DOCKETED	
Docket Number:	23-SPPE-01
Project Title:	STACK SVY03A Data Center Campus
TN #:	254550-2
Document Title:	STACK Responses to CEC Data Request Set 2 - SVY03A Part II of V
Description:	N/A
Filer:	Scott Galati
Organization:	DayZenLLC
Submitter Role:	Applicant Representative
Submission Date:	2/16/2024 4:25:22 PM
Docketed Date:	2/16/2024

HAYWARD FIRE DEPARTMENT

A Certified Unified Program Agency

777 B Street, Hayward, CA 94541-5007
TEL: (510) 583-4910 FAX (510) 583-3641 • TDD (510) 247-3340

RECEIVED BY FIRE PREVENTION OFFICE
JUN 11 2007
HAYWARD FIRE DEPARTMENT

UNIFIED PROGRAM CONSOLIDATED PERMIT AND REGISTRATION

Issued to

Name of Facility: FERREIRA SERVICE, INC	*Executive Contact:* JEFF STEVENS, V P OPERATIONS
Street Address: 26046 EDEN LANDING RD #5	*Mailing Address:* 26046 EDEN LANDING RD #5
Permit Type: ☐Full ☐Provisional ☐Temporary	*City/State/ZIP:* HAYWARD, CA 94545
Registration/Permit Number: 08-0810201-007707	*Telephone Number at Facility:* 783-9330

For the following elements of the Unified Hazardous Materials and Hazardous Waste Management Program

☒ XXX Hazardous Materials Storage (Range 1A)

☐ Hazardous Materials Business Plan

☐ Aboveground Petroleum Storage, SPCC Plan

☐ Underground Storage Tank Program
_____ tanks; Facility No. : 01-003-_____

☐ XXX Hazardous Waste Generator Program (CESQG)

☐ Tiered Permit Program for Onsite Treatment of Hazardous Waste:
_____ PBR; _____ CA; _____ CE

☐ California Accidental Release Prevention Program and/or Federal Risk Management Plan

Certification

I certify that I have read and I hereby accept the terms and conditions printed on the other side of this Unified Program Consolidated Permit and Registration. I agree to comply with all permit conditions and all local, state and federal ordinances, laws, statutes, codes, policies, rules and regulations relating to the storage, use, handling, generation and disposal of hazardous materials and/or hazardous waste.

Signature of Applicant	*Printed Name and Title*	*Date Signed*
	JEFF STEVENS VP operations	6-7-07

FOR OFFICE USE ONLY

Effective Date: 07/01/2007	Expiration Date: 06/30/2008	*Machine Validation / Official Receipt*
Date Payment Received: 06/11/2007	Payment Reference: ck# 019401	
Total Amount Paid: $287.00 POSTED	State Surcharge Paid: $24.00	Approved by the City of Hayward Fire Department

This permit shall not be construed as proof of compliance with any permitting, registration, licensing and/or other requirements of the Hayward Fire Department or of any other city, state, or federal agency.

HAYWARD FIRE DEPARTMENT

A Certified Unified Program Agency

777 B Street, Hayward, CA 94541-5007
TEL: (510) 583-4910 FAX (510) 583-3641 • TDD (510) 247-3340

UNIFIED PROGRAM CONSOLIDATED PERMIT AND REGISTRATION

Issued to

Name of Facility: FERREIRA SERVICE, INC.	*Executive Contact:* JEFF STEVENS/V.P. OPERATIONS
Street Address: 26046 EDEN LANDING RD #5	*Mailing Address:* 26046 EDEN LANDING RD #5
Permit Type: ☐Full ☐Provisional ☐Temporary	*City/State/ZIP:* HAYWARD, CA 94545
Registration/Permit Number: 07-0810201-007707	*Telephone Number at Facility:* 783-9330

For the following elements of the Unified Hazardous Materials and Hazardous Waste Management Program

- ☒ XXX Hazardous Materials Storage (Range 1A)
- ☐ Hazardous Materials Business Plan
- ☐ Aboveground Petroleum Storage, SPCC Plan
- ☐ Underground Storage Tank Program
  _____ tanks; Facility No. : 01-003-_____
- ☒ XXX Hazardous Waste Generator Program (CESQG)
- ☐ Tiered Permit Program for Onsite Treatment of Hazardous Waste:
  _____ PBR; _____ CA; _____ CE
- ☐ California Accidental Release Prevention Program and/or Federal Risk Management Plan

Certification

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Signature of Applicant	JEFF STEVENS V.P operations *Printed Name and Title*	6-8-06 *Date Signed*

FOR OFFICE USE ONLY

Effective Date: 07/01/2006	Expiration Date: 06/30/2007	*Machine Validation / Official Receipt*
Date Payment Received: 6/21/06	Payment Reference: ck# 017378	
Total Amount Paid: $ 287.00 POSTED	State Surcharge Paid: $ 24.00	Approved by the City of Hayward Fire Department

This permit shall not be construed as proof of compliance with any permitting, registration, licensing and/or other requirements of the Hayward Fire Department or of any other city, state, or federal agency.

HAYWARD FIRE DEPARTMENT

A Certified Unified Program Agency

777 B Street, Hayward, CA 94541-5007
TEL: (510) 583-4910 FAX (510) 583-3641 • TDD (510) 247-3340

RECEIVED BY
FIRE PREVENTION OFFICE
SEP 22 2005
HAYWARD FIRE DEPARTMENT

UNIFIED PROGRAM CONSOLIDATED PERMIT AND REGISTRATION

Issued to

Name of Facility: FERRERA SERVICE INC.	*Executive Contact:* JEFF STEVENS SUITE 5
Street Address: SAME	*Mailing Address:* 26046 EDEN LANDING RD.
Permit Type: ☒ Full ☐ Provisional ☐ Temporary	*City/State/ZIP:* HAYWARD, CA 94545
Registration/Permit Number: 06 - 0810201-7707	*Telephone Number at Facility:* 510-783-8330

For the following elements of the Unified Hazardous Materials and Hazardous Waste Management Program

- ☑ Hazardous Materials Storage (Range 1A)
- ☑ Hazardous Waste Generator Program (CESQG)
- ☐ Hazardous Materials Business Plan
- ☐ Tiered Permit Program for Onsite Treatment of Hazardous Waste: _____ PBR; _____ CA; _____ CE
- ☐ Aboveground Petroleum Storage, SPCC Plan
- ☐ Underground Storage Tank Program _____ tanks; Facility No. : 01-003-_____
- ☐ California Accidental Release Prevention Program and/or Federal Risk Management Plan

Certification

I certify that I have read and I hereby accept the terms and conditions printed on the other side of this Unified Program Consolidated Permit and Registration. I agree to comply with all permit conditions and all local, state and federal ordinances, laws, statutes, codes, policies, rules and regulations relating to the storage, use, handling, generation and disposal of hazardous materials and/or hazardous waste.

Signature of Applicant	*Printed Name and Title*	*Date Signed*
	JEFF STEVENS V.P OPERATIONS	9-20-05

FOR OFFICE USE ONLY

Effective Date: 07/01/05	Expiration Date: 06/30/06	*Machine Validation / Official Receipt*
Date Payment Received: 09/12/05	Payment Reference: Ck # 015618	
Total Amount Paid: $ 287.00	State Surcharge Paid: $ 24.00	Approved by the City of Hayward Fire Department

This permit shall not be construed as proof of compliance with any permitting, registration, licensing and/or other requirements of the Hayward Fire Department or of any other city, state, or federal agency.

HAYWARD FIRE DEPARTMENT

A Certified Unified Program Agency

777 B Street, Hayward, CA 94541-5007
TEL: (510) 583-4910 FAX (510) 583-3641 • TDD (510) 247-3340

UNIFIED PROGRAM CONSOLIDATED PERMIT AND REGISTRATION

Issued to

Name of Facility: FERREIRA SERVICE, INC.	*Executive Contact:* JEFF STEVENS/V.P. OPERATIONS
Street Address: 26046 EDEN LANDING RD	*Mailing Address:* 26046 EDEN LANDING RD #5
Permit Type: ☐ Full ☐ Provisional ☐ Temporary	*City/State/ZIP:* HAYWARD, CA 94545
Registration/Permit Number: 05-0810201-007707	*Telephone Number at Facility:* 783-9330

For the following elements of the Unified Hazardous Materials and Hazardous Waste Management Program

☒ XXX Hazardous Materials Storage (Range 1A)

☒ XXX Hazardous Waste Generator Program (CESQG)

☐ Hazardous Materials Business Plan

☐ Aboveground Petroleum Storage, SPCC Plan

☐ Underground Storage Tank Program
_____ tanks; Facility No. : 01-003-_____

☐ Tiered Permit Program for Onsite Treatment of Hazardous Waste:
_____ PBR; _____ CA; _____ CE

☐ California Accidental Release Prevention Program and/or Federal Risk Management Plan

Certification

I certify that I have read and I hereby accept the terms and conditions printed on the other side of this Unified Program Consolidated Permit and Registration. I agree to comply with all permit conditions and all local, state and federal ordinances, laws, statutes, codes, policies, rules and regulations relating to the storage, use, handling, generation and disposal of hazardous materials and/or hazardous waste.

Signature of Applicant	*Printed Name and Title*	*Date Signed*
	JEFF STEVENS V.P Operations	8/16/04

FOR OFFICE USE ONLY

Effective Date: 07/01/2004	Expiration Date: 06/30/2005	*Machine Validation / Official Receipt*
Date Payment Received: 8/19/04	Payment Reference: CK 013335	
Total Amount Paid: $ 287.00 Posted	State Surcharge Paid: $ 24.00	Approved by the City of Hayward Fire Department

This permit shall not be construed as proof of compliance with any permitting, registration, licensing and/or other requirements of the Hayward Fire Department or of any other city, state, or federal agency.

HAYWARD FIRE DEPARTMENT
A Certified Unified Program Agency
777 B Street, Hayward, CA 94541-5007
TEL. (510) 583-4910 ■ FAX (510) 583-3641 ■ TDD (510) 247-3340

BUSINESS ACTIVITIES FORM
APPLICATION FOR A CONSOLIDATED PERMIT/REGISTRATION
UNIFIED HAZARDOUS MATERIALS / HAZARDOUS WASTE MANAGEMENT REGULATORY PROGRAM

(Before completing this form, please read the instructions printed on a separate page.)

Type of Application: *(Please check one.)* ☐ **Initial Registration** ☐ **Modification** ☑ **Renewal**

1. Facility Information

Name: Ferreira Service, Inc.

Address: 26046 Eden Landing Rd, #5

Hayward, CA *(ZIP)* 94545

Telephone:

2. Hazardous Materials Storage Program

Do you have on site hazardous materials – solids, liquids, or gases; or extremely hazardous substances specified in 40CFRPart 355 Appendix A or B; or radiological materials? ☒ Yes ☒ No

Number of Hazard Classes		
Total Liquids	30	gallons
Total Solids	10	pounds
Total Gases (at STP)	50	cu. ft.
Total Radiological Materials	0	curies

3. Accidental Release Prevention Program (CalARP)

Do you have any regulated substance listed in Tables 1, 2, and/or 3 of the CalARP Program (CCR Title 19/Div. 2/Chapter.4.5)? ☐ Yes ☒ No

4. Underground Storage Tank Program (UST)

Do you own or operate Underground Storage Tanks (USTs) at this facility? ☐ Yes ☒ No

If "yes", list material stored and tank capacity in gallons:

5. Aboveground Storage Tank Program (AGT)

Do you have aboveground storage tanks containing petroleum products; at least one is greater than 660 gallons; or total aboveground storage capacity for facility greater than 1,320 gallons? ☐ Yes ☒ No

6. Hazardous Waste Generator Program (HWG)

Do you generate hazardous waste on site? ☐ Yes ☒ No

Quantity generated per month (gal or lbs)

Do you consolidate hazardous waste from remote sites at this facility? ☐ Yes ☒ No

7. Recycler (Onsite or Off-Site)

Do you recycle your own waste onsite? ☐ Yes ☒ No

Do you receive hazardous waste from other facilities and recycle it on your site? ☐ Yes ☒ No

8. Tiered Permit Program (On-site Treatment of HW)

Do you treat, on this site, any hazardous waste you generate? ☐ Yes ☒ No

Do you have a Tiered Permit? ☐ Yes ☒ No

Number of Treatment Units under Tiered Permit:

Permit-By-Rule	
Conditionally Authorized	
Conditionally Exempt – Specified Waste	
Conditionally Exempt – Small Quantity	
Conditionally Exempt – Limited	
Conditionally Exempt – Commercial Laundry	

8. Certification and Signature

I hereby certify that I used reasonable diligence in preparing this application. I have reviewed the application and, to the best of my knowledge, the information contained herein is true and correct.

Signature	JEFF STEVENS V.P OPERATIONS *Printed Name and Title*	7-28-04 *Date Signed*

Reviewed by: dmg

Date reviewed: 8/17/04

Change of address:

As of 08/22/03,
please note the following address change for
Ferreira Service Inc., FSI

was at
25566 Barrington Ct
(85601)

New address:

26046 Eden Landing Road, Suite 5,
Hayward, CA 94545
510-783-9330

810201

moved 8/22/03

HAYWARD FIRE DEPARTMENT

A Certified Unified Program Agency

777 B Street, Hayward, CA 94541-5007
TEL. (510) 583-4910 ■ FAX (510) 583-3641 ■ TDD (510) 247-3340

RECEIVED BY FIRE PREVENTION OFFICE

BUSINESS ACTIVITIES FORM

APPLICATION FOR A CONSOLIDATED PERMIT/REGISTRATION
UNIFIED HAZARDOUS MATERIALS / HAZARDOUS WASTE MANAGEMENT REGULATORY PROGRAM

(Before completing this form, please read the instructions printed on a separate page.)

Type of Application: *(Please check one.)* ☐ **Initial Registration** ☐ **Modification** ☑ **Renewal**

1. Facility Information

Name: Ferreira Service

* *Address:* 26046 Eden Landing Rd., Ste 5

Hayward, CA *(ZIP)* 94545

Telephone: 510.783.9330

2. Hazardous Materials Storage Program

Do you have on site hazardous materials – solids, liquids, or gases; or extremely hazardous substances specified in 40CFRPart 355 Appendix A or B; or radiological materials? ☐ Yes ☑ No

Number of Hazard Classes	
Total Liquids	gallons
Total Solids	pounds
Total Gases (at STP)	cu. ft.
Total Radiological Materials	curies

3. Accidental Release Prevention Program (CalARP)

Do you have any regulated substance listed in Tables 1, 2, and/or 3 of the CalARP Program (CCR Title 19/Div. 2/Chapter.4.5)? ☐ Yes ☑ No

4. Underground Storage Tank Program (UST)

Do you own or operate Underground Storage Tanks (USTs) at this facility? ☐ Yes ☑ No

If "yes", list material stored and tank capacity in gallons:

5. Aboveground Storage Tank Program (AGT)

Do you have aboveground storage tanks containing petroleum products; at least one is greater than 660 gallons; or total aboveground storage capacity for facility greater than 1,320 gallons? ☐ Yes ☑ No

6. Hazardous Waste Generator Program (HWG)

Do you generate hazardous waste on site? ☐ Yes ☑ No

Quantity generated per month (gal or lbs)

Do you consolidate hazardous waste from remote sites at this facility? ☐ Yes ☑ No

7. Recycler (Onsite or Off-Site)

Do you recycle your own waste onsite? ☐ Yes ☑ No

Do you receive hazardous waste from other facilities and recycle it on your site? ☐ Yes ☑ No

8. Tiered Permit Program (On-site Treatment of HW)

Do you treat, on this site, any hazardous waste you generate? ☐ Yes ☑ No

Do you have a Tiered Permit? ☐ Yes ☑ No

Number of Treatment Units under Tiered Permit:

Permit-By-Rule	
Conditionally Authorized	
Conditionally Exempt – Specified Waste	
Conditionally Exempt – Small Quantity	
Conditionally Exempt – Limited	
Conditionally Exempt – Commercial Laundry	

8. Certification and Signature

I hereby certify that I used reasonable diligence in preparing this application. I have reviewed the application and, to the best of my knowledge, the information contained herein is true and correct.

Renee Primer

Signature

Renee Primer. Acnty. Mgr.

Printed Name and Title

9.3.03

Date Signed

Reviewed by: _____ **Date reviewed:** _____

Hazardous Materials Worksheet

An attachment to the application for a Unified Hazardous Materials / Hazardous Waste Management Regulatory Program for

(Name and Street Address of Facility) Ferreira Service Inc. 26046 Eden Landing Rd., Ste 5

Use the "Hazardous Materials Hazard Categories" pamphlet and tally in the following table the total quantities of materials stored at your facility by hazard class. Summarize your inventory and report totals in the application form. Specify unit of measure under "quantity". Use ***gallons, pounds,*** or ***cu. ft.***

Hazard Category	Quantity
A.1 Explosives and Blasting Agents	
A.2(a) Compressed Gases – Flammable	
A.2(b) Compressed Gases – Oxidizing	
A.2(c) Compressed Gases – Corrosive	
A.2(d) Compressed Gases – Highly Toxic	
A.2(e) Compressed Gases – Toxic	
A.2(f) Compressed Gases – Inert	
A.2(g) Compressed Gases – Pyrophoric	
A.2(e) Compressed Gases – Unstable	
A.3(a) Flammable Liquids Class I-A	
A.3(a) Flammable Liquids Class I-B	
A.3(a) Flammable Liquids Class I-C	
A.3(b) Combustible Liquids Class II	
A.3(b) Combustible Liquids Class III-A	
A.3(b) Combustible Liquids Class III-B	
A.4(a) Flammable Solids – Organic Solids	
A.4(b) Flammable Solids – Inorganic Solids	
A.4(c) Flammable Solids – Combustible Metals (except dusts and powders)	
A.4(d) Flammable Solids – Combustible Dusts and Powders (incl. metals)	
A.5(a) Oxidizers – Gases	See A.2(b)
A.5(b/c) Oxidizers – Liquids/Solids Class 4	
A.5(b/c) Oxidizers – Liquids/Solids Class 3	
A.5(b/c) Oxidizers – Liquids/Solids Class 2	
A.5(b/c) Oxidizers – Liquids/Solids Class 1	
A.6 Organic Peroxides – Unclassified	
A.6 Organic Peroxides – Class I	
A.6 Organic Peroxides – Class II	
A.6 Organic Peroxides – Class III	
A.6 Organic Peroxides – Class IV	
A.6 Organic Peroxides – Class V	
A.7(a) Pyrophoric Materials – Gases	See A.2(g)
A.7(b) Pyrophoric Materials – Liquids	
A.7(c) Pyrophoric Materials – Solids	

Hazard Category	Quantity
A.8 Unstable (Reactive) Materials – Class 4	
A.8 Unstable (Reactive) Materials – Class 3	
A.8 Unstable (Reactive) Materials – Class 2	
A.8 Unstable (Reactive) Materials – Class 1	
A.9 Water-Reactive Materials – Class 3	
A.9 Water-Reactive Materials – Class 2	
A.9 Water-Reactive Materials – Class 1	
A.10(a) Cryogenic Fluids – Flammable	
A.10(b) Cryogenic Fluids – Oxidizing	
A.10(c) Cryogenic Fluids – Corrosive	
A.10(d) Cryogenic Fluids – Inert	
A.10(e) Cryogenic Fluids – Highly Toxic	
B.1(a) Highly Toxic Materials	
B.1(b) Toxic Materials – Gases	See A.2(e)
B.1(b) Toxic Materials – Liquids	
B.1(b) Toxic Materials – Solids	
B.2 Radioactive Materials	
B.3 Corrosives	
B.4(a) Carcinogens or Suspect Carcinogens	
B.4(b) Target Organ Toxins	
B.4(c) Irritants	
B.4(d) Sensitizers	
B.5 CalARP or RMP Chemicals	

SUMMARY	
Total number of hazard classes	
Total gallons of liquids	
Total pounds of solids	
Total cu. ft. at STP of gases	

HAYWARD FIRE DEPARTMENT
A Certified Unified Program Agency
777 B Street, Hayward, CA 94541-5007
TEL: (510) 583-4910 FAX (510) 583-3641 • TDD (510) 247-3340

UNIFIED PROGRAM CONSOLIDATED PERMIT AND REGISTRATION

Issued to

Name of Facility: FERREIRA SERVICE, INC	*Executive Contact:* JEFF STEVENS, VICE PRESIDENT OPERATIONS
Street Address: 2566 BARRINGTON CT	*Mailing Address:* 2566 BARRINGTON CT
Permit Type: ☐Full ☐Provisional ☐Temporary	*City/State/ZIP:* HAYWARD, CA 94545
Registration/Permit Number: 04-0085601-007707	*Telephone Number at Facility:* 783-9330

For the following elements of the Unified Hazardous Materials and Hazardous Waste Program

- ☒ Hazardous Materials Storage (Range 1A)
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- ☐ Hazardous Materials Business Plan
- ☐ Tiered Permit Program for Onsite Treatment of Hazardous Waste: _____ PBR; _____ CA; _____ CE
- ☐ Aboveground Petroleum Storage, SPCC Plan
- ☐ Underground Storage Tank Program _____ tanks; Facility No. : 01-003-_____
- ☐ California Accidental Release Prevention Program and/or Federal Risk Management Plan

Certification

I certify that I have read and I hereby accept the terms and conditions printed on the other side of this Unified Program Consolidated Permit and Registration. I agree to comply with all permit conditions and all local, state and federal ordinances, laws, statutes, codes, policies, rules and regulations relating to the storage, use, handling, generation and disposal of hazardous materials and/or hazardous waste.

Signature of Applicant	*Printed Name and Title*	*Date Signed*
	Renee Primer · Acctg. Mgr	6.2.03

FOR OFFICE USE ONLY

Effective Date: 7/1/2003	Expiration Date: 6/30/2004	*Machine Validation / Official Receipt*
Date Payment Received: 7-3-03	Payment Reference: CK# 07048	
Total Amount Paid: $ 256.50 POSTED	State Surcharge Paid: $ 17.50	Approved by the City of Hayward Fire Department

QC SERVICES
A DIVISION OF WORLD TECHNICAL SERVICES, INC.

WORLD TECHNICAL SERVICES, Inc.

26062 EDEN LANDING ROAD, SUITE 1 & 2
HAYWARD, CALIFORNIA 94545
PHONE (415) 782-3660

RADIATION SAFETY PROGRAM
QCS
RSP 687

MAIN OFFICE

QC SERVICES
A Division of World Technical Services, Inc.
26062 Eden Landing Road
Suite 1 & 2
Hayward, California
94621
(415) 782-3660

PREPARED BY _____ DATE 6-10-87

APPROVED BY _____ DATE 6-11-87

AUTHORIZED BY Robert L. Williams DATE 6-11-87

RADIATION SAFETY PROGRAM

INDEX

QC SERVICES
A DIVISION OF WORLD TECHNICAL SERVICES, INC.

WORLD TECHNICAL SERVICES, Inc.

26062 EDEN LANDING ROAD, SUITE 1 & 2
HAYWARD, CALIFORNIA 94545
PHONE (415) 782-3660

RADIATION SAFETY PROGRAM
QCS
RSP 687

SECTION I

PROGRAM PLAN

RADIATION SAFETY PROGRAM

1.0 **OBJECTIVE** – This plan defines the Radiation Safety Program of QC Services. The elements and methods, described herein, are based on the Nuclear Regulatory Commission (NRC) Federal Regulation 10CFR20, 10CFR21, 10CFR30, 10CFR34, and radiography regulation of Agreement States.

2.0 **APPLICATION** - Q C Services (Company) personnel and sites.

3.0 **PROCEDURE**

3.1 The Program, described herein, and the Radiation Safety Procedures in this manual, outlines the basic methods and practices and delineates the organizational elements used to assure the effectiveness of radiation safety efforts.

3.1.1 This program is an integrated systems approach to operation, emergencies, training, qualifications, organizations, documentation and audit conditions.

