6-6)
General Dynamics/Convair Division, San Diego, Calif.

Radiographic Testing, Programmed Instruction Handbooks (PL-4-6)
General Dynamics/Convair Division, San Diego, Calif.

Radiography in Modern Industry
Eastman Kodak Co., Rochester, N. Y.

Alpha Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item #8

Training For Individuals Working In Or Frequenting Restricted Areas

(8E)

Instructors Resume

Michael Kozak
President
Emergency Safety Officer

Atlas Research & Testing Labs, Inc.

PERSONAL RESUME

NAME: Michael Kozak

ADDRESS: 112 Stillwater Road
Barnegat, N. J. 08005

PHONE NO.: (609) 698-2780
SOC. SEC. NO.: 151-38-2483
DATE OF LAST EYE EXAMINATION: December 1982 ~~JAN 10 1984~~ KJS
January 14, 1985

SUBMITTED FOR POSITION AS:

Level III Technician/Examiner

EDUCATION

SCHOOL	LOCATION	COURSE	DATE		DEGREE
Irvington Tech.High Sch.	Irvington, N. J.	Auto Mech.	1962	1966	
/West Side High School	Newark, N. J.	Diploma		1966	Diploma
Bloomfield Tecn.College (Inc. NDE)	Bloomfield, N.J.	Aircraft Mechanics	1966	1967	
Academy of Aeronautics Junior College	Yonkers, N. Y.	A & E Qualification	1967	1968	Diploma
Emery Riddle University	Datona Beach, Fla.	NDE & Helium Mass Spectrometer, Airspace Engineering	1969	1972	
Essex County College	Newark, N. J.	Admin.-Computer & Instrument Reading		1972	

TRAINING

COMPANY / SCHOOL	COURSE DESCRIPTION	NDE METHOD	HOURS
Emery Riddle University	NDE & Helium Mass Spectrometer, Airspace Engineering	Engineering	
Bloomfield Technical College	Welding, etc.		
International Testing Labs	Chemical and Physical Analysis		
International Testing Labs	Tensile and Sun Machines		
General Magnaplate	NDE Training	PT,MT,UT,RT	1 Year
Convair Home Study Courses		PT,MT,UT,RT,EC	

WORK EXPERIENCE (SEE ATTACHED SHEET)

above information is, to the best of my knowledge, true and accurate.

Oct 27, 1982 — DATE

Wayne Dearinger — ATL - LEVEL III - SIGNATURE

EMPLOYEE SIGNATURE

MICHAEL KOZAK

Ramsey Machine & General Brass Company
(Summers & Evenings - Part Time - 1963 to 1967)

Mr. Kozak worked as an operator using Bridgeport milling machines, turret lathes and internal and external grinders. At General Brass, Mr. Kozak was a tool and die trainee.

General Magnaplate Company
1972

Mr. Kozak was employed at General Magnaplate Company where he received his initial work and training and experience in NDE. At this firm, he accumulated approximately 2200 hours in UT, PT, RT and MT and was certified to Level II.

International Testing Labs
1972 to 1973

Mr. Kozak was an NDE Manager. As an NDE Manager, Mr. Kozak was responsible for the supervision of NDE personnel, preparation of bids and quotations for jobs involving NDE to include manpower estimates and performance of nondestructive examinations. Liquid penetrant, magnetic particle, ultrasonic and radiographic examinations were performed under MIL-Standard 271D and NAVSHIPS 0700-006-8010. While working for ITL, received training and performed eddy current examinations.

Alicia Research & Testing Labs
June 1973

Mr. Kozak was self-employed at this time and worked for various contractors performing NDE. Performed chemical and physical analysis and subcontracted to Magnaflux Corporation to perform ultrasonic testing on steel pilings under water using diving gear. Also performed under water visual examinations on tankers examining propeller blades 10" thick and 30' in diameter. Mr. Kozak has prepared UT procedures for ABS and Coast Guard for examining propeller shafts using lamb and Raleigh waves and has performed RT examinations under water taking CO-60 and IR-192 exposures using special techniques. He has also used and prepared procedures for liquid penetrant testing using all types of penetrant. Performed fluorescent and white light MT examinations using longitudinal, shear, lamb and Raleigh waves, special focus and compound wave, RT examinations using CO-60 and IR-192 sources using special film techniques and eddy current examinations of 1 to 3 inch pipe and condenser tubing using scope and graph techniques. As a contractor to Magnaflux Corporation, Mr. Kozak performed ISI services to Sec. XI of the ASME Code.

Universal Testing Labs, Inc.
1974 to 1982

Mr. Kozak was employed as an NDE Level III Examiner. Certified in all NDE methods, Mr. Kozak's experience includes six nuclear refueling outages in New Jersey and Pennsylvania, etc. Mr. Kozak was also involved in performing ultrasonic testing on feedwater nozzles with Breda Corporation at Vermont Yankee and Three Mile Island, and ultrasonic testing on CRD's and all structures and inservice inspection for Oyster Creek Nuclear Generating Station, utilizing all NDE methods. Mr. Kozak was assigned to the Oyster Creek Nuclear Generating Station for their 1977 refueling outage and was in charge of all ultrasonic

testing for inservice inspection. Was also involved in special development of adaptive learning networks for pipe inspection, defect versus geometrical reflectors discrimination in carbon and stainless steel by the variation of the dependence of a reflector on changes in frequencies. Mr. Kozak is certified as an ANSI-N45.2.6, Level III Inspector. Mr. Kozak was involved in R&D work, writing procedures for such work as embrittlement, IGSCC, feedwater nozzle inspection graphization, etc. Mr. Kozak was responsible for implementation of all ISI programs at Oyster Creek. As an ISI Engineer, he has written the 90-day inspection reports, and the 10-year ISI inspection program. Mr. Kozak designed and manufactured all the calibration blocks for Oyster Creek and other fossil and nuclear plants. He was also involved in the R&D research with APRI, Columbus, Ohio in the IGSCC (ISI) ultrasonic examination. While working for UTL as a contractor, performed eddy current examinations at Oyster Creek Nuclear Generating Station. Mr. Kozak was certified to Level III Eddy Current Inspector by UTL.

PT	4,000 Hours
MT	4,200 Hours
RT	4,000 Hours
UT	10,000 Hours
EC	1,000 Hours
Mass Spec.	200 Hours

Alicia Research & Testing Labs, Inc.
September 1982 to Present

Mr. Kozak is presently devoting full time to his own business, Alicia Research & Testing Labs, Inc., as President. In addition, he is certified in RT, PT, MT, UT, VT and ET by examination.

Alcia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

ITEM 9 - FACILITIES AND EQUIPMENT

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

ITEM 9 - FACILITIES AND EQUIPMENT

1. DESCRIPTION OF INSTALLATION

The Radiographic Facilities are located in a one story building, no cellar, separated from the other operational facilities.

Refer to Dwg ART-0010 attached.

The building occupied by Alicia Research and Testing Labs is in a wooded section of West Creek, New Jersey, separated from other establishments in the community.

2. THICKNESS, DENSITY, TYPE OF SHIELDING

Walls are constructed of 100% solid concrete.

Refer to Dwg ART-0001 attached.

3. IDENTIFICATION OF ENTRANCE WAYS

Entrance to the exposure room has a lead lined door containing a padlock.

4. DESCRIPTION OF DISTANCE TO AREAS ADJACENT TO EXPOSURE AREAS

Two sides of exposure room face the outside wall. One side of exposure room faces garage opening approximately fifty feet away. One side of the exposure room faces the machine shop approximately fifty feet away separated by a concrete wall.

5. AREA SECURITY SAFEGUARDS

1. Lock on entrance door.
2. Caution - Radiation Area signs on all four walls.
3. Gamma Alarm on concrete wall.
4. Tech Ops 492 Series Gamma Alarm Radiation Monitors. Dwgs attached.
5. Safety Door Interlock.
6. Audible Alarm (Refer to ART Dwg-0002 attached)

ITEM 9 - FACILITIES AND EQUIPMENT

6. MAXIMUM RADIATION LEVEL MEASUREMENTS IN AREAS ADJACENT TO EXPOSURE AREAS INCLUDING ROOF/CEILING

Radiation levels 18 inches from walls of exposure room less than 2 mr/hr.

Roof/Ceiling is not accessible.

7. ACCESS TO ROOF CONTROLLERS

There is no access to the roof at this installation.

8. RADIATION LEVEL 18" FROM EXTERNAL SURFACE (UNRESTRICTED AREA)

Less than 2 mr/hr.

9. STORE EQUIPMENT AT TEMPORARY JOB SITES

Equipment will be stored in the company vehicle, under lock and key, with Caution Radioactive Material signs on all four sides.

If it is necessary to store equipment at temporary job site, equipment will be stored in a trunk chained to a facility, with Caution Radioactive signs posted.

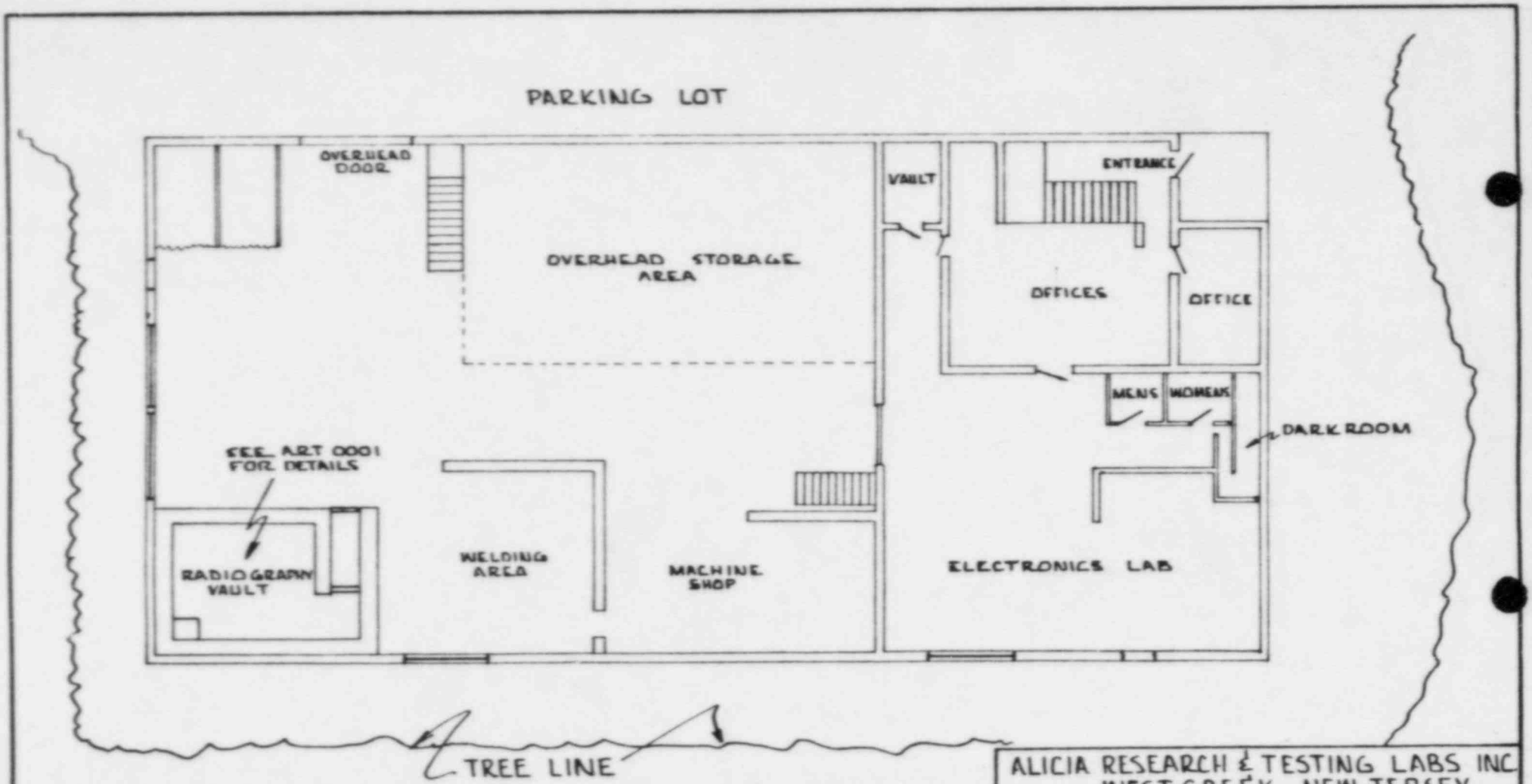
In all instances, emergency telephone numbers will be posted, so that a Radiographer or R.S.O. can be notified in the event of an emergency.

10. ALARM SYSTEM FOR AREA MONITOR

This alarm is to be used on exposure rooms that have a door at the entrance. The alarm is mounted stationary on the exposure room in close proximity to the door when in closed position. A sensor in the alarm detects movement of the door. When power is applied to the alarm and the door is moved, the sensor activates an audible warning.

The audible warning indicates an imminent danger of radiation exposure. The warning will continue until the radiation is eliminated or the door is returned to the closed position.

In order for the alarm system to operate properly, the area monitor must be operating (turned on) and the alarm must be connected to the monitor. Under these conditions, the alarm will sound a warning whenever radiation is present and the door to the exposure room is opened.



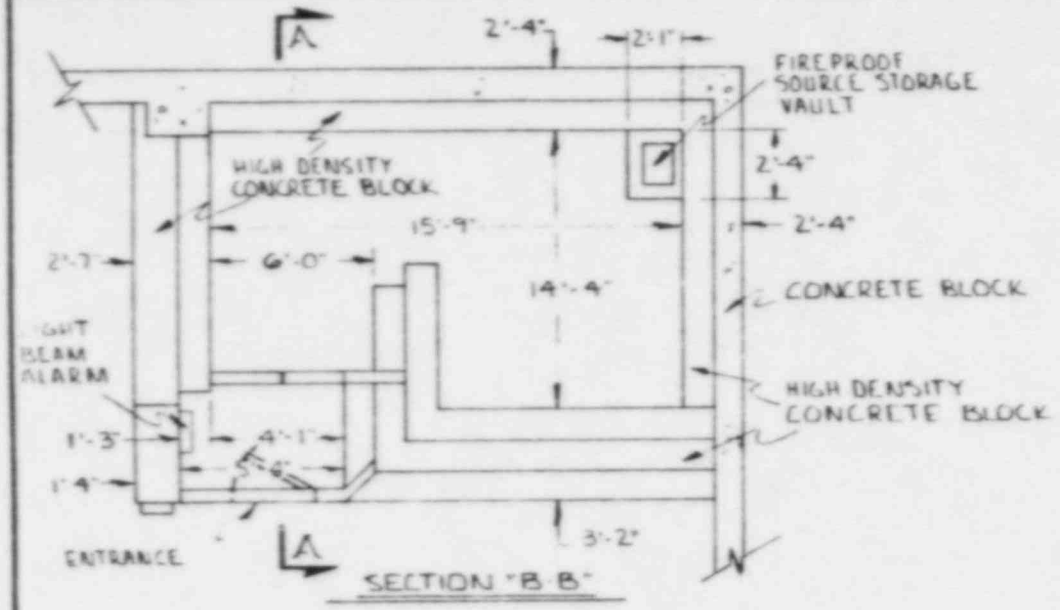
ALICIA RESEARCH & TESTING LABS INC
WEST CREEK, NEW JERSEY

SCALE NONE	APPROVED BY:	DRAWN BY: MF OBERSTADT
DATE 10-1-84		

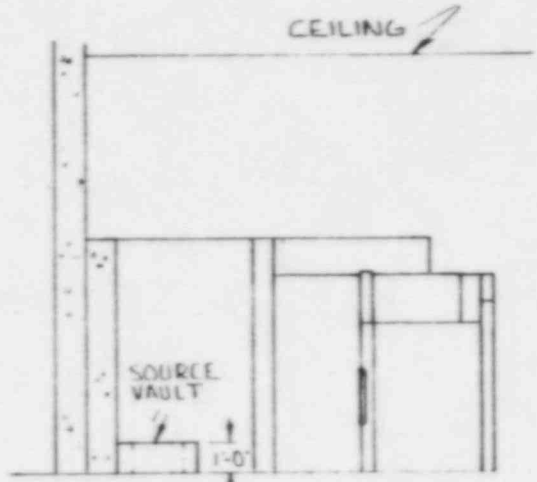
GENERAL OFFICE FLOOR PLAN

ART-0010

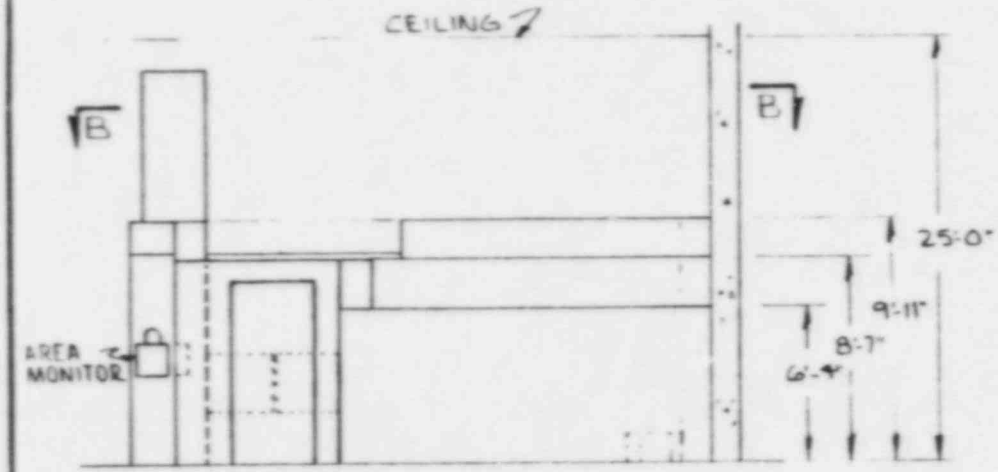
GARDEN STATE PARKWAY
RIGHT-OF-WAY



SECTION "B-B"



SECTION "A-A"



FRONT ELEVATION

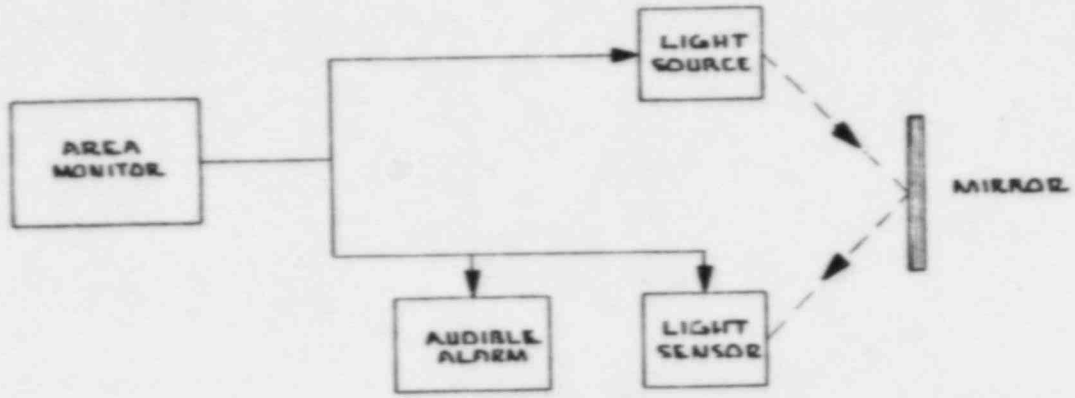
ALICIA RESEARCH & TESTING LABS. INC.
WEST CREEK, NEW JERSEY

SCALE NONE	APPROVED BY	DRAWN BY: MF DOCUMENT
DATE 10-1-84		

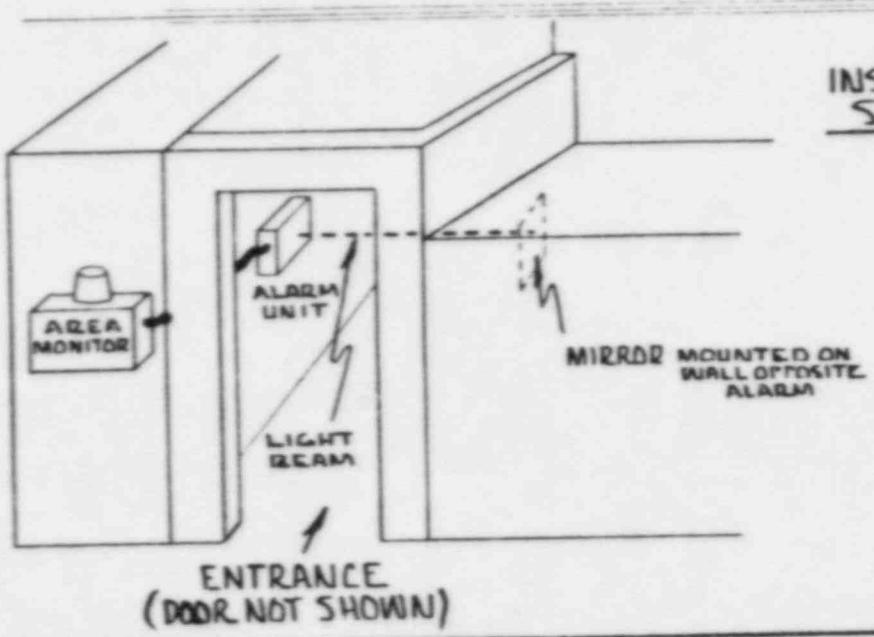
— RADIOGRAPHY LABORATORY —

DRAWING NUMBER: ART-0001

CIRCUIT DIAGRAM



INSTALLATION SKETCH



ALICIA RESEARCH & TESTING LABS. INC.
WEST CREEK, NEW JERSEY

SCALE NONE	APPROVED BY	DRAWN BY MC OBERSTADT
DATE 10-1-84		

ALARM SYSTEM

DRAWING NUMBER
ART-0002

492 series Gammalarm Radiation Monitors

Description

The Model 492D Gammalarm is a rugged radiation monitoring device which provides a continuous, highly visible indication of the environmental radiation field. The SAFE condition (which is indicated by a continuous green light) can be pre-set to trip to the HAZARD condition (a flashing red light) from approximately 1 mR/hr. to 50 mR/hr. by means of an internal potentiometer adjustment. The red light flashes at a rate of approx. 60 flashes per minute.

The 492D housing is an aluminum splashproof case and the circuitry is designed for "fail-safe" operation. Failure of any signalling element either turns on the red warning light or turns off both lights to alert the radiographer. *(The green light, therefore, not only shows that the radiation level is safe, but shows the system circuitry to be functioning normally.)* All components in the 492D are conservatively rated for long life—maintenance is generally limited to simple lamp replacement and periodic detector level (or sensitivity) adjustment. Because the Gammalarm is a compact 6" D × 13" H × 12" W weighing only 12 pounds (5.4Kg), it can be shelf mounted or set on any relatively flat surface for quick, easy installation.

Auxiliary connector sockets are incorporated in the Gammalarm to facilitate the addition of options such as a slave unit, additional light flashers, audible alarms, automatic door locks, etc. Over 1,000 installations in all types of industry show the Gammalarm to be a leading monitor for radiation control.

Features

Proven high reliability:
Circuitry provides virtually trouble free and highly stable operation.

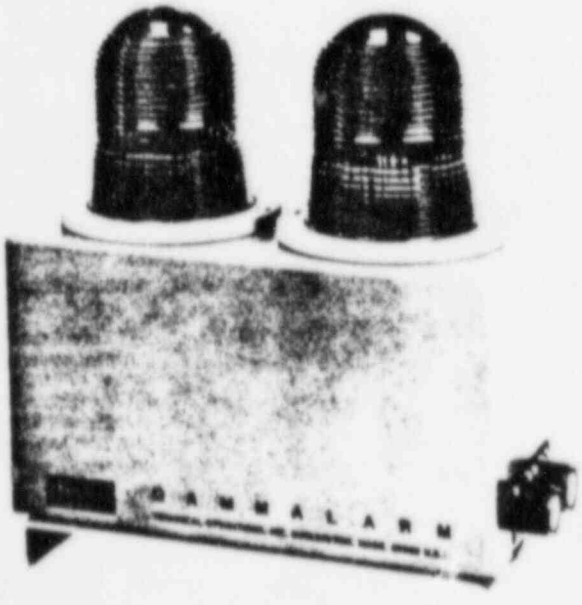
Rugged construction:
Case made of aluminum together with heavy duty glass light domes for industrial environments.

Fail Safe:
A small "keep-alive" Cesium^{137} isotope source (license-exempt) provides a constant monitor for the Geiger Mueller tube, so that any circuit breakdown is immediately detected and indicated by the red light flashing, or both lights switching off.

Maintenance Free:
Maintenance is generally limited to lamp replacement and sensitivity adjustment.

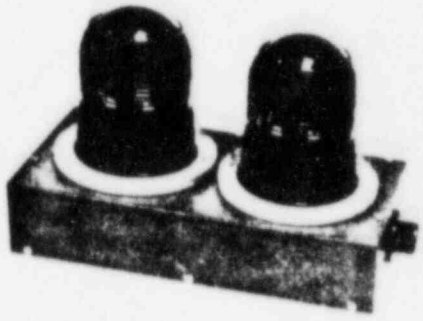
Complete System Options:
Auxiliary devices such as slave units, additional light flashers, audible alarms (both short interval and continuous) and automatic door locks can be easily connected to the main Gammalarm monitor.

Proven Performance:
Installations in many different applications world-wide make the Gammalarm a leader in Radiation Monitoring Devices.

