

APPLICATION FOR MATERIAL LICENSE

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

FEDERAL AGENCIES FILE APPLICATIONS WITH:

U.S. NUCLEAR REGULATORY COMMISSION
DIVISION OF FUEL CYCLE AND MATERIAL SAFETY, NMSS
WASHINGTON, DC 20555

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

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

U.S. NUCLEAR REGULATORY COMMISSION, REGION I
NUCLEAR MATERIAL SECTION B
631 PARK AVENUE
KING OF PRUSSIA, PA 19406

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

U.S. NUCLEAR REGULATORY COMMISSION, REGION II
MATERIAL RADIATION PROTECTION SECTION
101 MARIETTA STREET, SUITE 2900
ATLANTA, GA 30323

IF YOU ARE LOCATED IN:

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

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

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

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

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

U.S. NUCLEAR REGULATORY COMMISSION, REGION V
MATERIAL RADIATION PROTECTION SECTION
1450 MARIA LANE, SUITE 210
WALNUT CREEK, CA 94596

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTION.

1. THIS IS AN APPLICATION FOR (Check appropriate item)

- ☒ A. NEW LICENSE
☐ B. AMENDMENT TO LICENSE NUMBER _____
☐ C. RENEWAL OF LICENSE NUMBER _____

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

ANR Pipeline Company
Laboratory Services
15170 Commerce Drive North
Dearborn, Michigan 48120-1272

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

8509160223 850816
REQ3 LIC30
21-24502-01 PDR

ANR Pipeline Company
20095 Gilbert Road
Big Rapids, Michigan 49307

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

K. H. McLeod or J. T. Durant

TELEPHONE NUMBER

(313) 271-5780

SUBMIT ITEMS 5 THROUGH 11 ON 8 1/2 x 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL

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

Attachment I, Item 5

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

Attachment I, Item 6

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

Attachment II, Part II, C

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

Attachment I, Item 8, and Attachment III

9. FACILITIES AND EQUIPMENT.

Attachment I, Item 9

10. RADIATION SAFETY PROGRAM.

Attachment I, Item 10

11. WASTE MANAGEMENT.

Attachment I, Item 11

12. LICENSEE FEES (See 10 CFR 170 and Section 170.31)

FEE CATEGORY 0 AMOUNT ENCLOSED \$ \$700.00

13. CERTIFICATION (Must be completed by applicant): THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, AND 40 AND THAT ALL INFORMATION CONTAINED HEREIN, IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948, 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

SIGNATURE—CERTIFYING OFFICER

TYPED/PRINTED NAME

TITLE

DATE

William J. Haener

William J. Haener

Executive Vice President

05-06-85

14. VOLUNTARY ECONOMIC DATA

a. ANNUAL RECEIPTS

<\$250K	\$1M-3.5M
\$250K-500K	\$3.5M-7M
\$500K-750K	\$7M-10M
\$750K-1M	>\$10M

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

c. NUMBER OF BEDS

d. WOULD YOU BE WILLING TO FURNISH COST INFORMATION (Dollar and/or staff hours) ON THE ECONOMIC IMPACT OF SUPPLYING THE SERVICE OR ANY FUTURE PROPOSED NRC REGULATIONS TO THE AGENCY? YES ☒ NO ☐

MAY 09 1985

FOR NRC USE ONLY

TYPE OF FEE

FEE LOG

FEE CATEGORY

COMMENTS

REGION III

APPROVED BY

CONTROL NO.

78920

AMOUNT RECEIVED

CHECK NUMBER

MAY 9 1985

DATE

5/15/85

3

1

2321 P-O YAM

ATTACHMENT I

N. R. C. License Application

- Item 5 N. R. C. licensing is requested for the possession and use of sealed sources of Iridium 192 in strengths up to 100 curies.

It is further requested licensing for changing sources as described in Attachment V "Emergency and Operating Procedures for Radiographic Inspection", Part IV, Sections 7.0 and 8.0.

Licensing is also requested for performing the required leak tests. Attachment V "Emergency and Operating Procedures" for Radiographic Inspection, Part IV, Section 6 describes this procedure.

- Item 6 The sealed sources will be used for making industrial radiographic exposures.

- Item 7 The individuals responsible for the radiation safety program and their qualifications may be found in Attachment II "Administrative and Radiological Protection Procedures for Handling Ionizing Radiation Emitting Materials and Equipment in Radiography", Part II, Section C.

- Item 8 Training for individuals working in or frequenting restricted areas is described in Attachment II "Administrative and Radiological Protection Procedures". Attachment III "Procedure for Certifying Radiographic Test Personnel" enumerates the specific steps required for certification.

- Item 9 The use of sealed sources for radiographic exposures will be exclusively at temporary field locations. Primary usage will be in Michigan, a non-agreement state. The sealed source may be used in any state and the Gulf of Mexico for the inspection of ANR Pipeline Company facilities.

The prime storage location of the sealed source will be at 20095 Gilbert Road, Big Rapids, Michigan. The storage room will be constructed of masonry in the basement of the above address. Shielding of the structure shall be such that radiation levels at the outer surfaces will be less than 2 mr/hr. and less than 100 mr/7 days in the first floor occupiable areas. The storage room shall be equipped with a door lock and remain locked when a source is stored there. The outer walls will be properly identified with the appropriate signs "Caution Radioactive Material."

A permanently affixed, shielded and lockable storage container will be mounted near the tailgate of the transporting vehicle. Shielding of this storage container will be such that radiation levels of 2 mr/hr or less will be found around the vehicle's outer surfaces and in its occupiable areas. This container shall be the designated isotope storage area when it is used at remote field assignments.

The vehicle shall have 10-3/4" square placards, mounted in the "Diamond Position" on all four sides of the vehicle. Placards shall be a yellow upper half and white lower half with the black radiation symbol. The sign shall bear the legend "Caution-Radioactive Material."

A Gulf Nuclear Incorporated Model 20-VS exposure device will be used. See Attachment IV for the certificate of compliance.

The sealed source to be used in the Model 20-VS will be Gulf Nuclear Model RG-13 or Gamma Industries Model A-1-A.

Sealed sources will be shipped in a Gulf Nuclear Model U-110-A or a Gamma Industries Model C-10 source changer housed in a DOT "Type B" shipping drum.

Radiation survey equipment consists of:

- Victoreen Model 440
- Victoreen Model 592-B
- Victoreen Model 692

Radiation survey instruments are calibrated at three month intervals and when servicing is required other than battery replacement. The instruments are calibrated within + 20% accuracy at two setpoints separated by 50% of the full scale reading on each of the three selectable ranges. The instruments are capable of a range from 2 mr/hour to 1r/hour

Victoreen Model 541-A and 541-R pocket dosimeters with a range from 0 to 200 mr/hr are used. Calibration within + 30% accuracy is verified annually. Drift tests are performed in the laboratory to assure that dosimeters will not drift more than 2% in twenty-four hours.

Film badges are supplied by Siemens Gammasonics Incorporated on a monthly basis. Monthly evaluation of film badges is also performed by Siemens Gammasonics. Records of these evaluations are maintained on file indefinitely.

Gulf Nuclear Incorporated Model LTK-1 leak test kits will be used for performing leak tests. Gulf Nuclear Incorporated will also evaluate the leak tests.

Item 10 The Radiation Safety Program will be administered as described in Attachment II "Administrative and Radiological Protection Procedures for Handling Ionizing Radiation Emitting Equipment in Radiography" and Attachment V "Emergency and Operating Procedures for Radiographic Inspection."

Item 11 Depleted sources will be returned to Gulf Nuclear Incorporated in the Gulf Nuclear Model U-110-A or Gamma Industries Model C-10 source changer housed in a DOT "Type B" shipping drum.

Appropriate Organizational Charts are found in Attachment VI.

ATTACHMENT II

ANR PIPELINE COMPANY

Administrative and Radiological Protection Procedures for Handling Ionizing Radiation Emitting Materials and Equipment in Radiography

I. GENERAL

A. Scope

This document outlines the administration of the radiation safety program for the handling and use of ionizing radiation material and equipment in radiography as authorized by the U.S. Nuclear Regulatory Commission and Michigan Department of Public Health, Radiological Health Services Division.

B. Regulations

The use of radioactive isotopes and x-ray generators for Non Destructive Testing shall be governed by the following regulations.

1. Code of Federal Regulations

- a. Title 10 - Chapter 1, NRC Part 19,
"Notices, Instructions, and Reports to Employees of Licensees;
Inspections."
- b. Title 10 - Chapter 1 - NRC, Part 20,
"Standards for Protection Against Radiation."
- c. Title 10 - Chapter 1 - NRC, Part 21,
"Reporting of Defects and Noncompliance."
- d. Title 10 - Chapter 1 - NRC, Part 30,
"Rules of General Applicability to Licensing of By-Product
Material."
- e. Title 10 - Chapter 1 - NRC, Part 34,
"Licenses for Radiography and Radiation Safety Requirements for
Radiographic Operations."
- f. Title 10 - Chapter 1 - NRC, Part 71,
"Packaging of Radioactive Material for Transport and Transporta-
tion of Radioactive Material under Certain Conditions."
- g. Title 10 - Chapter 1 - NRC, Part 170,
"Fees for Facilities and Materials Licenses and Other Regulating
Services."
- h. NRC Licensing Guide - Industrial Radiography
"A Guide on Radiation Safety Considerations in Preparation of
License Applications."

i. Title 49 - Chapter 1 - DOT, Parts 107 and 171-189,
"Hazardous Materials Program Procedures" and
"Hazardous Materials Regulations"

j. Applicable local state and municipal regulations when radiography
is performed outside of Michigan.