3.1.2 Each procedure covers a specific area of radiation safety as identified by its title. The controlling documents for radiation safety are as follows:

II. Operating and Emergency System Procedure
III. Operating and Emergency Procedure
IV. Maintenance Procedure
V. Calibration of Radiation Survey Instruments Procedures
VI. Source Shipping/Receiving Instruction Procedure
VII. Leak Testing Procedure
VIII. Qualification/Training Procedure
IX. Audit Procedure
X. Corrective Action Procedure
XI. Forms Procedure

3.2 Organization

3.2.1 The organization of radiation safety is in accordance with Appendix A.

3.2.2 The responsibility for all phases of the Program is vested with the RSO, who reports directly to the President and/or Vice President

3.2.3 The Assistant RSO (management representative) is responsible for all phases of the Program in the absence of the RSO and will report directly to the RSO.

3.2.4 In the absence of the RSO, responsibility for radiation emergencies shall advance to the Vice President; in his absence, the President; and in their absence, the Assistant RSO shall act.

3.3 The Company utilizes three (3) manuals for control of radiation safety.

3.3.1 Radiation Safety Program Manual defines the system of control.

3.3.2 Operating and Emergency Procedures **(O&E P)** is the working document for Radiographers.

3.3.3 Radiographer Training Manual is the study material for Radiographic Personnel. (**Example**: Working Safely in Gamma Radiography - NUREG/BR0024.)

3.3.4 All revisions to the Program or Procedures shall be by letter designation as directed by the RSO and approved by the Executive Safety Committee.

APPENDIX A

OVERALL ORGANIZATIONAL STRUCTURE

RADIATION SAFETY ORGANIZATION

EXECTIVE SAFETY
COMMITEE

Robert L. Williamson
President

Richard L. Hilyard
Vice President

K. S. Gill
Radiation Safety Officer

Bernard Penley
Radiation Safety Officer

Tom W. Cuthbertson
Outside Consultant

Radiographers

Assistant
Radiographers

Trainee
Radiographers

QC SERVICES
A DIVISION OF WORLD TECHNICAL SERVICES, INC.

WORLD TECHNICAL SERVICES, Inc.

26062 EDEN LANDING ROAD, SUITE 1 & 2
HAYWARD, CALIFORNIA 94545
PHONE (415) 782-3660

RADIATION SAFETY PROGRAM
QCS
RSP 687

SECTION II

OPERATING AND EMERGENCY SYSTEM PROCEDURE

RADIATION SAFETY PROGRAM

1.0 **OBJECTIVE** - Present the administration system for normal operations and handling radiation emergencies. The specific emergency actions to be take by the Radiation Safety Officer (RSO) are also included in this procedure.

2.0 **APPLICATION** - Q C Services (Company) operations that control, handle and/or store sealed sources.

3.0 **PROCEDURE**

3.1 Operating and Emergency Procedures (O&E P) - The O&E P is the Radiographer's and Assistant Radiographer's controlling document for routine operations and handling radiation emergencies. The O&E P will be used in all lab and field operations.

3.1.1 Each Assistant Radiographer, and Radiographer shall have an O&E P available whenever they are working with or around a sealed source.

3.1.2 Operating personnel are directed by the O&E P to report all radiation emergencies, as defined under Paragraph 3.2.1, to the RSO.

3.2 Radiation Hazard Severity - The degrees of radiation hazard are arbitrarily identified as Emergency, Class B Incident and Class A Incident. The definitions for these terms are as follow.

3.2.1 Emergency - A condition which may have cause, or threatens to cause, one (1) of the following to occur.

3.2.1.1 Exposure
a) Whole Body - three (3) REM or more.
b) Hands, Forearms, Ankles and Feet - 45 REM or more.

3.2.1.2 Contamination - Any release of radioactive material.

3.2.1.3 Work Loss - The loss of four (4) hours work or more in any facility.

3.2.1.4 Damage - Damage to property in excess of $500.00.
Note: An Emergency includes all class B and A Incidents

3.2.2 Class B Incident - A condition which may have caused, or threatens to cause, one (1) of the following to occur.

3.2.2.1 Exposure:
a) Whole Body - 5 REM or more.

b) Hands, Forearms, Ankles and Feet - 75 REM or more.

3.2.2.2 Contamination - Any release of radioactive material.

3.2.2.3 Work Loss - The loss of one (1) work day or more of the operation of any facility affected.

3.2.2.4 Damage - Damage of property in excess of $2,000.00.

3.2.3 Class A Incident - A condition which may have caused, or threatens to cause, one (1) of the following to occur.

3.2.3.1 Exposure:
a) Whole Body - 25 REM or more.
b) Hands, Forearms, Feet and Ankles - 375 REM or more.

3.2.3.2 Contamination - Any release of radioactive material.

3.2.3.3 Work Loss - The loss of one (1) workweek or more for the operation of any facility affected.

3.2.3.4 Damage - Damage of property in excess of $200,000.00.

3.3 Handling an Emergency

3.3.1 Radiation emergency reports will be handled by the RSO or the approved alternates identified in the Program Plan.

3.3.2 The reporting Radiographer will be asked to answer the following questions and provide information covered in Paragraph 3.3.3.
a) Have all personnel been removed from the radiation area?
b) Has the radiation area been posted?
c) Is the area being controlled by a responsible person?
d) Is there any immediate danger of personnel receiving radiation exposure?
e) Were there any personnel injured?
f) What is the nature of the incident?

3.3.3 Three (3) Emergency Action Guidelines are included in this paragraph. The RSO shall select and use the appropriate guideline to plan the emergency action. Supplemental actions may be imposed by the RSO.

Type of Emergency	Reference Paragraph

Personnel Overexposure	3.3.3.1
Exposure Device Malfunction	3.3.3.1
Source Out of Guide Tube	3.3.3.1
Loss of Source on the Jobsite	3.3.3.1
Source Separated from Device	3.3.3.1
Other Conditions Not Listed Below	3.3.3.1
Missing or Stolen Device	3.3.3.2
Plant or Area Fire	3.3.3.3

3.3.3.1 Emergency Action Guidelines for All Conditions except plant or area fires,

a) Determine if the source is properly shielded.
b) Verify personnel are clear of the exposure are.
c) Verify the radiation area has been posted.
d) Verify the area is under surveillance.
e) Determine if personnel are in danger of receiving further exposure.
f) Determine if any personnel were injured.
g) Determine which personnel with radiation training are available at or near the site.
h) Determine the dosimeter readings of personnel involved.
i) Determine the radiation exposure of personnel involved.
j) Determine the nuclide and serial number (S/N) of the source to establish the field strength.
k) If the condition is a Class A Incident and there is no immediate danger, interrupt the reporting at this point to perform the notifications.
l) Class A Incidents shall be reported immediately and Class B Incidents within 24 hours. Reporting shall be by telephone or telegraph to the RSO.
m) Verify the exact source location known, or direct the location be determined by triangulation as explained in the Exhibit of the O&E P.
n) Direct the radiation area posting be corrected, if necessary, and the high radiation area be posted.
o) Determine what shielding is available which could be used to minimize exposure during recovery.
p) Determine the need for additional personnel including civil authorities and/or technical assistance during the planning stage and at the site. If extensive delays will occur, plan for surveillance of the area.
q) Determine the method of recovery which will produce the minimum exposure to personnel.
r) Review the radiation history of each trained person who is available to assist in recover.

s) Establish a step-by-step procedure for recovery. Specify on the written procedure the maximum allowable time for each step (Retreat Time) which will take place within the radiation or high radiation area.
t) Calculate the personnel exposure expected for each step. Determine the need for new film badges prior to recovery.
u) Review the procedure in detail with the person who will perform the recovery (Recoverer). Assure the times are realistic. Any changes in times will require recalculation of the exposure. Have the Recoverer read the procedure to the RSO for proofing.
v) The procedure shall be followed exactly. Changes will be made only by the RSO.
w) The Recoverer shall assign a responsible person as Timekeeper. The RSO shall verify that the Timekeeper understands each step of the procedure and the importance of the "Retreat Time".
x) The Timekeeper shall immediately notify the Recoverer if the Retreat Time of a step has been reached. The Recoverer shall then immediately leave the radiation area and report to the RSO for further instructions.
y) Upon elimination of the emergency, proceed with Post Emergency Action per Paragraph 3.4

3.3.3.2 Emergency Action Guidelines, in addition to those noted in paragraph 3.3.3.1, for Missing or Stolen Sources.

a) Determine what nuclide and S/N is missing.
b) Determine if the exposure device, storage container or source changer, containing the source, is missing.
c) Determine if the source containing the equipment was locked. Is there evidence the locking mechanisms were broken.
d) Determine if any personnel at the site have information as to the possible location of the source.
e) Direct the Radiogapher to immediately contact the supervisor of the company at the jobsite and make the supervisor aware of the hazard. Determine the need for clearing work areas until a survey is conducted. Determine the advisability of conducting a physical search of specific areas.
f) Direct the Radiographer tp rope off the area where the source was last seen to protect any evidence.
g) Interrupt the reporting at this point to perform the notification. Refer back to paragraph 3.3.3.1, g).

3.3.3.3 Emergency Procedure, in addition to those noted in paragraph 3.3.3.1, for Plant or Area Fire.

a) Determine if the source is exposed. If it is exposed, can it be safely secured and removed from the danger area?
b) Determine the location of the fire with relation to the source.
c) Determine if personnel are in danger of receiving further exposure.
e) Assure that the fire crew and plant supervision have been warned of the radiation hazard.
f) Determine if the radiation area is posted.
g) Determine if the radiation area can be maintained under surveillance. Refer back to paragraph 3.3.3.1, g).

3.4 Post Emergency Action

3.4.1 Film badges of all personnel involved shall be processed on an expedited basis. Exposed personnel are barred from potential radiation exposure assignments until the results of the film badges are available and the employee is released by the RSO.

3.4.2 Equipment that may have been damage during the incident shall be removed from service until an inspection, maintenance and calibration (if required) has been performed to the satisfaction of the RSO.

3.4.3 The RSO will implement formal corrective action for all radiation emergencies.

3.4.4 The RSO shall prepare a complete written report of all safety incidents within five (5) working days.

3.5 Personnel History Records

3.5.1 The RSO shall make a reasonable effort to obtain the previous radiation history of each new employee.

3.5.2 The RSO shall originated, maintain Form RH 2365, Form NRC-4 or equivalent in accordance with **Title 17.**

3.5.3 The RSO shall maintain individuals' accumulated whole body dose records.

3.5.4 New Hires (Radiographic Personnel) will be required to provide previous exposure history. Prior to receiving previous exposure history (record) each new hire will be required to sign a statement. The statement shall include

the Nature and estimated amount of occupational radiation exposure received during that current calendar quarter (30265.1).

3.6 Emergency Records - Complete records of radiation emergencies will be maintained by the RSO.

3.7 Posting requirements

3.7.1 The RSO shall be responsible for assuring **NRC-3** or **State Notice to Employee** is posted on the project.

3.7.2 The RSO shall be responsible for posting a '**NOTICE**' (conspicuously located) to comply with the requirements of**NRC** or **States Rules and Regulations**.

Notice

A COPY OF THE NRC OR STATES RULES AND REGULATIONS, RADIOACTIVE MATERIAL LICENSE(S) AND OPERATING PROCEDURES ARE AVAILABLE IN THIS OFFICE AND MAY BE EXAMINED BY CONTACTING THE RSO.

4.0 **SAFETY PROCEDURES** - It should be the aim of the RSO to develop ways to reduce and/or eliminate incidents through training and knowledge of the regulations.

4.1 It shall be the responsibility of the RSO to control, and have available for employees, the following:

a) Radiation Safety Program;
b) Radiation Safety Training Manual;
c) State/NRC Regulations.

5.0 **EMPLOYEE INFORMATION**

5.1 The RSO shall inform employees of their rights of access to records.

5.1.1 The RSO shall, upon request, assure the access of each employee to records relevant to the employee.

5.2 Monthly dosimetry reports (film badge reports) shall be made available to each employee by posting of other means.

QC SERVICES
A DIVISION OF WORLD TECHNICAL SERVICES, INC.

WORLD TECHNICAL SERVICES, Inc.

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HAYWARD, CALIFORNIA 94545
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RADIATION SAFETY PROGRAM
QCS
RSP 687

SECTION III

OPERATING AND EMERGENCY PROCEDURE
(O&E P)

IN CASE OF
RADIATION EMERGENCY

CONTACT THE

RADIATION SAFETY OFFICER
OR
ASSISTANT RADIATION SAFETY OFFICER

(415) 782-3660

APPROVED BY Lieutenant Sgt Gill DATE 6-11-87

AUTHORIZED BY Robert L. Williamson DATE 6-11-87

RADIATION SAFETY PROGRAM

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RADIATION SAFETY PROGRAM

1.0 **INTRODUCTION** - The Operating and Emergency Procedures (O&E P) is your guide to safe operation when working with radioactive sources. Have an O&E P available whenever you are using a source of radiation.

The O&E P includes detailed instruction on performing your job in a safe manner, the rules you must follow in your work and useful bits of reference information.

1.1 **SCOPE OF YOUR AUTHORITY** - Federal and/or Agreement State Regulations specify the tasks a person is allowed to perform when working with radioactive sources. The complexity of tasks allowed are based on the radiation safety training and experience of the employee. The levels of training, experience and/or authority, as used by the Company, are identified as **Radiographer Trainee, Assistant Radiographer, Radiographer, Assistant Radiation Safety Officer and Radiation Safety Officer (RSO).**

1.1.1 **RADIOGRAPHER TRAINEE** - A Radiographer Trainee is an employee who is in training for the position of Assistant Radiographer. During this period of training, the individual shall not act in the capacity of handling and/or using sources.

1.1.2 **ASSISTANT RADIOGRAPHER** - An employee who uses radiographic exposure devices, sealed sources, x-ray equipment, survey instruments and related equipment while under the personal **(direct)** supervision of a Radiographer. The Radiographer may not delegate his/her responsibility to the Assistant Radiographer. Any person who assists the Radiographer by manipulating radiographic exposure devices, sealed sources, x-ray equipment, survey instruments and related equipment, is acting as an Assistant Radiographer and must have been certified to that level by the RSO.

1.1.3 **RADIOGRAPHER** - An Employee who performs radiography or is in attendance at the radiographic site to personally supervise radiographic operations. The Radiographer is directly responsible for assuring the job is performed in accordance with the requirements of the O&E P.

1.1.4 ASSISTANT RADIATION SAFETY OFFICER - Is responsible for all phases of the Program in the absence of the RSO and will report directly to the RSO.

1.1.5 RADIATION SAFETY OFFICE (RSO) - A member of the management team of the Company with full authority and responsibility to administer and enforce the Program. The RSO shall have the authority to stop radiographic activity until safety requirements have been satisfied and to discharge or suspend any individual who violates the rules and regulations in matters relative to radiation safety. The RSO reports directly to the President or Vice President of the Company.

2.0 REFRESHER TRAINING - The RSO shall be responsible for insuring that refresher training for all Radiographers and Assistant Radiographers be conducted at intervals not to exceed six months.

2.1 Such training shall include, but not be limited to the following items:

a) Agreement States or Nuclear Regulatory Commission (NRC) Rules and Regulations, Parts 19, 20, 21 and 34 (latest revisions)
b) Agreement States or NRC Radioactive Material License
c) Radiographic equipment and detection instrumentation to be used.
d) The Operating and Emergency Procedure.
e) Fundamentals of radiation safety.
f) Prevention of overexposures to personnel.
g) NRC case histories.
h) Training in the transfer, packing and transport of radioactive material.

2.2 The RSO shall be responsible for the maintaining, available for inspection, records of refresher training, including:

a) Name(s) of instructor(s);
b) Names and initials of individuals attending;
c) Dates and duration of training;
d) Topic(s) discussed.

3.0 **PERSONNEL MONITORING** - Your personal safety depends on the use of radiation safety monitoring devices. Before working with radioactive sources, you must have available at the radiographic site:

a) Operating and Emergency Procedures;
b) Radioactive Material License;
c) State and/or NRC Regulations;
d) Dosimeter on person;
e) Film Badge on person;
f) Survey Meter.

3.1 **DOSIMETER** - The dosimeter measures total accumulated dose from zero to at least 200 milliroentgens (mR). It can show you your accumulated dose is abnormally high. Prior to each work shift, zero (+/- 5 mR; record actual reading) your dosimeter using the Dosimeter Charger. Record this reading on the Radiation Safety Report. Check your dosimeter frequently to assure you are operating in a safe manner. A saturated (off-scale) reading means danger -- stop work immediately and contact the RSO. If your dosimeter is lost, stop work immediately and contact your RSO for a replacement. **DO NOT** work without your dosimeter.

3.1.1 Dosimeters shall be calibrated at least yearly for correct response to radiation.

3.2 **FILM BADGE** - Your monthly film badge is the most accurate record of your total radiation exposure. Wear it on your belt or pants waist band. Do not let anyone wear your film badge. The film badge will be processed by a qualified film badge service and the exposure data reviewed by the RSO. **DO NOT** work with out your film badge. The data shall include:

3.2.1 Starting date of badge use and processing date.

3.2.2 Reporting date.

3.2.3 Employee name, social security number and date of birth.

3.2.4 Current dose (mrem).

3.2.5 Cumulative dose (mrem).

3.2.6 The badge should be stored during nonworking hours at an authorized location. Do not store your badge in an area where accidental exposure could occur. If your badge is lost -- stop work immediately and contact the RSO for replacement.

3.2.7 Film badges lost or not returned by individuals shall be investigated by the RSO. A report shall be made as to the reason for the badge not being returned including the individual's corrective action for the prevention of recurrence. Individual's dosimeter readings for the period of use will be totaled and used for the exposure received during that period.

3.3 PERMISSIBLE DOSE LEVELS

3.3.1 An individual, 18 years of age or over, may receive a dose to the whole body of three (3) rems per calendar quarter provided that:

a) The RSO has on file the individual's history of accumulated occupational dose to the whole body.
b) The individual's dose to the whole body, when added to the previously accumulated dose to whole body, shall not exceed 5 (N-18) rem where "N" equals the individual's age in years at last birthday.

3.3.2 Individuals may receive a dose to the whole body of only 1.250 rem per calendar quarter when the requirements of Paragraph 3.3.1 are not met.

3.3.3 Radiographic personnel should make every reasonable effort to maintain radiation exposure **As Low As Reasonable Achievable.**

3.4 **SURVEY METER** - The survey meter measures the radiation field strength and shall have a range such that two(2) mrem/hr. through one (1) R/hr. can be measured. Use the meter to:

a) Establish the isodose lines (perimeters);
b) Assure source is in the full retracted (safe) position;

c) Assure source is in full exposed position when using a collimator; (meter reading should fall off noticeably as source enters collimator);
d) Located the source (see Exhibit 4);
e) Predict the accumulated dose for several exposure; check the survey meter each shift for normal functioning and current calibration date; calibration is required every 90 days; if functioning is abnormal or the date has expired, do not use the meter.

3.5 USE OF MONITORING EQUIPMENT - Film badges and dosimeters shall be used by anyone 18 years of age and over who is likely to receive a dose of 300 mrem per calendar quarter. Personnel monitoring shall be worn by radiographic personnel as prescribed by the RSO. A survey meter shall be used every time a person enters a **Radiation Area** or is required to work with or around storage containers or exposure devices.

4.0 GETTING THE SOURCE TO THE JOB

4.1 REMOVAL FROM STORAGE - Survey all surfaces of the storage container for abnormal radiation levels using the survey meter. Radiation levels of a storage container shall not exceed two (2) mR/hr. Unlock and open the container. Survey the exposure device for abnormal radiation levels before removing it from the container. Remove the exposure device and survey the exterior circumference. No exposure device shall have an exterior surface reading in excess of 200 mR/hr.

4.2 DAILY EQUIPMENT INSPECTION - The daily inspection of the exposure device is for your safety. Equipment, which is maintained in good working order seldom causes an emergency situation. Perform the daily inspection of the exposure device by following the instructions and completing the **Daily Inspection of Exposure Device.**

4.3 CARRYING THE EXPOSURE DEVICE - The total time an exposure device is hand-carried should be kept to a minimum. Remember, the radiation level on the exposure device's surface may be as high as 200 mR/hr. During hand-

carrying, your legs can be exposed to this field. A good practice is to use a hand truck or cart whenever you are doing a lot of transporting.

5.0 CONTROLLING THE AREA

5.1 RESPONSIBILITY OF THE RADIOGRAPHER - The Radiographer is responsible for establishing the controlled **"Radiation"** and **"High Radiation"** areas and assuring unauthorized personnel are not allowed to enter the restricted area. The Assistant Radiographer may perform these duties only under the personal supervision of the Radiographer.

5.2 PRELIMINARY CONTROL - Prior to setting up the exposure device, the Radiographer will establish preliminary controls by conspicuously posting an area that will prevent anyone from entering and receiving, at the perimeter of these areas, a dose in excess of two (2) mR in any one (1) hour. The approximate perimeter of the radiographic area shall be established and posted with **"Caution--Radiation Area"** signs by referring to the Radiation Intensities and Distance Charts (Exhibit 5). The approximate perimeter of the High Radiation Area (100 mR/hr. or more) will be calculated from the Radiation Intensities and Distance Charts mentioned above. Conspicuous posting of this area will be accomplisher by using, **"Caution--High Radiation Area"** signs. "Caution--High Radiation Area" signs may not be used on the perimeters of the "Radiation Area". These areas are defined in the Definition section of this procedure. The signs shall be the conventional magenta and yellow colors used to indicate radiation areas. Perimeter shall be established using a radiation barrier tape or rope (magenta or yellow colors recommended).

5.2.1 The Radiographer is responsible for clearing the restricted area of unauthorized personnel at the time the preliminary control is established.

6.0 SETTING UP THE EXPOSURE

6.1 SOURCE TUBE - Secure the source positioning tip in the desired position and distance from the object to be radiographed. Attach one (1), two (2) or

three (3), seven (7) foot tubes. The source tubes should be laid out as straight as possible, avoiding bends, particularly bends of sharp radius. **Collimation** shall be used whenever applicable. Secure the collimator to the source positioning tip.

6.2 EXPOSURE DEVICE ASSEMBLY

Step 1 - Remove the storage cover (exposure device remains locked)
Step 2 - Attach the control cable to the source pigtail (locked exposure device).
Step 3 - Remove the safety plug
Step 4 - Connect the source tube to the exposure device.
Step 5- Unlock the device and crank the control handle in the exposed direction to move the source out of the exposure device through the source tubes and into the source positioning tip.

CAUTION: Undue pressure in either direction could damage the connection and even release the source from the cable; therefore, it is important that you **do not force the crank.** If undue resistance is encountered while moving the source into the exposed position, return the source to the exposure device and correct the cause of the resistance. **DO NOT** attempt tp force the source beyond the resistance. If undue resistance is encountered while returning the source to the exposure device, reverse the direction of the cranking until the unit operator smoothly. If, after a few reversals,cranking is still difficult, or there is reason to belive the source is loose from the drive cable, post a guard and contact the RSO.

7.0 POSTING THE AREA

7.1 FINAL CONTROL - After the exposure device is readied for operation, the source is driven to the end of the source tube and a survey performed to establish the restricted area. Survey the perimeter of the area which was posted during the preliminary control and correct the positioning of the signs, as necessary, to reflect the two (2) mR/hr in any one (1) hour field and record on the Radiation Safety Report. Surveys shall be required for each shift and/or when the source-target configuration is substantially different

from that of the preceding exposure. Survey meter reading in excess of two (2) mR/hr. are permissible at perimeters of the restricted area when the total exposure time during any one (1) hour is less then 60 minutes.

EXAMPLE

$$\frac{\text{Any One Hour (60 Min.)}}{\text{Exposure Minutes}} \times 2 = \text{Maximum Allowable mR/hr.}$$

The maximum allowable mR/hr. at the perimeter of the restricted area for a job requiring five (5) exposures of four (4) minutes would be figured as follows:

$$\frac{60}{5 \times 4} \times 2 = 6 \text{ mR/hr.}$$

All signs shall be magenta on yellow background and display the conventional three-bladed radiation safety symbol.

8.0 **USE OF EXPOSURE DEVICE** - The Radiographer is responsible for the safety of all personnel entering the restricted area. No one shall enter the area without the consent of the Radiographer for each specific entry. If any person persists in entering the posted area, secure the source until the person leaves. Report the problem to the RSO.

Note: When you warn persons of the danger of radiation, state the facts. Do not exaggerate.