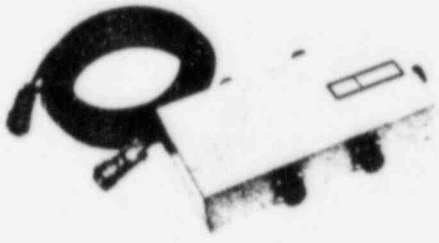


492D GAMMALARM

Options



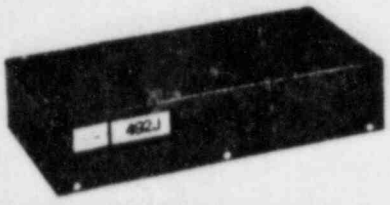
492E Dual Light Flasher This attachment connects directly to the 492D Gammalarm by electrical cable for remote signalling of the radiation field level. This "slave" unit, also has a rugged (steel) case with glass RED and GREEN light domes.



492K Junction Box. This unit, when used in conjunction with the 492D Gammalarm, allows for operation of up to 4 separate 492E Dual Light Flashers off of a single Gammalarm.

492G, 492H Audible Alarm This option is connected to the Gammalarm to provide an audio indication when the pre-set detection level has been reached. Suitable adjustment of the volume is accomplished with a potentiometer. The "alert" signal can be continuous or if specified, can be supplied with a short initial warning and then revert to a lower volume, or stop. Special alternatives are available to suit individual preference. (See specifications)

Radiation Products Division
Northwest Industrial Park
Burlington, MA 01803 USA
Telephone (617) 272-2000 or Toll Free 1-800-225-1383

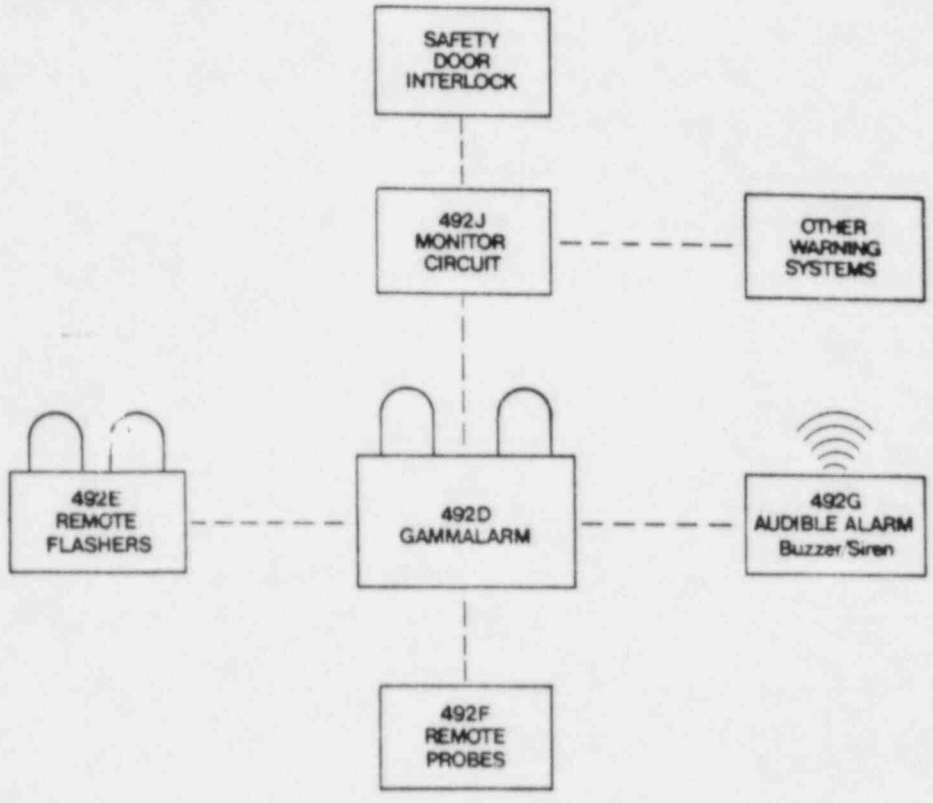


492J Monitor Circuit This special circuit arrangement, which is self contained, is triggered by the 110V provided by the main Gammalarm when in the Red "hazard" condition.

The circuitry provides a number of low voltage (as well as 110V) signals to operate safety devices in the radiography area. These could be horns, door locks, lights or interrupt switches—eg: to prevent the opening of a door to the radiation area.

A typical layout is shown in the illustration.

Suggested System Layout



Special Options are available such as mr/hr meter indicator, face-mounted sensitivity control knob or alternate sensitivity ranges, etc. For fixed installation radiography (rooms) an Automatic Exposure Control is available.

Specifications

492D

		Metric Equivalents
Internal Source	Cesium[137] (license-exempt-9μci)	
Detector	G-M Tube	
Detection Range Adjustment	1mR/hr —50 mR/hr	
Radiation Detected	Gamma (80 KV to 1.5MEV)	
Red (Hazard) Bulb	150W 115 VAC	
Green (Safe) Bulb	15W 115 VAC	
Red Flashing Rate	Approx. 60 Flashes/minute	
Case	Aluminum	
Height	13"	*33 cm*
Depth	5.75"	*14.6 cm*
Width	12" (w/case)	*30.5 cm*
Weight	12 lbs	*5.4 Kg*
Supply Voltage	115 VAC 60 c/s (220/240v 50 c/s optional)	

492E

Red (Hazard) Bulb	As Above	
Green (Safe) Bulb	As Above	
Case	Steel	
Height	8"	*22.9 cm*
Depth	6"	*15.2 cm*
Width	12"	*30.5 cm*
Weight	8 lbs	*3.6 Kg*

(Includes 25' Connecting Cable)

492G

Buzzer with 10 second loud warning before reverting to lower volume or off.

Case	Steel	
Length	5"	*12.7 cm*
Width	3"	*7.6 cm*
Height	4.3"	*10.8 cm*
Weight	2 lbs	*.9 Kg*

(Includes 6' Connecting Cable)

492H

As above but with adjustable initial warning signal period (0.5–30 sec.) before reverting to lower volume or off.

492J

Case	Steel	
Length	12"	*30.5 cm*
Width	6" (case only)	*15.2 cm*
Height	3"	*7.6 cm*
Weight	5.5 lbs	*2.5 Kg*

(Includes 6' line Cable)

492K

Case	Steel	
Length	12"	*30.5 cm*
Width	6"	*15.2 cm*
Height	3"	*7.6 cm*
Weight	6-1/4 lbs	*2.8 Kg*

(Includes 25' Connecting Cable)

Ordering Information

TO 492D	Gammalarm Radiation Monitor with detector level factory-set to 2 mR/hr. (Please specify other setting if required)
TO 492E	Dual light flasher for connection to 492D.
TO 492G	Fixed Time Audible Signal (Buzzer) for connection to 492D.
TO 492H	Variable Time Audible Signal (Buzzer) for connection to 492D.
TO 492J	Safety Monitor Circuit.
TO 492K	Junction Box Assembly.
NOTE:	For combination options, simply show necessary letters after number. EXAMPLE: 492DEJ . . . Gammalarm with slave unit and safety monitor circuit.
TO 492D/S	Gammalarm with special options (please describe option in full). EXAMPLE: 492D/S . . . Gammalarm with detector level adjustment on outside and 0–50 mR/hr. meter indicator.

U. K. Sales office
Tech/Ops Ltd. Radiation Products Division, Unit 1, Whitworth Road, Armstrong Industrial Estate, Washington, Tyne & Wear, NE 37 1PP, ENGLAND

Alicia Research & Testing Labs, Inc.

ITEM 10

10. RADIATION SAFETY PROGRAM

Refer to "Radiation Safety and Control Manual" Documented in Book No. 2 of this application.

Procedure ART-NDE/A-RSC-01 dated 3/5/84.

03706

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: 5-31-87

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)*

- [X] A. NEW LICENSE
- [ ] B. AMENDMENT TO LICENSE NUMBER _____
- [ ] C. RENEWAL OF LICENSE NUMBER _____

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

Alicia Research & Testing Labs, Inc.
Stafford Forge Rd. RR1 Box 150AA
West Creek, N.J. 08092

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

Alicia Research & Testing Labs, Inc.
Stafford Forge Road RR1 Box 150AA
West Creek, N.J. 08092

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Michael Kozak, President

TELEPHONE NUMBER: (609) 296-0800

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: By-product material
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
Michael Kozak	Michael Kozak	President	4/17/85

14. VOLUNTARY ECONOMIC DATA

a. ANNUAL RECEIPTS

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

b. NUMBER OF EMPLOYEES *(Total for entire facility excluding outside contractors)*: (6) Six

c. NUMBER OF BEDS: N/A

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)*

[X] YES [ ] NO

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS	APPROVED BY
			"OFFICIAL RECORD COPY" 03706	

AMOUNT RECEIVED	CHECK NUMBER	DATE
		APR 23 1985

ML10

Alicia
Research &
Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Book No. 2

03706

ART-5

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item 10 - Radiation Safety Program

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

ATTACHMENTS

SECTION 1	No. 1	R.S.C. Manual Receipt ART-188
SECTION 2	No. 2	Organization Chart
SECTION 2	No. 3	Resume R.S.O.
SECTION 2	No. 4	Resume V.P. Training & Education
SECTION 3	No. 5	Sample Calibration Data Sheet
SECTION 3	No. 6	Description of Calibration Procedure
SECTION 6	No. 7	Radiation Survey Report - ART 261
SECTION 6	No. 8	Current Occupational External Radiation Exposure ART-187
SECTION 6	No. 9	Utilization Log ART - 257
SECTION 6	No. 10	Occupational External Radiation Exposure History ART - 186
SECTION 6	No. 11	Source Receipt/Transfer/Disposal Leak Test Report ART - 259
SECTION 6	No. 12	Radiographic Survey Report/Safety Report ART-258
SECTION 6	No. 13	Radiation Safety Internal Audit Form ART-262
SECTION 6	No. 14	Management Inspection ART-260
SECTION 8	No. 15	ART-ASNT/A PQC-01 "Personnel Qualification & Certification for N.D.E.
SECTION 8	No. 16	ART-TP 2 Training Course on Radiography Testing
SECTION 10	No. 17	ART-QCA-15-01 "Control of Nonconformances"

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item 10 - Radiation Safety Program

Section 1 - General Policy

SECTION 1 - GENERAL POLICY

1.0 GENERAL POLICY:

1.1 Purpose

1.1.1 The procedures set forth herein are designed to control the use of radioactive isotopes and other radiation producing equipment within Alicia Research & Testing Labs, Inc.

1.1.2 A copy of this procedure will be given to all employees in any way concerned with radiation sources or equipment. The Receipt Form (Attachment #1) must be signed by the employee before the employee will be permitted to participate in performing radiography. The signed copy will be kept on file by the Radiation Safety Officer.

1.1.3 Alicia Research & Testing Labs, Inc. employees must have a copy of this procedure in their possession when using radioactive isotopes or radiation producing equipment.

1.1.4 Radiation producing equipment and/or radioactive isotopes, in common with such industrial hazards as toxic chemicals, combustible materials and high voltage electricity, are capable of inflicting boidly harm if used improperly or without due regard to safety. Safety is your job.

1.1.5 Requirements of the Nuclear Regulatory Commission (NRC) together with individual state regulations regarding control of by-product materials or any specific isotopes have been used as guides in establishing these standing instructions. These governing bodies in their regulations and instructions have as their prime objective the protection of health and prevention of accidents. Your objective must be the same; your job or even your life may be dependent upon your knowledge of these instructions.

1.1.6 The NRC and/or individual state control have the authority to modify, suspend or revoke licenses or take other action deemed proper and necessary to meet their objectives. These standing instructions must be followed explicitly.

SECTION 1 - GENERAL POLICY

1.1.7 Violation of the conditions and regulations set forth herein, by any employee, is considered just cause for punitive action.

1.2 Definitions

1.2.1 For the purpose of these procedures, the following definitions apply:

1.2.1.1 Chamber, Ionization: An instrument designed to measure a quantity of ionizing radiation in terms of the charge of electricity associated with ions produced within a defined volume.

1.2.1.2 Collimator: A device for confining the elements of a beam within an assigned solid angle.

1.2.1.3 Curie: The special unit of activity. One curie equals 3.7×10^{10} nuclear transformations per second. (Abbreviated Ci.) Several fractions of the curie are in common usage:

(a) Millicurie: One-thousandth of a curie (3.7×10^{7} disintegrations per second). Abbreviated mCi.

(b) Microcurie: One-millionth of a curie (3.7×10^{4} disintegrations per sec.) Abbreviated μCi.

1.2.1.4 Cumulative Dose (Radiation): The total dose resulting from repeated exposures to radiation.

1.2.1.5 Dosimeter: Instrument to detect and measure accumulated radiation exposure. In common usage, a pencil-size ionization chamber with a self-reading electrometer, used for personal monitoring.

1.2.1.6 Film Badge: A pack of photographic film which measures radiation exposure for personnel monitoring. The badge may contain two or three films of differing sensitivity and filters to shield parts of the film from certain types of radiation.

03706

SECTION 1 - GENERAL POLICY

1.2.1.7 Leak Test: A test on sealed sources to assure that radioactive material is not being released.

1.2.1.8 Milliroentgen (mR): A submultiple of the roentgen, equal to one-thousandth of a roentgen. (See Roentgen)

1.2.1.9 Monitoring: Periodic or continuous determination of the amount of ionizing radiation or radioactive contamination present in an occupied region.

1.2.1.10 Radiation Area: Any area, accessible to personnel, in which there exists radiation, originating in whole or in part within licensed material, at such levels that a major portion of the body could receive in any one hour a dose in excess of 5 millirem, or in any five consecutive days a dose in excess of 100 millirem.

1.2.1.11 High Radiation Area: Any area accessible to personnel in which there exists radiation originating in whole or in part within licensed materials at such levels that a major portion of the body could receive in any one hour a dose in excess of 100 millirem.

1.2.1.12 Radiographer: Any person who performs or personally supervises radiographic operations and who is responsible for compliance with NRC regulations and conditions of the license.

1.2.1.13 Radiographer's Assistant: Any individual who, under the personal supervision of a radiographer, uses radiographic exposure devices, sealed sources or related handling tools or radiation survey instruments in radiography.

1.2.1.14 Radiographic Exposure Device: Any instrument containing a sealed source fastened or contained therein, in which the sealed source or shielding thereof may be moved, or otherwise changed from a shielded to an unshielded position for purposes of making a radiographic exposure.

SECTION 1 - GENERAL POLICY

1.2.1.15 Rem: The measure of the dose of any ionizing radiation to body tissue in terms of its estimated biological effect relative to a dose of one roentgen (r) or x-rays equals one rem. One milliroentgen (mr) of x-rays equals one mrem (0.001 rem).

1.2.1.16 Roentgen: A unit of exposure to ionizing radiation. It is that amount of gamma or x-rays required to produce ions carrying 1 esu of charge in one cubic centimeter of dry air under standard conditions.

1.2.1.17 Sealed Source: Any by-product material that is encased in a capsule designed to prevent leakage or escape of by-product material.

1.2.1.18 Storage Container: A device in which sealed sources are transported or stored.

ATTACHMENT # 1

Alicia Research & Testing Labs, Inc.

QA, QC, NDE
Research and Development

Stafford Forge Road RRI Box 150 AA
West Creek, New Jersey 08092
(609) 296-0800

SUBJECT: R.S.C. Manual Receipt

Gentlemen:

I have received a controlled copy of the Alicia Research & Testing Labs, Inc. Radiation Safety and Control Manual #ART-NDE/A-RSC-01, Rev. 0, No._____.

My signature attests to the fact that I have received, read and am in full agreement with the requirements in the Radiation Safety and Control Manual.

_____
Signature

_____
Date

_____
Radiation Safety Officer

Alicia Research & Testing Labs, Inc.

QA, QC, NDE
Research and Development

Stafford Forge Road RRI Box 150 AA
West Creek, New Jersey 08092
(609) 296-0800

Attachment 3

Resume of Radiation Safety Officer

Jack Miller

Alicia Research & Testing Labs, Inc.

Alicia Research & Testing Labs, Inc.

Training/Experience (Appendix D)

NAME: Jack Miller (051-07-3160)
Radiation Safety Officer

TRAINING: Refer to resume attached

EXPERENCE:

N.Y. Testing Labs, Westbury, New York	Radiographer	1952-1965
Consolidated Testing New Hyde Park, New York	Radiographer	1965-1966
General Magnaplate Linden, New Jersey	Radiation Safety Officer Radiographer Prepared NRC license	1966-1970
Int'l Testing Newark, New Jersey	Radiation Safety Officer Radiographer Prepared NRC license	1970-1976
Cornell/Underhill Hoboken, New Jersey	Q.A. Manager Radiation Safety Officer Prepared NRC license	1978-1979
Peabody/Magnaflux Little Ferry, New Jersey	Radiographer Asst. Lab Manager	1976-1978

3706

ART-5

Advanced Research & Testing Labs, Inc.

PERSONAL RESUME

NAME: Jack Miller

ADDRESS: 3105 Brighton 3rd St.
Brooklyn, NY 11235

PHONE NO.:

SOC. SEC. NO.: 051-07-3160

DATE OF LAST EYE EXAMINATION: 3-6-84

SUBMITTED FOR POSITION AS:
QA, QC, NDE Mechanical Inspector - Level II

EDUCATION

SCHOOL	LOCATION	COURSE	DATE	DEGREE

EDUCATION -- Columbia University, New York

TRAINING/COURSES COMPLETED

METHOD	COURSE DESCRIPTION	EMPLOYER/SCHOOL	HOURS
RT	NAV 250-1500-1	New York Testing/Ebasco Services	40
RT	RADIATION SAFETY	Int'l Testing/Picker X-ray	40
RT	NASA SPEC.	New York Testing/Lockheed	16
RT	ALUM CASTING	Gen'l X-ray/Republic Aircraft	16
UT	ASME CODE	Gen'l Magnaplate/Automation Ind.	40
PT	MIL-STD-271	Consul. Testing/Magnaflux Corp.	20
MT	MIL-STD-271	Consul. Testing/Magnaflux Corp.	20

WORK EXPERIENCE (SEE ATTACHED SHEET)

The above information is, to the best of my knowledge, true and accurate.

Jack Miller

DATE

AR&TL - LEVEL III - SIGNATURE

EMPLOYEE SIGNATURE

WORK EXPERIENCE

METHOD	QUAL. LEVEL	CODE/STD./SPEC.	EMPLOYER	FROM	TO
QA/QC/ NDE	Level III	ANSI-N.45.2.6 ANSI-N.45.2.23 ASME SEC. III ASME SEC. XI	UNIVERSAL TESTING LABS A) LEAD AUDITOR B) SUSQUEHANNA STEAM/ELECTRIC C) QUALITY ASSURANCE ENGINEER	1981	1983
QA/QC/ NDE	Level III	ANSI-N.45.2.6 10 CFR 50 ANSI-N.45.2.23	UNIVERSAL TESTING LABS A) Q.A. ENGINEER (NUCLEAR) B) CON ED-NUCLEAR UNIT II (IND. PT.,NY)	1980	1981
RT	Level III	SNT-TC-1A (75)	C) ASS'T Q.A. COORDINATOR (NUCLEAR)		
RT,PT VT,MT QA/AC/NDE	Level III	ASME CODE GENERAL ELECTRIC	CORNELL & UNDERHILL A) Q.A. MANAGER	1978	1979
PT,RT MT	Level III	MIL-STD-271 ASME CODE	PEABODY/MAGNAFLUX A) ASS'T LAB MANAGER B) SALES MANAGER C) FIELD ENGINEER	1976	1978
RT,MT PV,VT	Level III	MIL-STD-271 ASME CODE F.A.A. N.R.C.	INT'L TESTING LABS A) LAB MANAGER B) RADIATION SAFETY OFFICER	1970	1976
RT,MT PT,VT	Level III	MIL-STD-271 ASME CODE F.A.A./N.R.C.	GEN'L MAGNAPLATE CORP. A) LAB MANAGER B) RADIATION SAFETY OFFICER	1966	1970
RT,MT PT,NDE	Level II Level II	NAV 250-1500-1 LOCKHEED/NASA	CONSOLIDATION TESTING A) ASS'T LAB MANAGER	1965	1966
RT,PT, VT,MT QA/QC/ NDE	Level II Level II	NAV 250-1500-1 ANSI-N.45.2.6 WESTINGHOUSE NAV 250-1500-1 ASME CODE	NEW YORK TESTING LABS A) CON EDISON - NUCLEAR (2) B) BROOKHAVEN - NUCLEAR (1) C) GEN'L DYNAMICS-NUCLEAR (10) D) WESTINGHOUSE-NUCLEAR (1)	1952	1965
NDE	Level II	LOCKHEED/NASA	E) LAB MANAGER		
RT	Level II	General Electric	GEN'L X-RAY LABS A) LAB SUPERVISOR	1950	1952

Alpha Research & Testing Labs, Inc.

EXPANDED RESUME

JACK MILLER - NUCLEAR QUALITY ASSURANCE - 1981 to 1983

1981 - CON EDISON INDIAN POINT GENERATING STATION
UNIT 2 - BUCHANAN, NEW YORK

ASSIGNMENT: NUCLEAR QUALITY ASSURANCE

PROJECTS:
1. Revised and updated CON EDISON QUALITY ASSURANCE MANUAL FOR NUCLEAR POWER PLANTS for the CONSTRUCTION DEPARTMENT.
2. Revised and updated a TRAINING MANUAL for ISI inspectors in accordance with ASME SECTION XI.
3. Performed audits of subcontractors on site.

1981 - SUSQUEHANNA STEAM AND ELECTRIC - BERWICK, PENNA.

ASSIGNMENT: NUCLEAR QUALITY ASSURANCE.

PROJECTS:
1. Inspected a CRD tubing in UNIT 1 and awarded certification as an INSPECTOR.
2. Performed in-depth audit of PEABODY TESTING RADIATION procedures in accordance with NRC requirements.
3. Performed audit of GENERAL ELECTRIC ULTRASONIC procedures.
4. Performed audit of NUCLEAR ENERGY SERVICES ULTRASONIC procedures.
5. Evaluated radiographs accepted by BECHTEL QUALITY CONTROL on a regular spot check basis.

1982 - SUSQUEHANNA STEAM AND ELECTRIC - UNIT 1 - BERWICK, PENNA.

ASSIGNMENT: NUCLEAR QUALITY ASSURANCE

PROJECTS:
1. Evaluated approximately 6000 radiographs for penny enhancement as a requirement of NRC BULLETIN.
2. Compiled a 40 hour training program for VISUAL EXAMINATION in accordance with ASME SECTION X1 including questions and answers for LEVEL I, LEVEL II and LEVEL III nuclear inspectors.
3. Maintained records of approximately 25 NDE inspectors including testing of personnel in MT, PT, RT, UT, and VISUAL methods.

4. Completed approximately 25 audits of subcontractors on site.

5. Organized and created test papers for NDE methods in accordance with SNT TC IA975) edition for LEVEL I, LEVEL II and LEVEL III.

1983 - SUSQUEHANNA STEAM AND ELECTRIC - UNITS 1 and 2
BERWICK, PENNA.

ASSIGNMENT: NUCLEAR QUALITY ASSURANCE

PROJECTS:

1. Performed monthly evaluation of radiographs accepted by BECHTEL QUALITY CONTROL (10%).

2. Maintained records and tested personnel by written examination (GENERAL, SPECIFIC and PRACTICAL) for those personnel whose certifications had expired, such as MT, PT, RT, and VISUAL and the use of TRAINING MODULES.

3. Performed audits under supervision of PP&L AUDIT TEAM LEADERS.

4. Temporary assignment to INDIAN POINT for compiling a training program for CON EDISON inspectors.

5. Temporary assignment to UNIVERSAL TESTING LABS for training and written examinations in RADIOGRAPHIC EXAMINATION method LEVEL III with a passing grade of 90%.

6. Temporary assignment to UNIVERSAL TESTING LABS for training and written examinations in accordance with ANSI 45.2.6. Completed tests with a passing grade of 88% for LEVEL III certification.

7. Performed audit of BECHTEL QUALITY ASSURANCE program.

8. Performed audit of PEABODY TESTING QUALITY ASSURANCE program.

9. Witnessed ON SITE inspections of LIQUID PENETRANT and ULTRASONIC inspections performed by GENERAL ELECTRIC, PEABODY TESTING, and NUCLEAR ENERGY SERVICES. Witnessed calibration of instruments, certification of personnel, and requirement of their QUALITY CONTROL MANUALS.

I certify that the above information is true and correct to the best of my knowledge.

Jack Miller

Alcia Research & Testing Labs, Inc.

Summary:

RADIOGRAPHIC TEST METHOD

Engagement No. 1----------1 year

Engagement No. 2----------6 years

Engagement No. 3----------5 years

Engagement No. 4----------1 year

Engagement No. 5----------13 years

Engagement No. 6----------2 years

TOTAL----------28 Years

Jack Miller
10 Brighton 4 Road
Brooklyn, N. Y. 11235

Assignment Number QB 733

NARRATIVE EXPERIENCE RECORD

Engagement No. 1 - 1977 - 1 year Peabody Testing Services, Little Ferry, N. J.

Job Title - N.D.T. Field Engineer

NDT METHOD
RADIOGRAPIC TEST

Duties: Ascertain type of radiography required including Radiation Service in the field site, as well as lab. site.
Create shooting sketches, and techniques.

Funtions: Liazon between the customer purchase order and completed N. D. T. process and N.D.T. specialist.

Level of Responsibility: Evaluate defects against acceptance standards. Make sure that technicians follow requirements of purchase order.

Procedure: Update radiographic procedures to reflect latest revisions. Create original procedures for all types of configuration that require radiographic techniques.