2. Applicable Rules and Regulations of Michigan, a non-agreement state.

Michigan Department of Health, Division Radiological Health,
Regulations Governing the use of Radioactive Isotopes,
X-radiation, and all other forms of ionizing radiation, section
R-325.5001 through Section R-325.5049.

Copies of each of these regulations and references will be made
available for review by all radiographers, assistant radiographers,
administrative and supervising personnel.

C. Responsibility

The overall responsibility for the non-destructive inspection program
for ANR Pipeline Company is with the Materials Testing Section of the
Laboratory Services Group. The program is under the direction of Mr.
M. A. Stolarski, Director, Laboratory Services and F. R. Orr, Manager,
Laboratory Services.

The radiation safety program is the responsibility of the Radiation
Safety Officer. J. T. Durant has been assigned the duties of the
Radiation Safety Officer. Duties of the Assistant Radiation Safety
Officer are performed by K. H. McLeod.

The major duties of the Radiation Safety Officer with the aid and
support of the Assistant Radiation Safety Officer are:

1. To act as liason officer with the NRC and Michigan Department of
Health, Occupational Health Division personnel.
2. To develop and maintain up-to-date operating and emergency
procedures.
3. To establish and conduct the training programs for radiographers and
assistant radiographers.
4. To evaluate and determine the competency of radiographers.
5. To establish and maintain the records keeping system.
6. To maintain control of procurement and disposal of the licensed
by-product materials.
7. To conduct quarterly inventories.

8. To investigate incidents and emergency situations and assume control of and institute corrective actions in these situations.
9. To establish and maintain the internal inspection system.
10. To administer a survey instrument and dosimeter calibration and maintenance program.
11. To administer the leak testing program.
12. To approve and recommend the procurement of radiographic equipment.
13. To act in an advisory capacity to the company's management and radiographic personnel.
14. To establish and administer the procedures for evaluating and reporting defects and equipment malfunctions.

The primary duties of the radiographer are:

1. To conduct radiographic examinations and physical radiation surveys.
2. To be responsible for the safety of all personnel in the area where radiographic work is performed.
3. To personally supervise the activities of the assistant radiographer.
4. To keep records of inspections, surveys, personnel monitoring and source utilization.
5. To inspect and maintain exposure devices, survey instruments, and associated equipment and facilities.
6. To notify the Radiation Safety Officer of emergencies, equipment defects and malfunctions.

D. Internal Inspection System

The Radiation Safety Officer shall be responsible for the internal inspection system for controlling the receipt, possession, use and transfer of radioactive material. The Assistant Radiation Safety Officer shall aid in the administration of all aspects of this system.

Qualification of these individuals to maintain control and administer the internal inspections system is documented in Section II (C).

At least once each calendar quarter, the Radiation Safety Officer or Assistant Radiation Safety Officer shall conduct an audit to determine that the NRC and all other applicable regulations, license provisions and emergency and operating procedures are being followed by the radiographers and assistant radiographers. These audits may be announced or unannounced and shall be documented on the appropriate form (Exhibit I attached). The audit will consist of:

1. Observations and evaluation of the radiographer.
2. Inspection of the radiographic exposure and safety equipment.
3. Inventory of all sources, source containers, exposure devices, survey instruments and personnel monitoring devices.

A copy of the radiographer evaluation will be given to the radiographer. A copy of the evaluation and copies of the other audit reports will be retained in the Radiation Safety Officer's files for five years.

Deficiencies will be corrected through a program of oral and written communications with the radiographer. Formal training and educational sessions may also be scheduled.

Quarterly inventories, daily usage reports, records of receipt and transfer of licensed material, instrument calibration records, personnel monitoring readings, and records of radiation surveys will be reviewed by the Radiation Safety Officer and Assistant Radiation Safety Officer on a continuing basis. Records shall be maintained in the active file for two years and then retired to storage.

E. Definitions

For the purposes of this document, the following terms are defined.

1. Calendar Quarter

For record purposes, a Calendar Quarter shall be defined as January 1 through March 31, April 1 through June 30, July 1 through September 30, and October 1 through December 31.

2. Exposure Devices

Any instrument containing a sealed source fastened or contained therein, in which the sealed source or shielding thereof may be moved, or otherwise changed, from a shielded position to unshielded position and x-ray generators used for making radiographic exposures.

3. Radiation Safety Officer

The individual within ANR Pipeline Company who has the responsibility for the overall radiation safety program.

4. Radiographer

Any individual who performs or who, in attendance at the site where radiography is being performed, personally supervises radiographic operations and is responsible to the licensee for assuring compliance with the requirements of regulations and the conditions of licenses.

5. Radiographers Assistant

Any individual who, under the personal supervision of a radiographer, uses radiographic exposure devices, sealed sources or related handling tools, or radiation survey instruments.

6. Radiography

The examination of the structure of materials by non-destructive test methods utilizing sealed sources and/or x-ray generators.

7. Sealed Source

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

8. Storage Container

A device in which sealed sources are transported or stored.

9. Survey Instruments

Instruments used in making radiation surveys, capable of measuring radiation levels from two milliroentgens through one roentgen per hour.

II TRAINING RADIOGRAPHERS

A. Scope

Radiographer candidates shall be given training in the fundamentals of radiation safety, radiation detection instruments, radiographic equipment operation and the company's emergency and operating procedures. Radiographers shall qualify and be certified in accordance with ASNT Recommended Practice Number SNT-TC-1A, 1980 Edition Guidelines and any subsequent revisions or amendments.

B. Initial Training

The candidate shall be instructed in Radiation Safety inclusive of the following:

1. Characteristics of X and gamma radiation
2. Units of radiation dose and quantity of radiation
3. Hazards of excessive exposure to radiation
4. Levels of radiation from source material
5. Methods of controlling radiation dose
6. Use of survey instruments
7. Survey techniques
8. Use of Personnel monitoring equipment

This training shall be accomplished by attending a radiation safety course conducted by Technical Operations Incorporated, of Burlington, Massachusetts or equivalent or by in-house and "on the job" training. Instructions of ANR Pipelines Emergency and Operating Procedures shall supplement "out-of-house" training and be an integral part of "in-house" training program.

A written and practical examination will be administered to individuals who qualify as radiographer candidates in accordance with SNT-TC-1A, Recommended Practices, 1980 Edition and any subsequent revisions or amendments.

One copy of ANR Pipeline's Procedure for Certifying Radiographers is attached (Attachment III). The Appendix outlines a typical training program. ANR Pipeline Company radiographer examinations shall be administered by the Radiation Safety Officer or Assistant Radiation Safety Officer.

Copies of radiographers examinations, field performance evaluations, and resulting test scores shall be maintained in the radiographer certification file.

Annual training sessions will be held to review past performances, up-dating of NRC and State regulations, equipment and safety criteria. Informal sessions will be held more frequently when deemed necessary.

C. Experience and Training of Administrative Personnel:

The following individuals are responsible for the examination, qualification and certification of the company's radiographers and assistant radiographers.

Name:	John T. Durant
Title:	Radiation Safety Officer
Education:	B. S. Metallurgical Engineering Drexel University - Philadelphia, Pennsylvania
Experience:	3.0 years ANR Pipeline 14 years - Sun Shipbuilding and Drydock Company
Training:	40 hours - Radiation Safety Sperry Schools - Columbus, Ohio 16 hours - Radiation Safety Administration Tech/OPS - Burlington, Massachusetts

Name:	Kendall H. McLeod
Title:	Assistant Radiation Safety Officer
Education:	3.5 years Industrial Engineering Lawrence Institute of Technology
Experience:	31 years ANR Systems Companies
Training:	40 hours - Non-destructive Testing Sperry Schools - Columbus, Ohio 40 hours - Isotope Radiography Tech/Ops - Burlington, Massachusetts 80 hours - School of Ultrasonics Krautkramer-Branson - Stamford, Conn.

III. OPERATING AND EMERGENCY PROCEDURES

A. Emergency Procedures

A set of Emergency and Operating Procedures, which incorporate emergency and operating procedures for both gamma ray and x-ray radiography is supplied to all NDE personnel. Radiographers must have these procedures available at all permanent and temporary radiographic inspection locations.

The Emergency and Operating Procedures contain the pertinent information required to perform their work in a safe and efficient manner.

The Radiation Safety Officer is responsible for up-dating the Emergency and Operating Procedures to reflect changes in regulations, license provisions, and equipment. Attachment V is one copy of ANR Pipeline Company's Emergency and Operating Procedures.