During an exposure, all personnel should stay outside the restricted area and the Radiographer and Assistant Radiographer (if used) shall act as guards. They must be alert at all times to prevent anyone from entering the area.

8.1 Upon completion of an exposure, the Radiographer must: return the source to to its safe shielded position in the radiographic exposure device by turning the hand crank in the retract direction until a positive stop is encountered.

8.2 Upon assuring yourself the source has been returned to the safe position, proceed toward the exposure device with a **survey meter in hand, carefully examining the meter readings.**

8.3 When reaching the exposure device, **immediately** survey the area where the source tube connects to the device and the entire circumference of the device shall be surveyed to see that the source has been retracted to the safe shielded position. If the radiographic exposure device has a source guide tube, the survey shall include the guide tube.

8.4 Upon assuring yourself the source is in a safe shielded position, lock the exposure device. This procedure shall be conducted after each exposure.

Note: When using (for an example) T/O Model 660 exposure device, locking the source in the safe position can be accomplished by rotating the selector from the **Operate** position to the **Lock** position and securing with the device's lock mechanism. When using (for an example) INC's Model IR100 exposure device, locking the source in the safe position is accomplished by fully retracting (source) into the device. This may be observed bt the "pop-up indicator.

No individual shall operate an exposure device until such individual has received instruction (training) in and demonstrated competence to use exposure device(s), sealed sources, related handling tools, which will be employed in their assignments. Records of such training will be maintained.

8.4.1 Radiographers and Assistant Radiographers shall be required to remove keys from all locked exposure devices except during authorized use or when under the direct surveillance of said individuals.

8.5 Upon completion of the scheduled radiographic operations in the established restricted area, the following procedure will be observed:

a) Lock the exposure device.
b) Remove the source tube and insert the safety plug.

c) Dismantle the setup and remove barricades.

d) After moving the exposure device from the site of radiographic operation and prior to storage, another survey of the device will be conducted to assure that the source is in the safe shielded position. Record the last survey (prior to storage) on the Radiation Safety Report.

8.6 An exposure device that is not returned to the storage area, and will be left unattended, must be locked and physically secured to prevent tampering or removal by unauthorized personnel. The device left in this condition must be barricaded and posted to a two (2) mR/hr. level.

8.7 **COBALT-60 DEVICE IN EXCESS OF 50 CURIES** - This paragraph presents the steps that should be taken when using Cobalt-60 sources in excess of 50 curies at temporary jobsites. These requirements **shall** be in addition to those detailed in this procedure.

8.7.1 The RSO or his designee should physically inspect the area where radiography is to take place.

8.7.2 The RSO or designee should decide on the location(s) for the exposure device and source tube positioning.

8.7.3 Written or verbal request should be received and approval given from the RSO prior to initiation of the radiographic operation.

8.7.4 Request shall contain the following information:

a) Location of operation.

b) Make, model and serial number (S/N) of exposure device.

c) Specific time period (date, time, off-shift, etc.).

d) Detailed diagram of proposed exposure area(s) showing:

1) Placement of exposure device - taking consideration for maximum safe access in case of equipment malfunction;

2) Source tube positioning;

3) Collimation;

4) Additional shielding;
5) Approximate perimeter lines and calculated dose rate;
6) Calculated exposure time(s);
7) Estimated number of exposures to be taken.

8.7.5 Records of such activities shall be maintained.

9.0 STORAGE OF EXPOSURE DEVICES

9.1 When not in use, radiographic exposure devices will be placed in the storage areas provided. All storage areas shall have a sign bearing the words, **"CAUTION--RADIOACTIVE MATERIAL"** with the radiation symbol (magenta on yellow background). These signs shall be posted on the outside perimeter(s) of the storage area.

9.2 A survey of the storage area containing the exposure devices shall be made on the outside perimeter and the reading shall not exceed two (2) mR/hr.

9.2.1 Survey of storage areas shall be made each time an exposure device is removed or returned to storage.

9.2.1.1 Survey of field storage areas shall be made each time an additional or new source is added. A record of that survey shall be kept.

9.3 Storage areas shall be kept locked at all times, except when in use or under direct surveillance of a Radiographer.

9.4 In the event radiographic operations are being conducted at a distance remote from the permanent storage area provided for the exposure device, the vehicle transporting the device may be used for storage by complying with the **Transportation** Paragraphs (14.0) of this procedure.

10.0 USE OF X-RAY EQUIPMENT - FIELD

10.1 Safety procedures of this paragraph shall apply to operations with x-ray producing machines, where applicable

10.1.1 Survey meters shall be used in the same manner as when utilizing radioactive material. They shall be used to determine that the x-ray unit is off except in cases where the main power source is disconnected.

10.1.2 No x-ray unit shall be left unattended whereby unauthorized personnel could cause the unit to be energized, resulting in a hazard. The control panel and/or power cables shall be stored or locked if unit is to be left unattended.

10.1.3 It will be the Radiographer's responsibility to complete the Radiation Safety Report.

10.1.4 No individual shall operate an x-ray machine until such individual has received a copy of, instruction in and demonstrates an understanding of, the operating procedures for said unit.

10.2 The X-Ray Equipment Procedure, although brief, does not relieve the Radiographer and/or Assistant Radiographer of any of the other detailed requirements of the O&E P, which does not pertain directly to the operation or use of an exposure device.

11.0 **PERMANENT RADIOGRAPHIC INSTALLATION** - Safety procedures of this paragraph shall apply to radiographic operations using permanent installations (shielded radiation exposure rooms). Requirements shall be in addition to those detailed in this procedure.

11.1 Exposure rooms shall be used only with those sources of radiation authorized by licenses and the RSO.

11.2 Sources of radiation to be exposed only in areas as authorized for each particular room.

11.3 Exposure rooms, having special requirements (other than listed in this paragraph) as required by the RSO, shall be complied with.

11.3.1 Those requirements shall be posted at the radiographic installation.

11.3.2 The RSO shall maintain a record of those special requirements.

11.4 Exposure rooms shall be equipped with a visible and audible alarm signal.

11.4.1 Alarm shall be generated so that an individual attempting to enter the area would be aware of the hazard during an exposure.

11.4.2 Alarm shall be generated so that the Radiographer would be aware of any unauthorized entry during an exposure.

11.4.3 Equipment inoperable shall be repaired or replaced immediately.

Note: Exposure rooms may be used until equipment is repaired or replaced by complying with field radiography requirements of this procedure.

11.5 Exposure rooms shall have available, a functioning and currently calibrated survey meter.

11.6 Exposure rooms shall be checked, prior to each exposure, to assure the area is cleared of personnel.

11.7 If an exposure device is to be left unattended, the device shall be returned to the shielded and locked position.

11.8 Upon completion of the scheduled radiographic operation, or the Radiographer's shift, the exposure device shall be returned to the storage condition.

11.9 Exposure rooms, utilizing x-ray equipment, shall be interlocked such that the unit will not operate unless all openings are securely closed.

12.0 COMPLETING THE RECORDS

12.1 Records are your evidence of compliance with the procedures of the O&E P.

12.2 It shall be the Radiographer's responsibility to complete the Radiation Safety Report.

12.3 Each form you use will have the instructions for completion printed on the reverse side. These instructions are self-explanatory and eliminate your

remembering each detail. Complete the record per the instructions. Make sure your signature and the date are legible.

13.0 RADIATION SAFETY RECORDS MAINTAINED

13.1 The following copies of records shall be maintained, which are necessary for inspections and verification of compliance with state regulations.

a) Film Badge Reports.
b) Radiation Safety Reports.
c) Radiation Safety Program.
d) State License (latest amendments).
e) Records of radiation safety refresher training.
f) Quarterly Inventories.
g) Leak Test Certificate, if applicable.
h) Survey Meter Calibration Certification.
i) Individual's Radiation Safety Qualifications.
j) Source Decay Charts.
k) Exposure Device Inspection - Quarterly.
l) Source Receipt, Transfer and Disposal Log.
m) Safety Audits (Personnel).
n) All required survey records.

14.0 TRANSPORTING THE SOURCE

14.1 **APPROVED VEHICLES** - Company vehicles should be the only vehicles used for transporting sealed sources.

14.2 **PREPARATION FOR TRANSPORT** - Packaging of exposure devices and/or storage containers, containing radioactive material, shall be designed and selected to meet all the requirements of the U.S. Department of Transportation (DOT), except when transported within the confines of the plant or other authorized location of use.

14.2.1 Procedure for the packaging requirements of exposure devices and/or storage containers can be found in Procedure VI of this Program (Source Shipping/Receiving Instruction Procedure).

14.2.2 Shipping containers/exposure devices shall be securely fastened in vehicle to prevent shifting in transit.

14.2.3 Shipping containers/exposure devices shall be placed in the vehicle in such a manner to prevent unnecessary exposure to personnel.

14.3 POSTING - Placard all four (4) sides of the vehicle with signs reading, "Radioactive", if required. The radioactive placard must have the top portion yellow with the symbol black. The lower portion must be white with the inscription, "Radioactive", in black.

Note: Requirements for the placarding of vehicles is determined by the transport index found in Procedure VI of this Program (Source Shipping/Receiving Instruction Procedure).

14.4 SURVEYING - Survey the exterior surfaces of the vehicle and the driver's compartment. No radiation field, exceeding two (2) mR/hr., shall be permitted in any normally occupied location of the vehicle.

14.5 SECURING THE VEHICLE - Close and lock the door to the storage area. This door must be kept locked until you arrive at the jobsite.

14.6 OVERNIGHT STOPS - A radiation emergency could occur by:

a) Unauthorized persons tampering with your equipment;
b) Another vehicle striking your vehicle.

The chances of these emergencies occurring can be minimized by considering the following guidelines when you park:

1) Make sure your vehicle is locked.
2) Park in a well lit area.
3) Do not park on streets carrying heavy traffic.

14.7 KEY CONTROL - keys to the vehicle give you control over the radioactive source during transport. Do not loan your keys to persons other than:

a) Company Certified Radiographer;
b) Another employee during the time you are personally with the vehicle.

NOTE: Do not hide a spare key in or around the vehicle.

15.0 HANDLING THE EMERGENCY

15.1 INTRODUCTION - This procedure is your instruction for handling an emergency involving a radioactive source. Follow the "Four Key Steps". The RSO will provide step-by-step procedures for elimination of the emergency. The objective is to minimize the radiation exposure of all personnel involved.

15.2 APPLICATION - These instructions apply to field operations.

15.3 RESPONSIBILITY - The Radiographer, who has been assigned the equipment, is responsible for the emergency action.

15.4 EMERGENCY - An emergency is a condition, or potential condition, which may cause one (1) of the following:

a) Overexposure, or potential overexposure, of any person in excess of the regulations.
b) Malfunctioning, damaged, stolen or missing survey instrument.
c) Malfunctioning, damaged, stolen or missing exposure device.
d) Vehicle accidents, fires or other relative situations.

The above emergencies, or potential emergencies, will be handled using the relative steps listed in Paragraphs 15.5, 15.6, 15.7 and 15.8.

15.5 RADIOGRAPHERS' ACTION - Follow the instructions listed below:

'THE FOUR KEY STEPS'

Step 1 - Assure all personnel are clear of radiation area.

Step 2 - Survey and post the area with "Caution--Radiation Area" signs. (Refer to Paragraph 7.0 of this procedure, "Posting the Area"). In the event the survey instrument is damaged or malfunctioning, the procedure described in Paragraph 5.2 (Preliminary Control) shall be followed and maintained. No one shall be allowed to enter this area until the location of the sealed source has been determined by the Radiographer. The safe position of the sealed source shall be determined by securing an operable survey instrument.

Step 3 - Maintain surveillance of the area until you can be relieved by a responsible person. Emphasize to your relief the importance of keeping all persons out of the posted area.

Step 4 - Contact the RSO for further instructions. **DO NOT PROCEED WITHOUT SPECIFIC INSTRUCTIONS FROM THE RSO.** The RSO will ask questions about the emergency to determine the safest method of correction. Carefully follow the RSO's instructions.

15.6 **PERSONNEL INVOLVED** - Personnel involved in the emergency are barred from further work with or around radioactive sources until released by the RSO.

15.7 **EQUIPMENT INVOLVED** - Equipment, which may have been damaged as a result of the emergency, shall not be used until released by the RSO.

15.8 **LOCATING A LOST SOURCE USING YOUR SURVEY METER** - In the event a source should become lost, immediately secure the suspected area of the loss by barricades, ropes and/or guards to prevent overexposure to personnel and proceed with the technique for locating a lost source as described in Exhibit 4.

15.9 **VIOLATIONS** - Any individual, who believes that a violation of Company, Federal and/or State Regulations has occurred or could possibly occur, should notify the RSO of the alleged violation.

16.0 CONFLICTS - When Federal/ State Regulations and the O&E P conflict, the most conservative requirement shall apply. If you are not sure which one to follow, contact the RSO.

17.0 INTERPRETATIONS

17.1 Except as specifically authorized by the RSO in writing, no interpretation of the meaning of these procedures by radiographic personnel will be recognized to be binding on the requirements.

17.2 The RSO shall be responsible to provide meaningful interpretation of procedures based on Federal/ State Regulations.

18.0 INSPECTION AND MAINTENANCE PROCEDURE - Inspection and Maintenance Procedures are the daily actions taken by a Radiographer to assure equipment is in good working order.

18.1 Equipment shall be maintained in good condition by periodic inspection, testing, calibration and maintenance.

18.2 A **maintenance/calibration label**, when applicable, shall be placed on equipment to identify the date for the next servicing/calibration.

18.3 EXPOSURE DEVICE

18.3.1 Daily Inspections shall be conducted by the Radiographer per the instructions of the Radiation Safety Report.

18.3.2 FIELD MAINTENANCE

a) Servicing of the equipment, to correct minor deficiencies uncovered by the inspection, may be performed by the Radiographer except when abnormally high radiation levels are involved.

b) Units which show abnormal radiation levels shall be immediately removed from service and the RSO shall be contacted.

18.4 SPECIAL INSPECTION - Inspection shall be conducted whenever equipment is malfunctioning or has been subject to severe damage of stress, such as dropping or submersion in water, etc. Exposure devices involved in emergencies shall be inspected per the instructions of the RSO. The report shall be identified **"Special Inspection"** and include a description of the abnormal situation encountered.

18.5 SURVEY INSTRUMENTS

a) Inspect the survey instrument at the beginning of each shift for normal functioning and current calibration date.
b) Calibration is required each 90 days.

Note: Do not use survey instruments with expired calibration dates.

18.6 DEFECTIVE EQUIPMENT - Any equipment found to be inoperable and/or out of calibration shall be removed from service.

19.0 DEFINITIONS

By-product Material - Any radioactive material, except special nuclear material, yielded in, or made radioactive by exposure to radiation incident to the process of producing or utilizing special nuclear material, for example, Cobalt-60 and Iridium-192.

Curie (Ci) - The unit of activity for measuring the quantity of radioactive material. One (1) Ci is that amount of material which yields 3.7 X 10 to the 10 disintegrations per second, or the activity approximately equivalent to that of one (1) gram of radium.

Dosimeter - A device for measuring the amount of exposure to ionizing radiation received by an individual.

High Radiation Area - Any area accessible to personnel in which there exists radiation at such levels that a major portion of the body could receive, in any one (1) hour, a dose in excess of 100 mrem.

Radiation Signs - Signs which warn of the presence of ionizing radiation or material that emits radiation. They display the conventional three-bladed radiation symbol in magenta on a yellow background.

Radiographer - Any individual who performs, or who is in attendance at the site and personally supervises radiographic testing operations, and who is responsible to the licensee for assuring compliance with Federal and State Regulations, the conditions of the license and these procedures.

Assistant Radiographer - Any individual who, under the personal supervision of a Radiographer, uses exposure devices or survey instruments in radiography.

Radiographic Exposure Device - Any device containing a radiographic sealed source fastened therein, in which radiographic sealed source, or shielding thereof, may be moved or otherwise changed from a shielded to an unshielded position, with respect to the source, for purpose of making a radiographic exposure.

Radiography - The nondestructive testing of materials by the production of an image on a radiation-sensitive surface, such as a photographic film, by the use of sealed sources containing radioactive material, or a beam of x-rays.

Roentgen Equivalent Man (rem) - A rem is a measure of dose of any ionizing radiation to body tissue relative to the estimated biological effects of exposure of one (1) R of x-ray. For the purpose of this procedure, one (1) "rem" and one "R" are identical for the reason that the sealed sources utilized in industrial radiography do not emit Alpha or Beta radiation outside of the stainless steel capsule.

Restricted Area - Any area access which is controlled for the purpose of protection of individuals from exposure to radiation.

Roentgen (R) - A Roentgen is a measure of the ionizing radiation in the air produced by x- or gamma radiation.

Sealed Source - Any radioactive material that is encased in a capsule designed to prevent leakage or escape of the radioactive material

Shielding Material - Any material used to absorb radiation, and thereby, reduce its amount of intensity.

Storage or Shipping Container - A shielded device in which sealed sources are placed for storage or transportation.

Survey - The measurement and recording of radiation intensities at various locations in an area where ionizing radiation exists.

Personal Supervision - The supervision of an Assistant Radiographer by a Radiographer in which the Radiographer is physically present at the site where sealed sources are being used and watching the Assistant when the Assistant uses radiographic exposure devices, sealed sources or related source handling tools, or radiation survey instruments in radiography.

20.0 FORMS

EXHIBIT NO.	
1	Radiation Safety Report - Field
2	Radiation Safety Report - Laboratory
3	Radiation Safety Report - X-Ray Machine (Field)
4	Locating a Lost Source Using the Survey Meter
5	Radiation Intensities and Distance Charts
6	Iridium-192 Decay Factors
7	NRC/State Radioactive Material License(s)

EXHIBIT 1

RADIATION SAFETY REPORT

FACILITY (JOBSITE)_____ WEEK ENDING_____

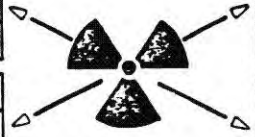
UTILIZATION AND DOSIMETER LOG

EXPOSURE DEVICE: MAKE _____ MODEL _____ S/N _____

DATE	LOCATION	SURFACE MR/HR DEVICE	SURVEY METER MODEL/SN	RADIOGRAPHER (1) ASSISTANT RADIOGRAPHER (2) TRAINEE RADIOGRAPHER (3)	DOSIMETER IN	DOSIMETER OUT	DOSIMETER IN	DOSIMETER OUT
SUN		IN / OUT		(1)				
				(2)				
				(3)				
MON		IN / OUT		(1)				
				(2)				
				(3)				
TUE		IN / OUT		(1)				
				(2)				
				(3)				
WED		IN / OUT		(1)				
				(2)				
				(3)				
THU		IN / OUT		(1)				
				(2)				
				(3)				
FRI		IN / OUT		(1)				
				(2)				
				(3)				
SAT		IN / OUT		(1)				
				(2)				
				(3)				

PHYSICAL RADIATION SURVEY
DOSE RATE – DISTANCE – SHIELDING

	SUN	MON	TUE	WED	THU	FRI	SAT
MR/HR							
FT							
SC							



	SUN	MON	TUE	WED	THU	FRI	SAT
MR/HR							
FT							
SC							

	SUN	MON	TUE	WED	THU	FRI	SAT
MR/HR							
FT							
SC							

	SUN	MON	TUE	WED	THU	FRI	SAT
MR/HR							
FT							
SC							

SC = SHIELDING CODE: W = TUNGSTEN Fe = STEEL C = CONCRETE Pb = LEAD OTHER _____

DAILY INSPECTION OF EXPOSURE DEVICE	SUN	MON	TUE	WED	THU	FRI	SAT
EXPOSURE DEVICE – Lock, Fitting – Labels – Plug – Threads – etc.							
CRANK ASSEMBLY – Loose Hardware – Freedom of Movement – etc.							
SOURCE TUBE – Threads – Clear Openings – Loose Fitting – etc.							
DRIVE CABLES & SOURCE CONNECTOR – Excessive Wear – Good Fit – etc.							
RADIOGRAPHER							

EXHIBIT 2

RADIATION SAFETY REPORT

LABORATORY

FACILITY_____ WEEK ENDING (SAT)_____

UTILIZATION AND DOSIMETER LOG

EXPOSURE DEVICE: MAKE_____ MODEL_____ S/N_____

DATE	(ROOM NO.) LOCATION	SOURCE IN SHIELDED CONDITION	MR/HR ON SURFACE OF DEVICE	SURVEY METER MODEL	SURVEY METER S/N	RADIOGRAPHER	DOSIMETER IN	DOSIMETER OUT

DAILY INSPECTION OF EXPOSURE ROOM AND DEVICE

	EXPOSURE ROOM				EXPOSURE DEVICE			CRANK ASSEMBLY		SOURCE TUBES	
DATE	DOOR INTER-LOCKS	AUDIBLE VISUAL WARNING	OPERATION OF ACCESS DOOR	RADIATION LEVELS AT ACCESS DOOR	MR/HR ON SURFACE OF DEVICE	LOCKS FITTINGS LABELS	SAFETY PLUG & THREADS	CONDITION	FREEDOM OF MOVEMENT	FITTINGS AND THREADS	CONDITION

EXHIBIT 3

RADIATION SAFETY REPORT

X-RAY PRODUCING MACHINES – FIELD

FACILITY (JOBSITE) _____ WEEK ENDING _____

UTILIZATION AND DOSIMETER LOG

RADIOGRAPHIC DEVICE: MAKE _____ MODEL _____ S/N _____

DATE	LOCATION OF OPERATION	NO. OF SETUPS PER SURVEY	SURVEY METER		RADIOGRAPHER (1) ASST. RADIOGRAPHER (2)	DOSIMETER	
			MODEL	S/N		IN	OUT
SUN					(1)		
					(2)		
MON					(1)		
					(2)		
TUE					(1)		
					(2)		
WED					(1)		
					(2)		
THU					(1)		
					(2)		
FRI					(1)		
					(2)		
SAT					(1)		
					(2)		

PHYSICAL RADIATION SURVEY

DOSE RATE – DISTANCE – SHIELDING

	SUN	MON	TUE	WED	THU	FRI	SAT
MR/HR							
FT							
SC							
MR/HR							
FT							
SC							

	SUN	MON	TUE	WED	THU	FRI	SAT
MR/HR							
FT							
SC							
MR/HR							
FT							
SC							

SC = SHIELDING CODE

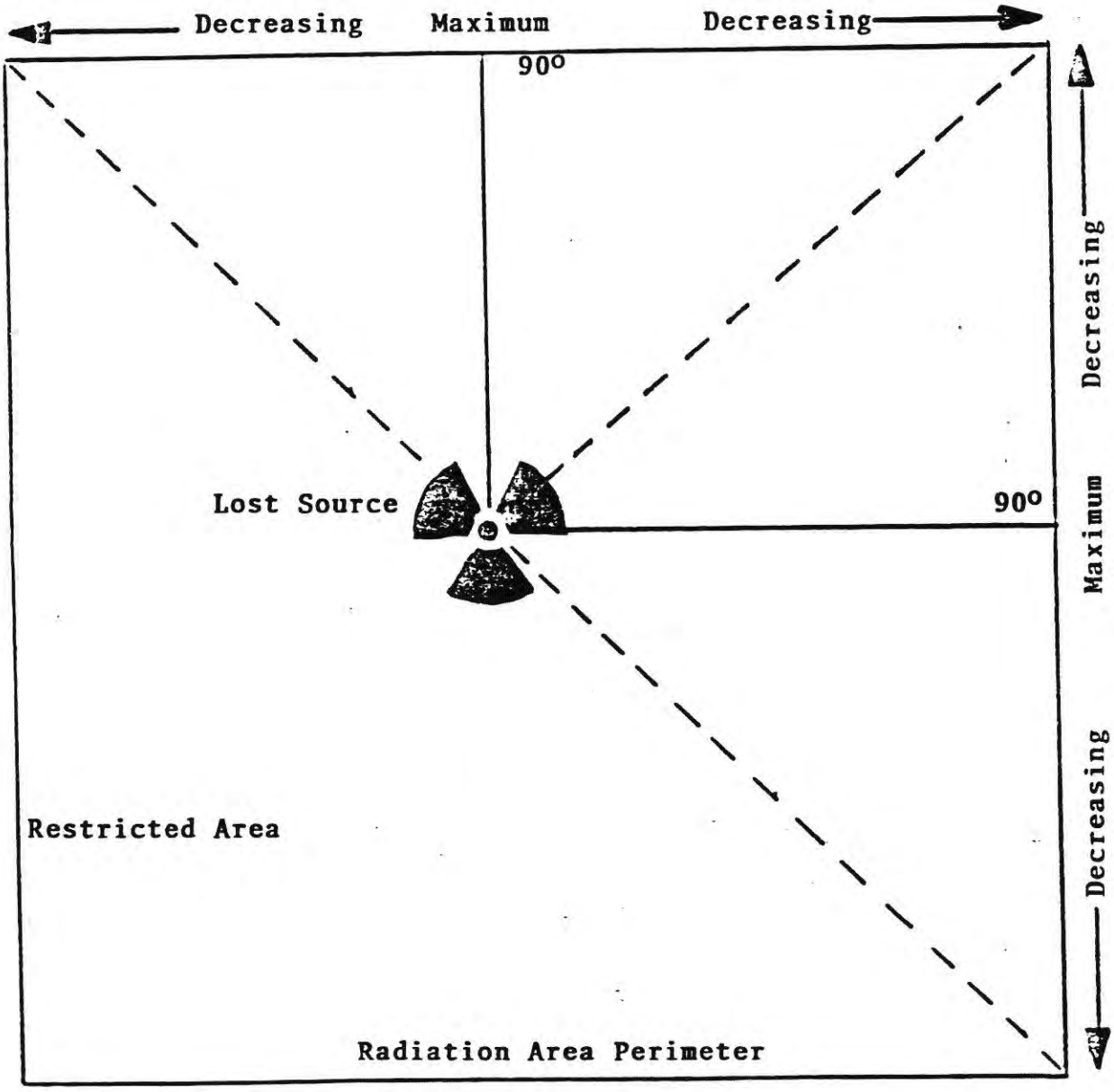
D = DISTANCE Fe = STEEL C = CONCRETE Pb = LEAD OTHER _____

METHOD OF CONTROLLING AREA = ROPES ☐ SIGNS ☐ LIGHTS ☐ OTHER _____

	DAILY INSPECTION RADIOGRAPHIC DEVICE			EXPOSURE INFORMATION NO. OF EXPOSURES, KV, MA PER SETUP									LENGTH OF LONGEST EXPOSURE			RADIOGRAPHER
	CONTROL PANEL	TUBE HEAD	CABLES	SETUP NO. 1			SETUP NO. 2			SETUP NO. 3			SETUP NO. 1	SETUP NO. 2	SETUP NO. 3	
				NO.	KV	MA	NO.	KV	MA	NO.	KV	MA				
SUN																
TUE																
WED																
THU																
FRI																
SAT																

EXHIBIT 4

LOCATING A LOST SOURCE USING THE SURVEY METER



1. Survey the area in two (2) straight paths that are 90° to each other.

2. Identify the location of maximum reading on each path.

3. Visually project a line at 90° to each path. The intersection of the projected lines will be the source location. Remember, these paths lead into the high radiation area.