Specifications:

ASME Sect. 8	NTR-1D
ASME Sect. 5	Nav-0900-003-9000
MIL-STD-271E	MIL-C-6021
ASTME 155	API-1104
ASME Sect.3	

Materials: Involved with the following materials:

a. Aluminum
b. Steel
c. Carbon Steel
d. Titanium
e. Wood
f. Silver/Bronze Braxing
g. Honeycomb
h. Solder

Equipment Used:
1100 Curies Cobalt 60 Tech ops
100 Curies Iridium 192 Tech ops
200KV-5MA- Boltcspot X-Ray
300KV-15MA-Explorer EX-Ray

Engagement No. 2 - International Testing Labs, Newark, New Jersey

Apex Research & Testing Labs, Inc.

1970 thru 1976 - 6 years

RADIOGRAPHIC TEST METHOD

Job Title: Manager - Non-destructive Testing

Duties: Organized and built the original X-ray department. Trained personnel to operate equipment, Wrote procedures for all specs. including acceptance standards. Set-up shooting sketches, wrote opearting and emergency procedures for x-ray and alsoisotopes. Originated the first A.E.C. License for the company.

Accepted work in to the company in accordance with P. O. requirements.

Wrote a manual that was approved by the F.A.A. resulting in a F.A.A. Repair Station Status.

Was in complete charge of the x-ray department for 6 years.

Function: Chief inspector for all radiographic requirements.

Levels of Responsibility: My level of reaponsibility was to oversee the department maintain the S.N.T. Code of Ethics by personnel under my supervision, and sign all reports.

Procedures Used: MIL-STD-453

Specification Used:

MIL-STD-271D
NAV-0900-003-9000
NAV-250-692-2
API-1104
API-650
MIL-STD-248
MIL-STD-278
ASTM-155
ASME-Sect 8
ASME-Sect 5
ASME-Sect 3
NAV-250-1500-1
AMS 2645

Materials:

Aluminum
Stainless Steel
Carbon Steel
Iron
Wood
Titanium
Concrete
Solder
Silver/Bronze Brazing
Copper Nickel

Equipment Used:

Tech-ops Iridium 192 100 Curies
Tech-ops Cobalt 60 100 Curies
Androx 250 KV-8MA.
Kodak AA, M, T, R, Films
Gevaert D2 Film

Atlas Research & Testing Labs, Inc.

Engagement No. 3 - General Magnaplate Corp., Linden, N. J.

1965 - 1970 (5 years)

RADIOGRAPHIC TEST METHOD

Job Title: Manager - Non-Destructive Testing

Duties: Sole responsibility to perform x-ray work in accordance with purchase order requirements. Set safety standards, was responsible for A.E.C. License. Trained personnel in the use of x-ray equipment, signed all reports, and maintained F.A.A. Standards for x-ray.

Function: Chief Inspector. Set-up techniques for all types of radiographic requirements. Training of Personnel.

Level of Responsibility: Responsible for all R.T. Requirements, nuclear, F.A.A. including signing of all reports. Approved by Electric Boat

Procedure Used: R.T. Procedures in accordance with MIL-STD-271D, NAV-Ships-250-1500-1, ASME Section 3.

Specification Used:

MIL-STD-453
ASME Section 8
ASME Section 5
ASME SECTION 3
MIL-STD-271D
NAV-0900-003-9000
NAV-250-1500-1
AMS 2645
API 1105
API 650
ASTME 155
MIL-C-6021

Materials:

Aluminum
Carbon Steel
Stainless Steel
Copper Nickel
Wood
Titanium
Silver/Bronze Brazing
Copper Braze
Silicon

Equipment Used:

Techops Cobalt 60
Techops Iridium 192
Branson 200KV-8MA
G.E. 250KV-15MA
Branson 140KV-5MA

Films: Kodak AA-T-M-R
Gaveart - D2 Single Coat

Engagement No. 4 - Consoli[illegible]ed Testing, New Hyde Park, N. [illegible]

Apeda Research & Testing Labs, Inc.

1964 - 1965 (1 Year)

Radiographic Test Method

Job Title:	N.D.T. Assistant to Manager
Duties:	Sales Engineer. NAV-250-1500-1 Film reader MIL-STD-750 Film reader (Nassa-Lockheed)
Function:	Evaluated job requirements
Level of Responsibility:	Liazon between client and lab.
Procedure Used:	Radiographic Test Methods Semi-conductors Carbon Nickel Castings Aluminum Castings Weldments
Specifications Used:	MIL-STD-271D NAV-250-1500-1 MIL-STD-750 API-1105 API 650 MIL-C-6021 ASME Section 8 ASME Section 3
Materials:	Carbon Steel Stainless Steel Aluminum Semi-Conductors Silver/Braze Copper/Braze Carbon Nickel
Equipment:	100 Curies Iridium 182 50 Curies Cobalt 60 300 KV-15 MA General Electric 200 KV-FMA-Branson Films: Kodak AA-T-M-R Gaveart D2 Single Coat

Engagement No. 5 - New Yo[illegible] Testing Labs., Westbury, Long [illegible]and, N. Y.

Ajax Research & Testing Labs, Inc.

1951 - 1964 (13 Years)

Radiographic Test Method

Job Title:	Manager - Non-destructive Testing
Duties:	Train personnel. Film read for carbon nickel castings. Nav-ships 250-1500-1 radiographic supervisor. Film reader for Nasa and Lockheed semi-conductors. Created shooting sketches for carbon nickel castings for Electric Boat, Mare Island, and Westinghouse. Polaris Submarine Castings, Nautilis Submarine Program.
Function:	Supervise personnel for R.T. of Cu/Ni Castings. Training program. R.T. of semi-conductors. Liazon between client and lab. Sale responsibility for Radiographic Test Methods.
Level of Responsibility:	Responsible to President of Company.
Procedures Used:	Radiographic Test Methods. X-Ray of semi-conductors X-Ray of cu/ni castings Basic R.T. Test Method For x-ray machines Basic R.T. Test Method For Isotopes Electric Boat Procedures Westinghouse Procedures Military Standards AMS ASTM
Specifications Used:	Nav 250-1500-1 Nav 250-692-13 API 1104 API 650 ASME Section 8 Nasa Lockheed Electric Boat MIL-STD 453 MIL-16865
Materials:	Carbon Nickel Stainless Steel Ferris Carbon Steel Wood Art Paintings Semi-conducted material Concrete Lead Film Emulsions
Equipment:	100 Curies Iridium 192 50 Curies Cobalt 60 300 KV-15MA-General Electric Andrex-250KV-8MA Film: Gevaert Dt, D4,D2,SC Kodak AA

Alaska Research & Testing Labs, Inc.

Engagement No. 6 - Superior Bearing and Bronze, Greenpoint, N. Y.

1950 - 1951 (2 years)

Radiographic Test Methods

Job Title:	Supervisor - day, night shift.
Duties:	Trained personnel in use of x-ray machines. Set up R.T. Techniques, created shooting sketches for x-ray, evaluate radiographs for aircraft castings.
Function:	Liazon between film reader and x-ray technicians.
Level of Responsibility:	Responsible to General Manager for radiographic test method using x-ray machines only.
Procedure Used:	General Electric procedures for x-ray of aluminum castings.
Specification Used:	MIL-I-6865 MIL-STD-453
Materials:	Aluminum
Equipment:	General Electric - 250 KV-8MA Film: Kodak AA-M

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item 10 - Radiation Safety Program

Section 2 - Organization

SECTION 2 - ORGANIZATION

2.0 ORGANIZATION:

2.1 Organization Structure

2.1.1 Attachment #2 illustrates the Organizational Chart.

2.2 Responsibilities

2.2.1 The Radiation Safety Officer shall report to the office of the President of Alicia Research & Testing Labs, Inc. and shall be responsible for all activities concerned with receipt, possession, use or transfer of any material licensed pursuant to the regulations of Parts 30 through 35, 40, or 70 of 10 CFR, Chapter 1, in accordance with the rules as delineated in 10 CFR, Part 20 - Standards for Protection Against Radiation. In the absence of the Radiation Safety Officer, the President will assume his responsibilities.

2.2.1.1 The Radiation Safety Officer (R.S.O.) is responsible for overall compliance of these rules and regulations by all concerned. The R.S.O. will serve as a liaison officer with the N.R.C. and/or any individual state and establishes procedures for procurement and disposal of licensed by-product material in accordance with pertinent regulations. He is responsible for dissemination of information relating to regulations and changes thereof in handling of radiation sources and supervises the maintenance of established personnel monitoring program. He maintains the Alicia Research & Testing Labs, Inc. internal inspection system and investigates causes of incidents. He develops preventive procedures and will be responsible for maintaining and revising this procedure.

2.2.2 The Vice President of Training and Education shall be responsible for conducting the training programs, giving the examinations and qualifying radiographers and assistant radiographers.

2.2.3 Radiographers shall have the authority to use and supervise the use of, while in constant attendance at the site, the sealed sources for which the company is licensed or other radiation producing equipment.

2.2.3.1 The Assistant Radiographer shall work with and under the personal supervision of the Radiographer.

2.3 Qualifications

2.3.1 The Radiation Safety Officer shall be a qualified Radiographer with training in the use of the types of equipment employed at Alicia Research & Testing Labs, Inc. He shall have thorough knowledge of management policies, company administrative and operating procedures and safety procedures relating to protection against radiation exposures. (Attachment #3, Resume of the R.S.O.)

2.3.2 The Vice President of Training and Education shall be certified as a Level III in accordance with SNT-TC-1A by examination for all N.D.E. methods which are being instructed at Alicia Research & Testing Labs, Inc. and in addition, shall have a strong background of training and experience with radiation. (Attachment #4, Resume of the Vice President of Training and Education).

2.3.3 The Radiographer shall be certified as a Level II in Radiography after having met the requirements of ART-ASNT/A-PQC-01 which is in compliance with SNT-TC-1A. In addition to the above, he shall have successfully completed the Radiation Safety Course.

2.3.3.1 The Assistant Radiographer shall meet the same requirements as Par. 2.3.3 except he shall be certified as Level I.

2.3.3.2 Radiographers and Assistant Radiographers will be reviewed at sufficient intervals to ensure compliance with N.R.C. regulations and these procedures.

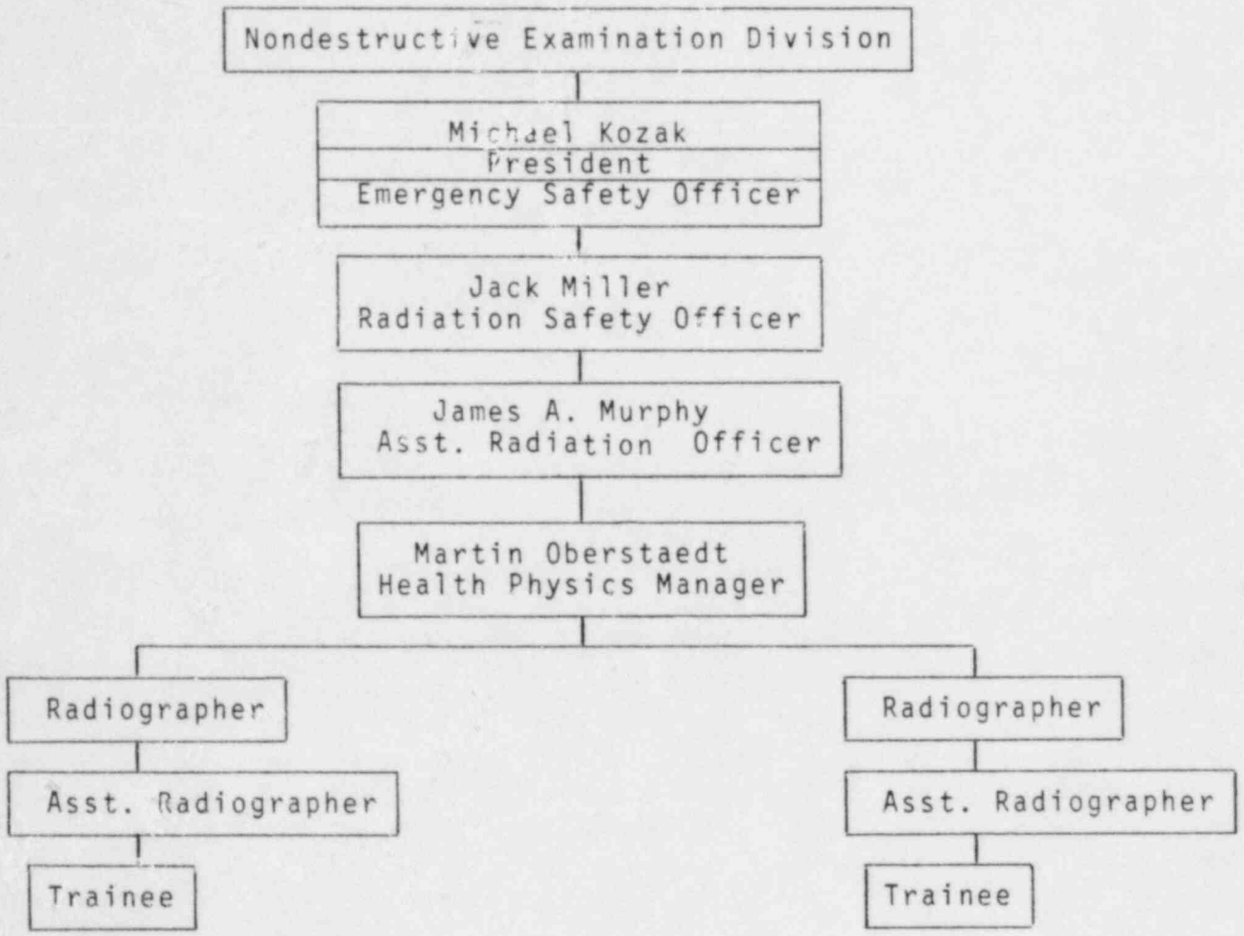
Alicia Research & Testing Labs, Inc.

QA, QC, NDE
Research and Development

Stafford Forge Road RRI Box 150 AA
West Creek, New Jersey 08092
(609) 296-0800

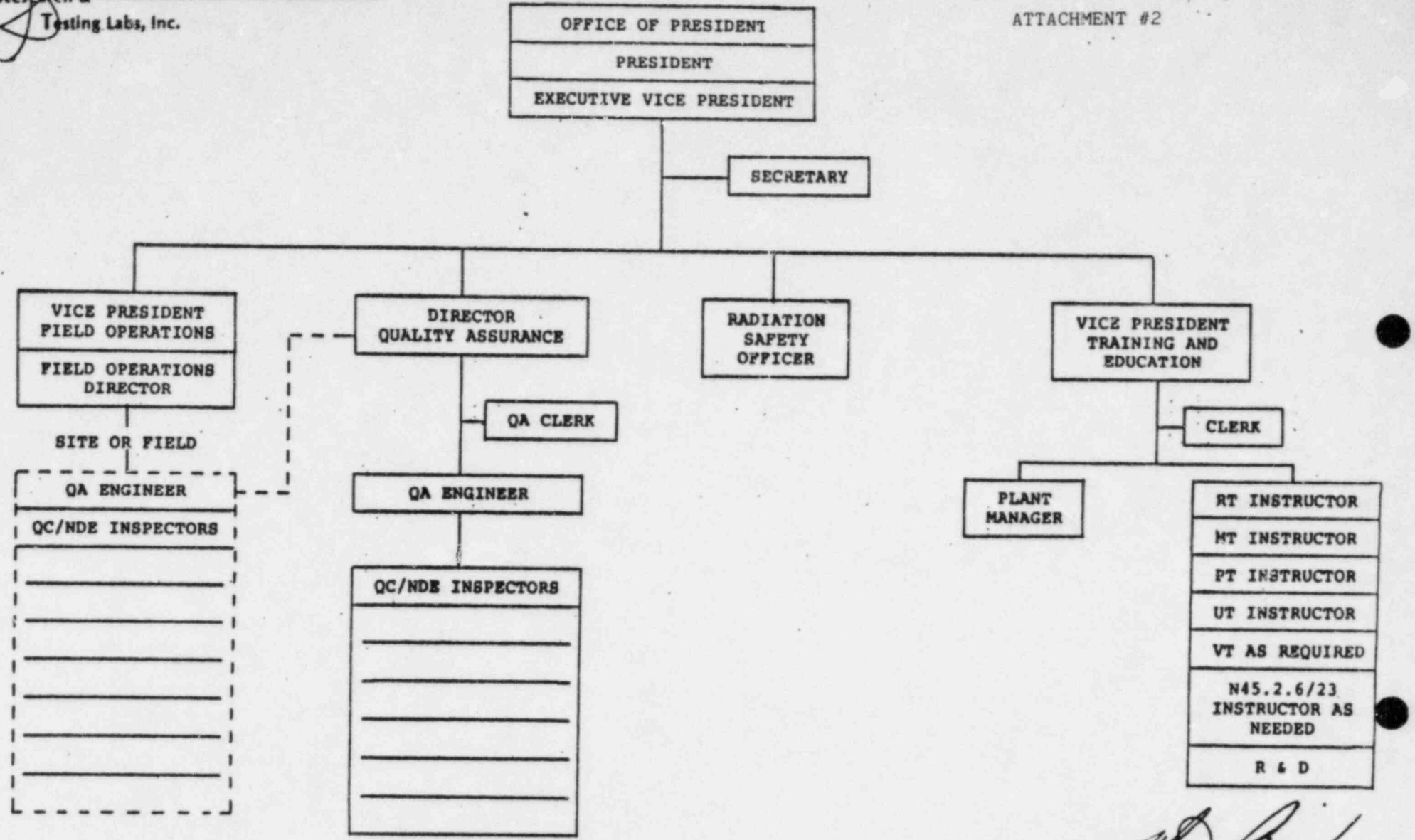
Attachment 2A

Alicia Research & Testing Labs, Inc.
West Creek, N.J.



Alpha Research & Testing Labs, Inc.

ATTACHMENT #2



The site QA Engineer acts as the lead AR&TL individual on site and answers administratively to the VP-FO and functionally to the Director, Q.A.

APPROVED BY: Wm Rogak

DATE: 8/9/82

REV: 0

Alicia Research & Testing Labs, Inc.

QA, QC, NDE
Research and Development

Stafford Forge Road RRI Box 150 AA
West Creek, New Jersey 08092
(609) 296-0800

Attachment 4

Resume Vice President Training/ Education

Michael Kozak

Abcia Research & Testing Labs, Inc.

ATTACHMENT # 3 & 4

SUBMITTED FOR POSITION AS:

Level III Technician/Examiner

PERSONAL RESUME

NAME: Mic[illegible]l Kozak

ADDRESS: 112 Stillwater Road
Barnegat, N. J. 08005

PHONE NO.: (609) 698-2780
SOC. SEC. NO.: 151-38-2483
DATE OF LAST EYE EXAMINATION: December 1982
JAN 10 1984

EDUCATION

SCHOOL	LOCATION	COURSE	DATE		DEGREE
Irvington Tech.High Sch.	Irvington, N. J.	Auto Mech.	1962	1966	
/West Side High School	Newark, N. J.	Diploma		1966	Diploma
Bloomfield Tech.College (Inc. NDE)	Bloomfield, N.J.	Aircraft Mechanics	1966	1967	
Academy of Aeronautics Junior College	Yonkers, N. Y.	A & E Qualification	1967	1968	Diploma
Emery Riddle University	Datona Beach, Fla.	NDE & Helium Mass Spectrometer, Airspace Engineering	1969	1972	
Essex County College	Newark, N. J.	Admin.-Computer & Instrument Reading		1972	

TRAINING

COMPANY / SCHOOL	COURSE DESCRIPTION	NDE METHOD	HOURS
Emery Riddle University	NDE & Helium Mass Spectrometer, Airspace Engineering	Engineering	
Bloomfield Technical College	Welding, etc.		
International Testing Labs	Chemical and Physical Analysis		
International Testing Labs	Tensile and Sun Machines		
General Magnaplate	NDE Training	PT,MT,UT,RT	1 Year
Convair Home Study Courses		PT,MT,UT,RT,EC	

WORK EXPERIENCE (SEE ATTACHED SHEET)

e above information is, to the best of my knowledge, true and accurate.

Oct 27, 1982 — DATE

Wayne Denlinger — AR&T - LEVEL III - SIGNATURE

EMPLOYEE SIGNATURE

ART-112

MICHAEL KOZAK

Ramsey Machine & General Brass Company
(Summers and Evenings - Part Time - 1963 to 1967

Mr. Kozak worked as an operator using Bridgeport milling machines, turret lathes and internal and external grinders from 1963 to 1967. At General Brass, Mr. Kozak was a tool and die trainee.

General Magnaplate Company
1972

Mr. Kozak was employed at General Magnaplate Company where he received his initial work and training experience in NDE. At this firm, he accumulated approximately 2200 hours in UT, PT, RT and MT and was certified to Level II.

International Testing Labs
1972 to 1973

Mr. Kozak was an NDE Manager from 1972 to 1973. As NDE Manager, Mr. Kozak was responsible for the supervision of NDE personnel, preparation of bids and quotations for jobs involving NDE to include manpower estimates and performance of nondestructive examinations. Liquid penetrant, magnetic particle, ultrasonic and radiographic examinations were performed under MIL-Standard 271D and NAVSHIPS 0700-006-8010.

Alicia Research & Testing Labs
June 1973

Mr. Kozak was self-employed at this time and worked for various contractors performing NDE. He performed chemical and physical analysis and subcontracted to Magnaflux Corporation to perform ultrasonic testing on steel pilings under water using diving gear. He also performed under water visual examinations on tankers examining propeller blades 10" thick and 30' in diameter. Mr. Kozak has prepared UT procedures for ABS and Coast Guard for examining propeller shafts using lamb and Raleigh waves and has performed RT examinations under water taking Co-60 and Ir-192 exposures using special techniques. He has also used and prepared procedures for liquid penetrant testing using all types of penetrant. He has performed fluorescent and white light MT examinations using longitudinal, shear, lamb and Raleigh waves, special focus and compound wave, RT examinations using Co-60 and IR-192 sources using special film techniques and eddy current examinations of 1 to 3 inch pipe and condenser tubing using scope and graph techniques. As a contractor to Magnaflux Corporation, Mr. Kozak performed ISI services to Sec. XI of the ASME Code.

Universal Testing Labs, Inc.
1974 to 1982

Mr. Kozak was employed as an NDE Level III Examiner from 1974 until 1982. He is certified in all NDE methods, and his experience includes six nuclear refueling outages in New Jersey and Pennsylvania, etc. Mr. Kozak was also involved in performing ultrasonic testing on feedwater nozzles with Breda Corp. at Vermont Yankee and Three Mile Island, and ultrasonic testing on CRD's and all structures and inservice inspection for Oyster Creek Nuclear Generating Station, utilizing all NDE methods. Mr. Kozak was assigned to the Oyster Creek Nuclear Generating Station for their 1977 refueling outage and was in charge of all ultrasonic testing for inservice inspection. He was also involved in special development of adaptive learning networks for pipe inspection, defect versus geometrical reflectors discrimination in carbon and stainless steel by the variation of the dependence of a reflector on changes in frequencies. Mr. Kozak is certified as an ANSI-N45.2.6, Level III Inspector. Mr. Kozak was involved in R & D work, writing procedures for such work as hydrogen embrittlement, IGSCC, feedwater nozzle inspection graphization, etc. Mr. Kozak was responsible for implementation of all ISI programs at Oyster Creek. As an ISI Engineer, he has written the 90-day inspection reports, and the 10-year ISI inspection program. Mr. Kozak designed and manufactured all the calibration blocks for Oyster Creek and other fossil and nuclear plants. He was also involved in the R & D research with APRI, Columbus, Ohio in the IGSCC (ISI) ultrasonic examination.

PT	4000 Hours
MT	4200 Hours
RT	4000 Hours
UT	10,000 Hours
EC	1000 Hours
Mass Spec.	200 Hours

Alicia Research & Testing Labs, Inc.
Sept. 1982 to Present

Mr. Kozak is presently devoting full time to his own business, Alicia Research & Testing Labs, Inc. As President and Acting Director, Quality Assurance, he is certified in RT, PT, MT and UT, by examination, and also in VT to ANSI-N45.2.6, by appointment.

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item 10 - Radiation Safety Program

Section 3 - Radiation Detection Instruments

SECTION 3 - RADIATION DETECTION INSTRUMENTS

3.0 RADIATION DETECTION INSTRUMENTS:

3.1 Survey Meters

3.1.1 An Eberline Model E-130G Survey Meter designed for use in gamma radiation surveys will be used by Alicia Research & Testing Labs, Inc. for all radiographic and radiation detection operations.

3.1.2 These meters have a range of 0-1000 mr/hr. The instrument has a scale switch with three different ranges from 0-10 mr/hr, 10-100 mr/hr, and 100-1000 mr/hr.

3.1.3 A "battery check" switch provides a quick check on the condition of the batteries. Two "D" size 1.5 volt cells are required to operate these meters and are easily obtainable.

3.1.4 A sufficient number of instruments will be available to ensure that:

3.1.4.1 All radiographic operations are conducted with a calibrated and operable survey meter.

3.1.4.2 All survey meters will be calibrated every three months and after each repair.

3.1.4.3 Spare meters will be available for replacement of any meters broken, lost or inoperative and while meters are being calibrated.

3.1.4.4 If a survey meter becomes inoperable during a field radiography job, operations will be curtailed and the office notified immediately. Operations will be resumed only after a calibrated and operable meter has replaced the inoperable one.

3.1.5 A Victoreen Model 492 Survey Meter may be used as an alternative to the Eberline Model E-130G Survey Meter.

SECTION 3 - RADIATION DETECTION INSTRUMENTS

3.2 Area Monitor

3.2.1 The entrance to the permanent exposure room will be monitored by the Tech/Ops 492 series Gammalarm Radiation Monitors. Refer to attachments.