B. Survey Meter and Dosimeter Calibration

1. Survey meters are calibrated at three month maximum intervals or earlier if the equipment requires repair or servicing other than battery replacement.
2. Personnel dosimeters have their accuracy verified annually.
3. Instrument calibration is performed by Victoreen Incorporated, Cleveland, Ohio and by Exam Company, Northwood, Ohio. Exhibits II and III.
4. Two survey meters are available for each radiographic inspection unit. This makes one unit available at all times while the other is being repaired and/or calibrated. An adequate number of dosimeters are on hand to replace those out-of-service for calibration or replacement.
5. Instrument Calibration records are retained for three years.
6. Film badges are supplied and processed by Siemens Gammasonics Incorporated monthly.
7. Radiation exposure reports are retained indefinitely.
8. The Radiation Safety Officer is responsible for scheduling instrument calibrations.

IV. NOTIFICATION TO NUCLEAR REGULATORY COMMISSION

The Radiation Safety Officer will be the Company representative in matters concerned with the license granted by the Nuclear Regulatory Commission and the Michigan Department of Health.

The radiographic program is under the jurisdiction of the Region III, NRC office. Communications shall be addressed to:

U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137
Phone: (312) 932-2500

Incidents involving radioactive isotopes shall be reported to the National Regulatory Commission as required by Title 10 Code of Federal Regulations Chapter I NRC - Part 20 and to the Michigan Department of Public Health.

The use of x-radiation generators and incidents thereof, shall be reported to the Michigan Department of Public Health.

Michigan Department of Public Health
Division of Radiological Health Services
3500 N. Logan, P. O. Box 30035
Lansing, Michigan 48909
Phone: (517) 373-1578

After Hours: The nearest Michigan State Police Post

EXHIBIT I

ANR PIPELINE COMPANY

Radiographic Field Performance Evaluation

Quarterly evaluation of Radiographers' proficiency and an integral part of radiographer candidate examination.

	<u>Yes</u>	<u>No</u>	<u>Comments</u>
Visual equipment inspection	_____	_____	_____
Operate survey meter	_____	_____	_____
Personnel monitoring devices	_____	_____	_____
Layout guide tubes and control cables	_____	_____	_____
Placement of radiation warning signs	_____	_____	_____
Connect guide tube sections and control cables to projector	_____	_____	_____
Conduct survey(reference survey)	_____	_____	_____
Operate projector lock mechanism	_____	_____	_____
Film handling	_____	_____	_____
Crank source to expose position	_____	_____	_____
Conduct survey	_____	_____	_____
Retract source to shielded position	_____	_____	_____
Conduct survey	_____	_____	_____
Disconnect guide tubes & control cable	_____	_____	_____
Lock projector	_____	_____	_____
Conduct survey	_____	_____	_____
Coil & store guide tubes/control cable	_____	_____	_____
Lock projector	_____	_____	_____
Conduct survey	_____	_____	_____
Coil & store guide tubes/control cable	_____	_____	_____

Overall comments: _____

Examination and Evaluation conducted by: _____
Title: _____

12601 Eckel Road
P.O. Box 31, Perrysburg, Ohio 43551
(419) 874-7924

CALIBRATION CERTIFICATE

The following dosimeter has been calibrated using a Victoreen Calibration Device, Model 541-205, Serial Number 381.

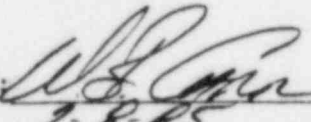
Dosimeter NumberCalibration Reading
(Milliroentgens)Dosimeter Reading
(Milliroentgens)

1566 0008

60

68

The above dosimeter falls within the required plus or minus (20%) twenty percent accuracy range.

Signed: Date: 7-8-85

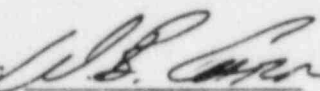
EXAM COMPANY

12601 Eckel Road
P.O. Box 31, Perrysburg, Ohio 43551
(419) 874-7924

CALIBRATION OF SURVEY INSTRUMENT

MANUFACTURER: Victoreen
MODEL NO: 692
SERIAL NO: 442
DATE CALIBRATED: 11-7-84
VOID DATE: 2-7-85

The above referenced survey instrument has been calibrated using a Tech Ops Model 571 Calibration Device. Radiation calibrations are traceable to the National Bureau of Standards.

Signed: 
Date: 11-7-84

EXAM COMPANY

CERTIFICATE OF CALIBRATION

RANGE SETTING	CALIBRATION POINT	WITHIN LIMITS
	750 MR/HR	
	250 MR/HR	
	75 MR/HR	
	25 MR/HR	
	7.5 MR/HR	
	2.5 MR/HR	

THE ABOVE CALIBRATIONS WERE PERFORMED IN ACCORDANCE WITH EXAM RADIATION SAFETY ADMINISTRATION MANUAL, PART 5, USING A TECH OPS MODEL 571 CALIBRATION DEVICE. RADIATION CALIBRATIONS ARE TRACEABLE TO THE NATIONAL BUREAU OF STANDARDS.

SIGNATURE _____

DISTRICT _____ DATE CALIBRATED _____

MANUFACTURER _____

MODEL NO. _____ SERIAL NO. _____

Form 852

WHITE COPY—TULSA OFFICE YELLOW COPY—DISTRICT OFFICE
PINK COPY—METER COPY

ATTACHMENT III

ANR PIPELINE COMPANY

Procedure for Certifying Radiographic Test Personnel

1.0 Scope

1.1 This document lists the procedures ANR Pipeline Company Engineering Laboratory will follow to train and certify radiographic test personnel. It incorporates the requirements of Recommended Practice SNT-TC-1A Supplement A, Radiographic Testing Method as issued by the American Society for Nondestructive Testing.

2.0 Levels of Certification

2.1 There shall be three levels of certification for radiographic test personnel.

A. NDT Level I

An NDT Level I radiographer must have sufficient training and experience to properly perform the necessary tests. He shall be responsible to a person certified to NDT Level II or NDT Level III for the proper performance of the tests in the applicable method.

B. NDT Level II

An NDT Level II radiographer shall be qualified to direct and carry out tests in the method certified. He must also be able to set up and calibrate equipment (where applicable), read and interpret indications, and evaluate them with reference to applicable codes and specifications. He shall be thoroughly familiar with the scope and limitations of the method, and shall have the ability to apply detailed techniques to products or parts within his limit of qualifications. He shall be able to organize and report nondestructive testing results.

C. NDT Level III

An NDT Level III radiographer shall be capable of establishing techniques, interpreting specifications and codes, designating the particular test method and techniques to be used, and interpreting the results. He shall be capable of evaluating the results not only in terms of existing codes or specifications, but he also should have sufficient practical background in acceptance criteria when none are otherwise available. It is desirable that he have general familiarity with all other commonly used NDT methods. He shall be responsible for conducting examinations of NDT Level I and NDT Level II personnel.

3.0 Qualifications required for Each Level of Certification

3.1 General

All individuals acting as radiographers shall, without regard to certification level, comply with the minimum requirements of 10 CFR 34.31(a) with relation to receipt of instructions and all applicable documents as well as having demonstrated his understanding of the material presented and competence to use all of the appropriate equipment.

All individuals acting as a radiographer's assistant shall, without regard to certification level, comply with the requirements of 10 CFR 34.31(b).

3.2 NDT Level III

Level III radiographers shall be certified without examination by a written statement verifying their qualifications. Their qualifications shall include a combination of experience and specialized training together with specialized Laboratory training in; metallurgy, welding, ultrasonics, radiography, magnetic particle, dye penetrant, and other related subjects and/or NDT techniques that may arise in the future.

3.3 NDT Level II

A. Completion with passing grades of at least two years of engineering and science study at an accredited university, college, or technical institute, plus one year's experience at a certified NDT Level I in radiographic testing, plus 36 hours training in accordance with the training course outline in Table A-1, Level II of SNT-TC-1A.

- or -

B. High school graduation plus two years experience as a certified NDT Level I in radiographic testing plus 36 hours training in accordance with the training course outlined in Table A-1, Level II of SNT-TC-1A.

- or -

C. Grammar school (8th grade) graduation plus three years experience as a certified NDT Level I in radiographic testing plus 36 hours training in accordance with the training course outlined in Table A-1, Level II of SNT-TC-1A.

The above requirements may be partially replaced by experience as a certified NDT Level I in NDT methods other than radiographic testing. The radiographic testing experience of an NDT Level II shall not be less than 25% of the above requirements.

3.4 NDT Level I

- A. Completion with passing grades of at least two years of engineering or science study at an accredited university, college, or technical institute, plus three months experience in radiographic testing, plus 20 hours training in accordance with the training course outlined in Table A-1, Level I of SNT-TC-1A.

- or -

- B. High school graduation plus six months experience in radiographic testing plus 20 hours training in accordance with the training course outlined in Table A-1, Level I of SNT-TC-1A.

- or -

- C. Grammar school (8th grade) graduation plus one year experience in radiographic testing plus 20 hours training in accordance with the training course outlined in Table A-1, Level I of SNT-TC-1A.