EXHIBIT 5

Radiation Intensities at Various Distances from Unshielded Source

Iridium-192

Exposure Time In Any One Hour	Distance From Perimeter of Restricted Area	mr/hr. Level	Exposure Time In Any One Hour	Distance From Perimeter of Restricted Area	mr/hr. Level
20 Curies Strength			**30 Curies Strength**		
60 min.	245 ft.	2 mr/hr.	60 min.	300 ft.	2 mr/hr.
30 min.	170 ft.	4 mr/hr.	30 min.	210 ft.	4 mr/hr.
10 min.	100 ft.	12 mr/hr.	10 min.	120 ft.	12 mr/hr.
5 min.	70 ft.	24 mr/hr.	5 min.	85 ft.	24 mr/hr.
1 min.	30 ft.	120 mr/hr.	1 min.	40 ft.	120 mr/hr.
40 Curies Strength			**50 Curies Strength**		
60 min.	360 ft.	2 mr/hr.	60 min.	395 ft.	2 mr/hr.
30 min.	250 ft.	4 mr/hr.	30 min.	280 ft.	4 mr/hr.
10 min.	140 ft.	12 mr/hr.	10 min.	160 ft.	12 mr/hr.
5 min.	100 ft.	24 mr/hr.	5 min.	115 ft.	24 mr/hr.
1 min.	45 ft.	120 mr/hr.	1 min.	50 ft.	120 mr/hr.
60 Curies Strength			**70 Curies Strength**		
60 min.	430 ft.	2 mr/hr.	60 min.	460 ft.	2 mr/hr.
30 min.	305 ft.	4 mr/hr.	30 min.	325 ft.	4 mr/hr.
10 min.	175 ft.	12 mr/hr.	10 min.	190 ft.	12 mr/hr.
5 min.	125 ft.	24 mr/hr.	5 min.	135 ft.	24 mr/hr.
1 min.	55 ft.	120 mr/hr.	1 min.	60 ft.	120 mr/hr.
80 Curies Strength			**90 Curies Strength**		
60 min.	495 ft.	2 mr/hr.	60 min.	525 ft.	2 mr/hr.
30 min.	350 ft.	4 mr/hr.	30 min.	370 ft.	4 mr/hr.
10 min.	200 ft.	12 mr/hr.	10 min.	215 ft.	12 mr/hr.
5 min.	145 ft.	24 mr/hr.	5 min.	155 ft.	24 mr/hr.
1 min.	65 ft.	120 mr/hr.	1 min.	68 ft.	120 mr/hr.
100 Curies Strength			**Intensities of Iridium -192**		
60 min.	555 ft.	2 mr/hr.			
30 min.	390 ft.	4 mr/hr.			
10 min.	230 ft.	12 mr/hr.			
5 min.	160 ft.	24 mr/hr.	5.90 R/hr. from 1 curie at 1 ft.		
1 min.	72 ft.	120 mr/hr.	.55 R/hr. from 1 curie at 1 meter		

Half and Tenth Value Thickness (Inches)

		Ir^{192}	Co^{60}
Lead	- Half	.19	.49
	- Tenth	.64	1.62
Steel	- Half	.53	.87
	- Tenth	1.8	2.90
Concrete	- Half	1.9	2.7
	- Tenth	6.2	9.0
Tungsten	- Half	.12	.31
	- Tenth	.40	1.04

Half value thicknesses reduce radiation to 1/2-Tenth value thickness. Reduce radiation to 1/10.

EXHIBIT 5 (CONT'D.)

Radiation Intensities at Various Distances from Unshielded Source

Cobalt-60

Exposure Time In Any One Hour	Distance From Perimeter of Restricted Area	mr/hr. Level
5 Curies Strength		
60 min.	190 ft.	2 mr/hr.
30 min.	135 ft.	4 mr/hr.
10 min.	80 ft.	12 mr/hr.
5 min.	60 ft.	24 mr/hr.
1 min.	25 ft.	120 mr/hr.
20 Curies Strength		
60 min.	385 ft.	2 mr/hr.
30 min.	270 ft.	4 mr/hr.
10 min.	160 ft.	12 mr/hr.
5 min.	110 ft.	24 mr/hr.
1 min.	50 ft.	120 mr/hr.
50 Curies Strength		
60 min.	605 ft.	2 mr/hr.
30 min.	430 ft.	4 mr/hr.
10 min.	250 ft.	12 mr/hr.
5 min.	175 ft.	24 mr/hr.
1 min.	80 ft.	120 mr/hr.

Exposure Time In Any One Hour	Distance From Perimeter of Restricted Area	mr/hr. Level
10 Curies Strength		
60 min.	270 ft.	2 mr/hr.
30 min.	190 ft.	4 mr/hr.
10 min.	110 ft.	12 mr/hr.
5 min.	80 ft.	24 mr/hr.
1 min.	35 ft.	120 mr/hr.
30 Curies Strength		
60 min.	470 ft.	2 mr/hr.
30 min.	330 ft.	4 mr/hr.
10 min.	190 ft.	12 mr/hr.
5 min.	135 ft.	24 mr/hr.
1 min.	65 ft.	120 mr/hr.
Intensities of Cobalt-60		
14.50 R/hr. from 1 curie at 1 ft.		
1.35 R/hr. from 1 curie at 1 meter		

Radiation Intensities at Various Distance from Unshielded Source

Distance From Source (Feet)	Milliroentgens Per Hour Per Curies	
	Co^{60}	Ir^{192}
1	14,500	5,900
5	580	236
10	145	59
15	65	26
20	36	15
25	23	9
30	16	6.5

EXHIBIT 6

Iridium-192 Decay Factors

Factor - 0.0093203 (1 day) **$T_{\frac{1}{2}}$ = 74.37 days**

Days	0	1	2	3	4	5	6	7	8	9
0	1.000	.9907	.9815	.9724	.9634	.9545	.9456	.9368	.9281	.9195
10	.9110	.9026	.8942	.8859	.8777	.8695	.8615	.8535	.8455	.8377
20	.8299	.8222	.8146	.8070	.7996	.7921	.7848	.7775	.7703	.7632
30	.7561	.7491	.7421	.7352	.7284	.7217	.7150	.7083	.7018	.6952
40	.6888	.6824	.6761	.6698	.6636	.6574	.6513	.6453	.6393	.6334
50	.6275	.6217	.6159	.6102	.6045	.5989	.5934	.5879	.5824	.5770
60	.5716	.5663	.5611	.5559	.5507	.5456	.5406	.5355	.5306	.5257
70	.5208	.5160	.5112	.5064	.5017	.4971	.4925	.4879	.4834	.4789
80	.4744	.4700	.4657	.4613	.4571	.4528	.4486	.4445	.4403	.4363
90	.4322	.4282	.4242	.4203	.4164	.4125	.4087	.4049	.4012	.3974
100	.3937	.3901	.3865	.3829	.3793	.3758	.3723	.3689	.3655	.3621
110	.3587	.3554	.3521	.3488	.3456	.3424	.3392	.3360	.3329	.3298
120	.3268	.3238	.3207	.3178	.3148	.3119	.3090	.3061	.3033	.3005
130	.2977	.2949	.2922	.2895	.2868	.2841	.2815	.2789	.2763	.2738
140	.2712	.2687	.2662	.2637	.2613	.2589	.2565	.2541	.2517	.2494
150	.2471	.2448	.2435	.2403	.2380	.2358	.2336	.2315	.2293	.2272
160	.2251	.2230	.2209	.2189	.2169	.2148	.2128	.2109	.2089	.2070
170	.2051	.2032	.2013	.1994	.1976	.1957	.1939	.1921	.1903	.1886
180	.1868	.1851	.1834	.1816	.1800	.1783	.1766	.1750	.1734	.1718
190	.1702	.1686	.1670	.1655	.1640	.1624	.1609	.1594	.1580	.1565

EXAMPLE: You have a source which originally was 105 curies on April 30, 1982.

Determine the age, in days, of the source (33 days as of June 2, 1982).

Find the decay factor for 33 days on the chart (.7352).

Multiply the original (105) curies times the decay factor (.7352).

The answer (77.196) is the number of curies for the source on June 2, 1982.

STATE OF CALIFORNIA
DEPARTMENT OF HEALTH

RADIOACTIVE MATERIAL LICENSE

Pursuant to the California Administrative Code, Title 17, Chapter 5, Subchapter 4, Group 2, Licensing of Radioactive Material, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, use, possess, transfer or dispose of radioactive material listed below; and to use such radioactive material for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations and orders of the Department of Health now or hereafter in effect and to any conditions specified in this license.

1. Licensee: Q. C. Services, Incorporated

2. Address: 26062 Eden Landing Road, Suite 1 & 2
Hayward, CA 94545

Attn: E. W. Huddleston
Radiation Safety Officer

3. License no. 1711-60 is hereby amended in its entirety. Amendment no. 31

4. Expiration date: July 1, 1987

5. Inspection agency: Div. of Occupational Safety & Health - N

6. Nuclide	7. Form	8. Possession limit
A. Iridium 192	A. Sealed sources (Indust. Nuclear Co. Model No. 1, Technical Operations, Inc. Model A424-1, Gamma Indust. Model T-1-A or T-1-T, Gulf Nuclear Model RT 14)	A. 6 sources not to exceed 100 curies each

(cont'd) Page 2

9. Authorized use

A. To be used in Technical Operations Projectors Model 524 or 533, with cables modified as appropriate for source-pigtails assemblies, for Industrial radiography.

(cont'd) Page 2

10. *Radioactive material may be used only at the following locations:*

(a) 26062 Eden Landing Road, Suite 2, Hayward, CA 94545- Industrial radiographic operations in shielded room facilities is authorized.
(b) 355 South Vasco Road, Liverrore, CA 94550
(c) temoprary job sites of the licensee throughout the State of California, except areas under exclusive Federal jurisdiction.

11. *The individuals listed below are the only persons authorized to act as radiographers under this license:*

a)(1) E. W. Huddleston (2) A. J. Trucks (3) Jiwan Singh (4) Kulwant S. Gill (5) M. I. Vannier (6) J. D. Hollison (7) Charles Whitaker (8) David Dickinson (9) E. L. Pedrick (10) Gino Martini (11) Dean Fonceca (12) J. Valkenaar (13) R. E. Magoon (14) G. F. Snyder (15) William J. Griffin (16) Robert J. Cory (17) R. C. Wenstrom.

b)

The individuals listed below are the only persons authorized to perform calibration of instruments under this license:
(1) E. W. Huddleston (2) Kulwant S. Gill (cont'd)

continued

6. Nuclide (cont'd)	7. Form (cont'd)	8. Possession limit (cont'd)
B. Iridium 192	B. Sealed sources(Indust. Nuclear Co. Model No. 7, Technical Operations, Inc. Model A424-9, Gulf Nuclear Model RT 15)	B. 4 sources not to exceed 100 curies.
C. Cobalt 60	C. Sealed source (Gamma Industries Model A-9-A or A-9-G)	C. 1 source not to exceed 50 curies.
D. Cobalt 60	D. Sealed source(Gamma Industries Model B-2-B or B-2-G)	D. 1 source not to exceed 40 curies.
E. Cobalt 60	E. Sealed source (Technical Operations Model 571)	E. 1 source not to exceed 15 millicuries.
F. Iridium 192	F. Sealed sources (Indust. Nuclear Co. Models 32 or 33)	F. 6 sources not to exceed 100 curies.

9. Authorized use (cont'd)

B. To be used in Technical Operations projectors, Model 660 for industrial radiography.

C. To be used in Gamma Industries projector Model Utility Twin 50 for industrial radiography.

D. To be used in Automation Industries projector Model 51-B, with cables modified as appropriate for source-pigtail assemblies, for industrial radiography.

E. To be used in a Technical Operations calibration kit Model 571.

F. To be used in Industrial Nuclear Company, projectors Model IR 100 for industrial radiography.

12. The radiation safety officer in this program shall be E. W. Huddleston

The alternate radiation safety officers shall be K. S. Gill and M. I. Vannier.

(Cont'd)

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-60

Amendment Number 31

Continued

This license is subject to all numbered conditions below.
Conditions to which this license is not subject are marked N/A.

13. This license is subject to an annual fee of three hundred fifty (350) dollars due and payable on the anniversa of the date of issue of this license., July 1, 1968.

14. Tests for leakage and/or contamination of sealed sources shall be performed only by persons specifically authorized to perform that service.

15. The following individuals are authorized to collect wipe test samples of sealed sources possessed under this license using leak test kits acceptable to t State Department of Health:

(a) the radiation safety officer or a radiographer designated by him.

16. Pursuant to California Radiation Control Regulations, the licensee is authorized to possess up to 999 kilograms (2203 pounds) of natural or deple uranium used for purposes of shielding or collimation in radiographic exposure devices listed in Item 9 of this license.

17. At any time the licensee is engaged in the performance of industrial radiography by authority of this license, at either a permanent or a temporary j site, he shall have a current copy of each of the following documents available for inspection at the site:

(a) California Radiation Control Regulations
(b) this license
(c) the licensee's operating and emergency procedures

18. The licensee shall not authorize any radiographer to use any model of a radiographic exposure device, related handling tool, or radiation ... instrument until the radiographer has been trained in the use of such equipment, and has demonstrated competence in its use. For each radiograph the licensee shall maintain the following records available for inspection:

(a) Training received by the radiographer in the use of such equipment, including dates, duration, and name of instructor.
(b) Each radiographic exposure device for which the radiographer has demonstrated competence in its use, including date of demonstration competence.

19. (a) The licensee shall conduct refresher training for all radiographers and radiographers' assistants at intervals not to exceed six months. Su training shall include, but not be limited to:

(1) California Radiation Control Regulations, with emphasis on Sections 30330-30334.
(2) Subject matter listed in Section 30335 of California Radiation Control Regulations.
(3) This license.
(4) The licensee's operating and emergency procedures, with emphasis on any changes which have been made within one year.
(5) Equipment used under this license for performance of industrial radiography with emphasis on equipment which has been used the licensee for less than one year.
(6) Prevention of overexposures of personnel, with emphasis on prevention of actions and circumstances within the past year which h caused, or threatened to cause, overexposures.

(b) The licensee shall maintain available for inspection records of refresher training described in (a) above, including:

(1) Names of instructors
(2) Names of individuals trained
(3) Dates and duration of training

20. Sources of radioactive material shall be changed in each radiographic projector only in accordance with instructions of the distributor of the sou changer. The individuals listed below are the only ones authorized by this license to change sources in radiographic projectors:

(a) the radiation safety officer or a radiographer designated by him.

21. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 7 and 8 of t license in accordance with statements, representations and procedures contained in the following documents:

(a) letter with application and attachments dated May 29, 1980, and signed by E. W. Huddleston.

(cont'd Page 4)

STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-(

Amendment Number 31

continued

21. (documents) cont'd

(b) licensee's "Radiological Safety Manual", received with the application dated May 23, 1980, as modified by:

(1) enclosure to the letter dated December 22, 1980 and signed by K. S. Gill.

(c) letter with attachments dated December 22, 1980, and signed by K. S. Gill.

22. Cobalt 60 may be used in the licensee's shielded room facility at 26062 Eden Landing Road, Hayward, California 94545 only whenever a collimator pointing the radiation beam downward is used.

For the State Department of Health Services

Date January 12, 1981

by _____

Radiologic Health Section
714 P Street, Sacramento, CA 95814

II

RH 2551 (9/79)

STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES

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RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-60

Amendment Number 32

Q. C. Services, Inc.
26062 Eden Landing Road, Suite 1 & 2
Hayward, CA 94545

Attention: E. W. Huddleston
Radiation Safety Officer

In response to the letter with attachments dated October 21, 1981, signed by K. S. Gill, Vice President, License No. 1711-60 is hereby amended in part as follows:

To add:

11. (a) (18) James D. Neal

(19) Mayo L. Fontenot

(20) Jerry D. Godwin

For the State Department of Health Services

Date November 25, 1981

by Gerard C. Wong

State of California—Health and Welfare Agency

Department of Health Services

Page 1 of 1 pages

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-60

Amendment Number 33

Q. C. Services, Inc.
26062 Eden Landing Road, Suite 1 and 2
Hayward, CA 94545

Attention: E. W. Huddleston
Radiation Safety Officer

License Number 1711-60 is hereby amended in part as follows:

To add:

6. Nuclide	7. Form	8. Possession limit
G. Iridium-192	G. Sealed sources (Gulf Nuclear, Inc. Model RG-13)	G. 3 sources, each not to exceed 100 Curies.

9. Authorized use

G. To be used in Gulf Nuclear, Inc. projectors Model 20V for industrial radiography.

21. (d) letter dated June 15, 1982, signed by E. W. Huddleston and attachments thereto.

For the State Department of Health Services

Date June 23, 1982

by William L Freeman

Radiologic Health Branch
7[illegible] Street, Sacramento, CA 95814

RH 2551 (5/82)

State of California—Health and Welfare Agency

Department of Health Services

Page 1 of 1 pages

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-60

Amendment Number 34

Q. C. Services, Inc.
26062 Eden Landing Road, Suite 1 and 2
Hayward, California 94545

Attention: E. W. Huddleston
Radiation Safety Officer

In response to the letter dated July 20, 1982 and the letter dated July 26, 1982 both signed by E. W. Huddleston, License No. 1711-60 is hereby amended in part as follows:

To add:

11. (a) (21) Hugh Friedl
(22) Walter William Hess

For the State Department of Health Services

Date August 11, 1982

by Gerald C. Wong

Radiologic Health Branch
714 P Street, Sacramento, CA 95814

RH 2551 (2/82)

II

State of California—Health and Welfare Agency

Department of Health Services

Page 1 of 1 pages

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-60

Amendment Number 35

Q C SERVICES INC
26062 EDEN LANDING #1
HAYWARD CA 94545
ATTN: E W HUDDLESTON
RADIATION SAFETY OFFICER

License Number 1711-60 is hereby amended in part as follows:

To read:

13 This license is subject to an annual fee of one thousand fifty (1050) dollars due and payable on the anniversary of the date of issue of this license, July 1, 1968.

For the State Department of Health Services

Date August 1, 1982

by Gerard C. Wong

Radiologic Health Branch
714 P Street, Sacramento, CA 95814

RH 2551 (2/82)

State of California—Health and Welfare Agency

Department of Health Services

Page 1 of 1 pages

License Number 1711-60

Amendment Number 36

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

Q. C. Services, Inc.
26062 Eden Landing Road, Suite 1 & 2
Hayward, CA 94545

Attention: E. W. Huddleston
Radiation Safety Officer

In response to the letter dated October 6, 1983, signed by K. S. Gill; License No. 1711-60 is hereby amended in part as follows:

To delete:

Subitem D. is deleted in its entirety.

For the State Department of Health Services

Date February 6, 1984

by Alvin de Lalla, Ph.D.

Radiologic Health Branch
714 P Street, Sacramento, CA 95814

RH 2551 (2/82)

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-60

Amendment Number 37

Q. C. Services, Inc.
26062 Eden Landing Road, Suite 1 & 2
Hayward, CA 94545

Attention: E. W. Huddleston
Radiation Safety Officer

In response to the letters dated December 4, 1985 and December 9, 1985, signed by K. S. Gill; License Number 1711-60 is hereby amended in part as follows:

To add:

6. Nuclide	7. Form	8. Possession limit
H. Cobalt-60	H. Sealed source (Gamma Industries Model A-7-A)	H. 1 source not to exceed 50 curies.

9. Authorized use:

H. To be used in a Gamma Industries projector Model Gammatron 50A for Industrial radiography.

For the State Department of Health Services

Date December 12, 1985

by _____

Radiologic Health Branch
714 P Street, Sacramento, CA 95814

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-60

Amendment Number 38

Q.C. Services, Inc.
26062 Eden Landing Road, Suites 1 & 2
Hayward, CA 94545

Attention: E. W. Huddleston
Radiation Safety Officer

In response to the letters with attachments dated March 26, 1986, May 8, 1986 and May 13, 1986, all signed by K. S. Gill, License No. 1711-60 is hereby amended in part as follows:

To add:

11. (a) (23) Jordan W. Norton
(24) Robert W. Hardy

For the State Department of Health Services

Date May 27, 1986

by Gerard Dong

Radiologic Health Branch
714 P Street, Sacramento, CA 95814

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-60

Amendment Number 39

Q. C. Services, Division of World
Technical Services, Inc.
26062 Eden Landing Road, Suites 1 and 2
Hayward, CA 94545

Attention: K. S. Gill
Radiation Safety Officer

In response to the letters dated June 6, 1986, and September 3, 1986, both signed by K. S. Gill, license number 1711-60 is hereby amended in part as follows:

To delete:

Condition 10 (b) is hereby deleted in its entirety.

To read:

1. Licensee: Q. C. Services, Division of World Technical Services, Inc.

11.(a) The individuals listed below are the only persons authorized to act as radiographers under this license:

(1) E. W. Huddleston
(2) A. J. Trucks
(3) Jiwan Singh
(4) Kulwant S. Gill
(5) David Dickinson
(6) Jordan W. Norton
(7) Robert W. Hardy
(8) Dean Fonceca
(9) J. Valkenaar
(10) James D. Neal
(11) Mayo L. Fontenot
(12) Bradley Steven Klossner
(13) A. Ray Jacobs
(14) James P. Bemis
(15) Bernard E. Penley
(16) Donald N. Hurt

12. (a) The radiation safety officer in this program shall be K. S. Gill.