3.2.2 A visible signal will be actuated by radiation whenever the source is exposed. An audible signal will be actuated whenever an attempt is made to enter the installation while the source is exposed.

3.2.3 This alarm is to be used on exposure rooms that have a door at the entrance. The alarm is mounted stationary on the exposure room in close proximity to the door when in the closed position. A sensor in the alarm detects movement of the door. When power is applied to the alarm and the door is moved, the sensor activates an audible warning.

3.2.4 The audible warning indicated an imminent danger of radiation exposure. The warning will continue until the radiation is eliminated or the door is returned to the closed position.

3.2.5 In order for the alarm system to operate properly, the area monitor must be operating (turned on) and the alarm must be connected to the monitor. Under these conditions, the alarm will sound a warning whenever radiation is present and the door to the exposure room is opened.

Refer to drawing ART-0002 attached

3.3 Calibration

3.3.1 The survey meters will be calibrated at three month intervals, or sooner, in the event it is made or suspected to be inoperative.

3.3.2 The calibration of survey meters will be made by Alicia Research & Testing Labs, Inc. under the supervision of the Radiation Safety Officer. Attachment No. 6, Certification of Calibration.

3.3.3 Repairs to survey meters will be made by the manufacturer.

03706

492 series Gammalarm Radiation Monitors

Description

The Model 492D Gammalarm is a rugged radiation monitoring device which provides a continuous, highly visible indication of the environmental radiation field. The SAFE condition (which is indicated by a continuous green light) can be pre-set to trip to the HAZARD condition (a flashing red light) from approximately 1 mR/hr. to 50 mR/hr. by means of an internal potentiometer adjustment. The red light flashes at a rate of approx. 60 flashes per minute.

The 492D housing is an aluminum splashproof case and the circuitry is designed for "fail-safe" operation. Failure of any signalling element either turns on the red warning light or turns off both lights to alert the radiographer. *(The green light, therefore, not only shows that the radiation level is safe, but shows the system circuitry to be functioning normally.)* All components in the 492D are conservatively rated for long life—maintenance is generally limited to simple lamp replacement and periodic detector level (or sensitivity) adjustment. Because the Gammalarm is a compact 6"D × 13"H × 12"W weighing only 12 pounds (5.4Kg), it can be shelf mounted or set on any relatively flat surface for quick, easy installation.

Auxiliary connector sockets are incorporated in the Gammalarm to facilitate the addition of options such as a slave unit, additional light flashers, audible alarms, automatic door locks, etc. Over 1,000 installations in all types of industry show the Gammalarm to be a leading monitor for radiation control.

Features

Proven high reliability:
Circuitry provides virtually trouble free and highly stable operation.

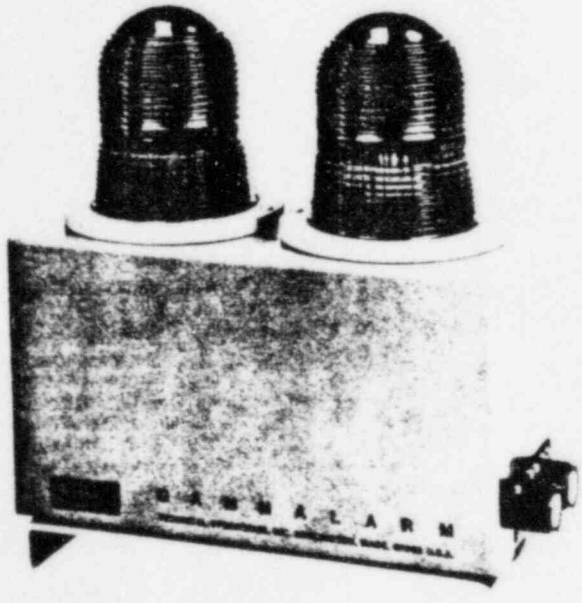
Rugged construction:
Case made of aluminum together with heavy duty glass light domes for industrial environments.

Fail Safe:
A small "keep-alive" Cesium^{137} isotope source (license-exempt) provides a constant monitor for the Geiger Mueller tube, so that any circuit breakdown is immediately detected and indicated by the red light flashing, or both lights switching off.

Maintenance Free:
Maintenance is generally limited to lamp replacement and sensitivity adjustment.

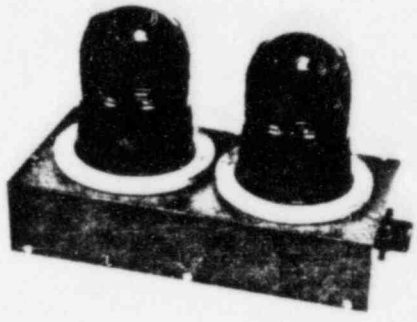
Complete System Options:
Auxiliary devices such as slave units, additional light flashers, audible alarms (both short interval and continuous) and automatic door locks can be easily connected to the main Gammalarm monitor.

Proven Performance:
Installations in many different applications world-wide make the Gammalarm a leader in Radiation Monitoring Devices.

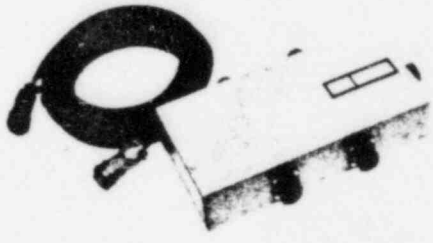


492D GAMMALARM

Options



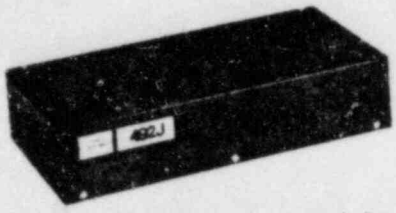
492E Dual Light Flasher This attachment connects directly to the 492D Gammalarm by electrical cable for remote signalling of the radiation field level. This "slave" unit, also has a rugged (steel) case with glass RED and GREEN light domes.



492K Junction Box. This unit, when used in conjunction with the 492D Gammalarm, allows for operation of up to 4 separate 492E Dual Light Flashers off of a single Gammalarm.

492G, 492H Audible Alarm This option is connected to the Gammalarm to provide an audio indication when the pre-set detection level has been reached. Suitable adjustment of the volume is accomplished with a potentiometer. The "alert" signal can be continuous or if specified, can be supplied with a short initial warning and then revert to a lower volume, or stop. Special alternatives are available to suit individual preference. (See specifications).

Radiation Products Division
Northwest Industrial Park
Burlington, MA 01803 USA
Telephone (617) 272-2000 or Toll Free 1-800-225-1383



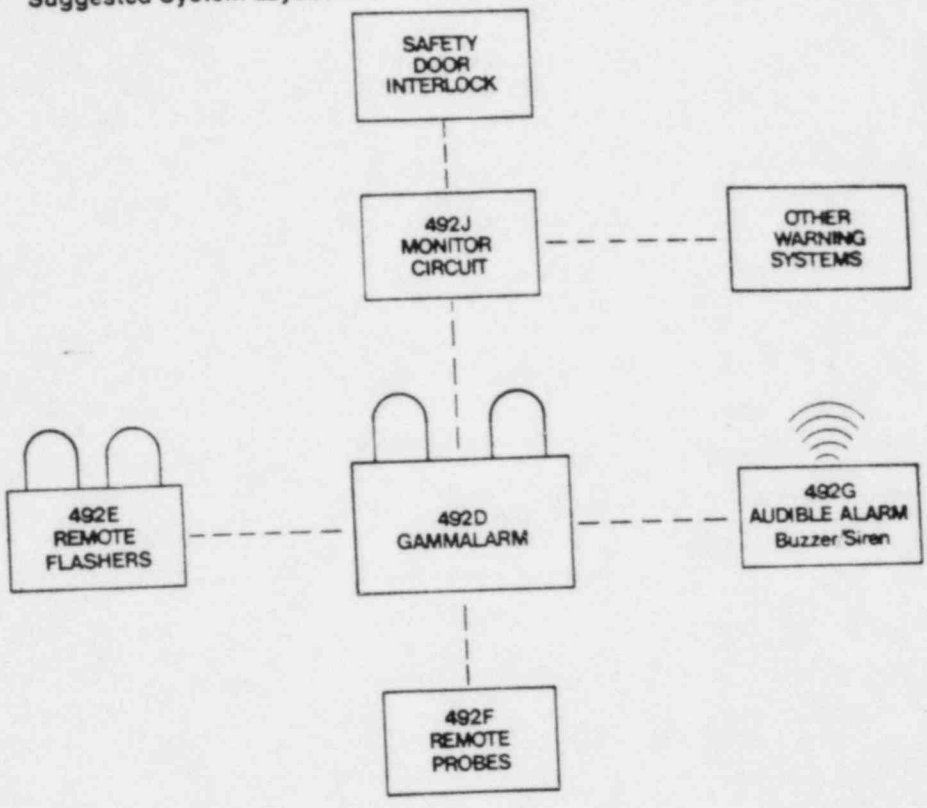
492J Monitor Circuit This special circuit arrangement, which is self contained, is triggered by the 110V provided by the main Gammalarm when in the Red "hazard" condition.

The circuitry provides a number of low voltage (as well as 110V) signals to operate safety devices in the radiography area. These could be horns, door locks, lights or interrupt switches—eg. to prevent the opening of a door to the radiation area.

A typical layout is shown in the illustration.

Special Options are available such as mr/hr meter indicator, face-mounted sensitivity control knob or alternate sensitivity ranges, etc. For fixed installation radiography (rooms) an Automatic Exposure Control is available.

Suggested System Layout



Specifications

492D

		Metric Equivalents
Internal Source	Cesium^{137} (license-exempt-9μci)	
Detector	G-M Tube	
Detection Range Adjustment	1mR/hr —50 mR/hr	
Radiation Detected	Gamma (80 KV to 1.5MEV)	
Red (Hazard) Bulb	150W 115 VAC	
Green (Safe) Bulb	15W 115 VAC	
Red Flashing Rate	Approx. 60 Flashes/minute	
Case	Aluminum	
Height	13"	33 *cm*
Depth	5.75"	14.6 *cm*
Width	12" (w/case)	30.5 *cm*
Weight	12 lbs.	5.4 *Kg*
Supply Voltage	115 VAC 60 c/s (220/240v 50 c/s optional)	

492E

Red (Hazard) Bulb	As Above	
Green (Safe) Bulb	As Above	
Case	Steel	
Height	8"	22.9 *cm*
Depth	6"	15.2 *cm*
Width	12"	30.5 *cm*
Weight	8 lbs.	3.6 *Kg*

(Includes 25' Connecting Cable)

492G

Buzzer with 10 second loud warning before reverting to lower volume or off.

Case	Steel	
Length	5	12.7 *cm*
Width	3	7.6 *cm*
Height	4.3	10.8 *cm*
Weight	2 lbs.	.9 *Kg*

(Includes 6' Connecting Cable)

492H

As above but with adjustable initial warning signal period (0.5–30 sec.) before reverting to lower volume or off.

492J

Case	Steel	
Length	12	30.5 *cm*
Width	6" (case only)	15.2 *cm*
Height	3	7.6 *cm*
Weight	5.5 lbs.	2.5 *Kg*

(Includes 6' line Cable)

492K

Case	Steel	
Length	12	30.5 *cm*
Width	6	15.2 *cm*
Height	3"	7.6 *cm*
Weight	6-1/4 lbs	2.8 *Kg*

(Includes 25' Connecting Cable)

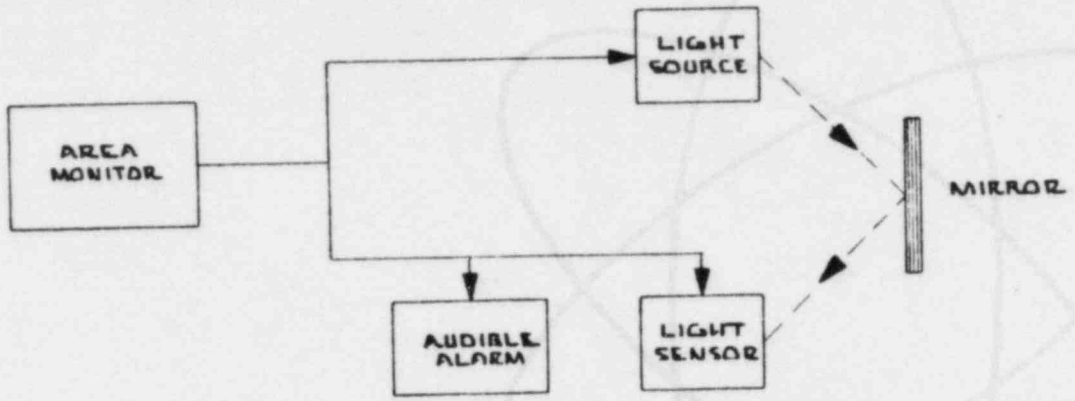
Ordering Information

TO 492D	Gammalarm Radiation Monitor with detector level factory-set to 2 mR/hr. (Please specify other setting if required)
TO 492E	Dual light flasher for connection to 492D.
TO 492G	Fixed Time Audible Signal (Buzzer) for connection to 492D.
TO 492H	Variable Time Audible Signal (Buzzer) for connection to 492D
TO 492J	Safety Monitor Circuit
TO 492K	Junction Box Assembly
NOTE:	For combination options, simply show necessary letters after number EXAMPLE 492DEJ Gammalarm with slave unit and safety monitor circuit.
TO 492D/S	Gammalarm with special options (please describe option in full) EXAMPLE 492D/S . . . Gammalarm with detector level adjustment on outside and 0–50 mR/hr. meter indicator.

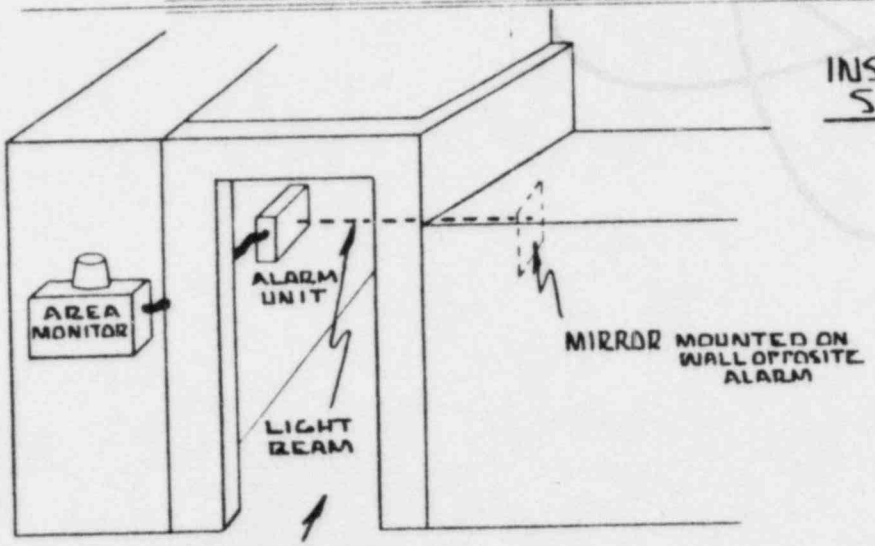
U.K. Sales office
Tech Ops Ltd. Radiation Products Division, Unit 1, Whitworth Road, Armstrong Industrial Estate, Washington, Tyne & Wear, NE37 1PP, ENGLAND

Alicia Research & Testing Labs, Inc.

CIRCUIT DIAGRAM



INSTALLATION SKETCH



ALICIA RESEARCH & TESTING LABS. INC.
WEST CREEK, NEW JERSEY

SCALE NONE	APPROVED BY	DRAWN BY McOBERSTREET
DATE 10-1-84		

ALARM SYSTEM

DRAWING NUMBER ART-0002

Alicia Research & Testing Labs, Inc.

ATTACHMENT #6

CALIBRATION OF METERS

CONTENTS

A) Survey Meters

B) Pocket Dosimeters

Prepared by:

Jack Miller, Radiation Safety Officer

Alicia Research & Testing Labs, Inc.

RADIATION DETECTION INSTRUMENTS

Survey Meters

MFG.	MODEL NO.	S/N	RANGE
Eberline	E130-G	1566	0-1000 MR/HR
Eberline	E130-G	45	0-1000 MR/HR
Eberline	E130-G	3914	0-1000 MR/HR

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Attachment 6

Description of Calibration Procedure

Alicia Research & Testing Labs, Inc.

ATTACHMENT #6

DESCRIPTION OF CALIBRATION PROCEDURE

Survey instruments are calibrated quarterly by an independent calibration laboratory. (Alicia Research & Testing Labs, Inc.)

Meters are also checked before each job, switching to batteries; observing meter location. Cesium is used as a low level radiation source at a distance recommended by manufacturer and observing meter radiation detection. This method is used daily prior to work or when deemed necessary during the day.

Alicia Research & Testing Labs, Inc.

PROCEDURE FOR THE CALIBRATION OF SURVEY METERS USING TECH/OPS MODEL 773 INSTRUMENT CALIBRATION DEVICE

Model 773

The Model 773 is a small, protable radiation survey instrument calibration device. The unit consists of a 150 millicurie 137 Cesium source permanently attached to a movable source rod which is installed in a lead shield casting. The source is exposed by raising the source rod which positions the source in a 36^{o} x 20^{o} collimated beam port.

Procedures for Calibration - T/O 773

1. The unit is equipped with three attenuators (transmission of 0.25, 0.10 and 0.10) to allow a survey instrument with three ranges to be calibrated at 20% and 80% of each range without changing the position of the survey instrument. The Model 773 can be used to calibrate survey instruments with ranges up to 2000 milliroentgens per hour.

2. Place the source shield in a restricted area so that the directional port is aimed horizontally. To minimize the effects of scattered radiation, the unit should be 16 feet from any wall in the direction of the primary beam.

   Position a support horizontally from the Model 773 instrument calibration device as shown in figures 1 and 2.

3. Determine the activity of the source on the date of calibration from the decay chart provided with the source.

4. Determine the distance from the source at which the radiation intensity would be 800 MR/HR (use figure 3).

5. Using the tape measure attached to the Model 773, place the survey meter such that the axis of the detector is located at the proper distance from the source as determined above.

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

7. Standing away from the radiation beam, expose the source manually raising the source rod. Note and record the survey reading, return the source to the stored position. The actual intensity is 800 MR/HR.

8. Place the 0.25 attenuator in the beam. Repeat step 7; the actual intensity is 200 MR/HR.

9. Remove the 0.25 attenuator from the beam and place a 0.10 attenuator in the beam. Repeat step 7; the actual intensity is 80 MR/HR.

10. Place the 0.25 attenuator in the beam. Repeat step 7; the actual intensity is 20 MR/HR.

11. Remove the 0.25 attenuator from the beam and place the other 0.10 attenuator in the beam. Repeat step 7; the actual intensity is 8 MR/HR.

12. Place the 0.25 attenuator in the beam. Repeat step 7; the actual intensity is 2 MR/HR.

NOTE:

The survey meter should be located so that the center of the detector is at the correct distance and centered on the center line of the radiation beam. The axis of the detector should be perpendicular to the centerline of the radiation beam. Depending upon the physical size of your survey instrument, it may be necessary to mount it somewhat higher than the bench surface. When the proper geometry for your instrument has been established, use the same physical arragement consistently in future calibration operations.

At short distance, using survey instruments with large detector volumes, the radiation intensity will not be uniform across the detector. Consideration should be given to this effect when determining the radiation intensities to be checked.

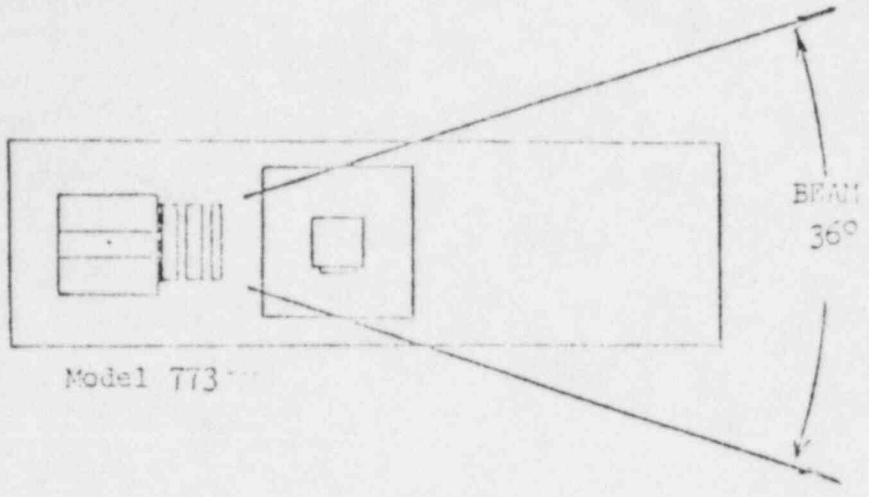


FIGURE 1

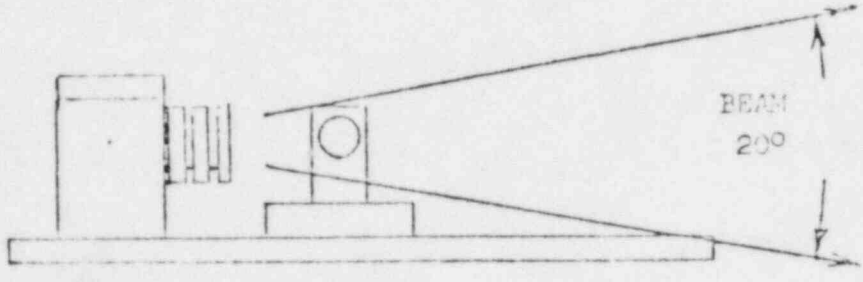


FIGURE 2

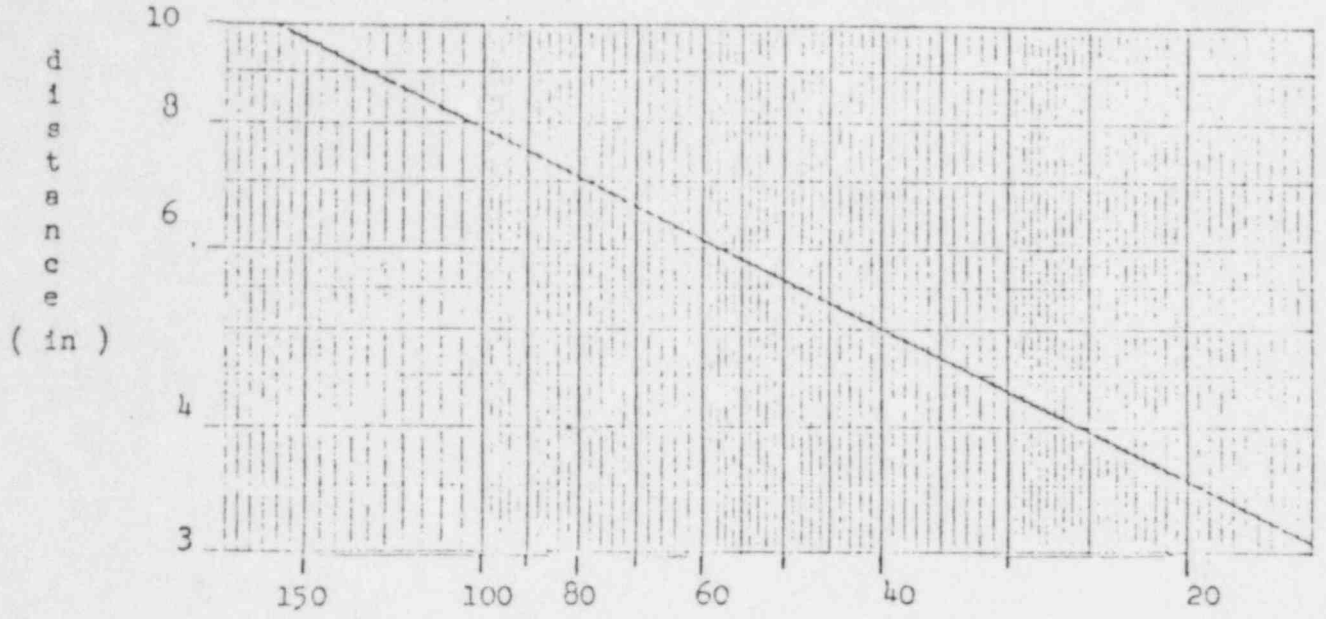
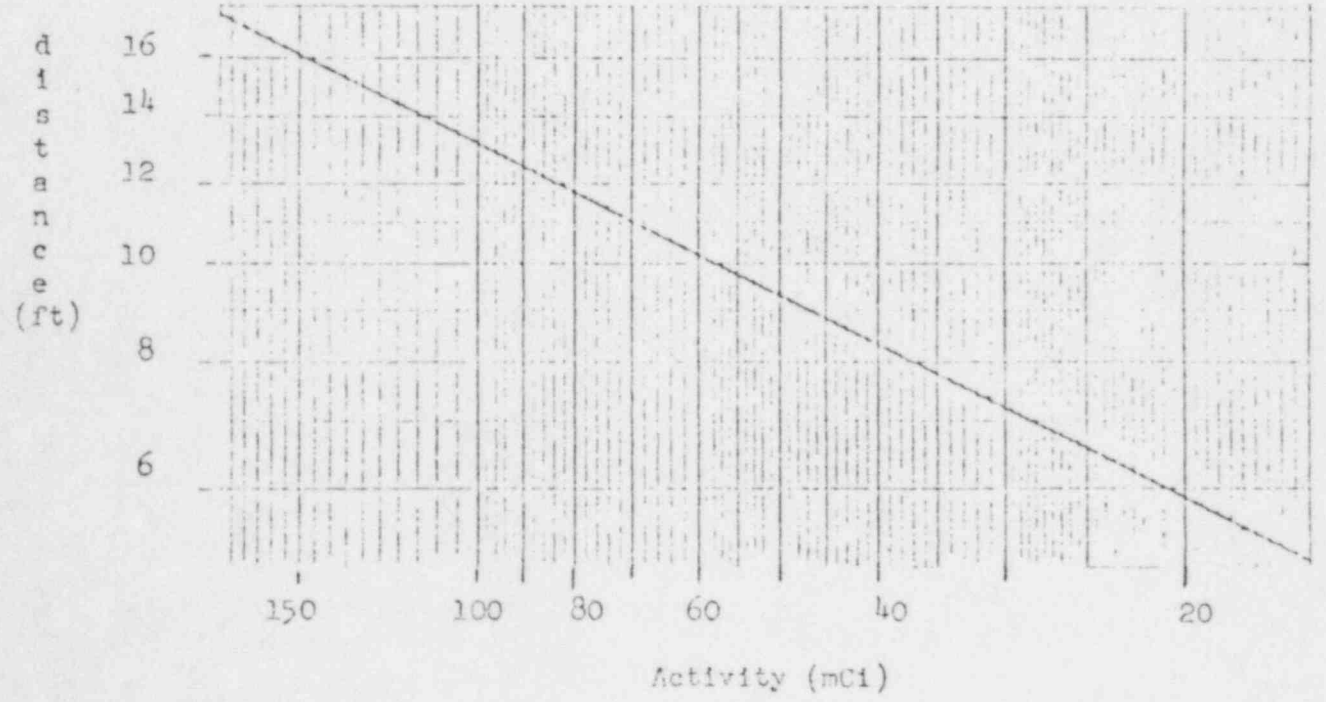


Figure 3

Distance to 800mR/hr isodose line as a Function of Activity



Distance to 2mR/hr isodose line as a Function of Activity

Figure 4

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item 10 - Radiation Safety Program

Attachment 5

Sample Calibration Data Sheet

Alicia Research & Testing Labs, Inc.