The above requirements may be reduced in recognition of either satisfactory completion of additional applicable training or demonstrated proficiency in conducting radiographic tests. For NDT Level I in radiographic testing, the required experience shall not be less than three months.

4.0 Physical Examination Requirements

- A. All levels -- a general physical examination must be passed prior to employment.
- B. NDT Levels II, III

The NDT Level II and Level III radiographer must have natural or corrected near vision acuity such that he is capable of reading J-2 letters on standard Jaeger's Test type chart or equivalent type test.

5.0 Training

Personnel considered for certification shall receive sufficient organized training to become familiar with principles and practices of radiographic testing to the level of certification desired and applicable to the procedures to be used and to the products to be tested. A typical training course outline is shown in Table No. I.

6.0 Examination

- 6.1 Examinations to verify technical qualifications shall consist of three segments.

A. General Examination

A written test consisting of twenty (20) questions selected by the examiner from Appendix A-1 SNT TC 1A for NDT Level I or NDT Level II. These questions are designed to test the applicant's knowledge of basic radiographic test principles. They shall be answered within a two hour period without access to any reference material (closed book).

B. Specific Examination

A written test consisting of ten (10) questions prepared or approved by the examiner. These questions shall cover the equipment, codes, operating procedures and test techniques that the candidate will encounter in the applications of radiography to which he will be assigned. This test shall be a closed book and shall be answered within a one-hour period.

C. Practical Examination

Performance tests designed to verify the candidate's ability to:

1. Satisfactorily perform radiography on one or more samples selected by the examiner by following a prescribed technique.

- or -

2. Satisfactorily perform radiography on one or more samples selected by the examiner after formulating a satisfactory technique based on given job conditions.

- and -

3. Review selected films and determine whether the test technique, film quality and defect type and dimensions are within the acceptable limits of Company radiographic specifications or standards.

7.0 Grading of Examinations

- 7.1 A percentile weight factor will be applied to the percentage grades of the various examinations. The percentile weight assigned any particular examination will be within the ranges listed below and will be established in accordance with the principles outlined in paragraph 1.0 - SCOPE. The total of the three percentile weights shall equal 1.0

7.2 NDT Level I Examination Percentile Weights

- a. General - 0.2 to 0.6
- b. Specific - 0.1 to 0.5
- c. Practical - 0.3 to 0.7

7.3 NDT Level II Examination Percentile Weights

1. General - 0.3 to 0.7
2. Specific - 0.2 to 0.6
3. Practical - 0.1 to 0.5

7.4 The composite grade (Gc) is determined as follow:

$$Gc = (Gg \times Wg) + (Gs \times Ws) + (Gp \times Wp)$$

Where: Gg = Actual grade from general examination in percent

Wg = Percentile weight of general examination

Gs = Actual grade from specific examination in percent

Ws = Percentile weight of specific examination

Gp = Actual grade from practical examination in percent

Wp = Percentile weight of practical examination

7.5 Example:

a. Test results obtained for Level I examination =

General (Gg) = 87%
Specific (Gs) = 93%
Practical (Gp) = 90%

b. Percentile weight assigned for each examination =

General (Wg) = 0.3
Specific (Ws) = 0.2
Practical (Wp) = 0.5

c. Then: $Gc = (87 \times 0.3) + (93 \times 0.2) + (90 \times 0.5)$

$$\begin{aligned} Gc &= 26.1 + 18.6 + 45 \\ Gc &= 89.7 \end{aligned}$$

7.6 When an examination is administered for NDT Level I radiographer or NDT Level II radiographer, a composite grade of 80% or greater is required for qualification. In addition, each grade for the general, specific and practical examination shall be 70% or greater.

7.7 Individuals failing to pass examinations shall wait at least thirty days before being re-examined unless additional training is received.

8.0 Certification

8.1 Certification records shall be maintained on file by the Laboratory and shall contain personnel records of the certified individuals and copies of written procedures.

8.2 The personnel records of the certified individuals shall include:

- a. Name of certified individual
- b. Level of certification
- c. Educational background and experience of certified individuals
- d. Statement indicating satisfactory completion of training in accordance with the employer's written procedure
- e. Results of the physical examination
- f. Actual grades obtained in each examination if examinations were employed for qualification
- g. Percentile weights assigned to each examination if examinations were employed for qualification
- h. Composite grade if examinations were employed
- i. Date of certification and/or recertification
- j. Signature of examiner
- k. Signature of certifying agency representative (if outside agency administered the qualification and certification program).

8.3 The written procedure justifying the certification of Level I and Level II personnel shall include:

- a. Training course outline
- b. Time spent in each phase of training
- c. Description of pertinent examinations when examinations are employed for qualification and subsequent certification.

9.0 Recertification

9.1 All levels of NDT personnel shall be recertified at least once every three years in accordance with one of the following criteria as determined by the Laboratory.

- a. Evidence of continuing satisfactory performance
- b. Re-examination in accordance with Paragraph 6.0 EXAMINATION, Paragraph 7.0 - GRADING OF EXAMINATIONS, and Paragraph 8.0 CERTIFICATION

10.0 Termination of Certification

An employees certification shall be automatically terminated when he accepts employment with another firm.

TABLE NO. I

TYPICAL COURSE OUTLINE

RADIATION SAFETY

PROPERTIES OF RADIOISOTOPES

Alpha radiation
Beta radiation
The process of K capture
Gamma radiation
The electromagnetic spectrum-chart

ATTENUATION OF GAMMA RAYS

Shielding-half and tenth value layers
Shielding problems
Reduction factors
 ED-769 graph-lead
 ED-770 graph-concrete
 ED-780 graph-iron

Time
Distance-inverse square law
 1. inverse square law problems
 2. combination problems

MEASUREMENT OF X AND GAMMA RADIATION

Pocket dosimeters
Pocket chamber
Film badge
Survey instruments
Care and use of survey meters
Miscellaneous-source exchange
 Leak tests

BIOLOGICAL EFFECT OF RADIATION

Genetic effect
Effects of acute radiation doses-table
Summary of effect resulting from whole body
 Exposure to radiation-table
 Blood tests
 Natural and diagnostic exposures-table
The maximum permissible dose
Radiation protection requirements
Disaster procedure

GAMMA RAY RADIOGRAPHY

Radioisotopes used in radiography

- General

- Cobalt 60

- Cesium 137

- Iridium 192

- Thulium 170

- Sensitivity

 - Unsharpness

 - Relationship-unsharpness to geometry, Figure 1

 - Build-up scatter - Figure 2

 - Total unsharpness

 - Minimum source film distance

 - Collimation

 - Relationship defect-thickness or object-film distance - Figure 3

 - Do's and don'ts

RADIATION PROTECTION

Output of x-ray machines

RADIOISOTOPES

Their production and significance in industry radiography

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIALS PACKAGES

U.S. NUCLEAR REGULATORY COMMISSION

1. CERTIFICATE NUMBER 9160	2. REVISION NUMBER 0	3. PACKAGE IDENTIFICATION NUMBER USA/9160/B(U)	4. PAGE NUMBER 1	5. TOTAL NUMBER PAGES 2
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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):

Gulf Nuclear, Inc.
202 Medical Center Boulevard
Webster, TX 77598

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Gulf Nuclear, Inc. application dated
January 21, 1984, as supplemented.

c. DOCKET NUMBER

71-9160

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-VS and 40-VS

(2) Description

Radiographic devices and shipping container for sealed sources. The packages are approximately 12" high x 6" wide x 8" long. The outer case is constructed of 15 gauge 303 stainless steel. The package is provided with a 0.76" diameter handle. The 34 pound uranium shield is held in place by potting epoxy and 2 brackets within the case. The sealed source is held within a Zircaloy or titanium S-tube by a lockblock assembly and a safety plug assembly at the opposite end of the S-tube. The Model Nos. 20-VS and 40-VS are identical except for shielding capability of the uranium shield. The package weighs 42 pounds.

(3) Drawings

The package is constructed in accordance with Gulf Nuclear, Inc. Drawing Nos. A-31, Sheets 3 and 4, Rev. 1; A-31-1, Sheets 1 and 2, Rev. 0; A-3-1, Rev. 1; A-31-12, Rev. 0; A-31-16, Rev. 1; A-31-18, Rev. 1; A-31-20, Rev. 1; A-31-21, Sheets 1, 2, and 3, Rev. 1; A-31-31, Sheets 1, 2, and 3, Rev. 1; A-31-32, Rev. 0; A-31-34, Sheet 3, Rev. 1 and Sheet 4, Rev. 0; 1000-50-14, Rev. 0; and 1000-50-13, Rev. 0.

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Page 2 - Certificate No. 9160 - Revision No. 0 - Docket No. 71-9160

(b) Contents

(1) Type and form of material

Iridium 192 sealed source which must be shown to meet the requirements of special form radioactive material.

(2) Maximum quantity of material per package

One source containing:

(i) Model No. 20-VS package - 120 Ci; or

(ii) Model No. 40-VS package - 220 Ci.

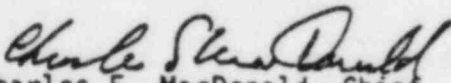
6. The package model designation must be determined by the Initial Acceptance criteria given in Section 5.3 (p 5-3) of the application.
7. The packages authorized by this certificate are hereby approved for use under the general license provisions of 10 CFR §71.12.
8. Expiration date: April 30, 1989.