(b) The alternate radiation safety officer shall be Bernard Penley.

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-60

Amendment Number 39

(continued)

To add:

21. (e) the letter with attachments dated July 11, 1986, signed by K. S. Gill.

(f) the letter with respect to management structure dated July 7, 1986, signed by R. L. Williamson.

(g) the letter with attachments, dated September 12, 1986, signed by K. S. Gill.

For the State Department of Health Services

Date November 5, 1986

by _____

Radiologic Health Branch
714 P Street, Sacramento, CA 95814

RH 2551 (2/82)

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-60

Amendment Number 40

Q. C. Services, Division of
World Technical Services, Inc.
26062 Eden Landing Road, Suites 1 and 2
Hayward, CA - 94545

Attention: K. S. Gill
Vice President

In response to the letter dated December 3, 1986, signed by K. S. Gill, Radioactive Materia
License Number 1711-50 is hereby amended in part as follows:

To add:

11. (a) (17) Richard A. Cook.

For the State Department of Health Services

Date December 23, 1986

by _____

Radiologic Health Branch
714 P Street, Sacramento, CA 95814

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-60

Amendment Number 41

Q.C. Services, Division of
World Technical Services, Inc.
26062 Eden Landing Road, Suites 1 & 2
Hayward, CA 94545

Attention: K. S. Gill
Vice President

In response to the letter dated December 18, 1986, signed by K. S. Gill, License No. 1711-60 is hereby amended in part as follows:

To read:

---

7. Form

B. Sealed sources (Industrial Nuclear Co. Model No. 7, Technical Operations, Inc. Model A424-9, Gulf Nuclear Model RT 15, Gamma Industries Inc. Model T-3-T).

F. Sealed sources (Industrial Nuclear Co. Model 32 or 33, Gamma Industries Inc. Model IN-1-T or IN-1-A).

To add:

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6. Nuclide	7. Form	8. Possession limit
I. Iridium 192	I. Sealed sources (Source Production and Equipment Co. Model G-1 (G-3), Gamma Industries, Inc. Model S-16)	I. 3 sources not to exceed 35 curies each.
J. Iridium 192	J. Sealed sources (Source Production and Equipment Co. Model G-1 (G-3), Gamma Industries, Inc. Model S-16)	J. 4 sources not to exceed 100 curies each
K. Iridium 192	K. Sealed sources (Technical Operations, Inc. Model A424-1 or Source Production and Equipment Co. Model T-1)	K. 2 sources not to exceed 100 curies each.

For the State Department of Health Services

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-60

Amendment Number 41

To add:

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9. Authorized Use

I. To be used in Gamma Industries Inc. projector Models 35 S or 35 SA for industrial radiography.

J. To be used in Gamma Industries, Inc. projector Model Century S for industrial radiography.

K. To be used in a Technical Operations, Inc. projector Model 533 for industrial radiography.

To read:

13. This license is subject to an annual fee for sources of radioactive material authorized to be possessed at any one time as specified in Item 8 of this license. The annual fee for this license is required by and computed in accordance with Sections 30230 - 30232 of the California Radiation Control Regulations and is also subject to an annual cost of living adjustment pursuant to Section 113 of the California Health and Safety Code.

For the State Department of Health Services

Date January 21, 1987

by Gerald L. Doss

Radiologic Health Branch
714 P Street, Sacramento, CA 95814

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-60

Amendment Number 42

Q. C. Services
Division of World Technical Services, Inc.
26062 Eden Landing Road, Suites 1 and 2
Hayward, CA 94545

Attention: K. S. Gill
Vice President

In response to the letter with attachments dated March 10, 1987, signed by Bernard E. Penley, and the letters with attachments both dated March 12, 1987, signed by Bernard E. Penley, License Number 1711-60 is hereby amended in part as follows:

To read:

11. (a) The individuals named below are the only persons authorized to act as radiographers under this license:

(1) E. W. Huddleston
(2) A. J. Trucks
(3) Jiwan Singh
(4) Kulwant S. Gill
(5) David Dickinson
(6) Jordan W. Norton
(7) Robert W. Hardy
(8) Dean Fonceca
(9) J. Valkenaar
(10) James D. Neal
(11) Mayo L. Fontenot
(12) Bradley Steven Klossner
(13) A. Ray Jacobs
(14) James P. Bemis
(15) Bernard E. Penley
(16) Donald N. Hurt
(17) Richard A. Cook
(18) Robert L. Williamson
(19) Charles E. Penley
(20) David W. Waples

For the State Department of Health Services

Date June 1, 1987

by _____

Radiologic Health Branch
714 P Street, Sacramento, CA 95814

RH 2551 (2/82)

State of California—Health and Welfare Agency

Department of Health Services

Page 1 of 1 pages

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-60

Amendment Number 43

Q. C. Services
Division of World Technical Services, Inc.
26062 Eden Landing Road, Suites 1 and 2
Hayward, CA 94545

Attention: K. S. Gill
Radiation Safety Officer

In response to the letters dated April 2 and 16, 1987, signed by K. S. Gill, License Number 1711-60 is hereby amended in part as follows:

To add:

11. (a) The individual named below is the only person authorized to act as a radiographer under this license:

(21) Steve M. Gant

For the State Department of Health Services

Date August 7, 1987

by Gerard C. Dong

Radiologic Health Branch
714 P Street, Sacramento, CA 95814

RH 2551 (2/82)

State of California—Health and Welfare Agency

Department of Health Services

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-60

Amendment Number 44

Q. C. Services
Division of World Technical Services, Inc.
26062 Eden Landing Road, Suites 1 and 2
Hayward, CA 94545

Attention: K. S. Gill
Radiation Safety Officer

In response to the letter with attachments, dated July 27, 1987, signed by K. S. Gill, License Number 1711-60 is hereby amended in part as follows:

To add:

11. (a) The individuals named below are the only persons authorized to act as radiographers under this license:

(22) Richard L. Hilyard
(23) Jerry Tucker

For the State Department of Health Services

Date August 26, 1987

by

Radiologic Health Branch
714 P Street; Sacramento, CA 95814

RH 2551 (2/82)

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-60

Amendment Number 45

Q. C. Services
Division of World Technical
Services, Inc.
26062 Eden Landing Road, Suites 1 & 2
Hayward, CA 94545

Attention: K. S. Gill
Radiation Safety Officer

In response to the letter with attachments dated October 5, 1987, signed by K. S. Gill, License No. 1711-60 is hereby amended in part as follows:

To add:

11. (a) The individuals named below are the only persons authorized to act as radiographers under this license:

(24) Tom W. Cuthbertson (training only)

(25) Louis C. Tanore

(26) Peter E. Puig

21. (h) The letter dated August 18, 1987 regarding training facility approval signed by Robert L. Williamson.

For the State Department of Health Services

Date October 30, 1987

by Gerard Dong

Radiologic Health Branch
714 P Street, Sacramento, CA 95814

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-60

Amendment Number 46

Q. C. Services
Division of World Technical Services, Inc.
26062 Eden Landing Road, Suites 1 & 2
Hayward, CA 94545

Attention: K. S. Gill
Radiation Safety Officer

In response to the letter, with attachments, dated November 12, 1987, signed by K. S. Gill, License Number 1711-60 is hereby amended in part as follows:

To add:

11. (a) (27) John E. Tucker

For the State Department of Health Services

Date November 12, 1987

by _____

Radiologic Health Branch

[illegible] Street, Sacramento, CA 95814

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-60

Amendment Number 47

Q.C. Services
Division of World Technical
Services, Inc.
26062 Eden Landing Road, Suites 1 & 2
Hayward, CA 94545

Attention: K.S. Gill
Radiation Safety Officer

In response in part to the letter with attachments dated October 5, 1987, and the letter dated December 21, 1987, both signed by K.S. Gill, License Number 1711-60 is hereby amended in part as follows:

To add:

11. (a) (28) Daniel D. Green
(29) Kenneth W. Reierson
(30) Kenneth M. Qualls

For the State Department of Health Services

Date December 30, 1987

by

Radiologic Health Branch

RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

License Number 1711-60

Amendment Number 48

Q. C. Services
Division of World Technical Services, Inc.
26062 Eden Landing Road, Suites 1 & 2
Hayward, California 94545

Attention: K. S. Gill
Radiation Safey Officer

In response to the letter with attachments dated January 8, 1988, signed by Robert L. Williamson, President, License Number 1711-60 is hereby amended in part as follows:

To add:

11. (a) (31) Sidney Ray Blythe
(32) Robert L. Hammon

For the State Department of Health Services

Date January 15, 1988

by

Radiologic Health Branch
714 P Street, Sacramento, CA 95814

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. QC Services Division of World Technical Services, Inc.	3. License number 04-14875-02
2. 26062 Eden Landing Road, Suite 1 & 2 Hayward, California 94545	4. Expiration date February 28, 1993
	5. Docket or Reference No. 030-20443

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Iridium 192	A. Industrial Nuclear Models 32 and 33 Amersham/Technical Operations Model 87703 Gamma Industries Model IN-1-A or IN-1-T sealed sources	A. Not to exceed 100 curies per source
B. Iridium 192	B. Industrial Nuclear Model 7 Amersham/Technical Operations Model A424-9 Gamma Industries Model T-3-T Gulf Nuclear Model RT-15 Source Production and Equipment, Inc. Model T5 sealed sources	B. Not to exceed 100 curies per source
C. Iridium 192	C. Industrial Nuclear Model 1 Amersham/Technical Operations Model A424-1 Gamma Industries Model T-1-A or T-1-T Gulf Nuclear Model RT14 Source Production and Equipment, Inc. Model T-1 sealed sources	C. Not to exceed 100 curies per source

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number
04-14875-02

Docket or Reference number
030-20443

6. BYPRODUCT, SOURCE, AND/OR SPECIAL NUCLEAR MATERIAL	7. CHEMICAL AND/OR PHYSICAL FORM	8. MAXIMUM AMOUNT THAT LICENSEE MAY POSSESS AT ANY ONE TIME UNDER THIS LICENSE
D. Iridium 192	D. Industrial Nuclear Model 2 Amersham/Technical Operations Model 848 Gamma Industries Model S-16 Source Production and Equipment, Inc. Model G-1 or G-3 sealed sources	D. Not to exceed 100 curies per source
E. Iridium 192	E. Industrial Nuclear Model 2 Gamma Industries Model S-16 Source Production and Equipment, Inc. Model G-1 or G-3 sealed sources	E. Not to exceed 35 curies per source
F. Iridium 192	F. Industrial Nuclear Model 2 Amersham/Technical Operations Model 848 Gulf Nuclear Model RG-13 sealed sources	F. Not to exceed 100 curies per source
G. Cobalt 60	G. Gamma Industries Model A-9-A or A-9-G sealed sources	G. Not to exceed 50 curies per source
H. Cobalt 60	H. Gamma Industries Model A-7-A sealed sources	H. Not to exceed 50 curies per source
I. Cobalt 60	I. Technical Operations Model 571 source rod	I. Not to exceed 15 millicuries per source

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number
04-14875-02

Docket or Reference number
030-20443

9. Authorized use

A. For use in Industrial Nuclear Model IR100 exposure devices for industrial radiography or in Gamma Industries Model C-10 or Industrial Nuclear Model IR-50 source changers for storage and replacement of sources.

B. For use in Amersham/Technical Operations Model 660 exposure devices for industrial radiography or in Gamma Industries Model C-10, Industrial Nuclear Model IR-50, Amersham (Tech/Ops) Model 650, or Source Production and Equipment, Inc. Model C-1 source changers for storage and replacement of sources.

C. For use in Amersham/Technical Operations Model 533 exposure devices for industrial radiography or in Gamma Industries Model C-10, Industrial Nuclear Ir-50, Amersham (Tech/Ops) Model 650, or Source Production and Equipment, Inc. Model C-1 source changers for storage and replacement of sources.

D. For use in Gamma Industries Model Century S exposure devices for industrial radiography or in Gamma Industries Model C-10, Industrial Nuclear Model IR-50, Amersham (Tech/Ops) Model 650, Gulf Nuclear Model 130, or Source Production and Equipment, Inc. Model C-1 source changers for storage and replacement of sources.

E. For use in Gamma Industries Model 35 exposure devices for industrial radiography or in Gamma Industries Model C-10, Industrial Nuclear Model IR-50, Gulf Nuclear Model 130, or Source Production and Equipment, Inc. Model C-1 source changers for storage and replacement of sources.

F. For use in Gulf Nuclear Model 20V exposure devices for industrial radiography or in Gamma Industries Model C-10, Industrial Nuclear Model IR-50, Amersham (Tech/Ops) Model 650, or Source Production and Equipment, Inc. Model C-1 sources changers for storage and replacement of sources.

G. For use in Gamma Industries Model Utility Twin 50 exposure devices for industrial radiography or in Gamma Industries Model C-8 source changers for storage and replacement of sources.

H. For use in Gamma Industries Model Gammatron 50A exposure devices for industrial radiography or in Gamma Industries Model C-8 source changers for storage and replacement of sources.

I. For use in Technical Operations Model 571 meter calibration kits for calibration of instruments.

CONDITIONS

(continued)

10. Licensed material may be used at temporary job sites of the licensee anywhere in the United States where the U. S. Nuclear Regulatory Commission maintains jurisdiction for regulating the use of licensed material.

11. A. Notwithstanding the periodic leak test required by 10 CFR 34.25(b), such requirement does not apply to radiography sources that are stored and not being used. The sources excepted from this test shall be tested for leakage before use or transfer to another person.

    B. Sealed sources authorized for a use other than radiography shall be tested as radiography sources in accordance with 10 CFR 34.25.

12. The licensee is authorized to receive, possess, and use sealed sources of iridium 192 or cobalt 60 where the radioactivity exceeds the maximum amount of radioactivity specified in this license provided:

    A. Such possession does not exceed the quantity per source specified in Item 8 by more than 20% for iridium 192 or 10% for cobalt 60;

    B. Records of the licensee show that no more than the maximum amount of radioactivity per source specified in this license was ordered from the supplier or transferor of the byproduct material; and

    C. The levels of radiation for radiographic exposure devices and storage containers do not exceed those specified in 10 CFR 34.21.

13. Pursuant to 10 CFR Part 40, "Domestic Licensing of Source Material", the licensee is authorized to possess, use, transfer, and import up to 999 kilograms of uranium contained as shielding material in the radiography exposure devices and source changers authorized by this license.

14. The licensee may transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material".

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number
04-14875-02

Docket or Reference number
030-20443

CONDITIONS

(continued)

15. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Application dated September 14, 1987
B. Letter dated November 30, 1987

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date FEB 24 1988

By Beth A. Riedlinger
Beth A. Riedlinger
Health Physicist (Licensing)
Nuclear Materials Safety Section
Region V

QC SERVICES
A DIVISION OF WORLD TECHNICAL SERVICES, INC.

WORLD TECHNICAL SERVICES, Inc.

26062 EDEN LANDING ROAD, SUITE 1 & 2
HAYWARD, CALIFORNIA 94545
PHONE (415) 782-3660

RADIATION SAFETY PROGRAM
QCS
RSP 687

SECTION IV

MAINTENANCE PROCEDURE

RADIATION SAFETY PROGRAM

1.0 **OBJECTIVE** - Provide safe equipment operation and assure sealed sources are controlled.

2.0 **APPLICATION** - Q C Services (Company) equipment of the types listed below.

2.1 Sealed Source.

2.2 Exposure Device

2.3 Survey Meter

3.0 **PROCEDURES** - Equipment will be maintained in good condition by periodic inspection and calibration.

3.1 A **Maintenance/Calibration label,** placed on the equipment (if applicable), will identify the date for the next servicing.

3.2 **SEALED SOURCE**

3.2.1 Leak testing will be performed every six (6) months and after any equipment accident that could have caused damaged to the source capsule.

a) Leak testing will be performed by the RSO, Assistant RSO or designee, per the direction of the Leak Testing of Sealed Source Kit.

b) The leak test will be sent to an approved laboratory for analysis.

c) The laboratory will report the results to the RSO.

d) Reports, which identify capsule leakage, will require immediate action per the Operating and Emergency Procedure (O&E P).

3.2.2 **QUARTERLY INVENTORY**

a) Quarterly physical inventories of sealed sources will be conducted by the Radiographer under the direction of the RSO. Source Quarterly Inventory Form, will be completed.

b) Any sources, which cannot be accounted for, constitutes a Class A Incident requiring immediate action per the O&E P.

3.3 **EXPOSURE DEVICE**

3.3.1 Daily Inspection will be conducted by the Radiographer per the instructions of Radiation Safety Report Form, Exposure Device Inspection (Daily).

3.3.2.1 Exposure Device Inspection (Quarterly) Form, shall be used when performing the step-by-step inspection procedure.

3.3.2.2 Inspection shall be conducted on the following items:

a) Shield Assembly
b) Source Pigtail Assembly.
c) Source Tubes and Cable Housings.
d) Crank Assembly.
e) Cable (source drive).
f) Mechanical Compatibility of Components.

3.3.2.3 Items found to be defective and/or inoperable shall be "Repaired" of "Replaced" before being returned to service.

3.3.2.4 Inoperable and/or defective items, unable to be repaired or replaced, shall be removed from service.

3.3.2.5 Defective equipment shall be returned to the appropriate equipment and/or source manufacturer for maintenance and/or overhaul as directed by the RSO.

3.3.3 SPECIAL INSPECTION - Inspections will be conducted on equipment that has been subjected to severe stress of damage (dropping or submersion in water). Exposure device involved in emergencies will be inspected per the inspection of the RSO. The report shall be identified "Special Inspection" and include a description of the abnormal situation encountered.

3.3.4 FIELD MAINTENANCE

a) Servicing of the equipment to correct minor deficiencies uncovered by the daily inspection may be performed by the Radiographer except when abnormally high radiation levels are involved.
Note: Minor deficiencies are defined as Preventive Maintenance only.
b) Units, which show abnormal radiation, shall be immediately removed from service and the RSO contacted.

3.3.5 SOURCE REPLACEMENT - Maintenance and required overhaul will be performed prior to installation of each new source.

a) Exposure device containing Iridium-192 will be overhauled by the Company, appropriate equipment and/or source manufacture per the instructions of the Exposure Device Maintenance Form.

3.3.5.1 OPERATING INSTRUCTIONS - SOURCE CHANGES

a) Survey shipping container with a calibrated survey meter.
Note: If surface reading exceeds 200 mR/hr., place container in a safe area and contact the supplier.
b) Locate source changer and exposure device in an area where the source may be exposed safely.
c) Set up exposure device as for an exposure.
d) Attach one (1) end of the transfer tube to the exposure device in the usual manner. Remove shipping plug from changer. Remove adaptor plug from the dust cap, attach it to source changer lock body. Connect the other end of the source tube to the adaptor plug on the empty side of the source changer. Position the equipment in such a manner as to permit free travel of the source assembly in the tube.
e) Position the drive crank at the maximum distance from the exposure device.
f) Quickly crank the source out of the exposure device and into the source changer. Survey the changer to verify the insertion of the source.
g) Secure the source changer lock. Test pigtail to verify source is securely held by the closed lock. This may be done by attempting to retract the source after the lock has been closed.
h) Unscrew the adaptor coupling connecting the exposure tube and the source changer. Disconnect the source from the drive cable in accordance with the exposure devices manufacturer's instructions.
i) Remove the dust cap on the lock body with the new source tag.
j) Install the dust cap on the lock body containing the spent. Remove the spent source nameplate from the exposure device. Wire seal the spent source nameplate to the dust cap and lock body.
k) Align the exposure device and source tube with source changer. The exposure tube should be straight and free of kinks with the end of the drive cable protruding one-half (1/2) inch from the end of the housing.
l) Connect the new source to the drive cable in accordance with the manufacture's instructions.
m) Connect the source tube and adaptor coupling to the source changer lock body.
n) Position the exposure device drive crank at the maximum distance from the device.

o) Unlock the safety feature securing the new source in the source changer.
p) Quickly crank the new source into the exposure device. Survey the exposure device to verify the safe position of the source.
q) Lock the exposure device and replace the adaptor and shipping plug. Attach the new source identification nameplate to the exposure device.

3.3.5.2 A copy of the source changer **instructions** should be provided with each source shipment. Source changing should be in strict accordance with the manufacturer's instructions.

Example: Industrial Nuclear Company's Source Changer, IR50 or Technical Operations, Inc. Source Changer, 650.

3.3.5.3 SHIPPING - Refer to Section VI, Source Shipping/Receiving Instruction Procedure, before returning source changer to the appropriate manufacture.

3.4 SURVEY INSTRUMENTS - Maintenance will be performed, as required, prior to each calibration and after damage or malfunction. The maintenance of survey instruments will be performed by a facility that has NRC and/or State of California approval.

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SECTION V

CALIBRATION OF RADIATION

SURVEY INSTRUMENTS PROCEDURE

1.0 OBJECTIVE - Provide a calibration program to assure radiation survey instruments will produce reliable data.

2.0 APPLICATION - Q C Services (Company) radiation survey instruments.

3.0 PROCEDURE

3.1 Calibration shall be conducted by a NRC and/or State of California approved facility on a quarterly (90 days) basis and after instrument maintenance.

3.1.1 The approved facility report shall contain the following:

a) Certification of maintenance and calibration identifiable to the model and serial number (S/N) of the instrument.
b) The date of certification.
c) Extent of servicing and items repaired or replaced.
d) Signature and date of the person performing calibration.

3.2 Instruments shall be identified with a Maintenance/Calibration Label which states the recalibration date.

3.3 Recall of survey instruments for recalibration is the responsibility of the Radiation Safety Office (RSO).

3.4 The RSO shall maintain the following records of calibration:

a) Verification of the calibration facilities.
b) Verification of calibration for each survey instrument currently in use.

3.5 Procedure for Calibration of Radiation Survey Meters.

3.5.1 This procedure is to be used for calibration of radiation survey meters which are used by the Company for industrial radiography.

3.5.2 Personnel Qualification - Only the individuals specifically approved by the RSO may perform or directly supervise radiation survey meter calibration.

3.5.3 FACILITIES

3.5.3.1 The Model TO 571 meter Calibration kit manufactured by Technical Operations, Inc. will be used as the calibration source for the radiation survey meter calibration. The unit is a welded steel, lead filled storage

container. It contains a 60o port, a movable source capsule, locking bar, and a padlock for securing the source against unauthorized use. The container is equipped with a 15 millicurie Cobalt 60 source in a sliding capsule which allows the source to be moved from the stored position to the directional port window, but not removed from the container. The dose/distance computer and metric tape are fastened to the container for ready reference.

3.5.3.2 The TO 571 meter calibration kit can be used in any area to which access can be restricted for a distance of ten (10) feet. The restricted area must be under direct surveillance and posted conspicuously with **"Caution--Radiation Area"** signs.

3.5.4 PROCEDURES FOR CALIBATION

3.5.4.1 In use, the inverse square law applied by placing the survey meter at the appropriated distance for the desired radiation field. These correct distances can be determined immediately from the dose/distance computer mounted on the container; and distances can be measured directly with the build-in metric tape.

3.5.4.2 Place the container on a long bench in an area to which access can be restricted for a distance of about ten (10) feet.

3.5.4.3 Set the age of the source on the Scale A opposite the calibrated source size shown on Scale B and tighten the holding screws.

3.5.4.4 Read the appropriate distance on Scale D under the dose level desired shown on Scale C.

3.5.4.5 Place your survey meter at the correct distance, lift the source capsule to **"open"** position and read the meter.

3.5.4.6 Check each instrument at two or more points on each scale. If the instrument readings correspond to calculated values, within a range of plus or minus 10 percent, it can be considered to be properly calibrated. Minor adjustments can oftentimes be made which will bring the instrument within the desired range.

3.5.4.7 If the instrument cannot be adjusted in order for the readings to a=fall within the calculated range it should be returned to the manufacture or a qualified instrument repair facility for repair and calibration.

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SECTION VI

SOURCE SHIPPING/RECEIVING

INSTRUCTION PROCEDURE

RADIATION SAFETY PROGRAM

1.0 **OBJECTIVE** - The objective of this procedure is to assure the proper methods and practices are used to insure compliance with Federal, State and Company regulations which effect the transporting, shipping and receiving of radioactive material.