C E R T I F I C A T E O F C A L B R A T I O N

Client: Date:

Manufacturer Electronic Test

Model Number Serial Number

RANGE	CALIBRATION POINT	ACTUAL READING	ERROR
X1	2.5 MR/HR		
X1	7.5 MR/HR		
X10	25 MR/HR		
X10	75 MR/HR		
X100	250 MR/HR		
X100	750 MR/HR		

Repairs/Parts

The calibration and certification is in accordance with the Nuclear Regulatory Commission requirements of 10 CFR Part 34 Regulations.

The above instrument was calibrated with a Cesium 137 Source - NRC Regulations require that it be recalibrated not later than_____.

Calibrated by:_____

ALICIA RESEARCH & TESTING LABS, INC.

By_____

Radiation Products Division
Northwest Industrial Park
Burlington, MA 01803 USA
Telephone (617) 272-2000 or Toll Free 1-800-225-1383

Model 773 Instrument Calibration Device

OPERATION

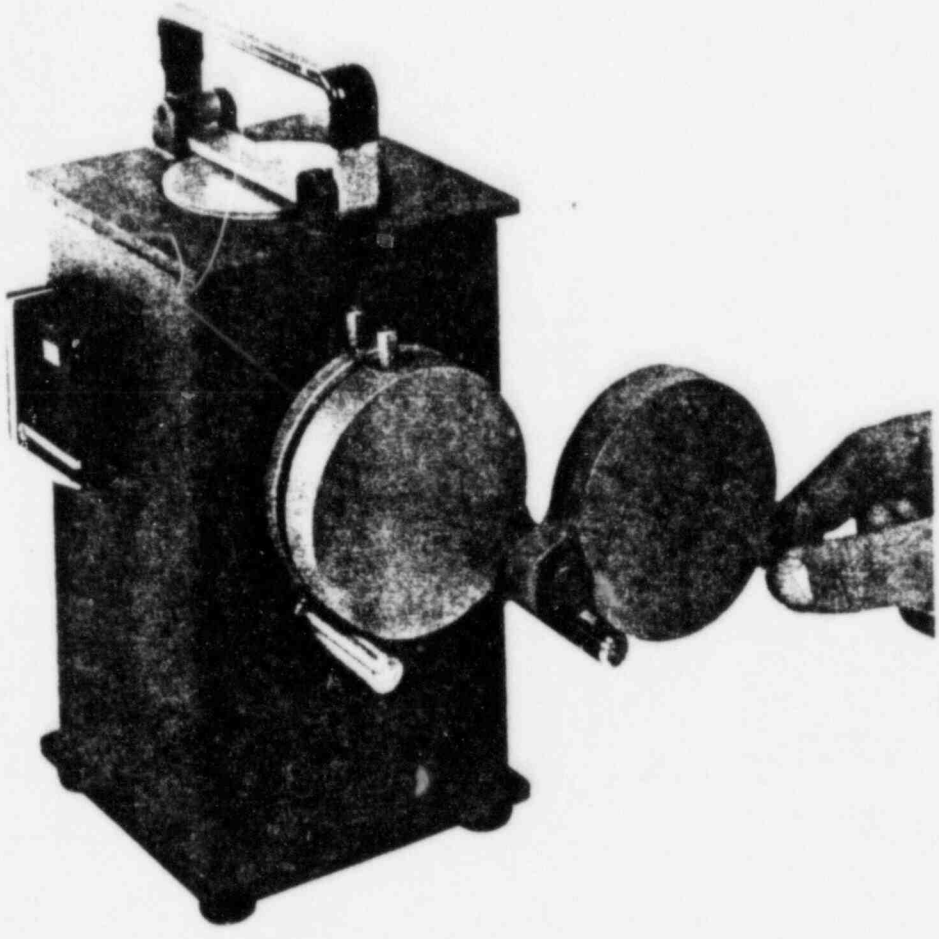
(Note: See Operation Manual for detailed instructions).

In order to properly calibrate a survey instrument, it is necessary to check the instruments response at two points on each of the instrument's ranges. These points must be separated by at least 50% of the full scale reading. The instruments reading should agree with the actual radiation intensity within 10% to be in proper calibration.

The model 773 calibrator allows for the calibration of a survey instrument without changing the position of the survey instrument.

After proper warm-up of the survey instrument, the distance from the source at which the radiation intensity would be 800 mr/hr is determined (9.6" for 150 millicuries Cesium^{137}). Using the tape measure attached to the model 773, the survey meter is placed at the prescribed distance. With the survey meter switched on, the following steps are taken:

1. The source is exposed by raising the source rod. The survey meter reading is noted and recorded and the source is returned to the stored position. This reading is checked against the actual intensity. If within ± 10%, the next step is taken. If not, adjust the instrument and recommence calibration.
2. Place the 0.25 attenuator in the beam; repeat step 1; the acutal intensity is 200 mr/hr.
3. Remove the 0.25 attenuator from the beam and place a 0.10 attenuator in the beam. Repeat step 1; the actual intensity is 80 mr/hr.
4. Place the 0.25 attenuator in the beam. Repeat step 1; the actual intensity is 20 mr/hr.
5. Remove the 0.25 attenuator from the beam and place the other 0.10 attenuator in the beam. Repeat step 1; the actual intensity is 8 mr/hr.
6. Place the 0.25 attenuator in the beam. Repeat step 1; the actual intensity is 2 mr/hr.



SPECIFICATIONS

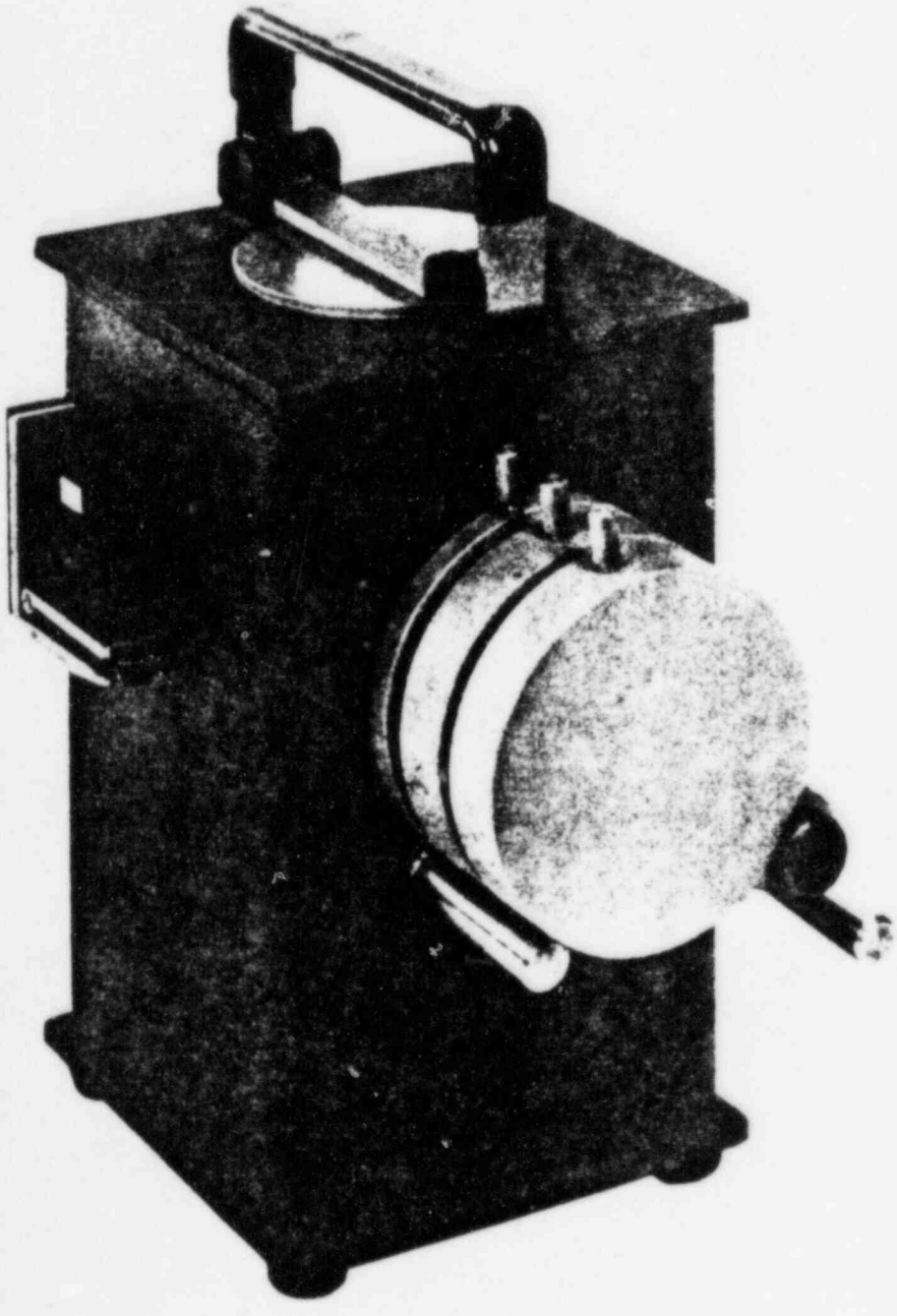
Size: 5" (12.7 cm) wide, 5" (12.7 cm) deep, 8.5" (21.6 cm) high
Weight: (with attenuators) 52 lbs. (24 Kg)
(without attenuators) 45 lbs.(20 Kg)
Source: Model 77302, Cesium^{137}, 165 millicuries
Transport Status: DOT Specification 7A type A Package
Shielding Material: Lead, approx. 29 lbs. (13 Kg)

Specifications subject to change without notice.

U. K. Sales office
Tech Ops Ltd. Radiation Products Division, Unit 1, Whitworth Road, Armstrong Industrial Estate, Washington, Tyne & Wear, NE37 1PP ENGLAND

Tech/Ops

Model 773 Instrument Calibration Device



FEATURES

- Self Contained ^{137}Cs source with no external power supply required.
- Calibrates instruments with ranges up to 2000 mR/hr.
- Calibration traceable to NBS.
- Attenuators eliminate repositioning for different scale measurments.
- Can be padlocked in closed position for safety.
- Only 52 lbs. (24 kg)!

DESCRIPTION

This sturdy, easy-to-use device permits the safe, accurate calibration of instruments used for surveying gamma radiation. It enables users of dosage-measuring equipment to perform routine checks at will or as necessary to meet the regulations of the N.R.C. and Agreement States. This simple, fool-proof system eliminates the expense, inconvenience and work-time lost when sending such instruments to an outside calibration service.

The heavy-duty lead container holds 165 mCi of Cesium-137 encapsulated at one end of a control rod. Since ^{137}Cs has a long half-life (30 yrs.), there is no need to calculate a correction factor for at least 1 or 2 years after the instrument is shipped.

The source remains in either of 2 positions: stored or exposed. In the fully-shielded "stored" position, radiation at the container's surface is less than 200 mR/hr; at 1 meter away it is less than 10 mR/hr. In the "exposed" position, the source faces a 36° (horizontal) x 20° (vertical) port at the shield's side. The radiation field can be varied by means of three built-in attenuators (transmission factors 0.25, 0.10 and 0.10). These permit calibration of three meter scales, each at 20% and 80% of full scale, using only one source-to-meter distance measurment. The source is moved from "stored" to "exposed" merely by raising the control rod. For safety, the ^{137}Cs source cannot be removed from its shield except by Tech/Ops.

A built-in tape measure helps determine the distance from the ^{137}Cs source to the instrument being calibrated. A padlock (not included) prevents unauthorized use of the equipment. Convenient carrying handling. Measures 5" square x 8½" high. Weights 52 lbs.

An N.R.C. or Agreement State license is required. When applying, please designate the source as Tech/Ops model 773. A copy of your license must accompany order.

APPENDIX A

CALIBRATION OF INSTRUMENTS

1. Calibration of survey meters should be performed with radionuclide sources* that approximate point sources.

a. The source activities should be traceable within 5% accuracy to the U.S. National Bureau of Standards (NBS) calibrations.

b. Section 34.24 requires that survey instruments be calibrated at intervals not exceeding 3 months and after servicing.

c. Each scale in the range from two milliroentgens per hour through one roentgen per hour is required to be calibrated. Other scales should also be calibrated.

d. The highest and lowest points used to calibrate each scale of the instrument should be separated by at least 50% of the scale.

e. The exposure rate measured by the instrument should be within ±20% of the exposure rate specified for the standard source.

f. A calibration chart or graph containing the calibration factor, the date of last calibration, and due date of next calibration should be affixed to the survey meter.

2. The use of the small check source that is incorporated into some survey meters is not appropriate or acceptable for calibration purposes.

3. Section 34.24 requires that records of the calibrations discussed in Item 1 be maintained.

4. The inverse square law and radioactive decay law may be used for calibration. A calibrated source will have a calibration certificate giving its output at a given distance measured on a specified date by the manufacturer. The inverse square law may be used with any point source to calculate the exposure rate at other distances. The radioactive decay law may be used to calculate the output at any time after the specified date.

a. *Inverse Square Law*

If R_a is the exposure rate at a distance D_a from a point source and R_b is the exposure rate at a distance D_b from the same point source, then

$$R_a D_a^2 = R_b D_b^2$$

Note: R_a and R_b must be in the same units of exposure rate (e.g., mR/hour, R/hour, etc.) and D_a and D_b must be in the same units of distance (e.g., centimeters, meters, etc.).

If R_a, D_a, and D_b are known, R_b can be calculated from

$$R_b = \frac{D_a^2}{D_b^2} \times R_a$$

b. *Radioactive Decay Law*

The exposure rate of a standard source at a time, t, after a specified calibration date is given by

$$R_t = R_o \, e^{-(0.693 \frac{t}{T_{1/2}})}$$

where

R_t is the exposure rate at a time t after the source calibration date

R_o is the exposure rate on the day of calibration

t is the time elapsed since the calibration date

$T_{1/2}$ is the radionuclide half-life

Note: R_t and R_o must be in the same units of exposure rate (e.g., mR/hour, R/hour, etc.) and t and $T_{1/2}$ must be in the same units of time (e.g., seconds, days, years, etc.).

*Sources of cesium-137, radium-226, or cobalt-60 are appropriate for use in calibrations. The activity of the calibration standard should be sufficient to calibrate the survey meters on all ranges up to one roentgen per hour. If there are higher ranges, they should at least be checked for operation and approximately correct response to radiation.

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item 10 - Radiation Safety Program

Section 4 - Personnel Monitoring Equipment

SECTION 4 - PERSONNEL MONITORING EQUIPMENT

4.0 Personnel Monitoring Equipment:

4.1 Pocket Dosimeters

4.1.1 The following dosimeters will be used : Victoreen, model 541A range to 200 MR, Dosimeter Corp. of America, model 862 range to 200 MR.

4.1.2 All pocket dosimeters shall be calibrated at least once every 3 months.

4.1.3 Procedure

4.1.1.1 Determine radiation output of a known radioactive source

4.1.1.2 Align all pocket dosimeters at a specific distance from known source and expose simaltaneously for the following levels of radiation.

15 m/r HR

60 mr/HR

150 mr/HR

4.1.1.3 Pocket dosimeters are calibrated plus or minus 10% of true activity.

4.1.1.4 If dosimeters will not conform to calibration methods, replace with new meters.

4.2 Film Badge Service

4.2.1. Film Badge Service shall be supplied by:
R. S. Landauer, Jr. & Co.
Glenwood Science Park
Glenwook, Illinois 60425

4.2.2 The Film Badges shall be exchanged on a monthly basis.

SECTION 4 -PERSONNEL MONITORING EQUIPMENT

4.3 Records

4.3.1 Records of the calibration shall be maintained containing the following information:

1. Survey meter manufacturer
2. Survey meter model no. and serial no.
3. Date of calibration
4. Statement that readings are with $\pm$ 10% of calculated values.
5. Name of person who performed the calibration.

4.3.2 A calibration sticker shall be affixed to the radiation survey meter case with the following information:

1. Survey meter model no. and serial no.
2. Date of calibration.
3. Date next calibration is due.
4. Initials of person who performed the calibration.

SECTION 4 - PERSONNEL MONITORING EQUIPMENT

4.0 PERSONNEL MONITORING EQUIPMENT:

4.1 Pocket Dosimeters

4.1.1 The following dosimeters will be used: Victoreen, model 541A range to 200 MR, Dosimeter Corp. of America, model 862 range to 200 MR.

4.2 Film Badge Service

4.2.1 Film Badge Service shall be supplied by:
R.S. Landauer, Jr. & Co.
Glenwood Science Park
Glenwood, Illinois 60425

4.2.2 The Film Badges shall be exchanged on a monthly basis.

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item 10 - Radiation Safety Program

Section 5 - Sealed Sources and Equipment

SECTION 5 - SEALED SOURCES AND EQUIPMENT

5.0 SEALED SOURCES

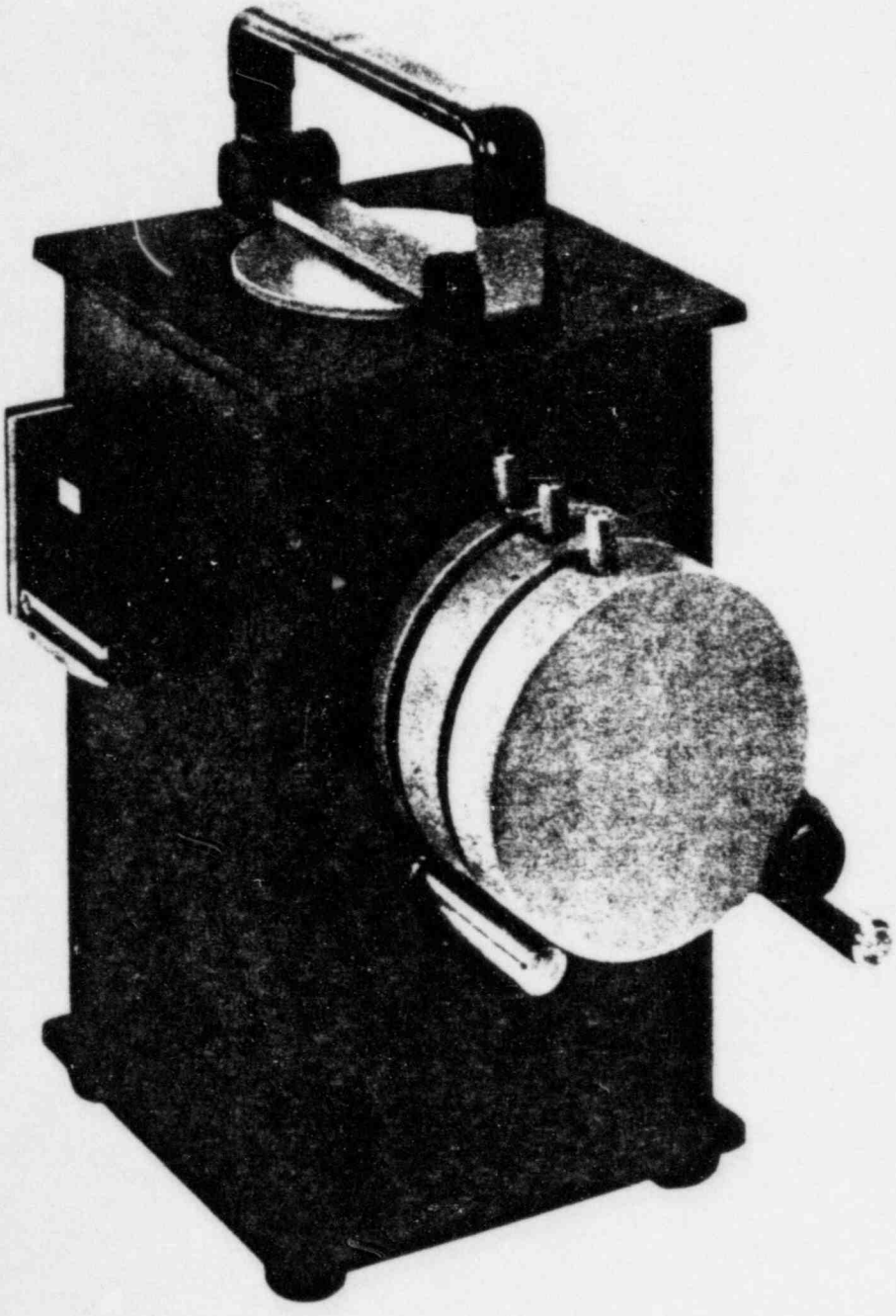
5.1 The sealed sources to be used in radiography is Iridium 192 manufactured by Tech. OPS, source assembly A424-9. The maximum activity for each source shall be 100 curies.

5.2 The radiographic exposure devices shall be model 660 Gamma Ray Projector, manufactured by Tech OPS Radiation Products Division, Burlington, Mass.

5.3 The sealed source to be used in the calibration of survey meters is the Tech-Cps model 773 Instrument Calibration Device containing 165 MC of Cesium 137 encapsulating at one end of a control rod. (Descriptive material attached)

Tech/Ops

Model 773 Instrument Calibration Device



FEATURES

- **Self Contained ^{137}Cs source with no external power supply required.**
- **Calibrates instruments with ranges up to 2000 mR/hr.**
- **Calibration traceable to NBS.**
- **Attenuators eliminate repositioning for different scale measurments.**
- **Can be padlocked in closed position for safety.**
- **Only 52 lbs. (24 kg)!**

DESCRIPTION

This sturdy, easy-to-use device permits the safe, accurate calibration of instruments used for surveying gamma radiation. It enables users of dosage-measuring equipment to perform routine checks at will or as necessary to meet the regulations of the N.R.C. and Agreement States. This simple, fool-proof system eliminates the expense, inconvenience and work-time lost when sending such instruments to an outside calibration service.

The heavy-duty lead container holds 165 mCi of Cesium-137 encapsulated at one end of a control rod. Since ^{137}Cs has a long half-life (30 yrs.), there is no need to calculate a correction factor for at least 1 or 2 years after the instrument is shipped.

The source remains in either of 2 positions: stored or exposed. In the fully-shielded "stored" position, radiation at the container's surface is less than 200 mR/hr; at 1 meter away it is less than 10 mR/hr. In the "exposed" position, the source faces a 36° (horizontal) x 20° (vertical) port at the shield's side. The radiation field can be varied by means of three built-in attenuators (transmission factors 0.25, 0.10 and 0.10). These permit calibration of three meter scales, each at 20% and 80% of full scale, using only one source-to-meter distance measurment. The source is moved from "stored" to "exposed" merely by raising the control rod. For safety, the ^{137}Cs source cannot be removed from its shield except by Tech/Ops.

A built-in tape measure helps determine the distance from the ^{137}Cs source to the instrument being calibrated. A padlock (not included) prevents unauthorized use of the equipment. Convenient carrying handling. Measures 5" square x 8½" high. Weights 52 lbs.

An N.R.C. or Agreement State license is required. When applying, please designate the source as Tech/Ops model 773. A copy of your license must accompany order.