REFERENCES

Gulf Nuclear, Inc. application dated January 21, 1984.

Supplements dated: March 6 and 20, 1984.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION


Charles E. MacDonald, Chief
Transportation Certification Branch
Division of Fuel Cycle and
Material Safety, NMSS

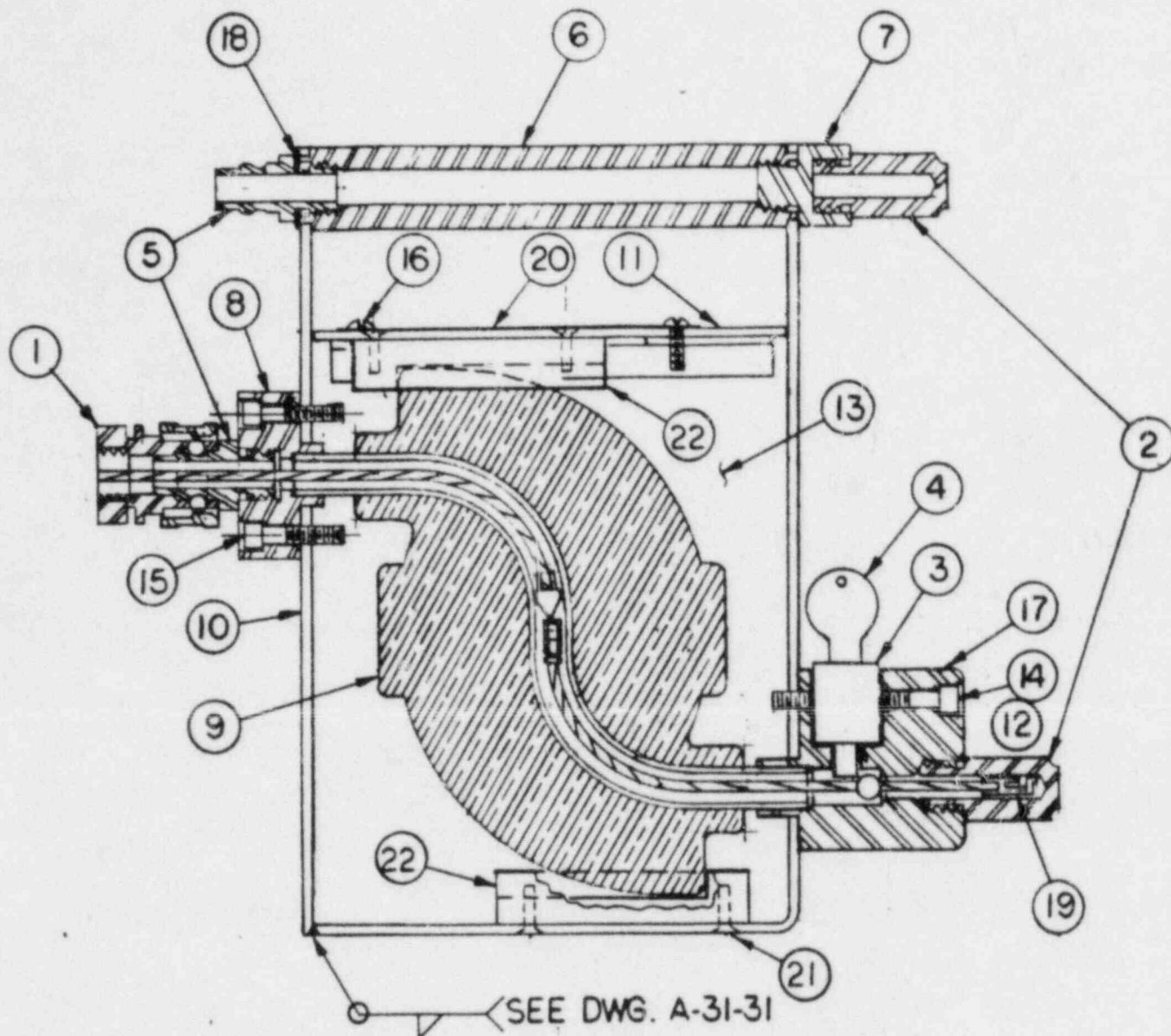
Date: APR 10 1984

CONTROL NO. 78920

ITEM NO.	ITEM DESCRIPTION		PART NO. /	QTY. REQ'D
			DWG. NO.	
1	SAFETY PLUG ASSEMBLY	1000-50-01	A-31-1	1
2	DUST COVER	1000-50-03	A-31-2	1
3	LOCK - CORBIN KA 4T152	PURCHASED	A-31-7	1
4	KEY - CORBIN 4T152	PURCHASED	A-31-10	1
5	OUTLET NIPPLE	1000-50-04	A-31-12	1
6	STORAGE HANDLE	1000-50-05	A-31-16	1
7	DUST COVER STORAGE BOLT	1000-50-06	A-31-18	1
8	CAMERA NOSE	1000-50-07	A-31-20	1
9	CAMERA CASTING	1000-50-08	A-31-21	1
10	CAMERA HOUSING (FRONT & BACK - WELDED UNIT)	1000-52-03	1000-52-03	1
11	CAMERA HOUSING (LID)	1000-52-03	A-31-31 SHT 4	1
12	SET SCREW - 8-32UNC	PURCHASED	A-31-23	2
13	POTTING EPOXY		NONE	3 LBS
14	SKT. HD. CAP SCREW 1/4-20UNC X 2" PURCHASED		A-31-25	4
15	SKT. HD. CAP SCREW 1/4 20UNC X 1" PURCHASED		A-31-26	4
16	BTN. HD. MACH. SCREW 6-32UNC X 1/2" PURCHASED		A-31-27	4
17	LOCKBLOCK	1000-52-04	A-31-32	1
18	WASHER - FLAT (FOR 5/8-18UNC) PURCHASED		A-31-29	1
19	PIGTAIL ASSEMBLY		VARIES	1
20	I. D. TAG	1000-52-05	A-31-34	1
21	FLAT HD. SCREWS 6-32UNC X 1/2" PURCHASED		A-31-35	4
22	MOVEMENT RESTRICTION BRACKET		1000-50-13	2

REVISIONS			GULF NUCLEAR, INC.		
NO.	DATE	BY			
1	3-6-84	RCP	20VS, 40VS PARTS LIST		
2	4-24-84	RCP			
3			DRAWN BY RCP	SCALE NONE	MATERIAL
4			CHK'D	DATE 1-11-84	DRAWING NO.
5			TRACED	APP'D	A-31 SHT 3 of 4

P1000-52-01



REVISIONS			GULF NUCLEAR, INC.		
NO.	DATE	BY	20VS, 40VS ASSEMBLY		
1	3-6-84	RCP	DRAWN BY RCP CHK'D TRACED	SCALE NONE	MATERIAL
2				DATE 1-11-84	DRAWING NO.
3				APP'D	A-31 SHT 4 of 4
4					
5					

1000-52-01

ATTACHMENT V

ANR PIPELINE COMPANY

Emergency and Operating Procedures for Radiographic Inspection

PART I - EMERGENCY PROCEDURE

Dr. E. A. Shaptini is the Radiation Safety Health Officer for the American Natural Resources Company and as such is responsible for the health and safety of all employees whose work involves the use of any form of ionizing radiation.

Mr. J. T. Durant is the Radiation Safety Officer for ANR Pipeline Company, Laboratory Services and is responsible for the safe operation of all radiographic exposure devices and equipment utilized by ANR Pipeline Company's Laboratory Services Group.

Any incident as defined in the Code of Federal Regulations, Title 10 - Chapter 1 - NRC, Part 20, Michigan Department of Health Regulations Governing the use of Ionizing Radiation, and potential hazards shall be reported to the Radiation Safety Officer immediately.

1.0 MEASURES TO BE TAKEN IN THE EVENT OF EXCESSIVE EXPOSURE

In the event that any individual receives a dose or is subjected to a potential excessive exposure, the following measures shall be taken immediately.

1.1 Notify one of the responsible parties or alternate as listed below:

Radiation Safety Officer	J. T. Durant	313-271-5780 Ext. 202
After normal workday and week ends		313-274-3426

Alternate:

Assistant Radiation Safety Officer	K. H. McLeod	313-271-5780 Ext. 212
After normal workday and week ends		313-476-1769

Radiation Safety Health Officer	Dr. E. A. Shaptini	313-496-4613
After normal weekday and week ends		313-393-9491

Alternate:

	Dr. Joel Silberg	313-496-4602
After normal work day and week ends		313-352-0967

1.2 Send film badge to:

Dr. E. A. Shaptini
One Woodward Avenue
Detroit, Michigan 48226

- 1.3 Employee shall be relieved of radiographic inspection duties immediately.

If at any time during the working day a pocket dosimeter should read in excess of 200 mr (off scale) follow steps 1.1, 1.2 and 1.3. In addition to the aforementioned steps, the dosimeter should be recharged and placed in a radiation free area. If the dosimeter again discharges, notify Dr. E. A. Shaptini and the Radiation Safety Officer.