2.0 **APPLICATION** - Q C Services (Company) personnel transporting, shipping and/or receiving radioactive material outside the confines of the plant or other authorized location of use.

3.0 **PROCEDURE**

3.1 The Radioactive Material (source) Shipping/Receiving Instruction Procedure, described herein, outlines the basic methods and practices used by the Company to meet the objectives of the regulations.

3.2 This procedure is your guide for the instruction used whenever you are shipping and/or receiving radioactive material. It shall be made available for review when shipping or receiving source material.

3.3 This procedure is subject to modification or revision due to changes in Federal Department of Transportation (DOT), State and/or Company regulations.

3.3.1 Procedure modifications or revisions shall be co-ordinated by the Radiation Safety Officer (RSO).

3.3.2 The RSO is responsible for transmittal of modifications or revision.

3.4 **The RSO shall be made aware of all radioactive material shipments.**

4.0 **PACKAGING** - Packaging of radioactive material shall be designated and selected to meet with all the requirements of DOT.

5.0 **PREPARATION FOR SHIPPING**

5.1 A **Survey Meter** shall be used every time a person is required to ship radioactive material.

5.2 **Inspection of Radiographic Exposure Device (Iridium-192)**

5.2.1 Survey surface of device for surface radiation levels.

Note: No device shall have a reading in excess of 200 mr.

5.2.2 Attach wire seal through safety plug, then to device.

5.2.3 Place exposure device in shipping container provided.

a) Exposure device, having DOT approved Type "B" (Example: TO660), will be placed in an overpack labelled with certificate No. USA 9033/Type B for shipping by air or common carrier (truck).
b) Exposure device, having DOT approved Type "B" (Example: IR100), will be placed in an overpack (black drum) labelled with certificate No. USA 9157/Type B for shipping by air or common carrier (truck).

5.3 SHIPPING CONTAINER

5.3.1 Shipping container shall be a DOT approved type "B" package.

6.0 SHIPPING

6.1 The following **instructions** are mandatory to meet with the requirements of DOT and/or Company regulations.

6.1.1 Affix address label on shipping container (remove or cover old label. If shipped by air (federal Express) -- the Airbill can be used as the address label.

6.1.2 Thoroughly remove Radioactive Yellow Shipping Labels from previous shipment.

6.1.3 Complete Radioactive Yellow-II or III Labels and place on opposite sides of shipping container. **Do Not** ship without two (2) Radioactive Yellow Labels (on opposite sides of container).

"RADIOACTIVE YELLOW-II" - 0.5 To 50 hr. on surface. Not over 1.0 mrem/hr. at 1 meter (39").

"RADIOACTIVE YELLOW-III" - 50 mrem/hr. on surface but not over 200. Over1.0 mrem/hr. at 1 meter (39") but not over 10 mrem/hr.

Transport Index - The highest amount of radiation measured at 1 meter (39") from any surface of the shipping container.

"RAdioactive Yellow II" - Does not require vehicle placard for highway shipments.

"Radioactive Yellow III" – Requires vehicle placards on all four (4) sides.

6.1.4 Container **shall** have affixed a **"DANGER CARGO AIRCRAFT ONLY"** label (for shipments by air).

6.1.5 Container shall be labeled with the basic description of the material. **("RADIOACTIVE MATERIAL SPECIAL FORM N.O.S. UN 2974").**

6.1.6 Container shall be labeled with certificate number and type of package.

Example: USA 9033/Type B (T0660 Device).
USA 9157/Tupe B (IR100 Device).

6.1.7 Container shall have affixed a package certificate of approval.

6.2 Shipped By Air - **"CARGO ONLY AIRCRAFT"**

6.2.1 COMPLETE **AIR BILL** (Federal Express Shipping Form).

6.2.2 Complete **Shipper's Certification for Materials Classified as Radioactive Material** (Federal Express Shipping Form).

6.3 SHIPPED BY TRUCK

6.3.1 COMMON CARRIER - Complete waybill (Trucking Bill of Lading).

6.3.2 Company Vehicles (Exclusive-Use Vehicles) - Complete Radioactive Material Shipping Document Company Vehicles.

6.4 Only those **Individuals Qualified (by training)** to handle radioactive material shall prepare and sign shipments.

6.4.1 Qualified Individuals are: Radiographers or designated individuals by the RSO.

6.5 Check to see you have completed all **required items**.

6.6 Place device in the approved shipping container.

6.7 Secure Container with a wire seal or other means approved by the RSO.

7.0 RECEIVING

7.1 **PICKING UP SHIPMENT** - Each licensee, who picks up shipments from a carrier's ternimal shall do so expeditiously upon receipt of notification. The shipment shall be monitored as soon as practicable after receipt for surface radiation levels of container.

7.2 **RECEIVING SHIPMENT** - Monitoring shall be performed as soon as practicable after receipt, but no later than three(3) hours after the package is received at the facility if received during normal working hours, or 18 hours if received after normal working hours.

7.3 If **Radiation levels** are found on external surfaces of container in excess of 200mr/hr., or at 1 meter (39") from external surface in excess of ten (10) mr/hr., the individual shall immediately notify the RSO.

8.0 ENFORCEMENT OF REQUIREMENTS

8.1 It shall be the responsibility of the RSO to enforce the requirements of this procedure.

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SECTION VII

LEAK TESTING PROCEDURE

1.0 **OBJECTIVE** - Detect leakage of a sealed source.

2.0 **APPLICATION** - Q C Services (Company) sealed sources.

3.0 **PROCEDURE**

3.1 Leak test shall be performed on each sealed source every six (6) months.

3.2 Sources transferred to the Company shall be accompanied by a current Certification of Sealed Source and Leak Test Analysis (Semi-Annual), containing the following, or be subjected to retesting:

a) Nuclide.
b) Source serial number (S/N).
c) Activity.
d) Date sample collected.
e) Date of analysis.

3.3 Industrial Nuclear Company or other authorized facility will perform the leak test analysis and certification of sealed sources with the following exceptions.

3.3.1 RSO, or designated individual(s), shall perform such test of sources. The leak test kit furnished by the analyzing laboratory should be used.

3.3.2 Supplier performing source changes and/or maintenance.

3.4 **Retest Notification** - The RSO is responsible for implementing the action for leak testing. RSO may direct the device containing the sealed source be returned, or designated individual(s), to perform the leak test per the instructions of the sealed source Leak Test Kit.

3.5 Any analyses that show a level of contamination of .005 micro-curies or greater, constitutes a Class A Incident. The RSO shall immediately implement the required emergency action.

3.6 Each report will be reviewed and filed by the RSO.

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SECTION VIII

QUALIFICATION/TRAINING PROCEDURE

RADIATION SAFETY PROGRAM

1.0 OBJECTIVE - Assure personnel are competent in radiation safety to the level required by their job assignment.

2.0 APPLICATION - Q C Services (Company) personnel.

3.0 PROCEDURE

3.1 DEFINITIONS

3.1.1 QUALIFICATION - Compliance with the requirements of certification.

3.1.2 CERTIFICATION - Written testimony of qualifications.

3.1.3 RADIOGRAPER TRAINEE - An employee who is in training for the position of Assistant Radiographer.

3.1.4 ASSISTANT RADIOGRAPHER - An individual who uses radiographic exposure devices, sealed sources, related handling tools and survey instruments while under the personal supervision of a Radiographer, and is certified is certified in accordance with this procedure.

3.1.5 RADIOGRAPHER - An individual who performs radiography or is in attendance at the radiography site to personally supervise radiographic operations. The Radiographer is directly responsible to the Radiation Safety Office (RSO) for assuring that radiography is performed in accordance with the Radiation Safety Program and is certified in accordance with this procedure.

3.2 AUTHORITY - The radiation safety portion of personnel qualification and certification shall be vested with the RSO.

4.0 LEVELS OF QUALIFICATION/TRAINING

4.1 RADIOGRAPHER TRAINEE - An individual with no previous, who is in training for the position of Assistant Radiographer. During this period of training, the individual shall not act in the capacity of handling and/or using sources.

4.1.1 All Trainees shall be trained in basic radiation safety. The individual will be required to complete a written quiz prior to starting the on-the-job training assignment.

4.1.2 A five (5) question written quiz will be given to each trainee. It will be directed toward avoiding accidental exposure.

4.1.3 Radiographer Trainees are given a four (4) hour lecture of informative instruction. This instruction is given by the RSO, Assistant RSO or qualified individual. The lecture includes coverage of the following subjects.

a) Basic Radiation Safety.
b) Needs and Requirements for Personnel Monitoring;
   1) **Dosimeter** - Its functions, necessity, how it is used and the importance of it being carried at all times when on the job.
   2) **Film Badge** - Its function, necessity, how it is used and the importance of its being worn on the job at all times.
   3) **Dose Rate** - R/hr. and mr/hr.
   4) **Radiation Survey Meters** - Their function, operation and necessity in radiography.
   5) **Controlling Radiation Dose** - Time, distance and shielding.

4.1.4 At the time of presentation (lecture), the Trainee is issued a film badge.

4.1.5 Upon completion of the four (4) hours of informative instruction, the Trainee is given a written Basic Radiation Quiz and oral review on basic radiation safety. This is to verify understanding of the subjects covered as listed above.

4.1.6 A minimum of One (1) week (40 hours) of documented on-the-job training shall be required before a Trainee can become qualified for the position or title of Assistant Radiographer. During this period of on-the-job training, the Trainee shall not act in the capacity of handling and/or using sources.

4.1.6 The on-the-job training period includes coverage of the following subjects:

a) Operating and Emergency Procedures (O&E P).
b) Radiography Equipment

Note: The instruction will be given by the Radiographer, Assistant RSO or RSO. The Radiation Safety Program Procedures shall be used as the text for this instruction. The Trainee should be assigned to a radiography team and observe the operations, procedures and techniques used by the team.

4.1.7 After completion of one (1) week (40 hours) on-the-job training, the Trainee will be eligible for a written examination and oral review for an Assistant Radiographer. In addition, the Trainee must satisfactorily demonstrate competence to use, under the instructions of a radiographer, radiographic exposure device, radiation survey instruments, sealed sources and related handling tools which will be used in performing duties as an Assistant Radiographer.

Upon successful completion of the written examination, oral review, and demonstration, the Trainee becomes eligible for certification as an Assistant Radiographer.

4.2 **ASSISTANT RADIOGRAPHER** - The radiation safety requirements for an Assistant Radiographer are as follows:

a) Minimum age - 18 years.
b) No know history of previous radiation exposures which would prohibit or cause restriction of activity.
c) Free from physical handicaps which could endanger himself/herself or others during performance of the job.
d) Completion of the radiation safety training requirements for Assistant Radiographer.
e) Satisfactory completion of the Assistant Radiographer examinations.

4.2.1 **ASSISTANT RADIOGRAPHER TRAINING** - No previous experience. The Assistant Radiographer will attend a lecture of informative instruction. This instruction is given by a qualified instructor, the RSO and/or designated individual. The lecture includes coverage of the following subjects.

a) **Basic Radiation Safety**
b) **Needs and Requirements for Personnel Monitoring**
   1) **Dosimeter** - Its function, necessity, how it is used and the importance of it being carried at all times when on the job.
   2) **Film Badge** - Its function, necessity, how it is used and the importance of it being worn on the job at all times.
   3) **Dose Rate** - R/hr. and mR/hr.
   4) **Radiation Survey Meters** - Their function, operation and necessity in radiography.
   5) **Controlling Radiation Dose** - Time, distance and shielding.
c) **Instruction in the O&E P**
d) **Review of State Regulations/License**

4.2.2 Upon completion of the informative instruction, the Assistant Radiographer is given a written examination, oral review and demonstration. This is to verify understanding of the subjects covered as listed above.

4.2.3 The on-the-job training of the Assistant Radiographer will include coverage of the following subject:

a) **Operating and Emergency Procedures (O&E P)**
   1) The Assistant Radiographer shall be instructed in each section of the O&E P using the procedures as the text for this instruction. This instruction shall be given by a Radiographer or the RSO.
   2) The O&E P shall be made available to the Assistant Radiographer and referred to whenever needed for clarification and understanding of the procedures.

b) **Radiography Equipment**
   1) The Assistant Radiographer shall be instructed in the use of radiography equipment by using the manufacturer's operating manuals as a text for instruction. This instruction shall be given by a Radiographer or the RSO.
   2) The Assistant Radiographer will be assigned to a Radiographer and will observe the operations, procedures and techniques used.

4.2.4 After at least three (3) months on-the-job training as an Assistant Radiographer, the individual becomes eligible for advancement to the position of Radiographer upon successful completion of instructions on the subjects outlined in State Regulations.

Note: Formal training (as outlined in Paragraph 30335 of the State Regulations Title 17) shall be completed by an NRC or State approved facility.

4.2.5 Upon successful completion of the required formal training, demonstration and examination, the Assistant is eligible for certification as a Radiographer.

4.3 **RADIOGRAPHER** - The radiation safety requirements for a Radiographer are as follows:

a) Previous qualification (Previously Trained) as Radiographer or compliance with b) and c) below.
b) A minimum of three (3) months experience as an Assistant Radiographer.

c) Completion of the radiation safety training requirements for Radiographer as defined in the State of California's Regulations Title 17, Paragraph 30335.
Note: Formal Training shall be completed by an NRC or State approved facility.
d) Satisfactory completion of the Radiographer examinations - General - Specific - Practical.

4.4 EXPERIENCED RADIOGRAPHIC PERSONNEL - Radiographic personnel with previous experience must meet the following requirements.

4.4.1 Verification by previous employer(s) of the following:

a) Confirmation of employment;
b) Length of time employes;
c) Position and/or title held while employed;
d) Record of radiation safety training, of experience and rating held relative to position or placement.

4.4.2 After completion of prior employment information and training verification, the experienced personnel will be given a copy of the O&E P to study and review.

4.4.3 Radiographic personnel with previous experience are given informative instruction on the Company's O&E P, instruments, source devices and equipment used in the course of performing their duties in radiographic inspection.

4.4.3.1 This instruction is given by a qualified individual.

4.4.4 Radiographic personnel with previous experience shall be required to pass examinations (General - Specific - Practical) that are applicable to the position be filled.

4.4.4.1 Upon completion of these requirements, radiographic personnel with previous experience will be eligible for certification to the level for which they are qualified.

5.0 EXAMINATION

5.1 RADIOGRAPHER TRAINEE - A five (5) question written quiz will be given each Trainee. It will be directed toward avoiding accidental exposure. An

oral review will also be used to assure the points are understood. This quiz will be conducted and evaluated by a qualified individual.

5.2 ASSISTANT RADIOGRAPHER

a) **General** - The general examination shall contain a minimum of 10 question on basic radiation safety (closed book).
b) **Specific** - The specific examination shall contain a minimum of 15 question on the OE & P (open book).
c) **Practical** - The practical examination shall measure the individual's proficiency in performing required functions. Individuals will be required to demonstrate competence to use the radiographic exposure devices, sealed sources, related handling tools and survey instruments.
d) **Oral Review** - An oral review should be conducted with the individual to clarify any question and correct misunderstandings.
e) Examinations will be **administered and evaluated** by a qualified individual.
f) The RSO shall **review** the examinations prior to issuance of certification.

5.3 RADIOGRAPER

a) **General** - The general examination shall contain at least 20 questions on basic radiation safety (closed book).
b) **Specific** - The specific examination shall contain at least 30 questions (open book) based on:
    1) O&E P,
    2) State and/or Federal Regulations, and
    3) Exposure Device and Survey Meters.
c) **Practical** - The practical examination shall measure the individual's proficiency in performing required functions. Individuals will be required to demonstrate competence to use the radiographic exposure devices, sealed sources, related handling tools and survey instruments.
d) **Oral Review** - An oral review should be conducted with the individual to clarify and questions and correct misunderstanding.
e) Examinations will be **administered and evaluated** by a qualified individual.
f) The RSO shall **review the** examinations prior to issuance of certification.

6.0 **PASSING GRADE** - Passing grade for the general and specific examinations for all certifications will 70 percent of greater. Certification can be disapproved for inability to demonstrate understanding and/or knowledge of safety requirements.

7.0 **RE-EXAMINATION** - Re-examination, after failure of an individual to satisfactorily complete a certification examination, shall not be conducted without a reasonable retraining period. The period shall be determined by the person who conducted the original examination and approved by the RSO.

8.0 **CERTIFICATION** - The RSO's authority for issuing certifications shall not be delegated.

8.1 **PERSONNEL RECORDS** - The personnel records of all certified individuals shall include:

a) Name of certified individual;
b) Level of certification;
c) Educational background and experience;
d) Statement indicating satisfactory completion of the required training;
e) Actual grades obtained on each examination;
f) Dates of certification and/or recertification; and
g) Signature of RSO.

9.0 **RECERTIFICATION** - Radiographer should complete a refresher training and recertification every three (3) years by one (1) of the following criteria:

a) When deemed necessary by the RSO because of changes in Regulation, equipment and O&E P
b) Evidence of continuing satisfactory performance as substantiated by audits.
c) Re-examination in accordance with the original examination requirements or an alternate method approved by the RSO.
d) Recertification examinations can be administered by individuals designated by the RSO.

9.1 Upon satisfactory completion of the recertification requirements, the Radiographer is eligible for rectification.

10.0 **CERTIFICATION WITHDRAWALS** - The RSO shall have the authority to withdrawal certifications for:

a) Violation of safety procedures or disregard for safety practices;
b) Inability to demonstrate correct procedures during audits;
c) Reassignment to functions no longer requiring the certification;
d) Termination of the individual.

CERTIFICATION OF RADIATION SAFETY TRAINING
RADIOGRAPHER TRAINEE

I Radiographer Trainee_____Date of Hire_____

Date of Birth_____Social Security No._____Jobsite_____

II The above named individual has received the following items:

1. Film Badge Date Received_____
2. Dosimeter Date Received_____

Note: If items were issued at time of hire, use the date.

III. The above named individual has satisfactorily completed QC Services informative instructions and testing for Radiographer Trainee as specified below:

1. Attended informative instruction on the topics outlined in the Training Procedure (Section VII) paragraph 4.1.3

   a) Basic Radiation Safety

   b) Needs and requirements for personnel monitoring. (Min. four (4) Hours)

      1. Dosimeter
      2. Film Badge
      3. Dose Rate
      4. Radiation Survey Meters
      5. Controlling Radiation Dose No. of Hrs._____Date_____

2. Passed a written examination and oral review on basic radiation safety at the conclusion of the four (4) hours of instructions (Basic Radiation Quiz).

   No. of Hrs._____Date_____

IV. The above named individual has satisfactorily completed training and examination to begin their one (1) week on-the-job as a Radiographer Training.

Date (Beginning on-the-job training)_____

V. I hereby scarify the above information is correct to the best of my knowledge.

_____ _____

Signature of Radiographer Trainee Individual Administering Training/Exam

Date_____ Date_____

Approved by the RSO_____**Date**_____

CERTIFICATION OF RADIATION SAFETY TRAINING
ASSISTANT RADIOGRAPHER

I Assistant Radiographer_____ Date of Hire_____

Date of Birth_____ Social Security No._____ Jobsite_____

II The above named individual has satisfactorily complete QC Services informative instructions and testing for Radiographer Trainee as specified below.

1. Attended informative instruction of the topics outlined in the Training Procedure (Section VIII) Paragraph 4.1.3;

   a) Basic Radiation Safety

   b) Needs and requirements for personnel monitoring

   (Min. Four (4) Hrs) No. of Hrs._____ Date_____

2. Past a written examination and oral review on basic radiation safety at the conclusion of the four (4) hours of instruction (Basic Radiation Quiz).

   Exam Score_____ Date_____

III. Completed a minimum of one (1) week on-the-job training as a Radiographer Trainee.

Date From_____ To_____

IV. The above named individual has satisfactorily completed the Company's Assistant Radiographer Training Testing as specified below.

1. Attended instruction on the topics outlined in the Training Procedure Paragraph 4.2.1. and (Paragraph 4.2.3);

   a) Operating and Emergency Procedures Date_____

   b) Radiography Equipment Date_____

2. Successfully completed the written examination and oral review associated with the position of Assistant Radiographer.

   Date_____

V. I hereby scarify the above information is correct to the best of my knowledge.

_____ _____

Signature of Assistant Radiographer Individual Administering Training/Exam

Date_____ Date_____

Approved by the RSO_____ **Date**_____

CERTIFICATION OF RADIATION SAFETY TRAINING
RADIOGRAPHER

I Radiographer _____ Date of Hire _____

Date of Birth _____ Social Security No. _____ Jobsite _____

II. The above named individual has satisfactorily completed QC Services Radiographer Training Program and has received radiation safety training & testing as specified below:

1. Attended instruction on the topics outlined in the Training Procedure (Section VII) paragraph 4.3 (State of Calif. Title 17 (30335), Subjects to be covered in Training):
   a) Fundamentals of Radiation Safety (including eight (8) sub-parts) No. of Hrs _____ Date _____
   b) Radiation Instrumentation (including ten (10) sub-parts) No. of Hrs _____ Date _____
   c) Radiographic Equipment. (including five (5) sub-parts) No. of Hrs _____ Date _____
   d) Inspection and Maintenance Performed by Radiographer Hrs _____ Date _____
   e) Case Histories of Radiography Accidents. No. of Hrs _____ Date _____
2. Received instruction in additional Company requirements as follows:
   a) Transfer, Packaging and transport of Radioactive Material Hrs _____ Date _____
   b) Requirements of State/Federal Regulations No. of Hrs _____ Date _____
   c) Terms and conditions of the Radioactive Material License Hrs _____ Date _____
   d) Instructions in the Radiation Safety Program with emphasis on the Operating and Emergency Procedures (O&E P). No. of Hrs _____ Date _____
3. Completed on-the-job training as an Assistant Radiographer under the direct supervision of a qualified Radiographer during the period from:
   Date _____ To _____
   The Principle Radiographer Instructor was (Name) _____
4. Passed a written examination to determine his knowledge of topic outlined above.
   Date _____ Exam Score _____
5. Demonstrated satisfactorily his competence to perform Industrial Radiography and to use the necessary tools and equipment associated with such operations.
   Date _____ Exam Score _____

III. I hereby scarify the above information is correct to the best of my knowledge.

_____ _____

Signature of Radiographer | Individual Administering Training/Exam

Date _____ Date _____

Approved by the RSO _____ **Date** _____

CERTIFICATION OF RADIATION SAFETY TRAINING FOR PREVIOUSLY TRAINED RADIOGRAPHERS

I. Radiographer_____ Date of Hire_____

Date of Birth_____ Social Security No._____ Jobsite_____

II The above named Radiographer has been licensed previously to use radioactive sources as a fully qualified radiographer prior to employment with QC Services. However, to insure that the individual has received adequate safety training prior to being designated as a qualified Radiographer, the following training and examination were given:

1. Informative instruction on Company's Operating and Emergency Procedures, instruments, sources, devices and equipment used in the course of their duties in Radiography.
   Instruction shall include NRC case Histories No.ofHrs._____ Date_____
2. Passed a written examination to determine their knowledge of topics outlined the Company's Training Procedure and O&E P.
   Date_____ Exam Score_____
3. Demonstrated satisfactorily their competence to perform Industrial Radiography and use the necessary related tools and equipment associated with such operations.
   Date_____ Exam Score_____
3. Received instructions in the Company's Material License, O&E P, and State and/or Federal Regulations for Control of Radiation.
   Date_____

III. Previous training and experience as a Radiographer using Radioactive Sources as follows:

1. Employed as a Radiographer's Assistant from_____ To_____
   For (Company)_____
2. Received formal instruction on topics outlined in the Company's Training Procedure, Section VIII, Paragraph 4.3.
   Company_____ Date_____
3. Was first qualified as a Radiographer at (Company)_____ Date_____
4. Have worked as a Radiograher for the following Company on the dates shown:
   _____ From_____ To_____
   _____ From_____ To_____
   _____ From_____ To_____

IV. I hereby scarify the above information is correct to the best of my knowledge.

_____ _____

Signature of Radiographer Individual Administering Training/Eam

Date_____ Date_____

Approved by the RSO_____ **Date**_____

QC SERVICES
A DIVISION OF WORLD TECHNICAL SERVICES, INC.

WORLD TECHNICAL SERVICES, Inc.