03706

Radiation Products Division
Northwest Industrial Park
Burlington, MA 01803 USA
Telephone (617) 272-2000 or Toll Free 1-800-225-1383

Model 773 Instrument Calibration Device

OPERATION

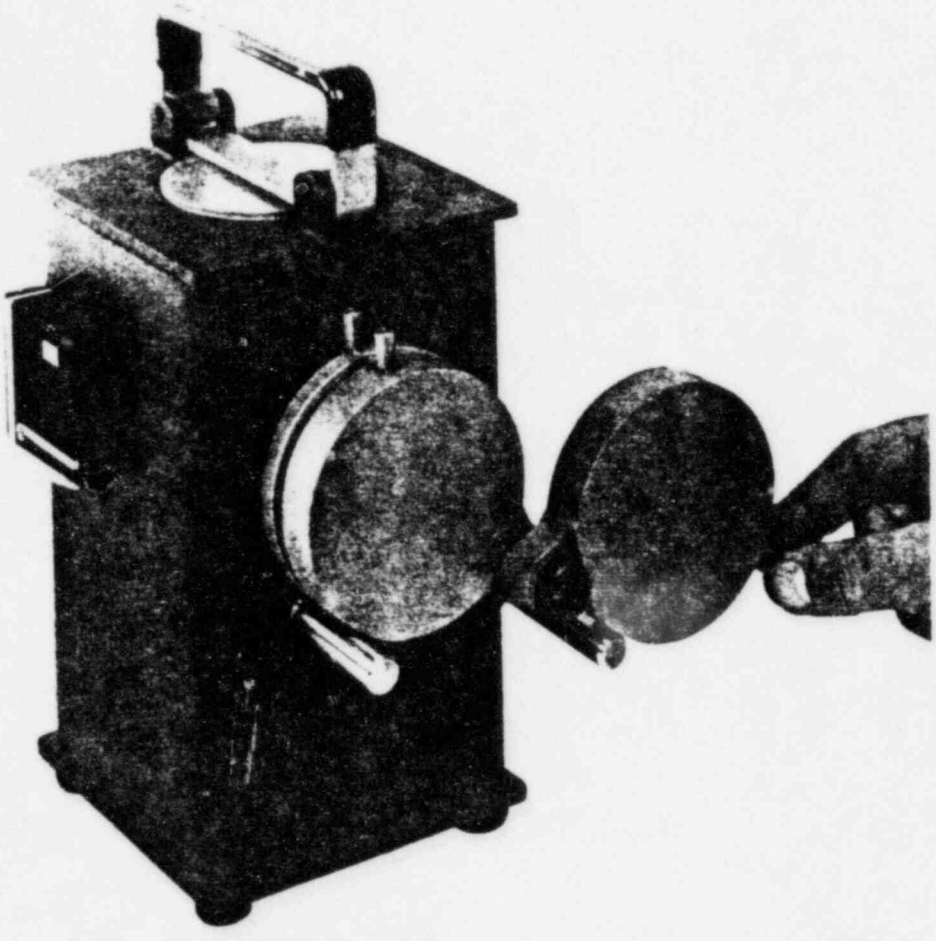
(Note: See Operation Manual for detailed instructions).

In order to properly calibrate a survey instrument, it is necessary to check the instruments response at two points on each of the instrument's ranges. These points must be separated by at least 50% of the full scale reading. The instruments reading should agree with the actual radiation intensity within 10% to be in proper calibration.

The model 773 calibrator allows for the calibration of a survey instrument without changing the position of the survey instrument.

After proper warm-up of the survey instrument, the distance from the source at which the radiation intensity would be 800 mr/hr is determined (9.6" for 150 millicuries Cesium^{137}). Using the tape measure attached to the model 773, the survey meter is placed at the prescribed distance. With the survey meter switched on, the following steps are taken:

1. The source is exposed by raising the source rod. The survey meter reading is noted and recorded and the source is returned to the stored position. This reading is checked against the actual intensity. If within ± 10%, the next step is taken. If not, adjust the instrument and recommence calibration.
2. Place the 0.25 attenuator in the beam; repeat step 1; the acutal intensity is 200 mr/hr.
3. Remove the 0.25 attenuator from the beam and place a 0.10 attenuator in the beam. Repeat step 1; the actual intensity is 80 mr/hr.
4. Place the 0.25 attenuator in the beam. Repeat step 1; the actual intensity is 20 mr/hr.
5. Remove the 0.25 attenuator from the beam and place the other 0.10 attenuator in the beam. Repeat step 1; the actual intensity is 8 mr/hr.
6. Place the 0.25 attenuator in the beam. Repeat step 1; the actual intensity is 2 mr/hr.



SPECIFICATIONS

Size: 5" (12.7 cm) wide, 5" (12.7 cm) deep, 8.5" (21.6 cm) high
Weight: (with attenuators) 52 lbs. (24 Kg)
(without attenuators) 45 lbs.(20 Kg)
Source: Model 77302, Cesium^{137}, 165 millicuries
Transport Status: DOT Specification 7A type A Package
Shielding Material: Lead, approx. 29 lbs. (13 Kg)

Specifications subject to change without notice.

U. K. Sales office
Tech Ops Ltd. Radiation Products Division, Unit 1, Whitworth Road, Armstrong Industrial Estate, Washington, Tyne & Wear, NE 37 1PP, ENGLAND

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item 10 - Radiation Safety Program

Section 7 - Emergency Procedures

SECTION 7 - EMERGENCY PROCEDURES

7.1 GENERAL

7.1.1 There is always the possibility of an accident occurring, so it is necessary that all radiographic personnel know the proper steps to be taken in such an emergency. In no event is radiographic work to be taken in such an emergency. In no event is radiographic work to be started unless an operable, calibrated survey meter is available at the job site.

7.2 EMERGENCY SITUATIONS

In the event of an emergency in an area adjacent to a radiographic device, such as a fire or an accident involving field personnel, immediately do the following:

A. Return the source to the shielded position in the device, if possible.

B. Conduct a physical radiation survey to make sure that the source is fully shielded.

C. Lock the device.

D. Remove device, source tube, control cable and other accessories from danger area.

E. Notify the Radiation Safety officer immediately.

F. If the device cannot be removed from the danger area, establish a restricted area using the survey meter to determine the perimeter. Inform all persons having to enter the emergency area of the location. of the perimeter, the location of the source and the possible radiation, hazards within the perimeter

7.3 DAMAGE TO EXPOSURE DEVICES AND SOURCE CONTAINERS

7.3.1 In the event of an accident to the source, such as a falling object hitting the device, immediately do the following:

A. Return the source to the shielded position in the device, if possible.

B. Concut a physical radiation survey to make sure that the source is fully shielded.

C. Lock the device.

D. Notify the radiographer who will, in turn, notify the R.S.O.

E. Wait for the R.S.O. to determine the extend of damage and, if possible, to authorize the return of the exposure device to service.

F. If it is not possible to return the source to the shielded position, follow the instructions given below for DISCONNECTIONS OF SOURCE".

7.4 DISCONNECTION OF SOURCE

7.4.1 When it is determined that a sealed source is missing from its proper exposure device, storage container or shipping container the following steps shall be taken:

A. Obtain all information on the last known location of the source.

B. Check the area with the survey meter and rope off a restricted area after locating the source. Boundary must be 2 mr/hr or less.

C. Notify the Radiation Safety Officer immediately.

D. Determine the exact source location within the restricted area by using the survey meter and triangulation methods.

E. After locating the source, determine what actions should be taken to avoid overexposure of personnel.

F. Maintain surveillance of perimeter until source recovery team from Tech/Ops arrives to assume responsibility for placing source into the properly shielded position.

7.5 EXCESSIVE RADIATION EXPOSURE TO PERSONNEL

7.5.1 Levels of Excessive Radiation

A. Radiographic Personnel--3 rem during any calander quarter when the total maximum permissible occupational whole body dose is not exceeded, as determined by N.R.C. Form 4 maintained for such personnel.

B. Adults-- 1.25 rem during any calander quarter for adults over the age of 18.

C. Minors-- 0.125 rem during any calander quarter for minors under the age of 18.

D. General--in unrestricted areas, exposure of persons at a rate that exceeds 2 mr in any 1 hour or, if the person is continuously present, at a rate that exceeds 100 mr in any consecutive 7 days.

7.5.2 Accident Involving Non-Monitored personnel

A. Escort persons to unrestricted area.

B. Record names and all pertinent facts concerning accident.

C. Determine exposure levels, if possible.

D. Notify the Radiation Safety Officer immediately.

7.5.3 Accident Involving Monitored personnel

This section applies for those cases where the pocket chamber of either the radiographer or the radiographer's assistant goes off scale.

A. Escort person to unrestricted area.

B. Record name and all pertinent facts concerning accident.

C. Determine if pocket chamber is working properly.

D. Determine exposure levels, if possible.

E. Notify the R.S.O. immediately.

F. Submit the film badge for immediate evaluation.

G. Remove person from occupation exposure situations until the results of his film badge evaluation are received and a determination of dose has been accomplished.

7.6 VEHICULAR ACCIDENTS

7.6.1 In the event of a vehicular accident while transporting a source to an exposure site, a restricted area must be established while the accident is being investigated.

A. If the survey meter is operable, survey the vehicle's surface to determine if the source has been dislodged. If so, establish a rope perimeter for an unrestricted area at a distance where the exposure levels are 2 mr/hr or less.

B. If the survey meter is inoperable, assume that the source is in the exposed position inside of the vehicle. Calculate the distances necessary to establish an unrestricted area. Do not approach source until an operable survey meter is present. Then, establish correct perimeter.

C. Notify the R.S.O, immediately.

D. If the survey shows that the source has become disconnected, follow the procedures given above for "DISCONNECTION OF SOURCE".

E. If the survey shows that the source poses no hazard and the vehicle has sustained little damage, continue on to the job site.

F. If the source poses no hazard and the vehicle cannot be moved, wait for the R.S.O. to arrive with another vehicle to return source to the storage area.

7.7 NOTIFICATION OF INCIDENTS

7.7.1 The Director of the appropriate N.R.C. Inspection and Enforcement Regional Office shall be immediately notified by telephone and telegraph of any incident involving licensed material which may have caused or threatens to cause:

A. Exposure of the whole body of any individual to 150 Rems or more of radiation; or exposure of the feet, ankles, hands or forearms of any individual to 375 Rems or more of radiation; or

B. A loss of one working week or more of operations of any facilities affected; or

C. Damage to property in excess of $100,000.

7.7.2 The Director of the appropriate N.R.C. Inspection and Enforcement Regional Office shall be notified within 24 hours by telephone and telegraph of any incident involving licensed material which may have caused or threatens to cause:

A. Exposure of the whole body of any individual to 5 Rems or more of radiation; exposure of the skin of the whole body of any individual to 30 Rems or more of radiation; or exposure of the feet, ankles, hands or forearms of any individual to 75 Rems of more of radiation; or

B. A loss of one day or more of the operation of any facilities affected; or

C. Damage to property in excess of $1,000.

7.7.3 Within 30 days, a written report shall be sent to the Director of Inspection and Enforcement, Washington, D.C., as well as the appropriate Inspection and Enforcement Regional Office, of each incident involving licensed material which appears to have resulted in the exposure of an individual to radiation or to concentrations of radioactive material, in excess of any applicable limits set forth by the N.R.C. Each report shall describe the nature of the incident, the extent of exposure of persons to radiation or to radioactive material, the levels of radiation and concentration of radioactive material involved, the cause of the incident, and corrective steps taken or planned to assure against a recurrence of the incident.

SECTION 7 -EMERGENCY PROCEDURES

7.7.4 Malfunction of a Survey Instrument

7.7.5 These steps shall be followed in the event that a survey instrument becomes inoperative during radiographic activities and a replacement survey instument is not immediately available.

7.7.4.1 Immediately return the souce to the safe position in the exposure device, and cease radiographic operations.

7.7.4.2 Without an operable survey meter, a dosimeter shall be used in the following manner to determine that the source is in the safe position.

a) Read the dosimeter and record the reading.

b) Place the dosimeter one foot in front of the exposure port of the exposure device. This shall be done utilizing the factors of time, distance, and shielding to a degree that is most practical for the specific situation, such that exposure received by an individual (in the event the source is not in the safe position) is held to a minimum.

c) Leave dosimeter in place for a convenient length of time but not less than ½hour. Do not remain near the exposure device during this time.

d) Remove the dosimeter from in front of the exposure port.

e) Read the dosimeter and determine the dose accumulated.

f) Determine the radiation level by dividing the accumulated dose by the time the dosimeter was in front of the exposure port.

7.7.4.3 If the source is in the safe position, lock the exposure device.

7.7.4.4 Notify the RSM of the malfunctioning instrument

7.7.4.5 Replace the survey instrument with a calibrated and

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item 10 - Radiation Safety Program

Section 6 - General Operating Procedure

SECTION 6 - GENERAL OPERATING PROCEDURE

6.0 GENERAL OPERATING PROCEDURE:

6.1 General Requirements

6.1.1 The responsibility for the overall radiation protection program shall rest with the radiation safety officer.

6.1.2 Each radiographer employed will be inspected at sufficient intervals to insure compliance with N.R.C. regulations and this manual.

6.1.3 Radiographers shall have the authority to use and supervise the use of, while in constant attendance at the site, the sealed sources for which the company is licensed.

6.1.3.1 The company is licensed to use only the sealed sources and devices designated on its license.

6.2 Personnel Monitoring

6.2.1 Pocket dosimeters and radiation film badges are to be issued to each member of the radiographic department.

6.2.2 Dosimeters and Film Badges must be worn at all times by radiographic personnel during radiographic operations. Personnel monitoring devices, when not in use, shall be placed in their respective holding fixtures to insure proper storage and care. Respective holding fixtures are located in the supervisor's office. When extended overnight field work applies, all personnel monitoring devices will become the responsibility of the radiographer in charge. Storage of such devices will be at the discretion of the radiographer, but under no circumstance will they be stored in the same areas as the Radioactive Source.

6.2.3 Operating instructions for dosimeters, dosimeter charges and film badges are outlined as follows:

6.2.3.1 DOSIMETERS

SECTION 6 - GENERAL OPERATING PROCEDURE

(a) All radiographer's and radiographer's assistants shall wear a pocket dosimeter at all times during working hours.

(b) Pocket dosimeters, Victoreen 541-A or Dosimeter 862 are furnished. These dosimeters measure the amount of gamma and x-ray radiation received up to 200 mr.

(c) Dosimeters are delicate instruments, and should be treated as such. Jarring or dropping the instrument may cause a high reading. Also, excessive humidity may cause a high reading. If damage to your dosimeter is suspected, notify your Radiation Safety Officer immediately.

(d) If a dosimeter should go off-scale (over 200 mr), stop work and notify Radiation Safety Officer immediately.

(e) Para. 34.33 (d) of 10 CFR, Part 34, requires that if a dosimeter becomes fully discharged, the film badge shall be processed immediately to determine if any over exposure has taken place. Such a film badge must be sent to the Radiation Safety Officer and from there it will be sent to the film badge supplier for immediate processing. Having followed this procedure, immediately recharge the dosimeter and leave it in an area which is free of any type of radiation for a period of approximately one hour. After this time lapse, recheck the dosimeter. If it is again discharged, totally or partially, in all probability you have not been exposed to an overdose of radiation. This would indicate that the dosimeter is probably faulty. Having determined this, inform your Radiation Safety Officer. Only your Radiation Safety Officer may decide whether or not you may return to radiation work after he has carefully evaluated the situation.

SECTION 6 - GENERAL OPERATING PROCEDURE

(f) All dosimeters shall be charged daily at the start of each shift, by the radiographer, The radiographer shall read the dosimeter at the end of each shift and shall record daily readings.

(g) Dosimeters are to be read as often as necessary to determine if an abnormal dose of radiation has been received. If a dosimeter is found to be off-scale, an emergency situation shall be considered to exist and the corresponding Film badge shall be immediately returned to the supplier for processing.

(h) Each radiographer is responsible for recording both his and his assistant's dose on the Radiation Survey Report, form ART 261. Attachment #7

(i) Radiographic personnel shall be removed from exposure to radiation, when necessary to keep their individual dosages from exceeding 100 MR per week.

6.2.3.2 OPERATING INSTRUCTIONS FOR DOSIMETER CHARGES

(a) Insert dosimeter into charging socket.

(b) Hold dosimeter in contact (pressure required against spring).

(c) Turn large knob to adjust dosimeter to zero.

(d) Remove dosimeter from charger and check hairline position by looking through dosimeter at a source of light.

SECTION 6 - GENERAL OPERATING PROCEDURE

6.2.3.3 FILM BADGES

(a) Film Badge schedule provides a change of film on a Monthly Basis. During this period, badges are not to be interchanged with other employees. The film supplier shall be:

R.S. Landauer, Jr. & Co.
Glenwood Science Park
Glenwood, Illinois 60425

(b) Procedures for Issuance and Processing of Film Badges:

(1) Film Badges shall be worn by all radiography personnel during working hours.

(2) Radiographic personnel shall not report to a job without their film badge.

(3) Each film badge has the person's name and a number. Only the person indicated may wear that Film Badge.

(4) Film Badges will be changed monthly by the Radiation Safety Officer or Radiographer.

(5) New Films will be obtained from the Film Supplier used. Films will be turned in promptly by the Radiation Safety Officer for processing.

(6) Control badges are not to be worn by radiographic personnel. Control badges are periodically developed to insure that areas are free of radiation.

(7) All contacts with the Film Badge Supplier shall be through the Radiation Safety Officer. The Radiation Safety Officer shall return all used film to the supplier and receive all the reports of Film Badge results from the Supplier.

(8) The Radiation Safety Officer will review all Film Badge reports received. For any high

or unsusual results, the individual involved will be informed.

(9) The Radiaiton Safety Officer will be responsible for the maintenance of a central and complete file on all Film Badge results received. The film results must be maintained on Form ART-187 (NRC-5) Attachment #8

6.3 Instructions For Making An Exposure

6.3.1 Preliminary Instructions

(a) Each radiographic device shall be checked with a survey meter before it is put into operation or moved. This is to insure the radiographer that source is in the device and in its shielded position.

(b) No radiographic device shall be moved unless it is locked, and caps and plugs inserted in position, when applicable.

(c) A daily inspection must be performed when the equipment is in service by the radiographer to insure a safe operation of the following items prior to use of any source or device on any particular day - Record on Form ART 261.

(1) check operation of lock on shielded container.

(2) check for proper operation of crank mechanism.

(3) check accuracy of source position indicator.

(4) check source tube and drive cable for wear or damage.

(5) check to see that schematics are attached.

(6) A Meter Reading of camera before work.

(7) A Meter Reading of camera after work.

6.3.2 Specific Instructions for Making an Exposure.

(a) Position source cable end at exposure site, using jigs or other attachments. Straighten source cable and position film.

(b) Position and straighten control cable, placing hand-crank in position as far as possible from the exposure position.

(c) Remove plug on lockbox of source.

(d) Keep device locked.

(e) Pull out small source cable one-quarter inch to expose disconnection.

(f) Join control cable to connection on small source pigtail by bringing the two parts together. The connections should work freely, if not, the Radiation Safety Officer should be notified.

(g) Thread control cable adapter into position in lock box.

(h) Remove plug from the fitting on the face of the lead shield and thread the Flexible source tube into place.

(i) Establish and post restricted area and high radiation area, per. Par. 6.3.4.

(j) Unlock device with key provided for camera.

(k) Turn handle clockwise until it stops. The source position indicator shows position of source in tube at all times. Do not force handle.

(l) Source is now exposed.

(m) Survey the perimeter of the restricted area to assure that radiation levels do not exceed 2 MR/HR. as otherwise specified, and record results on form ART 261.

(n) Maintain continuous surveillance over the restricted area, keeping all persons from entering.

(o) After exposure time has elapsed, return source to device by turning control cable handle counterclockwise, until it stops and source position indicator reads zero.

SECTION 6 - GENERAL OPERATING PROCEDURE

(p) Use survey meter to check device and source cable for return of Source to safe position. Care should be exercised to assure that Source is in shielded position in device and not behind some temporary barrier. With the Source in the shielded position, radiation levels at the surface of the device could be from 10MR/HR. to to 200MR/HR. Zero radiaiton levels could indicate that the source did not return to the storage position.

(q) Lock device and remove key from Lockbox.

6.3.3 Specific Instructions For Securing Exposure Devices:

(a) Unthread Source cable from face of head shield.

(b) Replace plug into opening in face of head shield.

(c) Unthread control cable adapter.

(d) Disconnect small source pigtail from control cable.

(e) Replace plug into Lockbox of device.

(f) Return device to safe storage area.

(g) Make a physical radiation survey of the device to insure Source is in safe position. Make record of this survey on the Radiation Survey Report form ART 261.

(h) Place locked storage device inside storage box bolted to floor of mobile laboratory.

(i) Lock storage box.

(j) Exit laboratory and lock laboratory door.

(k) Survey external surfaces of laboratory and vehicle and record results on utilization log form ART 257. Attachment #9. IF levels exceed 2MR/Hr. add shielding around storage box until external levels are less than 2MR/Hr.

(l) Check external surfaces of laboratory for the presence of "Radioactive" placards on all four sides.

(m) For overnight storage, park vehicle away from major highways or heavily traveled streets whenever possible.

(n) Keys to storage device storage box and mobile laboratory are to be in possession of radiographer or radiographer's assistant at all times.

(o) If device cannot be returned to locked storage area, or otherwise physically secured, assign radiographer or radiographer's assistant to establish safe area around devices and to keep unauthorized persons from that area.

6.3.4 Radiation Surveys

6.3.4.1 Posting

6.3.4.1.1 Post all "Restricted Areas" as specified in these procedures with warning signs, provided by the Company. These signs contain the words: "Caution - Radiation Area" and the standard three-bladed radiation sign. The signs are Magenta or Purple on a yellow background.

6.3.4.1.2 Post all "High Radiation Areas" as specified in these procedures with warning signs containing the words: Caution-High Radiation Area", and the radiation symbol.

6.3.4.1.3 All restricted areas must be kept under constant surveillance by the radiographer or radiographer's assistant. Rope and radiation signs, shall be used to designate the perimeter of the restricted area.

SECTION 6 - GENERAL OPERATING PROCEDURE

6.3.4.1.4 Personnel who have no need to enter a restricted area, or who are not adequately monitored and aware of the radiation field, must not be allowed to enter a restricted area. If unauthorized personnel cannot be prevented from entering the area, the Source should be immediately returned to its shielded position.

6.3.4.1.5 A restricted area is that area into which the radiographer must control access for purposes of radiation safety. This restriction must be extended to include those areas containing radiation levels such that a person continuously present in the area could receive an exposure in excess of 2 millirem in any one hour. The perimeter of the restricted area would be at the 2mr/hr isodose line.

6.3.4.1.6 There are two restricted areas of radiation levels which are defined as:

(a) "High Radiation Areas" are those areas which contain radiation levels such that a person continuously present in the area could receive an exposure in excess of 100 mr. in any one hour. The limits of this area must be posted with signs bearing the radiation caution symbol and the words "CAUTION - HIGH RADIATION AREA". Normally these signs would be posted at the 100 mr/hr isodose line.

(b) "Radiation Areas" are those areas which contain Radiation levels such that a person continuously present in the area could receive an exposure in excess of 5 millirem in any one hour. Radiation areas must be posted with signs bearing the radiation caution symbol and the words "CAUTION - RADIATION AREA". Our policy is to use these signs to mark the perimeter of the restricted area; therefore, no action concerning the perimeter of the radiation area need be taken.

SECTION 6 - GENERAL OPERATING PROCEDURE

6.3.4.2 Surveying

6.3.4.2.1 A calibrated and operable survey meter must be maintained at each job site where radiography is being performed. The small tag attached to the survey meter provides the date of the latest calibration. This tag should be inspected frequently to insure that the instrument has been calibrated within 90 days. If the instrument has not been so calibrated, it is not to be used, but forwarded to the radiation safety officer for immediate calibration.

6.3.4.2.2 Survey meters are delicate instruments. It is essential that reasonable care be taken in their use to assure reliability.

6.3.4.2.3 Survey meters when transported in company vehicles should be placed in the driver's compartment. Adequate support of the instrument to prevent damage during transit is necessary.

6.3.4.2.4 Should your survey meter become inoperable for any reason, immediately cease work until the meter has been repaired or a replacement obtained.

6.3.4.2.5 A survey must be made during each exposure to insure that no individual, other than authorized personnel, is in an area where he could receive, if continuously present in the area, a dose in excess of 2 mr in any one (1) hour or 100 mr in any seven (7) consecutive days.

6.3.4.2.6 All radiation surveys are to be conducted in accordance with the following:

A. Physical radiation survey during exposure period.

(a) Determine area larger than necessary for actual exposure from calculations of Source strength and distance.

(b) Rope off and post this area.

(c) Expose Source as outlined in Par. 6.3.2 of these procedures.

(d) Survey boundaries determined in Par. 6.3.4.5 above using survey meter.

(e) Make adjustments to boundary as necessary to maintain readings at 2 mr/hr or less, or as otherwise authorized by the procedures for exposures of short duration in a restricted area.

(f) A record of these surveys must be maintained on ART Form 261 and should contain sketches and instrument readings, and explanatory notes if area was restricted to other than 2 mr/hr isodose line.

(g) If more than one exposure is taken in the same area, and there is no change in the restricting of that area, it is not necessary that the limits of the restricted area be again surveyed.

B. Physical radiation survey of Device after completion of individual exposures.

(a) Return Source to device until pointer indicator on control cable registers zero.

(b) Approach device using survey meter and physically survey guide tube and all sides of device to determine that the Source has returned to a safe storage condition.

(c) After determining the Source is in condition in device from meter readings, lock device.

C. Perform physical radiation survey prior to storage of device after last exposure and record on Form ART 261.

(a) After determining that Source is in safe condition in device from meter readings, lock device and screw in safety plugs.

(b) Return device to storage area.

(c) Use survey meter to measure radiation levels at surface of device. Readings may vary from 10 mr/hr to 200 mr/hr. A reading outside of this range, either high or low may be an indication that the Source is not contained in the device, and should be treated as an emergency situation.