2.0 EMERGENCIES

- 2.1 When an emergency occurs involving ionizing radiation, a physical radiation survey shall be conducted using an operable and calibrated radiation survey meter, to determine the levels of radiation present and to establish a restricted area as needed.
- 2.2 The boundaries of the restricted area shall be determined by a physical radiation survey. The perimeter of the restricted area shall have a radiation level of 2mr/hour or less. The restricted area boundaries shall be defined by physical barriers, such as ropes, and radiation warning signs bearing the legend "Caution - Radiation Area". The radiographer must maintain surveillance over the restricted area.
- 2.3 The Radiation Safety Officer must be contacted as soon as possible, giving him the available information concerning the situation.
- 2.4 Accidents involving vehicles:
In the event of vehicle accident involving a vehicle carrying a radioactive isotope, the radiographer must immediately conduct a radiation survey to determine if the isotope shielding has been damaged or the isotope has become dislodged. If unacceptable radiation levels exist proceed in accordance with 2.1, 2.2 and 2.3. Maintain surveillance over the restricted area. Do not attempt source recovery. The Radiation Safety Officer will put into effect procedures for safely shielding the source.
- 2.5 Incidents involving a loose source:
When a source is determined to be disconnected from the control cable outside the exposure device, an emergency condition is considered to exist. Conduct the steps required in 2.1, 2.2 and 2.3. Do not attempt to retrieve the source. The Radiation Safety Officer will evaluate the situation and establish recovery procedures.
- 2.6 Incidents involving damage to exposure device or guide tube:
An emergency condition exists when the exposure device is damaged such that its shielding ability is impaired or when the guide tube is damaged with the source in an exposed situation. Conduct the steps required in 2.1, 2.2, and 2.3. The Radiation Safety Officer will establish procedures for returning the source to a safe condition.

- 2.7 Incidents involving radiation exposure to non-monitored persons:
In the event that non-monitored persons become exposed to radiation an emergency condition is considered to exist. The radiographer shall obtain and record all pertinent information regarding the exposure, inclusive of:

Names and addresses of persons exposed
Time and place of occurrence
Conditions which contribute to inadvertent exposure
The extent of exposure with regard to time, distance and source strength
Notify the Radiation Safety Officer

PART II - SHIPPING, RECEIVING, STORING AND TRANSPORTING RADIOACTIVE ISOTOPES

1.0 RECEIPT OF RADIOACTIVE ISOTOPES

- 1.1 The radiographer must make himself available to receive radioactive material from the carrier.
- 1.2 The shipping package must have a radiation survey performed on it within three hours after receiving. If the radiation level exceeds 200 mr/hour at the container surface and/or 10 mr/hour at three feet from the container surface notify the Radiation Safety Officer and the carrier. Place the container in the authorized storage area. Record all required information on the "Record of Transfer" form.
- 1.3 Prior to shipping a radioactive isotope conduct a radiation survey to assure compliance to DOT, Title 49 requirements for "Type B" shipping containers. Record all the required information on "Record of Transfer" form.

2.0 SECURITY OF SOURCES AND EXPOSURE SERVICES

- 2.1 Sealed sources shall be maintained within exposure devices and storage containers at all times. No radiographic work shall be permitted using a free source or the "Open Air" technique.
- 2.2 Each radiographic exposure device and storage container in which a source is stored shall be kept in a locked condition at all times except when in use and under the surveillance of a radiographer.
- 2.3 When not in use, the radiographer shall maintain each locked device and storage container in which a source is stored in a place which is secure from unauthorized personnel or accidental removal of the exposure device or storage containers. The facilities shall be secured at all times when unattended.
- 2.4 Storage areas, including vehicles used for source storage, shall be properly posted with signs containing the standard radiation symbol and the words "Caution-Radioactive Material". When necessary, additional shielding shall be provided to maintain radiation levels of 2 mr/hour or less at the exterior surface of the storage area.

- 2.5 Each time an exposure device is secured in an authorized storage area a radiation survey of the exposure device shall be conducted and the radiation levels recorded on the "Radiographic Usage Report".

3.0 TRANSPORT OF RADIOACTIVE EXPOSURE DEVICES AND STORAGE CONTAINERS IN COMPANY VEHICLES

- 3.1 No exposure device or storage container containing a source shall be transported in a Company vehicle unless accompanied by a qualified radiographer. An operable and calibrated radiation survey meter shall be carried in the vehicle.
- 3.2 The locked exposure device shall be transported by vehicle only in a locked, firmly affixed and shielded storage container designed and fabricated for this purpose.
- 3.3 The vehicle storage container shall be shielded so that the external perimeter of the vehicle has a radiation level not exceeding 2 mr/hour. No occupiable area of the vehicle, including darkroom facilities, shall have a radiation level exceeding 2 mr/hour.
- 3.4 Compliance with 3.3 shall be determined by conducting a radiation survey of vehicle exterior and occupiable areas.
- 3.5 The vehicle shall be marked with placards imprinted with the words "Caution - Radioactive Material". The placards must be 10-3/4" square and mounted in the "diamond configuration". The top half must be yellow in color with the black symbol. The lower half must be white with black lettering.
- 3.6 Instructions for actions to be taken in the event of a vehicle accident are given in Part I the Emergency Procedures, Section 2.4. A copy of these instructions shall be prominently displayed in the vehicle for access in the event the radiographer is incapacitated to the extent he is unable to perform the radiation surveys and delineate the restricted area.
- 3.7 The prime storage area of the sealed source designed for this purpose is in the basement of 20095 Gilbert Road, Big Rapids, Michigan. The exposure device shall be stored in this area at all times when its use is not required. The vehicle mounted container shall be the authorized storage area when used at remote field assignments.

PART III - REPORTS AND MAINTENANCE OF RECORDS

- 1.0 Each day the radiographer shall complete the required information for sources and radiographic exposure devices assigned to him.
- 1.1 Each day the source and exposure device is used the radiographer shall fill out the "Inspection and Maintenance Check List".
- 1.1.2 Each day the source is used the radiographer shall fill out the required radiation survey information and record dosimeter readings on the "Radiographer Usage Report".

1.2 These reports shall be forwarded to the Radiation Safety Officer at least weekly.

1.3 The Radiation Safety Officer shall supervise the maintenance of records.

PART IV - OPERATING PROCEDURES

1.0 Radiographic exposure equipment shall be operated by radiographers certified by ANR Pipeline Company Radiographer Qualification Procedures and in accordance with ASNT, SNT-TC-1A, 1980 edition, Recommended Practices with one exception. Non-certified personnel may operate radiographic exposure devices in the presence, and under the direct supervision of a Level II and Level III radiographer for training purposes only.

1.1 Film badges and pocket dosimeters shall be worn at all times when working with ionizing radiation.

1.2 Dosimeters shall be calibrated daily and be read at various times during the work day. Readings shall be recorded on the "Radiographic Daily Usage Report".

1.3 The film badge insert shall be returned monthly to the Radiation Safety Health Officer.

2.0 OPERATIONS OF X-RAY EQUIPMENT AT PERMANENT LOCATIONS

2.1 No radioactive isotopes shall be used for radiographic exposures in the exposure room of the Dearborn Laboratory.

2.2 A calibrated radiation survey meter shall be present when operating radiation emitting equipment.

2.3 Inspection of safety interlocks and warning equipment shall be performed prior to each day's use and recorded on the "Daily Exposure Room Report".

2.4 The exterior of exposure room walls and accesses shall be surveyed quarterly to determine any deterioration in radiation shielding.

2.5 Accurate records shall be kept of radiographic exposure time (milli-ampere minutes) and shall be recorded on the "Daily Exposure Room Report".

2.6 Daily dosimeter reads shall be recorded on the "Daily Exposure Room Report".

2.7 The x-ray device shall be "locked off" and the key removed when unattended.

3.0 OPERATION OF RADIOGRAPHIC EXPOSURE DEVICES AT FIELD LOCATIONS

3.1 The Michigan Department of Health, Division of Radiological Health shall be notified in writing two working days prior to radiographic exposure work. Should the foregoing pose an undue hardship, the notification may be made by telephone (517) 373-1578 and followed by written notification.

3.2 Equipment:

- Personnel monitoring devices (worn).
- Operable and calibrated radiation survey meter
- 4 each - "CAUTION - HIGH RADIATION AREA" signs
- 4 each - "CAUTION - RADIATION AREA" signs
- Sufficient rope to cordon off the high radiation and radiation areas
- X-ray film
- Film cassettes
- Film processing equipment
- Variable intensity viewlight
- Exposure calculator
- Collimator
- Densitometer

4.0 OPERATION OF X-RAY EQUIPMENT AT FIELD LOCATIONS

4.1 A calibrated survey meter shall be present at the job site and the area shall be surveyed at the start and during work to define the 5mr/hr contour line. This shall be recorded on the work location radiation information report.

4.2 Daily dosimeter readings shall be recorded on the "Work Location Radiation Information" report and shall be kept on file in the Laboratory.