26062 EDEN LANDING ROAD, SUITE 1 & 2
HAYWARD, CALIFORNIA 94545
PHONE (415) 782-3660

RADIOGRAPHIC DEVICE TRAINING

The undersigned individual has received training and demonstrated competence to use radiographic exposure devices (noted below), sealed sources, related handling tool, and radiation survey instruments which will be employed in his assignments.

TYPE(S) OF RADIOGRAPHIC EXPOSURE DEVICES

Manufacture_____ Model_____ Date_____

Manufacture_____ Model_____ Date_____

Manufacture_____ Model_____ Date_____

Manufacture_____ Model_____ Date_____

Manufacture_____ Model_____ Date_____

Radiographer_____ Date_____

_____ Date_____

Assistant Radiographer_____ Date_____

_____ Date_____

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RADIATION SAFETY PROGRAM
QCS
RSP 687

SECTION IX

AUDIT PROCEDURE

RADIATION SAFETY PROGRAM

1.0 **OBJECTIVE** - The audit provides continuing surveillance to insure compliance with State, Federal and Company radiation safety regulations and timely information to management regarding the effectiveness of activities which affect radiation safety.

2.0 **APPLICATION** - Q C Services (Company) sites.

3.0 **PROCEDURE** - The Radiation Safety Office (RSO) is responsible for planning, scheduling, conducting and follow-up of radiation safety audits.

3.1 **Audits** are performed to determine adequacy of the radiation safety system.

3.1.1 Audit checklists shall be used to assure consistent evaluation of all areas of radiation safety.

3.2 **Equipment Audits** are designed to reduce radiation safety incidents resulting from equipment failures.

3.3 **Personnel Audits** will assure consistent training and verify that only qualified individuals are performing radiography.

3.3.1 Audits of personnel will use checklists tp verify compliance with training.

3.3.2 Personnel will be checked to insure that work being performed is within the limits of their qualification.

3.3.3 Personnel audits shall be conducted for certified Radiographers and Assistant Radiographers at intervals not to exceed three (3) months.

3.3.5 Individuals being certified by examination should be immediately scheduled for an audit after receiving certification.

3.4 **Audits** will be planned and scheduled by the RSO.

3.5 **Audits** will be performed by designated representatives as follows:

a) President;
b) Vice President;
c) RSO;
f) Individual(s) designated by the RSO.

Note: Designated individuals shall be a certified radiographer with at least one (1) year of experience in isotope handling. The individual

shall also have been given a letter, from the RSO, authorizing him/her to act in the capacity of management.

3.6 Audits may be **announced or unannounced**.

3.6 All audits will be **documented** with reports filed in the RSO's office

3.7 **Deficiencies** found by an audit will be reviewed by the RSO for appropriate corrective action taken.

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RADIATION SAFETY PROGRAM
QCS
RSP 687

SECTION X

CORRECTIVE ACTION PROCEDURE

RADIATION SAFETY PROGRAM

1.0 **OBJECTIVE** - To assure positive action is taken to prevent recurrence of incidents, hazardous conditions and audit deficiencies. To provide a system of determining causes of adverse conditions and verifying the effectiveness of corrective actions.

2.0 **APPLICATION** - Q C Services (Company) personnel and sites.

3.0 **PROCEDURE** - Corrective action shall be applied to all radiation incidents, radiation hazardous conditions and audit deficiencies as necessary in the judgment of the Radiation Safety Office (RSO).

3.1 All radiation incidents shall be documented, analyzed as to cause and appropriated corrective action assigned.

3.1.1 All corrective action to incidents shall be in writing and approved by the RSO and shall consist of the following:

a) The corrective steps which have been taken and the results achieved;
b) Corrective steps which will be taken to avoid further occurrence;
c) The date when full compliance will be achieved.

3.1.2 Follow-up to assure compliance shall be documented to provide feedback and prevent recurrence.

3.2 All radiation hazardous conditions shall be reported to the RSO for review and assignment of formal corrective action.

3.3 All audit deficiencies shall be reviewed and, where significant, formal corrective action shall be executed at the discretion of the RSO.

3.4 RSO shall assure that adequate corrective action is accomplished to eliminate the causes of discrepancies and to prevent the recurrence of similar discrepancies.

3.5 RSO shall maintain a log of all formal corrective actions with current status of follow-up and/or audit.

3.6 The RSO shall schedule appropriate re-audits to determine effectiveness of corrective measures.

3.7 Formal corrective action distribution should include the President and Vice President.

3.8 Noncompliance with RSO corrective action directions shall be resolved with the President and Vice President.

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RADIATION SAFETY PROGRAM
QCS
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SECTION XI

FORMS PROCEDURE

RADIATION SAFETY PROGRAM

1.0 OBJECTIVE - Define the procedure for organization, use and control of forms.

2.0 APPLICATION - Forms required and recommended for operation of the Program are included as appendices to this procedure. The time and manner of application are defined in other procedures of the Program.

3.0 PROCEDURE

3.1 Origination of new forms shall be at the direction, and with the approval of, the Radiation Safety Officer (RSO).

3.2 Revision of forms shall be identified by sequential letter changes. All changes shall be approved by the RSO.

3.3 Effective date of changes will be determined by the RSO.

3.4 Form instructions can be found on the reverse side of forms, as applicable.

3.5 Forms used by the Radiographer are also included in the Operating and Emergency Procedures (O&E P).

RADIATION SAFETY PROGRAM

FORMS INDEX

Description

RADIATION SAFETY REPORT - Field

RADIATION SAFETY REPORT - Laboratory

RADIATION SAFETY REPORT - X-Ray Machines - Field

AUDIT - PERSONNEL

SEALED SOURCE INVENTORY (Quarterly)

EXPOSURE DEVICE INSPECTION (Quarterly)

EXPOSURE DEVICE MAINTENANCE CHECKLIST (New Source)

INSPECTION OF SHIELDED ROOM (Quarterly)

RADIATION SURVEY REPORT - Storage Area

SOURCE RECEIPT, TRANSFER AND DISPOSAL RECORD

RADIOACTIVE MATERIAL SHIPPING DOCUMENT - Exclusive-Use

CERTIFICATION OF TRAINING - Radiographer Trainee

CERTIFICATION OF TRAINING - Assistant Radiographer

CERTIFICATION OF TRAINING - Radiographer

CERTIFICATION OF TRAINING - Previously Trained Radiographer

DETERMINATION OF PRIOR DOSE - New Hire

REQUEST FOR PREVIOUS RADIATION HISTORY

RADIOGRAPHIC DEVICE TRAINING

WORLD TECHNICAL SERVICES, Inc.

QC SERVICES
A DIVISION OF WORLD TECHNICAL SERVICES, INC.

RADIATION SAFETY REPORT

FACILITY (JOBSITE)_____ WEEK ENDING_____

UTILIZATION AND DOSIMETER LOG

EXPOSURE DEVICE: MAKE _____ MODEL _____ S/N _____

DATE	LOCATION	SURFACE MR/HR DEVICE	SURVEY METER MODEL/SN	RADIOGRAPHER (1) ASSISTANT RADIOGRAPHER (2) TRAINEE RADIOGRAPHER (3)	DOSIMETER IN	DOSIMETER OUT	DOSIMETER IN	DOSIMETER OUT
SUN		IN / OUT		(1)				
				(2)				
				(3)				
MON		IN / OUT		(1)				
				(2)				
				(3)				
TUE		IN / OUT		(1)				
				(2)				
				(3)				
WED		IN / OUT		(1)				
				(2)				
				(3)				
THU		IN / OUT		(1)				
				(2)				
				(3)				
FRI		IN / OUT		(1)				
				(2)				
				(3)				
SAT		IN / OUT		(1)				
				(2)				
				(3)				

PHYSICAL RADIATION SURVEY

DOSE RATE – DISTANCE – SHIELDING

	SUN	MON	TUE	WED	THU	FRI	SAT
MR/HR							
FT							
SC							

	SUN	MON	TUE	WED	THU	FRI	SAT
MR/HR							
FT							
SC							

	SUN	MON	TUE	WED	THU	FRI	SAT
MR/HR							
FT							
SC							

	SUN	MON	TUE	WED	THU	FRI	SAT
MR/HR							
FT							
SC							

SC = SHIELDING CODE: W = TUNGSTEN Fe = STEEL C = CONCRETE Pb = LEAD OTHER _____

DAILY INSPECTION OF EXPOSURE DEVICE	SUN	MON	TUE	WED	THU	FRI	SAT
EXPOSURE DEVICE - Lock, Fitting – Labels – Plug – Threads – etc.							
CRANK ASSEMBLY – Loose Hardware – Freedom of Movement – etc.							
SOURCE TUBE – Threads – Clear Openings – Loose Fitting – etc.							
DRIVE CABLES & SOURCE CONNECTOR – Excessive Wear – Good Fit – etc.							
RADIOGRAPHER							

INSTRUCTIONS

This form Radiation Safety Report (Field) is designed to fulfill NRC and Agreement State regulation requirements in Radiation Safety. This form is oriented toward the exposure device, i.e., one form will be used for one device for one week. On the days the device is not used, the words NOT USED will be entered in the "Location" column in the Utilization Log. When properly filled out, it will fulfill the requirements mentioned above.

UTILIZATION AND DOSIMETER LOG

Make, Model, and S/N of Exposure Device will be entered in spaces provided.

Enter the date the device is used in "Date" Column corresponding to the days of the week.

The name of the site where the device is used will be entered in the "Location" column except, on those days when the device is not used, the words NOT USED will be entered.

"Surface MR/HR Device"

When the requirements of paragraph 4.1 of the Operating and Emergency Procedures (Survey —removal from storage) have been complied with enter the survey meter reading obtained in the "IN" column.

When the requirements of Paragraph 8.5) of the operating and Emergency Procedures (last survey prior to locking device at completion of radiographic operations) have been complied with enter in the "OUT" column the reading obtained from the survey meter.

The radiographer, the assistant radiographer, and Trainee Radiographer, if applicable, will record their names in the column "Radiographer (1) Asst. Radiographer (2) Trainee (3)" and the dosimeter reading of each, prior to the work shift, the column "Dosimeter IN". The dosimeter reading at the conclusion of the work shift in the column "Dosimeter OUT". Whenever the reading is above 50 mr, record the reading in the additional spaces provided.

PHYSICAL RADIATION SURVEY

The location of the source is the radiation symbol.

"MR/HR" is the reading on the survey meter at the perimeter of the restricted area.

"FT" is the number of feet from the source to the perimeter of the restricted area.

"SC" is the shielding material used when applicable.

These three entries are always made in all four directions as required by paragraph 5.2 and paragraph 7 of the Operating and Emergency Procedures.

DAILY INSPECTION OF EXPOSURE DEVICE

Prior to removal from the storage area, and inspection of the exposure device will be accomplished by completing the checklist provided. Any damaged equipment will be repaired or replaced before using. The radiographer making the inspection will sign his name in the column provided.

Distribution: Original RSD

Form# RSO-102

WORLD TECHNICAL SERVICES, Inc.

QC SERVICES
A DIVISION OF WORLD TECHNICAL SERVICES, INC.

RADIATION SAFETY REPORT

LABORATORY

FACILITY ______________________ WEEK ENDING (SAT) ______________________

UTILIZATION AND DOSIMETER LOG

EXPOSURE DEVICE: MAKE ______________ MODEL ______________ S/N ______________

DATE	(ROOM NO.) LOCATION	SOURCE IN SHIELDED CONDITION	MR/HR ON SURFACE OF DEVICE	SURVEY METER MODEL	SURVEY METER S/N	RADIOGRAPHER	DOSIMETER IN	DOSIMETER OUT

DAILY INSPECTION OF EXPOSURE ROOM AND DEVICE

	EXPOSURE ROOM				EXPOSURE DEVICE			CRANK ASSEMBLY		SOURCE TUBES	
DATE	DOOR INTER-LOCKS	AUDIBLE VISUAL WARNING	OPERA-TION OF ACCESS DOOR	RADIATION LEVELS AT ACCESS DOOR	MR/HR ON SURFACE OF DEVICE	LOCKS FITTINGS LABELS	SAFETY PLUG & THREADS	CONDI-TION	FREEDOM OF MOVEMENT	FITTINGS AND THREADS	CONDI-TION

INSTRUCTIONS

This form (Form 160b) Radiation Safety Report (Laboratory) is designed to fulfill AEC and Agreement State regulation requirements in Radiation Safety. This form is oriented toward the exposure device, i.e., one form will be used for one device for one week. On the days the device is not used, the words NOT USED will be entered in the "Location" column in the Utilization Log. When properly filled out, it will fulfill the requirements mentioned above.

UTILIZATION AND DOSIMETER LOG

Make, Model, and S/N of Exposure Device will be entered in spaces provided.

Enter the date the device is used in "Date" column corresponding to the days of the week.

Number of the room in which the device is used will be entered in the "Location" column except, on those days when the device is not used, the words NOT USED will be entered.

When the requirements of paragraph 7.5d of the Operating and Emergency Procedures have been complied with, the word "Yes" will be entered in the "Source in Shielded Condition" column and the readings of the survey will be entered in "MR/HR On Surface of Device" column.

The model and S/N of the survey meter used during the radiographic operation will be entered in the column "Survey Meter".

The radiographer will record his name in the column "Radiographer" and the dosimeter reading of each, prior to the work shift, in the column "Dosimeter IN". The dosimeter reading at the conclusion of the work shift in the column "Dosimeter OUT".

DAILY INSPECTION OF EXPOSURE DEVICE

Prior to radiographic operation, an inspection of the exposure room and device will be accomplished by completing the checklist provided. Any damaged equipment will be repaired or replaced before using. The radiographer making the inspection will be the same individual who's name is recorded in the utilization log space "Radiographer" for that day. "Radiation Levels at Access Door", enter the reading obtained from the survey meter. "MR/HR On Surface Of Device", enter the reading obtained from the survey meter as required by paragraph 3.1 of the Operating and Emergency Procedures.

Distribution: Original RSO

QC SERVICES
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WORLD TECHNICAL SERVICES, Inc.

RADIATION SAFETY REPORT

X-RAY PRODUCING MACHINES – FIELD

FACILITY (JOBSITE) _____ WEEK ENDING _____

UTILIZATION AND DOSIMETER LOG

RADIOGRAPHIC DEVICE: MAKE _____ MODEL _____ S/N _____

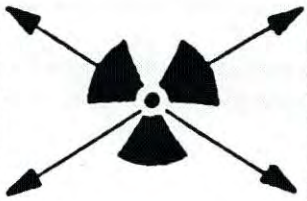
DATE	LOCATION OF OPERATION	NO. OF SETUPS PER SURVEY	SURVEY METER		RADIOGRAPHER (1) ASST. RADIOGRAPHER (2)	DOSIMETER	
			MODEL	S/N		IN	OUT
SUN					(1)		
					(2)		
MON					(1)		
					(2)		
TUE					(1)		
					(2)		
WED					(1)		
					(2)		
THU					(1)		
					(2)		
FRI					(1)		
					(2)		
SAT					(1)		
					(2)		

PHYSICAL RADIATION SURVEY

DOSE RATE – DISTANCE – SHIELDING

	SUN	MON	TUE	WED	THU	FRI	SAT
MR/HR							
FT							
SC							

	SUN	MON	TUE	WED	THU	FRI	SAT
MR/HR							
FT							
SC							



	SUN	MON	TUE	WED	THU	FRI	SAT
MR/HR							
FT							
SC							

	SUN	MON	TUE	WED	THU	FRI	SAT
MR/HR							
FT							
SC							

SC = SHIELDING CODE

D = DISTANCE Fe = STEEL C = CONCRETE Pb = LEAD OTHER _____

METHOD OF CONTROLLING AREA = ROPES ☐ SIGNS ☐ LIGHTS ☐ OTHER _____

	DAILY INSPECTION RADIOGRAPHIC DEVICE			EXPOSURE INFORMATION NO. OF EXPOSURES, KV, MA PER SETUP									LENGTH OF LONGEST EXPOSURE			RADIOGRAPHER
	CONTROL PANEL	TUBE HEAD	CABLES	SETUP NO. 1			SETUP NO. 2			SETUP NO. 3			SETUP NO. 1	SETUP NO. 2	SETUP NO. 3	
				NO.	KV	MA	NO.	KV	MA	NO.	KV	MA				
SUN																
MON																
TUE																
WED																
THU																
FRI																
SAT																

INSTRUCTIONS

This form Radiation Safety Report (X-Ray Producing Machines – Field) is designed to fulfill Agreement State regulation requirements in Radiation Safety. This form is oriented toward the Radiographic device, i.e., one form will be used for one device for one week. On the days the device is not used, the words NOT USED will be entered in the 'Location of Operation' column in the Utilization Log. When properly filled out, it will fulfill the requirements mentioned above.

UTILIZATION AND DOSIMETER LOG

Make, Model, and S/N of Radiographic Device will be entered in spaces provided.

Enter the date the device is used in 'Date' column corresponding to the days of the week.

The name of the site (area not jobsite) where the device is used will be entered in the 'Location of Operation' column except, on those days when the device is not used, the words NOT USED will be entered.

Number of setups per radiation survey will be entered in space provided. The number of setups will be the number completed without a change in the physical radiation survey dose rate. If a change in the radiation survey dose rate occurs, an additional report is to be completed for that day. If more than three (3) setups per survey are conducted, an additional report will be required.

The model and S/N of the survey meter used during the radiographic operation will be entered in the column 'Survey Meter'.

The radiographer and the assistant radiographer, if applicable, will record their names in the column 'Radiographer (1) Asst. Radiographer (2)' and the dosimeter reading of each, prior to the work shift, in the column 'Dosimeter IN'. The dosimeter reading at the conclusion of the work shift in the column 'Dosimeter OUT'.

PHYSICAL RADIATION SURVEY

The location of the source is the radiation symbol.

'MR'

HR is the reading on the survey meter at the perimeter of the restricted area.

'FT' is the number of feet from the source to the perimeter of the restricted area.

'SC' is the shielding material used when applicable.

These three entries are always made in all four directions as required by paragraph 4.2 and section 6 of the Operating and Emergency Procedures.

Method of Controlling Area will be completed by an X in the applicable box or boxes. If other is to be used, describe.

All area survey reports must be completed at the time the survey is made – not at the end of the day's shift.

DAILY INSPECTION/EXPOSURE INFORMATION

Prior to removal from the storage area, an inspection of the Radiographic device will be accomplished by completing the checklist provided. Any damaged equipment will be repaired or replaced before using.

Number of Exposures Per Setup – will be the total number of exposures taken using the same setup.

Length of Longest Exposure – will be the longest exposure time used for the same setup.

If more than three (3) setups per survey are conducted, an additional report will be required.

The radiographer completing the inspection/exposure information will sign his name in the column provided.

Distribution: Original RSO

Form# RSO-101

QC SERVICES
A DIVISION OF WORLD TECHNICAL SERVICES, INC.

WORLD TECHNICAL SERVICES, Inc.

26062 EDEN LANDING ROAD, SUITE 1 & 2
HAYWARD, CALIFORNIA 94545
PHONE (415) 782-3680

AUDIT
PERSONNEL
RADIATION SAFETY

Jobsite: _____ Date: _____

Individual: _____

Radiographer ( ) Assistant Radiographer ( )

	Enter in Space Provided Yes, No, N/A, Remarks
PERSONNEL	
1. Copy of individual's certification on file?	_____
2. Certification card on person?	_____
3. Individual has on person a current film badge and dosimeter?	_____
4. Film badge/dosimeter worn on the belt or waist band?	_____
5. Dosimeter in current calibration? a) Serial Number _____ b) Calibration Due Date _____ c) mr Reading _____	_____
6. Is a copy of the O&E P available to the individual?	_____
7. Individual knows who to contact in case of an emergency (four (4) key steps)?	_____
8. Individual has knowledge of State and/or Federal regulations/license?	_____
9. Has individual attended recent safety meetings?	_____
10. Individual's knowledge of radiation safety adequate?	_____
PAPERWORK	
11. Radiographer/Assistant Radiographer have a copy of Radiation Safety Report?	_____
12. Daily inspection of the exposure device completed prior to use?	_____
13. Dosimeter readings, in and/or out, logged on Radiation Safety Report?	_____
14. Physical radiation survey(s) completed as required?	_____
15. Utilization Log completed as required?	_____

RADIATION AREAS

16. Is the restricted area properly established and posted? _____
17. Is continuous and direct surveillance of the area being performed during exposures? _____
18. Is the high radiation area posted? _____
19. Is a survey meter present, operable, calibrated and being used as required? _____

EXPOSURE DEVICE/EQUIPMENT

20. Exposure Device Type --
    Model _____ S/N _____ Curies _____
21. Was the exposure device/equipment inspected prior to use? _____
22. Was a survey performed when removed from storage? _____
23. Is the equipment being handled and used properly? _____
24. Is the exposure device left unattended? _____
25. If device is left unattended, is it physically secured to prevent tampering or removal? _____
26. Is the device locked after each exposure? _____
27. Is the device and source tube surveyed after each exposure? _____
28. Is a collimator being used? _____

Remarks _____

_____

_____

( ) No items of noncompliance or unsafe conditions found.

Items of noncompliance:

1. ( )	6. ( )	11. ( )	16. ( )	21. ( )	25. ( )
2. ( )	7. ( )	12. ( )	17. ( )	22. ( )	26. ( )
3. ( )	8. ( )	13. ( )	18. ( )	23. ( )	27. ( )
4. ( )	9. ( )	14. ( )	19. ( )	24. ( )	28. ( )
5. ( )	10. ( )	15. ( )	20. ( )		

Were items of noncompliance discussed with the Manager? **Yes ( ) No ( )**

Audit Conducted By: _____

Individual: _____

cc: Radiation Safety Officer
Jobsite File

Form# RSO-104

QC SERVICES
A DIVISION OF WORLD TECHNICAL SERVICES, INC.

WORLD TECHNICAL SERVICES, Inc.

26082 EDEN LANDING ROAD, SUITE 1 & 2
HAYWARD, CALIFORNIA 94545
PHONE (415) 782-3660

SEALED SOURCES INVENTORY (QUARTERLY)

RADIATION SAFETY

Assignee _____ Due Date _____

Location _____ ___ Qtr. 19___

Isotope Ir-192 or Co-60	Camera		Source	
	Model	S/N	S/N	Curies
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				

Remarks _____

_____

_____

_____

_____

Designated Individual _____ Date _____

Instructions on Reverse Side

INSTRUCTIONS

ASSIGNEE: Designated individual assigned responsibility for completing the inventory.

DUE DATE: Date inventory to be completed.

LOCATION: Site where sources are being used.

QUARTER _____ 19____: The 1st, 2nd, 3rd or 4th quarter of the year 19____.

The above will be completed by the Radiation Safety Officer (RSO).

ISOTOPES, CAMERA, SOURCE: Self-explanatory.

Designated individual to sign and date form upon completion of inventory.

Return one (1) copy to RSO. Retain one (1) copy for jobsite file.

QC SERVICES
A DIVISION OF WORLD TECHNICAL SERVICES, INC.

WORLD TECHNICAL SERVICES, Inc.

28082 EDEN LANDING ROAD, SUITE 1 & 2
HAYWARD, CALIFORNIA 94545
PHONE (415) 782-3680

EXPOSURE DEVICE INSPECTION (QUARTERLY)

RADIATION SAFETY

Assignee _____ Due Date _____ ___ Qtr. 19____

Exposure Device _____ Model _____ S/N _____

Location _____

	Accept	Repaired	Replaced
SHIELD ASSEMBLY			
1. Check for excessive or abnormal radiation levels on the surface of the shield assembly.	_____	_____	_____
2. Inspect safety plug for proper condition.	_____	_____	_____
3. Check locking mechanism for proper operation and for firm attachment to the shield assembly.	_____	_____	_____
4. Inspect for proper alignment of "S" tube with entrance and exit ports.	_____	_____	_____
5. Inspect carrying and hold-down components for proper condition.	_____	_____	_____
6. Inspect for proper labeling.	_____	_____	_____
SOURCE PIGTAIL ASSEMBLY			
7. Inspect connector for proper condition using T/O Gauge 550, when applicable.	_____	_____	_____
SOURCE TUBES AND CABLE HOUSINGS			
8. Inspect for rust, dirt or sludge build-up inside the tubes.	_____	_____	_____

9. Inspect tube connectors for proper condition. _____ _____ _____

10. Inspect for kinks, crushed sections or other damage that could prevent operation. _____ _____ _____

CRANK ASSEMBLY

11. Check for operating characteristics. _____ _____ _____

12. Inspect for excessive wear or damage to components. _____ _____ _____

CABLE

13. Inspect connector for proper condition using T/O Gauge 550, when applicable. _____ _____ _____

14. Remove and inspect entire cable for flexibility, wear, rust, broken wires and length. _____ _____ _____

MECHANICAL COMPATIBILITY OF COMPONENTS

15. Check connectors on source pigtail assembly and cable for a proper fit and the possibility of accidental disconnection. _____ _____ _____

16. Check connectors on shield assembly and tubes for a proper fit. _____ _____ _____

Remarks _____

_____

_____

_____

Signature _____ Date _____

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HAYWARD, CALIFORNIA 94545
PHONE (415) 782-3660

EXPOSURE DEVICE MAINTENANCE CHECKLIST

RADIATION SAFETY

(TO BE COMPLETED BEFORE THE DEVICE IS LOADED WITH A NEW SOURCE.)