D. Physical radiation survey of outer surfaces of transporting vehicle.

(a) Since the outer surface of a transporting vehicle must be treated as an unrestricted area when the vehicle is outside of our plant area, a physical radiation survey of the vehicle must be made after the exposure device is secured in the vehicle to assure that radiation levels outside the vehicle do not exceed 2 mr/hr. A record of this survey should be made on the Radiation Survey Report.

SECTION 6 - GENERAL OPERATING PROCEDURE

(b) If radiation levels in excess of 2 mr/hr are found, the exposure device must be repositioned in the vehicle or further shielding must be used.

6.3.5 Summary of Instructions

6.3.5.1 If the Source should, for any reason, fail to return to its shielded position in the device, or any emergency arises, immediately follow emergency plan outlined in these procedures.

6.3.5.2 Survey area during exposure using survey instruments to confirm that restricted area limits are as specified. Do not allow anyone in this area.

6.3.5.3 Put safety plugs in device as soon as possible after an exposure. Do not move device without safety plugs in proper position and device locked.

6.3.5.4 After every exposure, survey device to insure that source is back in safe position.

6.4 Radiation Dosage

6.4.1 The amount of radiation received in an interval of time is called a dose and shall be measured in rems and millirems. The maximum permitted dose should not exceed those shown below:

Day (24 hours) - 100 millirem
Week (7 days) - 200 millirem
Calendar quarter (3 months) - 3 rems
Those with occupational history

6.4.2 Exposure to radiation must be held to a minimum. When required, and with approval of the Radiation Safety Officer, he may permit a radiographer or assistant radiographer to receive an exposure in excess of the above limits, for day and week as long as the limits, as set forth in CFR - Title 10 - Part 20 "Standards for Protection Against Radiation", are not exceeded.

6.5 Records

6.5.1 The following records shall be maintained for inspection by the Nuclear Regulatory Commission. Each record will not necessarily be maintained on a separate form independent of other records.

SECTION 6 - GENERAL OPERATING PROCEDURE

6.5.2 Utilization Log - Each exposure device shall be assigned a log, ART form 257

(a) A description of the device, including make and model number.

(b) The identity of the radiographer and his assistant to whom the device is assigned.

(c) The site of use; and

(d) The date of use, including arrival and departure time at site.

6.5.3 Radiation Surveys

6.5.3.1 Except when under the direct surveillance of either a radiographer or a radiographer's assistant, all sources will be kept locked in the appropriate storage container. When each source is returned to its shielded condition to be locked and not under surveillance, a survey shall be performed to verify that the source did retract within its shield. The results of each survey shall be recorded in Radiation Survey Report (Form ART 261).

6.5.3.2 The radiation area perimeter shall be surveyed to insure that radiation levels do not exceed 2 mr/hr. Such surveys will be conducted for each new radiographic procedure in which there is a change in either the position of the source o the position and/or type of object being radiographed. In addition, when the device is returned to the transportation vehicle, the surface and cab will be surveyed to insure that radiation levels do not exceed 2 mr/hr. The results of such surveys shall be recorded in the Radiation Survey Report (Form ART-261).

6.5.4 Personnel Monitoring

A. Film Badges--Film badge reports shall be filed monthly and maintained in accordance with 10 CFR 20.401. Results to be tabulated on ART-187 (NRC-5)

B. Pocket Dosimeters--All readings obtained as described in the Operating and Emergency procedures shall be recorded on ART Form 261.

C. Occupational external radiation exposure history to be recorded on ART form 196. Attachment #10.

6.5.5 Leak Tests

6.5.5.1 Written results of leak tests shall be maintained on file. The performance of the Leak Test by AR&T personnel shall be recorded on form ART-259. Attachment #11.

6.5.6 Quarterly Inventory

6.5.6.1 The sources shall be inventoried quarterly. Written results of each inventory shall be maintained and shall include date of inventory, quantity of by-product material on hand, description of by-product material and location of by-product material. Form ART 257 shall be used.

6.5.7 Instrument Calibration

6.5.7.1 Each survey instrument shall be calibrated quarterly by AR&T. Written results of these calibrations shall be maintained on file. In addition, calibration correction factors, if not equal to unity, will be placed on a label on each instrument.

6.5.7.2 Each pocket chamber will be checked quarterly for proper operation. Results of chamber deflection for ½ hour of both no radiation exposure and for constant radiation exposure will be recorded.

6.5.8 Training Records

6.5.8.1 A file shall be maintained on each individual who requires training as per 10 CFR 34 and shall contain:

1. Individual's name and capacity in which he will serve;
2. Training and experience upon initial employment;
3. Report of initial training and refresher training, including test results; and
4. Summary of any periodic training, form ART-258. Attachment #12.

SECTION 6 - GENERAL OPERATING PROCEDURE

6.5.9 Internal Audit

6.5.9.1 Copies of the Internal Audit Form ART 262 shall be maintained on file in accordance with Par. 9.0. Attachment #13

6.5.10 Quarterly Maintenance

6.5.10.1 The results of the quarterly maintenance inspection shall be maintained on file. Any discrepancies noted will be recorded as well as corrective actions, if any, taken and the date such actions are completed. Attachment #14

6.6 Receipt and Disposal of Sources

6.6.1 At any time a Source is received from the supplier; transferred from one camera to another; or disposed of by returning to the supplier, the information required on Form ART-259 will be filled out.

6.6.2 Disposal of Sources will be done by returning to the supplier.

6.6.3 When Sources are returned to supplier, all records shall show the action taken. These records will be kept on file along with the Daily Chart and Receipts of Sources from suppliers.

6.6.4 Source Changing

6.6.4.1 Source changing shall be accomplished using Tech/Ops Source Changer Model 650 in accordance with the following instructions:

For Removal of decayed source and installation of replacement source.

A. Introduction

The Model 650 is a dual chamber container to permit interchange of Iridium-192 Sources. The inner shield consists of a Depleted Uranium Casting weighing 70 pounds. The compact design of the container results in a light weight, rugged, and structurally sound package, capable of withstanding severe abuse encountered during shipping and field use.

B. Operation

After unbolting the container, proceed as follows:

(a) Be certain to have an operating survey meter on hand.

(b) Locate the Source Changer within one length of guide tube to the machine.

(c) Remove plug from your machine outlet.

(d) Remove (Shipping Plug) from Source Changer. Save (new) source number plate.

(e) Connect the Guide tube to your machine outlet, and to the Source Changer outlet. (empty hole).

(f) Connect Source Position Indicator control to your machine lock box and extend control, so that oper-

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

(h) At this point, the survey meter MUST be employed to insure that source has been safely located in shielded position.

(i) Disconnect Guide tube at Source Changer, and disengage disconnects, being careful not to pull out source.

(j) Secure decayed source in Changer.

(k) Open new Source side of the Source Changer, being careful not to pull out source cable inside. (This is your new Source).

(l) Carefully pull the source cable disconnect only enough to allow joining of disconnects.

(m) Join disconnects on control cable and source cable.

(n) Connect Guide tube to Source Changer outlet.

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

(p) After a monitor check has been made with a survey meter, remove guide tube.

(q) Close empty Source Changer hole.

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

(s) A Lead Seal wire has been furnished with your new source.

(t) Two D.O.T. 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 3 feet.

(u) Return the Source Changer with freight prepaid to Tech/Ops.

6.7 Leak Testing

6.7.1 A survey meter must be present during the following procedure.

6.7.2 Disconnect the source tube from the machine after checking with the survey meter to make sure that the source is in a safe position within the machine.

6.7.3 If the source is in a storage container, remove the source (using approved remote-handling methods).

6.7.4 Open the Tech/Ops Leak Test Kit Model 518 & take out the glass test tube.

6.7.5 Open the test tube and keep the cap in a convenient place where it won't be lost. Wet the swab by dipping it into the solution in the bottle. Remove the excess liquid from the swab by moving it in a circular motion while pressing it against the side of the bottle.

6.7.6 Insert the wetted swab into the outlet of the radiography unit. Push the swab in nearly as far as its handle will allow. Move the swab back and forth a few times to make sure that all internal surfaces of the source guide tube are contacted.

6.7.7 Remove the swab from the unit and place it in the Plastic Bag.

6.7.8 Measure the radiation level at the surface of the Bag.

6.7.9 If a reading of more than 0.5 mr/hr. is observed, follow the procedure given in Paragraph 6.7.11.

6.7.10 If a reading of less than 0.5 mr/hr. is observed, follow the procedure given in Paragraph 6.7.12.

6.7.11 If your test instrument shows a radiation level of more than 0.5 mr/hr. at the surface of the Bag, there may be gross contamination of the unit, and the following steps should be taken:

A. Put the Bag back in its place in the cardboard shipping container. DO NOT SEND IT TO TECH/OPS.

B. Immediately remove the radiography unit or source storage container from service. Keep the leak test sample and the contaminated unit together in a safe place until decontamination personnel can take care of them.

C. As soon as possible, call the nearest NRC Office. Inform them of your findings and subsequent actions.

D. Contact Tech/Ops and provide them with the same information. Use the following address or telephone number.

Tech/Ops
Radiation Products Division
40 North Avenue
Burlington, Mass. 01803

Telephone: 617 272-2000

6.7.12 If your test instrument shows a radiation level of less than 0.5 mr/hr. at the surface of the test Bag, mail the sample to Tech/Ops for further testing and certification. No radiation warning label need be affixed to the outside of the shipping container. (Par. 173.391 of Dept. of Transportation Regulations now exempts small quantities of radioactive materials from specification packaging, marking, and labeling.)

6.7.13 Use the following procedure for preparation and mailing of the test sample:

A. Put the test sample in its place in the cardboard shipping container.

B. Put the lid on the shipping container and fasten it.

C. Fill in the return-address section of the shipping label supplied with the kit. Moisten the label and attach it to the shipping container. The container may be mailed to Tech/Ops by any method desired (first class, parcel post, etc.). The postage must be PREPAID.

When they receive our sample, they will test it and notify us of the results. If the test shows a contamination of greater than 0.005 microcuries , we will be notified immediately by telegram, telephone, or teletype. In this case, we will remove the unit from service. If the test shows less than 0.005 curies, we will mail you a certificate of leak test for your records.

6.8 Storage & Transportation of Sealed Sources

6.8.1 Security of Sealed Sources In Radiographic Devices and Storage Containers.

6.8.1.1 Never leave an unattended radiographic exposure device or storage container outside of a locked storage area.

6.8.1.2 Storage areas containing radiographic exposure devices and storage containers shall be kept locked at all times.

6.8.1.3 Storage areas shall be properly posted using the warning signs which contain the words "CAUTION - RADIOACTIVE MATERIAL" and the radiation symbol.

6.8.1.4 All sources and devices shall immediately be placed in our storage vault when returning to the home facility.

6.8.1.5 This facility consists of a 12½" x 19" x ½" thick steel vault encased in solid concrete unit measuring 24" x 28" x 12" high. The steel vault is key locked and is located in the corner of the radiation exposure room at the home office.

6.8.1.6 Storage of sealed sources in the field will be done by locking the source in the steel shipping box which is bolted to the floor of the portable darkroom. The darkroom itself will then be padlocked.

6.8.2 Transportation

6.8.2.1 The NRC has authorized our use of radiography sources at temporary field sites away from our plant. Use of material at these locations must be approved by the Radiation Safety Officer.

6.8.2.2 Transportation to field sites and to any in-plant area must be in accordance with the following instructions. Before departing for field site, all the equipment specified in this section must be secured in the vehicle and checked by the Radiographer.

Movement of Radiographic Devices

(a) Devices shall be checked, using a survey meter, by a radiographer prior to removal from any storage area.

(b) A radiographer or radiographer's assistant shall be in constant attendance during movement.

(c) No device shall be moved unless it is locked, and all safety plugs are inserted.

(d) In-plant transportation can be accomplished by the use of handcarts or company vehicles. Portable exposure

devices are not to be handcarried long distances since relatively high radiation levels often exist at the surfaces of these devices. Any transporting vehicle must be clearly marked with the radiation caution symbol and the words "CAUTION - RADIOACTIVE MATERIAL".

(e) Transportation to field sites or other plant sites must be accomplished in a vehicle clearly marked with the radiation caution symbol and the words "CAUTION-RADIOACTIVE MATERIAL". The exposure device must be firmly secured inside the vehicle by placing it in the steel shipping box which has been bolted to the floor and locked. The outer surfaces of the vehicle must be surveyed to assure that radiation levels do not exceed 2 mr/hr. and lead or concrete shielding added if necessary to reduce radiation to this level. The shielding must also be secured to make it immobile.

(f) Radioactive Material must never be transported outside of our plant property unless it is accompanied by a radiographer or radiographer's assistant.

(g) The following equipment must be packed in the transporting vehicle prior to departing for a field exposure site.

(1) Survey meter which had been calibrated within 90 days.

(2) At least one 250-foot coil of rope.

(3) At least six "CAUTION - RADIATION AREA" SIGNS.

(4) At least three "CAUTION - HIGH RADIATION AREA" SIGNS.

(5) Eight stands to use in stringing rope.

(6) Report Form ART-261 for length of time in field.

(7) The exposure device and all related cables.

(8) Road flares.

(9) Copy of Radiation Safety & Control Manual.

6.8.2.3 The external surfaces and interior passenger compartment of the vehicle must be surveyed to be sure radiation levels do not exceed allowable limits.

6.8.2.4 The vehicle must be properly posted with "RADIOACTIVE" signs. Each marking or placard shall consist of letters not less than four (4) inches high, in blackletters on a yellow background, using approximately a 5/8 inch stroke The placard must be larger than the lettering required there on by at least one (1) inch at the top and bottom and sides. Placard shall be contained in an area on the vehicle which has no other marking, lettering, or graphic display, for at least three (3) inches in each direction. Placard shall be displayed at the front, rear, and on each side of the motor vehicle or trailer while it contains radioactive material. The front placard may be displayed on the front of either the truck, truck body, truck tractor or the trailer.

6.8.2.5 The placarding required shall be removed from or covered on any vehicle to which it is attached when such vehicle does not contain radioactive material.

6.8.2.6 All placards must be clearly discernible when required.

6.9 Inspection & Maintenance

6.9.1 Daily Equipment Check

6.9.1.1 When the equipment is in service, a daily report must be filled out by each radiographer to insure safe operation of the following items:

(a) Check operation of lock on shielded container.

(b) Check for proper operation of crank mechanism.

(c) Check accuracy of source position indicator.

(d) Check source tube and drive cable for wear or damage.

(e) Check to see that Schematics are attached.

(f) Meter Reading of Camera Before Work.

(g) Meter Reading of Camera After Work.

(h) Results will be reported on Form 261.

6.9.2 Management Inspection

6.9.2.1 Management will perform detailed, periodic inspection at intervals not to exceed three (3) months, or whenever a device appears to be impaired through abuse or wear. Results will be reported on Radiation Survey Form ART-260.

6.9.2.2 Preventive maintenance checks will be made on all of the above mentioned operational items.

6.9.2.3 Corrective maintenance will include all operational items found to be unsafe, to be discontinued until a repair or replacement part can be obtained.

6.9.2.4 Management will perform inspections on items listed below to insure proper operation.

(a) Change in operation characteristics.

(b) Proper operation of source indicator and crank mechanism.

(c) Operation of locking device.

(d) Damaged or worn parts.

(e) Proper connection of all mating components.

(f) All gear drives.

(g) Proper labeling.

6.9.3 Maintenance

6.9.3.1 Tech/Ops maintenance instructions will be closely followed during the cleaning and lubrication of the equipment. Wear gauges will be used to monitor the source connectors.

6.9.3.2 The Radiation Safety Officer will perform the maintenance on an established schedule.

6.10 Control of Keys

6.10.1 The Radiation Safety Officer shall be responsible for the control and assignment of keys in the Radiation Department.

6.10.2 For Field Assignments, the keys to locks for the source exposure device, the source storage container and for the door to the closed storage compartment on the transportation vehicle shall remain in the immediate possession of either the radiographer or the radiographer's assistant to whom the device is assigned. Such possession shall be maintained even for extended field trips involving overnight travel. At no time shall the keys be surrendered to an unauthorized person, such as a mechanic or policeman, except when the radiographer or his assistant is maintaining constant surveillance of the source device and/or the vehicle entrance to the source while using the survey meter.

6.11 Maintaining Source Identification

6.11.1 Each device containing a sealed source is to be clearly labeled with radiation caution symbol and the words "Caution - Radioactive Material". Also, each shall carry a label or tag plainly stating the kind of radioactive material contained in the device, together with the quantities thereof and the date of measurement of those quantities. Radiographers are responsible for keeping equipment in their possession properly labeled.

ATTACHMENT #7

Abcia Research & Testing Labs, Inc.

RADIATION SURVEY REPORT

P/N	View Number	Accept	Reject	Film Size	Area Survey: During Exposure	Area Survey: After Exposure	Area Survey: MR @ Camera	Remarks

Client: _____ AR&T: _____

Start: _____ Finish: _____ Total Hours _____ Date: _____

ALICIA RESEARCH & TESTING LABS, INC.

Location: _____ Report To: _____

_____ Phone No. _____

P.O. Number _____ Job No. _____

Job Description _____

Material & Capsule No. _____ Curies: _____ Camera:Model _____ Serial No. _____

No. of Set-Ups _____ No. of Exposures _____ FFD _____ Exposure Time _____

No. of Film Used _____ Type of Film _____ Survey Meter:Model _____ S/N _____

Vehicle Survey Before Leaving Lab: By: _____

Technician	Film Badge Number	Dosimeter Number	Dosimeter Start	Dosimeter Stop	Work Time	Stand By Time	Travel Time	

Job Completion Survey Remarks: _____

Vehicle Survey Before Leaving Jobsite: By _____

Show sketch of set-up area - Indicate walls, barricades, ropes, sign locations, etc. Give approximate dimensions of areas.

DAILY EQUIPMENT CHECK

A. Check Operation of Lock on Shielded Container

B. Check for Proper Operati Crank Mechanism

C. Check accuracy of Source Position Indicator

D. Check Source Tube and Dri Cable for Wear of Damage

E. Check to see that schem- atics are attached.

F. Meter Reading of Ca Before Work

G. Meter Reading of Camera After Work

Alicia Research & Testing Labs, Inc.

ATTACHMENT #8

CURRENT OCCUPATIONAL EXTERNAL RADIATION EXPOSURE

Identification

1. Name (Print - Last, First and Middle)	2. Social Security No.
3. Date of Birth (Month, Day, Year)	4. Name of Licensee

Occupational Exposure

5. Dose Recorded For (Specify: Whole Body; Skin of Whole Body; or Hands and Forearms Feet and Ankles).	6. Whole Body Dose Status (rem)	7. Method of Monitoring (e.g. Film Badge--FB, Pocket Chamber--PC, Calculations --Calc). X Or Gamma_____ Beta_____ Neutrons_____

8. Period of Exposure (from - to)	Dose for the Period (rem)				13. Running Total for Calendar Quarter (rem)
	9. X or Gamma	10. Beta	11. Neutron	12. Total	
January					
February					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					

Lifetime Accumulated Dose

14. Previous Total (rem)	15. Total Quarterly Dose Date	Rem	16. Total Accumulated Dose (rem)	17. Perm ACC Dose 5(N-18) (rem)	18. Unused Part of Permissible Accumulated Dose (rem)

Alicia Research & Testing Labs, Inc.

Attachment #9

SOURCE LOCATION/INVENTORY RECORD

Date	Camera Model	Camera Serial No.	Curies	MR at Camera	Location	Last Leak Test	Inventory By

Source Material____________________ Capsule No.____________

Camera: Model____________________ Serial No.____________

Date/Time Out	Date/Time In	Location	Radiographer

ALICIA RESEARCH & TESTING LABS

OCCUPATIONAL EXTERNAL RADIATION EXPOSURE HISTORY

IDENTIFICATION

1. Name _____
(Print Last First Middle)

2. Social Security No. _____

3. Date of Birth _____
(Month Day Year)

4. Age in Full Years (N) _____

OCCUPATIONAL EXPOSURE - PREVIOUS HISTORY

5. Previous Employments Involving Radiation Exposure - List Name and Address of Employer	6. Dates of Employment (From - To)	7. Periods of Exposure	Previous Dose History 8. Whole Body (rem)	9. Insert One; Record or Calculated	10. Remarks

ACCUMULATED OCCUPATIONAL DOSE - TOTALS 11.

12. CERTIFICATION: I certify that the exposure history listed in Column 5,6 and 7 is correct and complete to the best of my knowledge and belief.

Employee's Signature _____ Date _____

CALCULATIONS - PERMISSIBLE DOSE

13. Whole Body:
a. Permissible Accum. Dose = 5 (N-18) = _____ rem
b. Total Exposure to Date (FromItem 11) = _____ rem
c. Permissible Dose . . . . . = _____ rem

ATTACHMENT #10

(NRC-4) ART-186

Alicia Research & Testing Labs, Inc.

ATTACHMENT #11

SOURCE RECEIPT/TRANSFER/DISPOSAL LEAK TEST REPORT

Source Material _____ Capsule Number _____

RECEIPT

Received From: _____

Curies: _____ Changer No. _____

Installed in Camera: Model _____ Serial No. _____

Note: Complete leak test report data as shown below:

By: _____ Date: _____

TRANSFER

From Location: _____ To Location: _____

From Camera: Model _____ Serial No. _____

To Camera: Model _____ Serial No. _____

Changer No. _____ Curies: _____

By: _____ Date: _____

DISPOSAL

Sent To: _____

Changer No. _____ Curies: _____

By: _____ Date: _____

LEAK TEST

Type of Test: Dry _____ Water _____ Solvent _____

Test Kit Used: _____ Number of Swabs Used: _____

Location Wiped: _____

Camera: Model _____ Serial No. _____

By: _____ Date: _____

Comments:

Abcia Research & Testing Labs, Inc.

ATTACHMENT #12

RADIOGRAPHIC SURVEY REPORT/SAFETY TRAINING REPORT

Location: _____ Date: _____

MONITOR: _____

Radiographic Survey Report: _____

Radiographer: _____ Job Site: _____

Camera: Model: _____ Serial No. _____ Source No. _____

Survey Meter: Model: _____ Serial No. _____

Remarks:

Safety/Training Report:

Subjects:

Attendees:

ATTACHMENT #13

Alicia Research & Testing Labs, Inc.

RADIATION SAFETY INTERNAL AUDIT FORM

INDIVIDUAL: LOCATION: DATE:

REFERENCE		DESCRIPTION OF AUDIT POINT	SAT.	UNSAT.	N/A	REMARKS
10 CFR 19 Notices, Instructions and Reports to Workers	1	Posting of Notices to Workers				
	2	Instructions to Workers				
	3	Notifications & Reports to Workers				
10 CFR 20 Standards for Protection Against Radiation	4	Surveys				
	5	Personnel Monitoring				
	6	Signs, Labels, Signals & Controls				
	7	Records of Surveys & Monitoring				
	8	Notification of Incidents				
	9	Reports of Overexposure & Excessive Levels of Radiation				
	10	Personnel Exposure & Monitoring Reports				
	11	Notifications & Reports to Individuals				
10 CFR 21 Reporting of Defects and Incompliance	12	Provisions for Reporting				
	13	Maintenance of Report Log				
	14	Corrective Action Process				
10 CFR 30 Rules for Licensing	15	Applications for License Renewal				
10 CFR 34 Radiography and Radiation Safety	16	Radiation				
	17	Locking of Exposure Devices				
	18	Storage Precautions				
	19	Radiation Survey Instruments				
	20	Leak Testing & Tagging of Sources				
	21	Source Inventory				
	22	Utilization Log				
	23	Inspection & Maintenance of Equipment				
	24	Training				
	25	Operating & Emergency Procedures				
	26	Personnel Monitoring				
	27	Security & Posting of Signs				
	28	Radiation Surveys & Records				

Abcia Research & Testing Labs, Inc.

ATTACHMENT #14

EVERY THREE (3) MONTHS OR WHENEVER NECESSARY

MANAGEMENT INSPECTION

INSPECTOR: _____

DATE: _____

COMPONENTS	DAMAGED OR WORN PARTS	RUST, DIRT OR SLUDGE	PROPER LABELING	OPERATIONAL	UN-SATISFACTORY
1. CRANK MECHANISM a. #S.N. b. #S.N.					
2. SOURCE INDICATOR a. #S.N. b. #S.N.					
3. LOCKING DEVICES a. #S.N. b. #S.N.					
4. CAMERA a. #S.N. b. #S.N.					
5. SOURCE TUBES a. eg. 5 ft. lg. b. eg. 4 ft. lg.					
6. MATING COMPONENTS					
7. GEAR DRIVES					
8. PROPER CONNECTIONS OF MATING PARTS					

REMARKS:

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item 10 - Radiation Safety Program

Section 8 - Training Program

SECTION 8 - TRAINING PROGRAM

8.1 Responsibility

8.1.1 The Vice President of Training & Education shall be responsible for conducting the training programs, giving the examinations and qualifying radiographers and assistant radiographers.

8.2 Initial Training

8.2.1 The radiographer shall be certified as a Level II in radiography after having met the requirements of ART-ASNT/A PQC-01 which requires as a minimum the following:

A. Completion of the 60 hr. ART-TP 2 training course on radiographic testing.

B. 1575 hours of RT work time experience

C. Having passed a written and practical examination.

8.2.1.1 At the discretion of V.P. of Training and Education, training administered by others may be accepted, however, Section 5 of ART-TP-2 "Personnel Safety & Radiation Protection" must be completed by all radiographers, this will consist of 12 hours of instructions.