4.3 Radiographic exposures will be taken only in restricted areas

4.3.1 Access to the restricted area shall be physically defined by signs, ropes, barricades, or other personnel barriers encompassing the 5 mr/hr contour line

4.3.2 The restricted area shall be identified by "Caution - Radiation Area" signs

4.3.3 A radiographer shall be present at all times when the tube control panel is energized. He shall be prepared to deenergize the tube immediately should personnel trespass into the restricted zone.

4.4 The x-ray control panel shall be "locked off" and the key removed when left unattended.

4.5 Refer to 5.26 for rural areas and frequent location changes

5.0 RADIOGRAPHIC EXPOSURES WITH RADIOACTIVE ISOTOPES USING THE GULF NUCLEAR MODEL 20VS EXPOSURE DEVICE.

- 5.1 Survey exposure device - this provides a reference survey for later reference and assures that survey meter is operational
- 5.2 Inspect control cables, exposure device and source tube for defects and damage.
- 5.3 Remove the protector cap from the lock block of the exposure device thereby exposing the pigtail connector
- 5.4 Crank the control cable end out approximately 6 inches
- 5.5 Connect control cable to pigtail
- 5.6 Retract control cable so that the male connecting thread may be screwed into the lock box
- 5.7 Screw control cable into lock box
- 5.8 Remove the safety plug from the outlet
- 5.9 Connect the source tube to the outlet
- 5.10 Place the free end of the source tube in the desired position for an exposure, trying to keep it in a straight line without kinking.
- 5.11 Stretch the control cable away from the exposure device in as straight a line as possible, again, carefully avoid kinking
- 5.12 High Radiation Area:
By definition, the High Radiation Area is an area which will have a radiation intensity in excess of 100mr/hr. This area will be determined by the following calculation:

$$d = \sqrt{\frac{S (1000) \times 5.9 \times T}{100 \times 60}}$$

Where: d = distance in feet from source, adjusted for time

S = Source strength, curies

5.9 = radiation intensity in Roentgens of 1 curie of IR-192 at 1 foot from the source

T = maximum total time in minutes source is exposed during any consecutive 60 minutes

Note: For simplicity the slightly conservative formula $d = \sqrt{S \cdot T}$ may be used.

- 5.13 Radiation Area: By definition the Radiation Area is an area in which radiation intensity exceeds 5 mr/hr. This may be calculated by the following formula:

$$d = \sqrt{\frac{S (1000) \times 5.9 \times T}{5 \times 60}}$$

When: d = distance in feet from source adjusted for time.

S = Source strength, curies

5.9 = radiation intensity in Roentgens of 1 curie of IR 192 at 1 ft.

T = maximum total time in minutes source will be exposed in any 60 consecutive minutes.

This calculation shall be verified by a physical radiation survey.

Note: For simplicity the slightly conservative formula $d = \sqrt{20 ST}$ may be used.

- 5.14 Place rope cordons around the calculated zones. Place four "CAUTION - HIGH RADIATION AREA" signs around the high radiation area boundary. Place four "CAUTION - RADIATION AREA" signs around the calculated radiation area perimeter.
- 5.15 Crank out source as quick and smoothly until stopped by the source tube tip.
- 5.16 Survey and verify radiation area perimeter.
- 5.17 Restricted Area: by definition, an area with radiation intensity exceeding 2 mr/hr. Define the restricted area by a radiation survey and post "CAUTION - RADIATION AREA" signs.
- 5.18 Maintain constant surveillance over the Restricted Area
- 5.19 If, at any time during an exposure, any persons penetrates the Restricted Area retract the source to the shielded position and make a radiation survey of the exposure device and source tube. Halt all operations until the area is cleared of personnel.
- 5.20 At end of exposure retract the source to the shielded position
- 5.21 Survey the source tube and exposure device carefully to assure that the source has returned to the shielded position.
- 5.22 Depress plunger lock
- 5.23 An unlocked exposure device shall not be left unattended

- 5.24 Reverse the assembly operation. Insert Safety Plug.
- 5.25 Conduct a radiation survey of the exposure device at the termination of the day's work before storage. This final survey must be recorded on the Daily Usage Report.
- 5.26 For pipeline work in rural areas where it is impractical to erect barriers and rope off the radiation area because of frequent location changes the following steps must be taken:
1. Post "Caution - High Radiation Area" signs around the high radiation area perimeter.
 2. Maintain constant vigilance for intrusion of the restricted area
- 5.27 Carefully fill out the daily radiographic exposure report including beginning and ending dosimeter reads.

6.0 LEAK TESTING RADIOACTIVE ISOTOPE DEVICES

- 6.1 Leak test of entire source changer shall be performed upon receipt.
- 6.2 Leak test of exposure devices shall be performed immediately upon loading each new source and at intervals not to exceed 6 months thereafter.
- 6.3 A Gulf Nuclear, Incorporated, Model LTK-1 Leak Test Service Kit shall be used to perform this required leak test.
- 6.4 Perform radiation survey of the exposure device, giving careful attention to the source outlet.
- 6.5 Remove the safety plug
- 6.6 Mix detergent from leak kit with a small amount of water
- 6.7 Remove the swab from the plastic container at the left side of the leak test packet
- 6.7.1 Dip the swab into the detergent solution. Wipe the source outlet conduit of the exposure device to the accessible depth.
 - 6.7.2 Replace the swab in the plastic container from which it was removed
 - 6.7.3 Remove the dry swab from the plastic container on the right side of the leak test packet. Do not dip this swab in the detergent.

- 6.7.4 Repeat the wipe process performed with the wetted swab.
- 6.7.5 Replace the swab in the plastic container from which it was removed.
- 6.7.6 Fill in the required information as specified on the front of the leak test kit.
- 6.7.7 Perform a radiation survey of the completed leak test kit prior to mailing.
- 6.7.8 If no detectable radiation is found when the wipe(s) are brought to within 1 inch of the survey meter, mail the kit to:

Gulf Nuclear Incorporated
100 NASA Road One Suite 411
Webster, Texas

- 6.7.9 If any detectable radiation is found during the survey of 6.7.8 above remove the exposure devices from service and notify the Radiation Safety Officer immediately.
- 6.7.10 If the results of any leak test contain an excess of 0.005 microcuries of IR-192 remove the exposure device from service and notify the Radiation Safety Officer.

7.0 CHANGING SOURCES

- 7.1 Radioactive sources will be changed in the Gulf Nuclear 20 VS exposure device using a Gulf Nuclear Model U-110-A, or Gamma Industries C-10 source changer. The source changer (property of Gulf Nuclear, Incorporated) will be received in a DOT "Type B" shipping drum. The new source will be housed in one of the two source wells of the same changer.
- 7.2 Survey the container at its surface and at one meter (39.4 inches) to assure that it complies with its shipping label.
- 7.3 Remove the source changer from the shipping drum
- 7.4 Perform a reference radiation survey of the changer and exposure device.
- 7.5 Set up the exposure device for normal operation with the changer conduit attached. Attach end of tube to the empty side of the source changer.
- 7.6 Standing as far away as possible from the exposure device and source changer, crank the spent source into the source changer. Monitor radiation level during this operation.

- 7.7 Conduct radiation survey of the exposure device, source changer tube and source changer for acceptable radiation levels.
- 7.8 Lock source into place and remove the key
- 7.9 Unscrew the source tube from the source changer. Monitor radiation level during this operation. The connector of the spent source should protrude about 1/2 inch from the port.
- 7.10 Disconnect the source from the drive cable while monitoring the radiation level.
- 7.11 Remove the safety cap from the new source and install on the spent source.

8.0 INSTALLATION OF THE NEW SOURCE IN THE EXPOSURE DEVICE

- 8.1 Connect the new source to the drive cable, continuing to monitor radiation levels.
- 8.2 Screw changer tube onto source changer, then unlock the source changer
- 8.3 Retract the new source into the exposure device while standing as far away as possible. Monitor radiation level during this operation.
- 8.4 Conduct radiation survey of the exposure device, source changer tube and source changer to assure the isotope is properly shielded in the exposure device.
- 8.5 Lock the exposure device
- 8.6 Disassemble source changer tube, device cable, etc
- 8.7 Remove the metal source identification plate from the source changer and fasten to the exposure device.
- 8.8 Replace the source changer and the changer tube in the DOT "Type B" shipping drum
- 8.9 Prepare the drum for return shipment to Gulf Nuclear Incorporated.