Exposure Device Mfg. _____ Model _____ S/N _____

	Accept	Repaired	Replaced
SHIELD ASSEMBLY			
1. Shield Casting (if applicable)			
2. "U" Bolt (if applicable)			
3. Shim (if applicable)			
4. "S Tube			
5. Shipping Plug			
6. Front Female Nut and Retaining Ring			
7. Female Connector Assembly			
8. Dust Cap			
9. Lock Assembly (Key, Spring, Screw)			
REEL AND CRANK ASSEMBLY			
10. Frame			
11. Crank Housing			
12. Bearings			
13. Drive Gear and Drive Gear Pin			
14. Source Drive Cable (Condition and Length)			
15. Male Plug Connector Assembly			
16. Drive Cable Housing			
17. Source Tube			
18. Source Stop			
DRIVE CABLE CONNECTOR (MALE)			
19. Ball Shank Length			
20. Ball Shank Diameter			
21. Ball Diameter			
SOURCE CABLE CONNECTOR (FEMALE)			
22. Source Connector Hole			

Remarks _____

_____

Designated Representative _____ Date _____

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WORLD TECHNICAL SERVICES, Inc.

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HAYWARD, CALIFORNIA 94545
PHONE (415) 782-3660

SEALED SOURCES INVENTORY (QUARTERLY)

RADIATION SAFETY

Assignee _____ Due Date _____

Location _____ ___ Qtr. 19___

Isotope Ir-192 or Co-60	Camera		Source	
	Model	S/N	S/N	Curies
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				

Remarks _____

_____

_____

_____

_____

Designated Individual _____ Date _____

Instructions on Reverse Side

INSTRUCTIONS

ASSIGNEE: Designated individual assigned responsibility for completing the inventory.

DUE DATE: Date inventory to be completed.

LOCATION: Site where sources are being used.

QUARTER _____ 19____: The 1st, 2nd, 3rd or 4th quarter of the year 19____.

The above will be completed by the Radiation Safety Officer (RSO).

ISOTOPES, CAMERA, SOURCE: Self-explanatory.

Designated individual to sign and date form upon completion of inventory.

Return one (1) copy to RSO. Retain one (1) copy for jobsite file.

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WORLD TECHNICAL SERVICES, Inc.

26062 EDEN LANDING ROAD, SUITE 1 & 2
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PHONE (415) 782-3660

INSPECTION OF SHIELDED ROOM (QUARTERLY)

RADIATION SAFETY

Assignee _____ Due Date _____

Location _____ Room No. _____

	Accept	Repaired	Replaced
DOOR INTERLOCKS			
1. Operative	____	____	____
2. Condition	____	____	____
3. Adjustment	____	____	____
EQUIPMENT INTERLOCKS			
4. Operative	____	____	____
5. Condition	____	____	____
AUDIBLE AND VISUAL WARNING DEVICES			
6. Audible Operative	____	____	____
7. Audible Condition	____	____	____
8. Visual Operative	____	____	____
9. Visual Condition	____	____	____
10. Warning Signs Correct	____	____	____
11. Warning Signs Condition	____	____	____
ACCESS DOOR			
12. Seals Properly	____	____	____
13. Lock	____	____	____
14. Key	____	____	____

RADIATION LEVELS (Source Exposed)

Side 1 _____ mr/hr (North)
Side 2 _____ mr/hr (East)
Side 3 _____ mr/hr (South)
Side 4 _____ mr/hr (West)
Ceiling _____ mr/hr

Remarks _____

_____

_____

Signature _____ Date _____

Form# RSO-108

QC SERVICES
A DIVISION OF WORLD TECHNICAL SERVICES, INC.

WORLD TECHNICAL SERVICES, Inc.

26062 EDEN LANDING ROAD, SUITE 1 & 2
HAYWARD, CALIFORNIA 94545
PHONE (415) 782-3660

RADIATION SURVEY REPORT -- STORAGE AREA

Jobsite _____ Date: From _____ To _____

Date	Dose Rate mr/hr. Perimeters of Storage Area					Survey Meter		Radiographer
	①	②	③	④	⑤	Model	S/N	

Note 1: Asterisk the date of receipt of a new or additional source. (Section 3, Paragraph 9.2.1.1)

Note 2: Diagram of storage area and instructions on reverse side.

INSTRUCTIONS

This form complies with the requirement of Section III, Paragraph 9 of Operating and Emergency Procedures -- Storage of Exposure Devices.

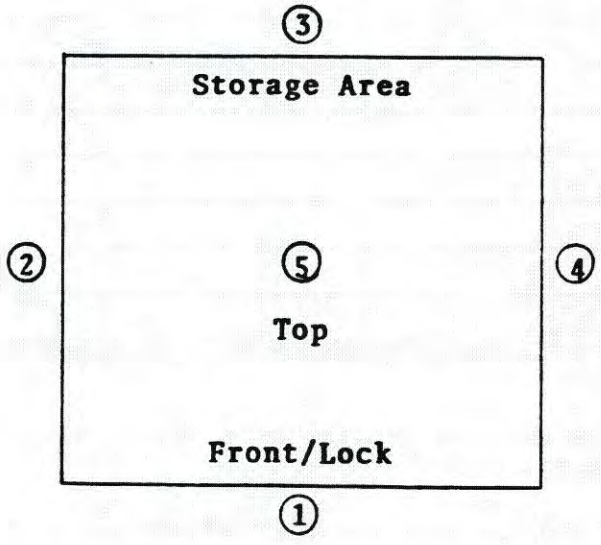
1. When not in use, exposure devices will be placed in the storage areas provided. All storage areas shall have a sign bearing the words, "CAUTION -- RADIOACTIVE MATERIAL" with the radiation symbol (magenta on yellow background). These signs shall be posted on the outside of the storage areas.

2. A survey of storage areas containing exposure devices shall be made on the outside perimeters and the reading shall not exceed two (2) mr/hr. Surveys shall be made each time an exposure device is removed or returned to storage.

3. Survey of Field (Trailer) storage areas shall be made each time an exposure device is added (additional or new source) and/or at the start of each workweek. The reading of that survey shall be recorded in spaces provided -- Dose Rate mr/hr. - Perimeters of Storage Area, 1 through 5 (see diagram).

4. Storage areas shall be kept locked at all times, except when in use.

5. All information required in spaces provided should be self-explanatory.



SOURCE RECEIPT, TRANSFER AND DISPOSAL RECORD

Source Co-60 or Ir-192	Source S/N	Camera S/N	Received From	Date Received	Shipped To	Date Shipped

QC SERVICES
A DIVISION OF WORLD TECHNICAL SERVICES, INC.

WORLD TECHNICAL SERVICES, Inc.

RADIOACTIVE MATERIAL SHIPPING DOCUMENT

COMPANY (EXCLUSIVE-USE) VEHICLE

IRIDIUM-192

WEEK ENDING _____

Shipper:	Consignee:

Date	Jobsite Location	Exposure Device S/N	No. of Curies	Surface mr/hr. of Container	(1 Meter) (TI) mr/hr. at 39"	Signature of Radiographer
Sun						
Mon						
Tue						
Wed						
Thu						
Fri						
Sat						

DESCRIPTION OF PIECES AND CONTENTS

Radioactive Material Special Form N.O.S. UN 2974 Class 7
Iridium 192 105 Curies Maximum
Yellow Label II
Transport Index Not Over 1

This is to certify that the above named materials are properly classified, described, packaged, marked, labeled and are in proper condition for transportation according to the applicable regulations of the DEPARTMENT OF TRANSPORTATION.

"Radioactive Yellow-II Label" - 0.5 to 50 mrem/hr. on the surface and not over 1.0 mrem/hr. at 39 in. Yellow-II Label does not require vehicle placards for shipment by highway.

Note: DO NOT TRANSPORT if surface of container is over 50 mrem/hr. and/or over 1.0 mrem/hr. at 39 in.(additional shielding shall be required to meet shipping requirements of "Radioactive Yellow-II Label"). IF there is any question on the correct procedure, DO NOT TRANSPORT. Call the Radiation Safety Officer.

INSTRUCTIONS

This Radioactive Material Shipping Document is designed to fulfill DOT requirements for transportation. This form is oriented toward Company vehicles transporting radioactive material to field sites (outside the confines of jobsites). One (1) form will be used for one (1) device, each day, each location, for each week.

Shipper and Consignee - The jobsite address shall be entered in spaces provided. This is the office and storage location address.

Date - Enter date the exposure device is transported.

Jobsite Location - Enter the field site address where the exposure device is to be used.

Exposure Device S/N - Enter serial number of the device.

Number of Curies - Enter the number of curies as of the day being transported.

Surface mr/hr. of Container and mr/hr. at 39" - Enter the surface reading of the shipping container and enter the reading at 39" from container (which is the transport index). (39 inches = 1 meter)

Signature of Radiographer - The Radiographers completing form will sign their name in the column provided.

Packaging (Type B Drum)- Packaging of radioactive material shall meet with all the requirements of DOT.

Preparation for Shipping - (Remove from storage per the O&E P)

1. A survey meter shall be used every time a person is required to work with or around radioactive material.
2. Inspection of radioactive exposure device. **Note:** No device shall have a reading in excess of 200 mr.
3. Place exposure device in shipping container.
4. Shipping container shall have affixed, an address label (same as used for shipper and consignee).
5. Shipping container shall have affixed two (2) "Yellow-II" labels. Information required on labels is as follows:

   Contents: Iridium-192
   Number of Curies: 105 maximum
   Transport Index: Not Over 1

   Note: DO NOT TRANSPORT if Transport Index is over 1 (additional shielding will be required).
6. Seal and lock shipping container.
7. Radioactive Material Shipping Document -- Company Vehicles shall be required to accompany each shipment.
8. Cover "Yellow-II" labels when shipping drum is not being used to transport radioactive material.

Note: If there is any question on the correct procedure, do not transport -- Call the Radiation Safety Officer (RSO) for clarification.

QC SERVICES
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WORLD TECHNICAL SERVICES, Inc.

7062 EDEN LANDING ROAD, SUITE 1 & 2
HAYWARD, CALIFORNIA 94545
PHONE (415) 782-3660

CERTIFICATION OF RADIATION SAFETY TRAINING
RADIOGRAPHER TRAINEE

I Radiographer Trainee_____Date of Hire_____

Date of Birth_____Social Security No._____Jobsite_____

II The above named individual has received the following items:

1. Film Badge Date Received_____
2. Dosimeter Date Received_____

Note: If items were issued at time of hire, use the date.

III. The above named individual has satisfactorily completed QC Services informative instructions and testing for Radiographer Trainee as specified below:

1. Attended informative instruction on the topics outlined in the Training Procedure (Section VII) paragraph 4.1.3

   a) Basic Radiation Safety

   b) Needs and requirements for personnel monitoring. (Min. four (4) Hours)

      1. Dosimeter
      2. Film Badge
      3. Dose Rate
      4. Radiation Survey Meters
      5. Controlling Radiation Dose No. of Hrs._____Date_____

2. Passed a written examination and oral review on basic radiation safety at the conclusion of the four (4) hours of instructions (Basic Radiation Quiz).

   No. of Hrs._____Date_____

IV. The above named individual has satisfactorily completed training and examination to begin their one (1) week on-the-job as a Radiographer Training.

Date (Beginning on-the-job training)_____

V. I hereby scarify the above information is correct to the best of my knowledge.

_____ _____

Signature of Radiographer Trainee Individual Administering Training/Exam

Date_____ Date_____

Approved by the RSO_____**Date**_____

Form# RSO-111

QC SERVICES
A DIVISION OF WORLD TECHNICAL SERVICES, INC.

WORLD TECHNICAL SERVICES, Inc.

26062 EDEN LANDING ROAD, SUITE 1 & 2
HAYWARD, CALIFORNIA 94545
PHONE (415) 782-3660

CERTIFICATION OF RADIATION SAFETY TRAINING
ASSISTANT RADIOGRAPHER

I Assistant Radiographer_____Date of Hire_____

Date of Birth_____Social Security No._____Jobsite_____

II The above named individual has satisfactorily complete QC Services informative instructions and testing for Radiographer Trainee as specified below.

1. Attended informative instruction of the topics outlined in the Training Procedure (Section VIII) Paragraph 4.1.3;

   a) Basic Radiation Safety

   b) Needs and requirements for personnel monitoring

   (Min. Four (4) Hrs) No. of Hrs._____Date_____

2. Past a written examination and oral review on basic radiation safety at the conclusion of the four (4) hours of instruction (Basic Radiation Quiz).

   Exam Score_____Date_____

III. Completed a minimum of one (1) week on-the-job training as a Radiographer Trainee.

Date From_____To_____

IV. The above named individual has satisfactorily completed the Company's Assistant Radiographer Training Testing as specified below.

1. Attended instruction on the topics outlined in the Training Procedure Paragraph 4.2.1. and (Paragraph 4.2.3);

   a) Operating and Emergency Procedures Date_____

   b) Radiography Equipment Date_____

2. Successfully completed the written examination and oral review associated with the position of Assistant Radiographer.

   Date_____

V. I hereby scarify the above information is correct to the best of my knowledge.

_____ _____

Signature of Assistant Radiographer Individual Administering Training/Exam

Date_____ Date_____

Approved by the RSO_____**Date**_____

Form# RSO-112

QC SERVICES
A DIVISION OF WORLD TECHNICAL SERVICES, INC.

WORLD TECHNICAL SERVICES, Inc.

22082 EDEN LANDING ROAD, SUITE 1 & 2
HAYWARD, CALIFORNIA 94545
PHONE (415) 782-3080

CERTIFICATION OF RADIATION SAFETY TRAINING
RADIOGRAPHER

I Radiographer _____ Date of Hire _____

Date of Birth _____ Social Security No. _____ Jobsite _____

II. The above named individual has satisfactorily completed QC Services Radiographer Training Program and has received radiation safety training & testing as specified below:

1. Attended instruction on the topics outlined in the Training Procedure (Section VII) paragraph 4.3 (State of Calif. Title 17 (30335), Subjects to be covered in Training):
   a) Fundamentals of Radiation Safety (including eight (8) sub-parts) No. of Hrs. _____ Date _____
   b) Radiation Instrumentation (including ten (10) sub-parts) No. of Hrs. _____ Date _____
   c) Radiographic Equipment. (including five (5) sub-parts) No. of Hrs. _____ Date _____
   d) Inspection and Maintenance Performed by Radiographer Hrs. _____ Date _____
   e) Case Histories of Radiography Accidents. No. of Hrs. _____ Date _____
2. Received instruction in additional Company requirements as follows:
   a) Transfer, Packaging and transport of Radioactive Material Hrs. _____ Date _____
   b) Requirements of State/Federal Regulations No. of Hrs. _____ Date _____
   c) Terms and conditions of the Radioactive Material License Hrs. _____ Date _____
   d) Instructions in the Radiation Safety Program with emphasis on the Operating and Emergency Procedures (O&E P). No. of Hrs. _____ Date _____
3. Completed on-the-job training as an Assistant Radiographer under the direct supervision of a qualified Radiographer during the period from:
   Date _____ To _____
   The Principle Radiographer Instructor was (Name) _____
4. Passed a written examination to determine his knowledge of topic outlined above.
   Date _____ Exam Score _____
5. Demonstrated satisfactorily his competence to perform Industrial Radiography and to use the necessary tools and equipment associated with such operations.
   Date _____ Exam Score _____

III. I hereby scarify the above information is correct to the best of my knowledge.

_____ _____

Signature of Radiographer Individual Administering Training/Exam

Date _____ Date _____

Approved by the RSO _____ **Date** _____

Form# RSO-113

QC SERVICES
A DIVISION OF WORLD TECHNICAL SERVICES, INC.

WORLD TECHNICAL SERVICES, Inc.

26062 EDEN LANDING ROAD, SUITE 1 & 2
HAYWARD, CALIFORNIA 94545
PHONE (415) 782 3660

CERTIFICATION OF RADIATION SAFETY TRAINING FOR PREVIOUSLY TRAINED RADIOGRAPHERS

I. Radiographer_____Date of Hire_____

Date of Birth_____Social Security No._____Jobsite_____

II The above named Radiographer has been licensed previously to use radioactive sources as a fully qualified radiographer prior to employment with QC Services. However, to insure that the individual has received adequate safety training prior to being designated as a qualified Radiographer, the following training and examination were given:

1. Informative instruction on Company's Operating and Emergency Procedures, instruments, sources, devices and equipment used in the course of their duties in Radiography.
   Instruction shall include NRC case Histories No.ofHrs._____Date_____
2. Passed a written examination to determine their knowledge of topics outlined the Company's Training Procedure and O&E P.
   Date_____Exam Score_____
3. Demonstrated satisfactorily their competence to perform Industrial Radiography and use the necessary related tools and equipment associated with such operations.
   Date_____Exam Score_____
3. Received instructions in the Company's Material License, O&E P, and State and/or Federal Regulations for Control of Radiation.
   Date_____

III. Previous training and experience as a Radiographer using Radioactive Sources as follows:

1. Employed as a Radiographer's Assistant from_____To_____
   For (Company)_____
2. Received formal instruction on topics outlined in the Company's Training Procedure, Section VIII, Paragraph 4.3.
   Company_____Date_____
3. Was first qualified as a Radiographer at (Company)_____Date_____
4. Have worked as a Radiograher for the following Company on the dates shown:
   _____From_____To_____
   _____From_____To_____
   _____From_____To_____

IV. I hereby scarify the above information is correct to the best of my knowledge.

_____ _____
Signature of Radiographer Individual Administering Training/Eam

Date_____ Date_____

Approved by the RSO_____**Date**_____

Form# RSO-114

QC SERVICES
A DIVISION OF WORLD TECHNICAL SERVICES, INC.

WORLD TECHNICAL SERVICES, Inc.

26062 EDEN LANDING ROAD, SUITE 1 & 2
HAYWARD, CALIFORNIA 94545
PHONE (415) 782-3660

NEW HIRE

CURRENT ESTIMATED OCCUPATIONAL RADIATION EXPOSURE
(Determination of Prior Dose)

Name_____ **Date of Hire**_____

Social Security No._____ **Date of Birth**_____

Previous Employer_____ **Term Date**_____

Method of Monitoring: X or Gamma_____
(Film Badge - FB; Pocket Chamber - PC; Calculations - Calc.)

PERIOD OF EXPOSURE:

YEAR	1st Qrt.	2nd Qrt.	3rd Qrt.	4th Qrt.	YEAR TOTAL
____	_____	_____	_____	_____	_____

This report is furnished under the provisions of the State Of California Radiation Control Regulations Title 17 Paragraph 30265.1. (a).

_____ Date_____
Signature of Radiographic Personnel

Form# RSO-115

QC SERVICES
A DIVISION OF WORLD TECHNICAL SERVICES, INC.

WORLD TECHNICAL SERVICES, Inc.

26062 EDEN LANDING ROAD, SUITE 1 & 2
HAYWARD, CALIFORNIA 94545
PHONE (415) 782-3660

ATTENTION: Radiation Exposure Records Department

SUBJECT: Request for Previous Radiation History

Name_____**SSN**_____

Currently employed by QC Services, indicated that he/she may have received occupational radiation exposure while employed with your organization during the time of

From_____**To**_____.

So that we may establish a more complete radiation history for this employee, please furnish details of any radiation exposure records that you might have.

This data is requested to fulfill the requirements of the State of California Title 17 (30265.1).

Thank you in advance for your prompt attention to this matter.

Sincerely,

Radiation Safety Officer

I hereby authorized the release of the information as requested by the above.

Name:_____Date_____

Form# RSO-116

QC SERVICES
A DIVISION OF WORLD TECHNICAL SERVICES, INC.

WORLD TECHNICAL SERVICES, Inc.

26062 EDEN LANDING ROAD, SUITE 1 & 2
HAYWARD, CALIFORNIA 94545
PHONE (415) 782-3660

RADIOGRAPHIC DEVICE TRAINING

The undersigned individual has received training and demonstrated competence to use radiographic exposure devices (noted below), sealed sources, related handling tool, and radiation survey instruments which will be employed in his assignments.

TYPE(S) OF RADIOGRAPHIC EXPOSURE DEVICES

Manufacture_____ **Model**_____ **Date**_____

Manufacture_____ **Model**_____ **Date**_____

Manufacture_____ **Model**_____ **Date**_____

Manufacture_____ **Model**_____ **Date**_____

Manufacture_____ **Model**_____ **Date**_____

Radiographer_____ **Date**_____

_____ **Date**_____

Assistant Radiographer_____ **Date**_____

_____ **Date**_____

Form# RSO-117

NRC FORM 618
(6-83)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIALS PACKAGES

1.a CERTIFICATE NUMBER	b. REVISION NUMBER	c. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PAGES
9126	3	USA/9126/B(U)	1	2

2. PREAMBLE

a. This certificate is issued to certify that the packaging and contents described in Item 5 below, meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging of Radioactive Materials for Transport and Transportation of Radioactive Material Under Certain Conditions."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. PREPARED BY (*Name and Address*)

Gamma Industries
P.O. Box 2543
Baton Rouge, LA 70821

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Gamma Industries application
dated May 20, 1978, as supplemented.

c. DOCKET NUMBER 71-9126

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5. (a) Packaging

(1) Model Nos.: 20, 20A, 50 and 50A

(2) Description

A steel encased, uranium shielded radiographic device. The shipping container is approximately 21 inches long, 23 inches wide and 42 inches high. The radioactive source assembly is housed in a Zircalloy or titanium "S" tube. The tube is surrounded by depleted uranium metal as shielding material. The depleted uranium shield assembly is encased in a steel housing. The void space between the depleted uranium shield assembly and the outer container is filled with a polyurethane foam. The gross weight of the container is 325 pounds.

(3) Drawings

The packaging is constructed in accordance with Gamma Industries Drawing Nos. 821-1001-128, Rev. 4; 821-1001-129, Rev. 1; and 180-01, Rev. 1.

(b) Contents

(1) Type and form of material

Cobalt 60 as sealed sources that meet the requirements for special form radioactive material.

(b) (2) Maximum quantity of material per package

Model No.	Quantity
20 and 20A	20 curies
50 and 50A	50 curies

6. The source shall be secured in the shielded position of the packaging by the safety plug assembly, source assembly and lockbox assembly. The components used to secure the source must be fabricated of materials capable of resisting a 1475°F fire environment for one-half hour and maintaining their positioning function. The ball stop of the source assembly must engage the locking device. The flexible cable of the source assembly and safety plug assembly must be of sufficient length and diameter to provide positive positioning of the source in the shielded position.

7. The can and side plates must be a minimum of 1/4-inch thick carbon steel. The can and side plates shall be joined by full penetration welds. All other welds shall be fillet welds having sufficient throat thickness to develop strength equal to or greater than the metals being joined.

8. The nameplates shall be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining their legibility.

9. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.

10. Expiration date: October 31, 1988.

REFERENCES

Gamma Industries application dated May 20, 1978.

Supplement dated: October 25, 1978.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

R H Odegaarden

for Charles E. MacDonald, Chief
Transportation Certification Branch
Division of Fuel Cycle and
Material Safety, NMSS

Date: OCT 06 1983