8.2.2 The assistant radiographer shall be certified as Level I in radiography after having met the requirements of ART-ASNT/A PQC-01 which requires as a minimum the following:

A. Completion of the 20 hr. ART-TP-2 training course on radioactive testing.

B. 525 hours of RT work time experience.

C. Having passed a written and practical examination.

8.2.2.1 Paragraph 8.2.1.1 shall apply except the hours of instruction shall be reduced to 5 hours.

8.3 Periodic Training

8.3.1 Annual refresher training shall be given to all radiographers and radiographer's assistants. This training shall consist of seven hours of classroom instructions followed by a written test. The seven hours of instruction will review parts of the classroom work accomplished during initial training.

8.3 2 The R.S.O. shall also provide training and instruction to radiographic personnel whenever changes in the radiography program are made. This shall include any changes in N.R.C. regulations, Radiation Safety and Control Manual Procedures and in equipment. This shall be documented on Form 258.

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item 10 - Radiation Safety Program

Section 8 - Attachment 16

ART-TP-2 Training/Radiography Testing

ATTACHMENT #16

ALICIA RESEARCH & TESTING LABS, INC.

	Procedure No. ART-TP-2	Page 1 of 8
	Date Issued 8-9-82	Effective Date 8-9-82
Subject: COURSE OUTLINE FOR TRAINING NDE PERSONNEL	Revision No. 0	Date 8-9-82
	Prepared By: Michael Rose III	
Approval/Concurrence: Wayne Deerinja Level III	A.I. If Required	
Project: RADIOGRAPHIC TESTING		

RECORD OF REVISIONS

LIST OF EFFECTIVE PAGES	DATE	REVISION NO.
1	8/9/82	0
2	8/9/82	0
3	8/9/82	0
4	8/9/82	0
5	8/9/82	0
6	8/9/82	0
7	8/9/82	0
8	8/9/82	0

RADIOGRAPHIC TESTING

1. Objectives

Objectives of radiographic method of nondestructive testing are stated below.

I. The trainee should:

A. Understand the principles governing the radiographic testing process.
B. Be familiar with the various types of parts which are commonly inspected with radiation.
C. Be cognizant of the routine procedures involved in accomplishing the test.
D. Understand the requirements for a specific technique and be able to select the technique.
E. Understand the advantages and disadvantages of the test.
F. Understand and be familiar with the safety precautions pertinent to radiation hazards.

II. The trainee will be able to:

A. Use typical equipment peculiar to radiographic processes. Use should be confined to the softer ray tests unless special requirements dictate otherwise.
B. Comply with local, state, and federal radiation safety codes.
C. Use the attachments and accessories pertinent to routine testing.
D. Use the X-ray technique in locating discontinuities.
E. Use the gamma-ray technique when this technique is required. NOTE: The trainee should be familiarized with the gamma-ray test and should be given the opportunity to perform some of these tests.
F. Differentiate among the several patterns of discontinuities.
G. Analyze the specific and total situation.
H. Evaluate the total inspection situation.
I. Accept or reject the specific indications.

RADIOGRAPHIC TESTING

		Min. Instruction Hours					
		LEVEL I			LEVEL II		
		*	**	***	*	**	***
1.0	INTRODUCTION	.9	1.5	6.0	1.0	1.0	5.0
	1.1 History of industrial radiography						
	1.2 General principles of examination of materials with penetrating radiation.						
	1.3 Relationship of penetrating radiation, radiography, and radiometry						
	1.4 Comparison with other methods						
	1.5 General areas of application:						
	1. Imaging						
	2. Metrological						
	3. Product						
2.0	PHYSICAL PRINCIPLES	1.2	2.0	8.0	5.0	5.0	20.0
	2.1 Nature of penetrating (all types briefly, X-ray, and gamma detailed).						
	1. Particles						
	2. Wave properties						
	3. Electromagentic waves						
	4. Electrical theory of matter						
	5. Fundamentals of radiation physics						
	6. Sources of radiation:						
	a. Electronic						
	b. Isotopic						
	c. Other						
	2.2 Interaction between penetrating radiation and matter						
	1. Absorption						
	2. Scatter						
	3. Pair production						
	4. Other secondary emission						

		Mini. Instruction Hours					
		LEVEL I			LEVEL II		
		*	**	***	*	**	***
2.3	Radiography						
	1. Imaging by film						
	2. Imaging by fluorescent materials						
	3. Imaging by electronic devices						
2.4	Radiometry						
	1. Physics of detection devices						
2.5	Glossary of terms and units of measure						
3.0	RADIATION SOURCES	1.8	3.0	12.0	3.0	3.0	6.0
3.1	Electronic Sources						
	1. X-ray sources						
	a. Generators and tybes as an integrated system						
	b. Electron sources:						
	Cold cathode						
	Hot cathode						
	Beam focusing						
	Field emission						
	Other						
	c. Accelerating potential:						
	General						
	Telsa coils						
	Mechanical rectifiers						
	Metal core transformers						
	Resonant coil transformers						
	Electrostatic						
	d. Targets:						
	Material						
	Configuration						
	Heat dissipation						
	e. Equipment design considerations						
	Generating wave shape						
	Window design						
	Duty cycle						
	Roentgen output						
	Tube shielding						
	Installation-fixed, mobile, etc.						

	Mini. Instruction Hours					
	LEVEL I			LEVEL II		
	*	**	***	*	**	***
2. Particulate radiation sources						
a. Electrons						
b. Neutrons						
c. Other (alpha, deutrons, etc.)						
3.2 Isotopic Sources						
1. Gamma						
a. Types						
b. Spectra						
c. Activity including self-absorption						
d. Handling						
2. Beta						
3. Bremsstrahlung						
4. Neutron						
4.0 RADIATION DETECTION	1.8	3.0	12.0	3.0	3.0	7.0
4.1 Imaging						
1. Film-principles-properties						
a. Material examination						
b. Monitoring						
2. Fluoroscopy						
a. Fluorescent screen						
b. Image amplification						
c. Cine techniques						
3. Direct TV viewing						
4. Solid state devices						
a. Xeroradiography						
b. Ionography						
c. Solid state viewer						
d. Other						
5. Special instrumentation associated with above						
4.2 Non-imaging Devices						
1. Solid state						
a. Scintillometers						
b. Photoresistive						
c. Other						
2. Gaseous						
a. Proportional counters						
b. Geiger counters						
c. Ionization chambers						
d. Ohmart cells						
e. Other						

		Mini. Instruction Hours					
		LEVEL I			LEVEL II		
		*	**	***	*	**	***
	3. Instrumentation a. Rate meters b. Counters c. Amplifiers and pre-amplifiers d. Recording readouts e. Other						
5.0	PERSONNEL SAFETY & RADIATION PROTECTION	1.5	2.5	10.0	3.0	3.0	7.0
	5.1 Hazard of excessive exposure 5.2 Methods of controlling radiation dose 1. Time 2. Distance 3. Shielding 5.3 Specific Equipment Requirements 1. X-ray 2. Gamma handling 3. Survey 4. Recording 5. Exposure shields and/or rooms a. Operation b. Alarms 5.4 Operation and emergency procedures 5.5 Federal, State & Local regulations						
6.0	THE RADIOGRAPHIC PROCESS	3.0	5.0	20.0	12.0	12.0	27.0
	6.1 Basic imaging considerations 1. Definition of sensitivity (including penetrameters) 2. Contrast and definition a. Relation of kilovoltage or wavelength to contrast and definition 3. Geometric principles 4. Intensifying screens a. Fluorescent b. Metallic 5. Generation and control of scatter 6. Choice of source						

7. Choice of film
8. Use of exposure curves and how to make them
9. Fluoroscopic inspection
   a. Theory of operation
   b. Applications
   c. Limitations
10. Film Processing
   a. Darkroom procedures
   b. Darkroom equipment and chemicals
   c. Film processing do's & don'ts
11. Viewing of radiographs
   a. Illuminator requirements
   b. Background lighting
   c. Judging quality of radiograph
12. Causes and correction of unsatisfactory radiographs
   a. High film density
   b. Insufficient film density
   c. High contrast
   d. Low contrast
   e. Poor definition
   f. Fog
   g. Light leaks
   h. Artifacts
13. Arithmetic of exposure and of other factors affecting test

6.2 Miscellaneous applications
1. Blocking and filtering
2. Multifilm techniques
3. Enlargement and projection
4. Stereoradiography
5. Triangulation methods
6. Autoradiography
7. Neutron radiography
8. Flash radiography
9. "In motion" radiography & fluoroscopy
10. Backscatter radiography
11. Microradiography
12. Causes of "diffraction" effects and minimization of interference with test
13. Determination of focal point spot size

		Mini. Instruction Hours					
		LEVEL I			LEVEL II		
		*	**	***	*	**	***
	14. Panoramic techniques						
	15. Altering film for contrast and for density						
	16. Gaging & control processes						
7.0	TEST RESULT INTERPRETATION	1.8	3.0	12.0	13.0	13.0	28.0
	7.1 Basic factors						
	1. General aspects						
	2. Effects on measurement and interpretation of test						
	3. Administrative control of test quality by interpreter						
	4. Familiarization with image						
	7.2 Material considerations						
	1. Metallurgy or other material discipline as it affects use of item and test results						
	2. Materials processing effects on use of item and test results						
	3. Discontinuities, their causes and effects						
	4. Radiographic appearance of discontinuities						
	TOTAL MINIMUM HOURS:	12.0	20.0	80.0	40.0	40.0	100.0

NOTE: Each student shall be made familiar with the Applicable Codes, Standards, ART Specifications, ART Procedures and ART N.D.E. personnel qualification and certification requirements.

* Completion with a passing grade of at lease two (2) years of engineering or science study at a university, college, or technical school.

** High school graduation, diploma or its equivalent.

*** Grammar school graduation, or demonstrated proficiency, or additional training.

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item 10 - Radiation Safety Program

Section 9 - Internal Inspections

SECTION 9 - INTERNAL INSPECTIONS

9.1 Responsibility

9.1.1 The internal inspection system will be administered by the Radiation Safety Officer. His qualifications are described in the attached resume. Results of such inspections will be recorded on the internal audit form 262, a copy of which is attached.

9.2 Frequency

9.2.1 Inspections of the radiography program shall be conducted on both an announced and an unannounced basis. There shall be a minimum of two of each type of inspection for each radiographer and radiographer's assistant during each twelve month period with one inspection each quarter. The inspections shall be planned and conducted to evaluate all equipment, procedures and personnel involved in the radiography operations. These inspections shall include direct observation of procedures and review of records such as inventory, utilization, personnel monitoring, surveys and other data as may be required by the Nuclear Regulatory Commission. All applicable provisions of 10 CFR 19, 20, 21, 30 and 34 will be subject to review.

9.3 Dispositions of Results

9.3.1 The results of these inspections shall be reported to the President. All deficiencies and/or violations shall require written corrective action within the time period established by the Radiation Safety Officer. A follow-up inspection shall be conducted within seven days after corrective action has been taken. Results of the follow-up inspection shall become a part of the initial report.

9.3.2 As required, results of inspections will be reported to the Commission as required in 10 CFR 20.401-.409.

SECTION 10 - IDENTIFICATION & REPORTING OF DEFECTS & NONCOMPLIANCES

10.1 Purpose

10.1.1 The purpose shall be to establish methods to identify, document, segregate and disposition nonconforming conditions, procedure ART-QCA-15-01 "Control of Nonconformances" shall be used. Attachment # This procedure shall also provide for appropriate reviews of the nonconforming conditions and the subsequent dispositions as well as verification of the implementations of the disposition.

10.2 Responsibilities

10.2.1 The Director, Quality Assurance is responsible for the implementation of procedure ART QCA-15-01 "Control of Nonconformances"

10.2.2 All employees of Alicia Research & Testing Labs, Inc. are responsible for reporting nonconforming conditions in accordance with the above procedure.

10.2.3 The President and General Manager, or his designee, is responsible for concurring with all dispositions of nonconformances.

10.2.4 Assigned Quality Assurance personnel are responsible to verify implementation of dispositions to nonconformances.

10.3 Procedure

10.3.1 Any employee who finds a condition or item to be nonconforming shall properly document it on a nonconformance report, Form ART 154 and forwarded to the Director, Quality Assurance for processing.

Alicia Research & Testing Labs, Inc.

Alicia Research & Testing Labs, Inc.

Training/Experience (Appendix D)

NAME: Jack Miller (051-07-3160)
Radiation Safety Officer

TRAINING: Refer to resume attached

EXPERENCE:

N.Y. Testing Labs, Westbury, New York	Radiographer	1952-1965
Consolidated Testing New Hyde Park, New York	Radiographer	1965-1966
General Magnaplate Linden, New Jersey	Radiation Safety Officer Radiographer Prepared NRC license	1966-1970
Int'l Testing Newark, New Jersey	Radiation Safety Officer Radiographer Prepared NRC license	1970-1976
Cornell/Underhill Hoboken, New Jersey	Q.A. Manager Radiation Safety Officer Prepared NRC license	1978-1979
Peabody/Magnaflux Little Ferry, New Jersey	Radiographer Asst. Lab Manager	1976-1978

Abcia Research & Testing Labs, Inc.

RADIATION SAFETY INTERNAL AUDIT FORM

INDIVIDUAL: LOCATION: DATE:

REFERENCE		DESCRIPTION OF AUDIT POINT	SAT.	UNSAT.	N/A	REMARKS
10 CFR 19 Notices, Instructions and Reports to Workers	1	Posting of Notices to Workers				
	2	Instructions to Workers				
	3	Notifications & Reports to Workers				
10 CFR 20 Standards for Protection Against Radiation	4	Surveys				
	5	Personnel Monitoring				
	6	Signs, Labels, Signals & Controls				
	7	Records of Surveys & Monitoring				
	8	Notification of Incidents				
	9	Reports of Overexposure & Excessive Levels of Radiation				
	10	Personnel Exposure & Monitoring Reports				
	11	Notifications & Reports to Individuals				
10 CFR 21 Reporting of Defects and Incompliance	12	Provisions for Reporting				
	13	Maintenance of Report Log				
	14	Corrective Action Process				
10 CFR 30 Rules for Licensing	15	Applications for License Renewal				
10 CFR 34 Radiography and Radiation Safety	16	Radiation				
	17	Locking of Exposure Devices				
	18	Storage Precautions				
	19	Radiation Survey Instruments				
	20	Leak Testing & Tagging of Sources				
	21	Source Inventory				
	22	Utilization Log				
	23	Inspection & Maintenance of Equipment				
	24	Training				
	25	Operating & Emergency Procedures				
	26	Personnel Monitoring				
	27	Security & Posting of Signs				
	28	Radiation Surveys & Records				

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item 10 - Radiation Safety Program

Section 10 - Identification & Reporting of Defects & Noncompliances

SECTION 10 - IDENTIFICATION & REPORTING OF DEFECTS & NONCOMPLIANCES

10.1 Purpose

10.1.1 The purpose shall be to establish methods to identify, document, segregate and disposition nonconforming conditions, procedure ART-QCA-15-01 "Control of Nonconformances" shall be used. Attachment # This procedure shall also provide for appropriate reviews of the nonconforming conditions and the subsequent dispositions as well as verification of the implementations of the disposition.

10.2 Responsibilities

10.2.1 The Director, Quality Assurance is responsible for the implementation of procedure ART QCA-15-01 "Control of Nonconformances"

10.2.2 All employees of Alicia Research & Testing Labs, Inc. are responsible for reporting nonconforming conditions in accordance with the above procedure.

10.2.3 The President and General Manager, or his designee, is responsible for concurring with all dispositions of nonconformances.

10.2.4 Assigned Quality Assurance personnel are responsible to verify implementation of dispositions to nonconformances.

10.3 Procedure

10.3.1 Any employee who finds a condition or item to be nonconforming shall properly document it on a nonconformance report, Form ART 154 and forwarded to the Director, Quality Assurance for processing.

Alicia Research & Testing Labs, Inc.

APPLICATION FOR MATERIAL LICENSE

Item 10 - Radiation Safety Program

Section 10 - Attachment 17

ART-QCA-15-01

Control of Nonconformances

Attachment #1 - Report Form
Attachment #2 - Instructions
Attachment #3 - Report Log

ATTACHMENT # 17

ALICIA RESEARCH & TESTING LABS, INC.

CONTROL OF NONCONFORMANCES	Procedure No. ART-QCA-15-01	Page 1 of 3
	Date Issued 11/29/82	Effective Date 11/29/82
Subject:	Revision No. 0	Date 11/29/82
	Prepared By: Wayne Denlinger	
Approval/Concurrence ~~Michael Kozak~~	A.I. If Required	
Project:		

RECORD OF REVISIONS

List of Effective Pages	Date	Revision No.
1	11/29/82	0
2	11/29/82	0
3	11/29/82	0
Attachment #1	11/29/82	0
hment #2, Page 1	11/29/82	0
achment #2, Page 2	11/29/82	0
Attachment #2, Page 3	11/29/82	0
Attachment #3	11/29/82	0

03106

1.0 PURPOSE:

1.1 The purpose of this procedure is to provide a method to control nonconformances.

2.0 SCOPE:

2.1 This procedure shall establish methods to identify, document, segregate and disposition nonconforming conditions. This procedure shall also provide for appropriate reviews of the nonconforming conditions and the subsequent dispositions as well as verification of the implementations of the disposition.

3.0 DEFINITIONS:

3.1 Nonconformance - a deficiency in characteristic, documentation, or procedure which renders the quality of an item unacceptable or indeterminate.

3.2 Corrective action - positive steps taken to preclude recurrence of reoccurring nonconforming conditions.

4.0 REFERENCES:

4.1 The Alicia Research & Testing Labs, Inc. Quality Assurance Manual.

5.0 RESPONSIBILITIES:

5.1 The Director, Quality Assurance is responsible for the implementation of this procedure.

5.2 All employees of Alicia Research & Testing Labs, Inc. are responsible for reporting nonconforming conditions in accordance with this procedure.

5.3 The President and General Manager, or his designee, is responsible for concurring with all dispositions of nonconformances.

5.4 Assigned Quality Assurance personnel are responsible to verify implementation of dispositions to nonconformances.

6.0 PROCEDURE:

6.1 Any item found to be nonconforming shall be properly documented on a Nonconformance Report Form (Attachment #1). After this is done, then instructions for completing the nonconformance report form shall be followed (Attachment #2).

6.2 Items which are nonconforming shall be identified as such by tagging (including reference to the nonconformance number) and segregated in a "hold area", where practicable, to prevent work or further processing until the nonconformance has been properly dispositioned.

6.3 The Nonconformance Report shall be forwarded to the Director, Quality Assurance for processing.

6.3.1 The Director, Quality Assurance shall assure the nonconformance gets proper review, and shall confer with the appropriate levels of management to ascertain a proper disposition. The acceptable dispositions are:

(a) scrap - self-explanatory

(b) rework - perform additional work on the item to make it meet the strict requirements of the specification or drawing.

(c) repair - perform additional work on the time to get it to acceptable condition, although not in strict adherance to specification or drawing.

(d) use as-is - self-explanatory

6.3.2 The disposition (and justification of same) shall be concurred with by the Director, Quality Assurance, the President and General Manager,the appropriate levels of production (if applicable) and the client (if the item is for client use or purchase, and the disposition is repair or use as-is).

6.3.3 Upon implementation of the disposition, qualified Quality Assurance personnel shall verify same and close out the Nonconformance Report.

6.4 A log (Attachment #3) shall be maintained to provide a record of the Nonconformance Reports and the status of each for tracking purposes.

7.0 Stop Work

7.1 Director, Quality Assurance shall "stop work" when he has reason to believe that work or further processing could endanger safety or incur prohibitive costs. Permission to remove "stop work" shall be only by the Director, Quality Assurance's signature.

8.0 RECORDS

8.1 The Director, Quality Assurance is responsible for maintaining a file of each Nonconformance Report and any supporting documentation for timely retrieval.

ATTACHMENT #2

INSTRUCTIONS FOR COMPLETING THE NONCONFORMANCE REPORT FORM

The numbers correspond to the encircled numbers on the form.

1. Enter the date on which the NCR is originated.

2. Enter the unique serial number of the NCR being originated. The number shall consist of two parts. The first being the last two (2) digits of the year in which the NCR is originated and the second shall be the consecutive number of the NCR generated for that year, thus the unique number 82-1 represents the first NCR generated in the year 1982.

3. Enter the signature of the individual originating the NCR.

4. Enter the name of the nonconforming item.

5. Enter the serial number of the nonconforming item.

6. Enter the drawing number including revision number or letter.

7. Enter the applicable specification number and revision (i.e. procurement, fabrication, installation).

8. Enter the quantitative or qualitative requirement as referenced in the specification entered in Item 7. If an inspection of the requirement is necessary in order to clarify the point, identify the clarification as such so that the NCR reader may distinguish between the requirement as established in the requirement document and the requirement as clarified by the NCR originator.

9. Enter the quantitative or qualitative as-is condition of the item.

10. Enter the location of the nonconforming item.

11. Enter the name of the organization/individual responsible for implementing corrective action.

12. Enter a description of the probable cause of the nonconformance which, if corrected, would preclude recurrence of the nonconformance or significantly reduce the frequency of recurrence.

13. Enter a checkmark in the appropriate box to indicate whether or not the nonconfirmance applies to a characteristic of an item which is Q-listed.

ATTACHMENT #1

NONCONFORMANCE REPORT FORM

Date: (1) NCR Serial No.: (2)

Initiated By: (3) Item: (4) Identification: (5)

Applicable Drawing: (6) Rev. No.: Spec. No.: (7) Rev. No.:

Specific Requirement: (8)

Nonconforming Condition (Description): (9)

Specific Location: (10)

Responsible Organization/Individual: (11)

Probable Cause of NCR: (12)

Does NC Affect Q-Listed Item: Yes (13) No ____. Is NC Reportable Per 50.55(e): Yes (14) No ____

Is NC Reportable Per 21: Yes (15) No ____. If "Yes", Date of Report To NRC: (16)

If "Yes", Time Of Report To NRC: (17). If "Yes", Who Made Report: (18)

If "Yes", Name of NRC Official To Whom Reported: (19)

Is C/A Required: Yes (20) No ____. If "Yes", See Page (21)

If "No", What Is Justification: (22)

Proposed Disposition: (23) Scrap____ Rework____ Repair____ Use As-Is____

Justification: (24)

Concurrence: Pres./Gen.Mgr. (25) Date (26) Production____ Date____

QA____ Date____ Client____ Date____

Additional Inspection Requirement: (27)

Verification Of Disposition And Additional Inspection Requirements: (28)

Verified By (29) Date (30)

Close Out By: (31) Date: (32)

ATTACHMENT #2

14. Enter a checkmark in the "Yes" box if the "Yes box in Block 13 was checked and if the nonconformance is reportable to the NRC in accordance with the requirements of Title 10 of the Code of Federal Regulations Part 50.55(e), otherwise, enter a checkmark in the "No" box.

15. Enter a checkmark in the "Yes" box if the "Yes" box in Block 13 was checked and if the nonconformance is reportable to the NRC in accordance with the requirements of Title 10 of the Code of Regulations, Part 21. Otherwise, enter a checkmark in the "No" box.

16. If the nonconformance is reportable to the NRC as indicated by an entry in the "Yes" box of either Block 14 or 15, enter a date on which the report was made to the NRC.

17. Enter the time of day on which the report was made to the NRC (use military time).

18. Enter the name of the individual who personally made the report to the NRC.

19. Enter the name of the NRC official to whom report was made.

20. If corrective action is required in accordance with the following guidelines, enter a checkmark in the "Yes" box. If not, enter a checkmark in the "No" box. Corrective action is required in any case for which the nonconformance is potentially repeatable and either a single repetition would have high safety or cost impact or multiple repetition, which are likely to have high safety or cost impact. Although the above represents general guidelines, the need for corrective action shall be decided at the discretion of the Director, Quality Assurance.

21. If the "Yes" box of Block 20 is checked, enter the page number of the supplemented sheet which is used to document the corrective action.

22. If the "No" box of Block 20 is checked, enter a statement of justification supporting the absence of any request for corrective action.

23. Check appropriate dispostion:

Rework - Re-perform fabrication or construction activity such as to render the characteristic in question within the drawing or specification requirement.

Repair - Perform fabrication or construction activity such as to render the characteristic to a usable condition which is not, however, in conformance with the drawing or specification requirement.

Use As-Is - To use the nonconforming characteristic in its existing condition without any further design fabrication or construction effort relative to part corrective action.

ATTACHMENT #2

24. Enter the justification for any use as-is or repair disposition, N/A for scrap and rework disposition.

25. Obtain the signature of the President and General Manager/designee, Quality Assurance, Production or Client personnel indicating concurrence with the nonconformance.

26. Enter the date of the concurrence obtained in Block 25.

27. For those hardware nonconformances related to inspection/fabrication activities, enter additional inspection attributes to be utilized to minimize recurrence of nonconformance.

28. Block 28, 29 and 30 shall include the signature of the individual who has re-inspected, re-examined or re-test verified that corrective action has been implemented, the date and means by which verification was made.

31. Obtain the signature of quality assurance individual responsible for closing nonconformance out.

32. Enter date of nonconformance close out.

Allied Research & Testing Labs, Inc.

ATTACHMENT #3

NONCONFORMANCE REPORT LOG

Procedure # ARTL-CA-15-01
Revision 0
11/29/82

NCR SERIAL NUMBER	DATE OF NCR ORIG.	ITEM IDENT. NO.	FILE NO.	Q.A. REP. RESP. FOR FOLLOW UP	ORG. RESP. FOR C/A	CORRECTIVE ACTION COM. DATE	CORREC. ACTION VERIFIED	DATE C/A VERIFIED	SIGNATURE OF Q.A. DIRECTOR AND DATE OF FIND CLOSURE

03106