RADIOGRAPHIC USAGE REPORT

Date: _____

Radiographer: _____

Dosimeter Read: Start _____ End _____

Assistant Radiographer: _____

Dosimeter Read: Start _____ End _____

Survey Instrument:

Model _____ Serial No.: _____ Calibration Date: _____

X-Ray Equipment:

Make: _____ Model _____ Total Milliampere:minutes _____

Isotope Exposure Device:

Model: _____ Serial No.: _____ Visual Inspection kg _____

Iridium 192 Source:

Make: _____ Model _____ Curie Strength _____ Total Exposure Time _____

Initial reference radiation survey of exposure device _____ mr/hr

Location: _____

Requested by: _____ Job or Function No: _____

Distance from source to high radiation zone boundary: _____

Distance from source to radiation zone boundary: _____

Distance from source to restricted zone boundary: _____

Weld Size _____ No. of welds inspected _____

Weld Size _____ No. of welds inspected _____

Weld Size _____ No. of welds inspected _____

Final radiation survey of exposure device prior to storage _____ mr/hr

Report executed by: _____

QUARTERLY INVENTORY AND MAINTENANCE REPORT

Location: _____ Date: _____

Type of Exposure Device	Serial Number	Source Material	Serial Number	Source Strength Curies	Assigned To	Date of Last Leak Test

Make and Model of Survey Meter	Serial Number	Assigned to	Date Calibrated

Number of Usable Dosimeters: _____

QUARTERLY MAINTENANCE OF EXPOSURE EQUIPMENT

Clean, inspect and lubricate crank assembly :
Performed by: _____

Clean and inspect control cable assembly:
Performed by: _____

Clean and inspect source tubes:
Performed by: _____

Clean and inspect accessible portions of exposure device:
Performed by: _____

Radiation Safety Officer

N.D.T. Analyst

1-16-85

Record of Transfer

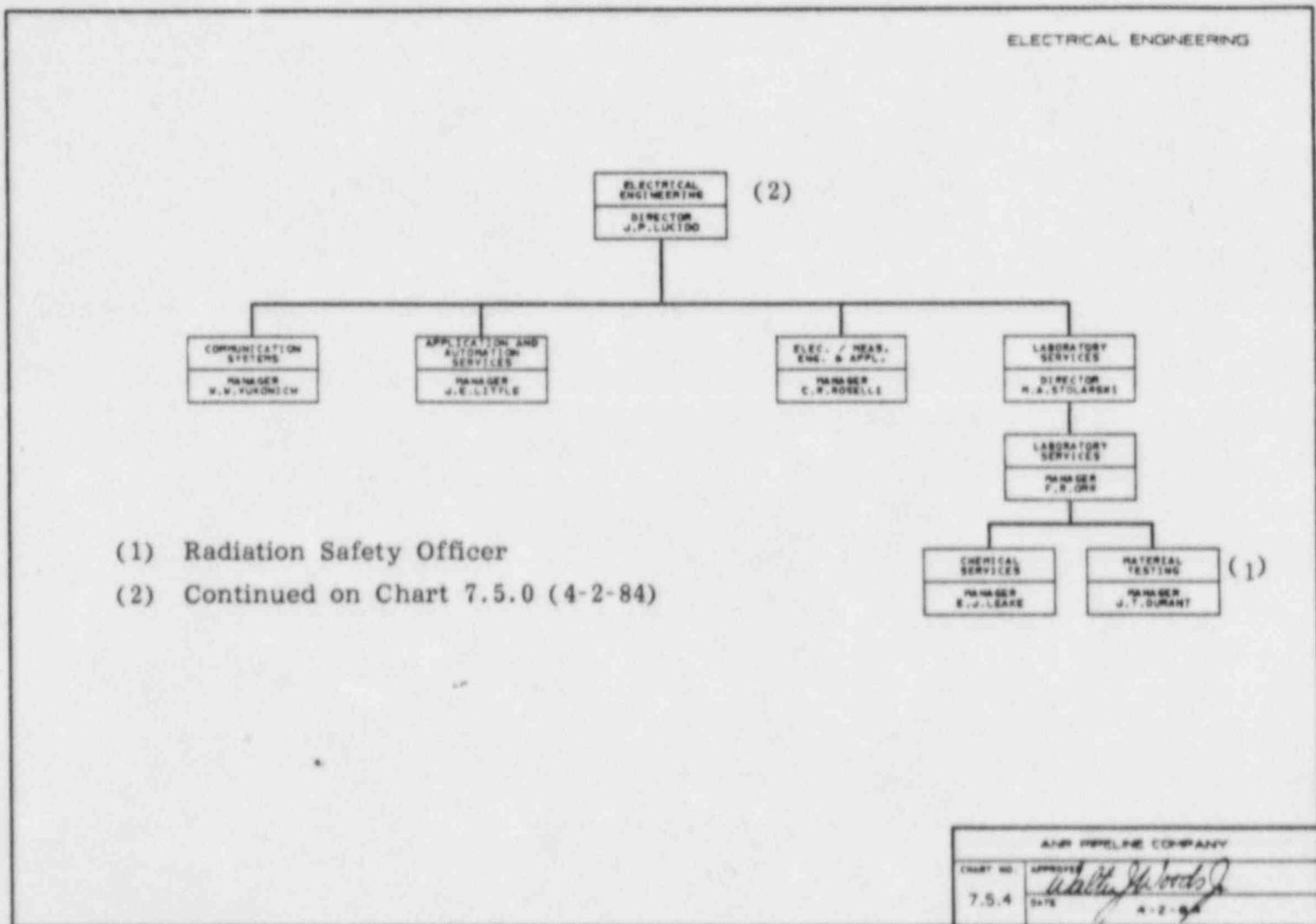
Radiographer:

Isotope: IR-192

Date Shipped	To Whom:	Serial Number	Source Strength	Leak Test Date	Radiation Surveys	
					Exposure Device	Shipping Container

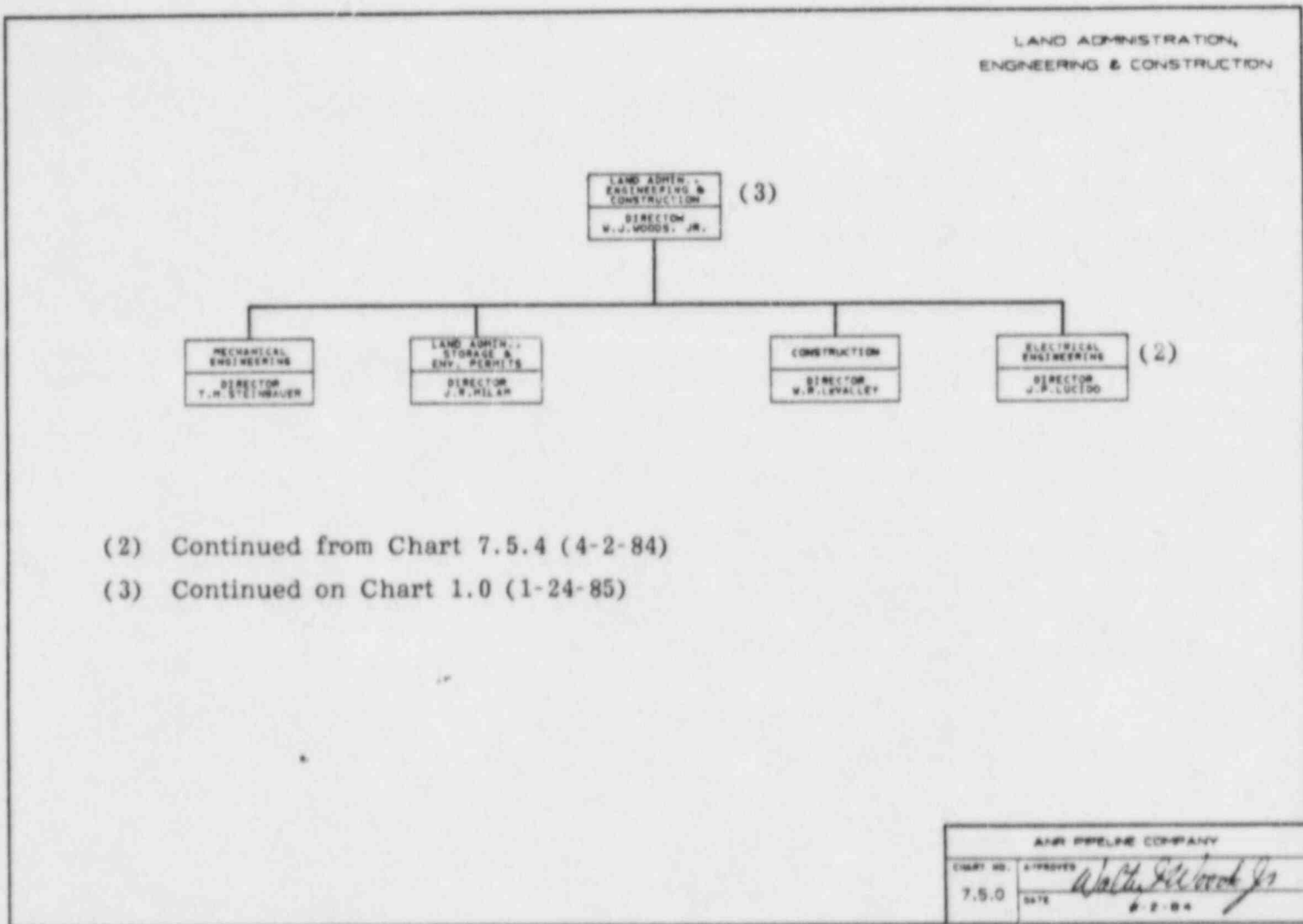
Attachment VI

CH. 7.5.0.01.000.000



Attachment VI-a

CM, PL, SA, DM, LA, CONEN



Attachment VI-b

