NRC FORM 313 (3-2009) 10 CFR 30, 32, 33, 34, 35, 36, 39, and 40

U.S. NUCLEAR REGULATORY COMMISSION

APPLICATION FOR MATERIALS LICENSE

APPROVED BY OMB: NO. 3150-0120 EXPIRES: 3/31/2012

Estimated burden per response to comply with this mandatory collection request: 4.3 hours. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. Send comments regarding burden estimate to the Records and FOIA/Privacy Services Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0120), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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.

APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

OFFICE OF FEDERAL & STATE MATERIALS AND
ENVIRONMENTAL MANAGEMENT PROGRAMS
DIVISION OF MATERIALS SAFETY AND STATE AGREEMENTS
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:

IF YOU ARE LOCATED IN:

ALABAMA, CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, FLORIDA, GEORGIA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, NORTH CAROLINA, PENNSYLVANIA, PUERTO RICO, RHODE ISLAND, SOUTH CAROLINA, TENNESSEE, VERMONT, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

LICENSING ASSISTANCE TEAM
DIVISION OF NUCLEAR MATERIALS SAFETY
U.S. NUCLEAR REGULATORY COMMISSION, REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

IF YOU ARE LOCATED IN:

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

MATERIALS LICENSING BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, IL 60532-4352

ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MISSISSIPPI, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING, SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
612 E. LAMAR BOULEVARD, SUITE 400
ARLINGTON, TX 76011-4125

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 JURISDICTIONS.

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)*

Emery Sapp & Sons, Inc
2602 N. Stadium Blvd
Columbia, MO 65202

3. ADDRESS WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED

2601 N. Stadium Blvd
Columbia, MO 65202

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Jeff Stephens

TELEPHONE NUMBER

(573) 445-8331

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.

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

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

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

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

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

FEE CATEGORY **3.P.** AMOUNT ENCLOSED $ **1,300.00**

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, 36, 39, AND 40, AND THAT ALL INFORMATION CONTANED 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.

CERTIFYING OFFICER – TYPED/PRINTED NAME AND TITLE	SIGNATURE	DATE
Jeff Stephens, Radiation Safety Officer		**06/03/2009**

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
			$		
APPROVED BY				DATE	

Item 5.

RADIONUCLIDE	SEALED SOURCE	Maximum Amount that will be possessed at one time
A. Cs-137	Special Form Troxler Drawing #A-102112	No single source to exceed 9 mCi
B. Am-241:Be	Special Form Troxler Drawing #A-102451	No single source to exceed 11 mCi

AUTHORIZED USE

A. For use in TROXLER MODEL 3400 series measuring devices.

B. For use in TROXLER MODEL 3400 series measuring devices.

POSSESSION LIMIT COMMITMENT

We will confine our possession of licensed material to quantities such that we will not exceed the applicable limits of 10 CFR 30.35(d).

DATA ON REGISTRATION CERTIFICATES

MANUFACTURER	REGISTRY NO.	MODEL NO.
TROXLER	NC-646-D-130-S	3400 SERIES

Item 6.

A. For use in Troxler Model 3400 series portable measuring gauges to measure construction materials.

B. For use in Troxler Model 3400 series portable measuring gauges to measure construction materials.

The maximum depth the density source rod will be lowered is 12 inches.

Item 7.

Jeff Stephens, RSO – Before obtaining licensed materials, the proposed RSO will have successfully completed Troxler Nuclear Gauge Safety Training Class or Troxler's Radiation Safety Officer Training Class.

Before being named as the RSO, future RSOs will have successfully completed Troxler's Nuclear Gauge Safety Training Class or Troxler's Radiation Safety Officer Training Class. See attached RSO Responsibilities.

Item 8.

Each individual that will operate the nuclear gauge will complete the Troxler Nuclear Gauge Training course taught by Troxler Instructors, received copies of and have read and understand our radiation safety procedures and be approved by our Radiation Safety Officer. Copies of each individual's training certificate will be maintained on file.

Item 9.

Permanent Storage: 2601 N. Stadium Blvd
Columbia, MO 65202

Temporary Storage: 8574 US 67
Fredericktown, MO 63645

Please find the attached storage location sketches and public dose calculation sheets for each location.

Item 10.

See Attached

Item 11.

Disposition of the gauge will be by transfer to either another licensee specifically licensed to possess the radioactive material or to a licensed disposal facility. It is our intent to recycle the sealed sources used in our gauges back to the manufacturer. In this manner waste is not created.

RSO RESPONSIBILITIES

The RSO is responsible for ensuring the following:

Stopping licensed activities that the RSO considers unsafe.

Possession, use, storage, and maintenance of sources and gauges are consistent with the limitations of the license, the Sealed Source and Device Registration sheet(s), and manufacturer's recommendations and instructions.

Individuals using gauges are properly trained.

When necessary, personnel monitoring devices are used and exchanged at the proper intervals; records of the results of such monitoring are maintained.

Gauges are properly secured.

Proper authorities are notified in case of accident, damage to gauges, fire or theft.

Unusual occurrences involving the gauge (eg, accident, damage) are investigated, cause(s) and appropriate corrective action are identified, and corrective action is taken.

Audits are performed at least annually and documented, and corrective actions taken.

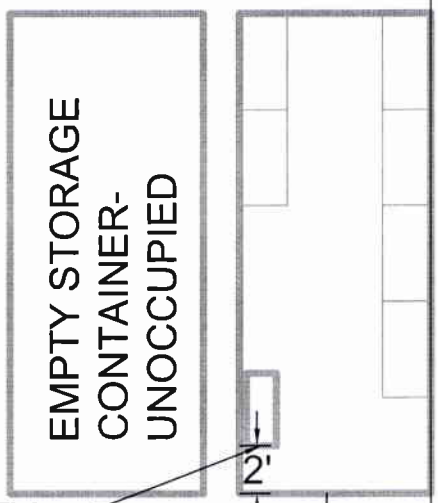
Licensed material is transported in accordance with all applicable DOT requirements.

Licensed material is disposed of properly.

Appropriate records are maintained.

Up to date license is maintained and amendment and renewal requests submitted in a timely manner.

OPEN GRASSED AREA



GRAVEL PARKING LOT

STORAGE CONTAINER- DOUBLE LOCKED, UNOCCUPIED

NUCLEAR DENSITY GAUGE - KEPT UNDER DOUBLE LOCK & KEY

60' TO ESS SHOP

CONCRETE DRIVE & PARKING LOT

Nuclear Density Gauge - Permenant Storage
2601 N. Stadium Blvd.
Columbia, MO 65202

Emery Sapp & Sons, Inc.
2602 N. Stadium Blvd.
Columbia, MO 65202
573.445.8331

May 8, 2009 | Sheet: 1 of 1

APPENDIX G
PUBLIC DOSE CALCULATION WORKSHEET

PERMANENT SOURCE
2601 N. STADIUM BLVD
COLUMBIA, MO 65202

To demonstrate compliance, you must show that the maximum dose to any ***member of the public*** will be less 100 millirem in a year and that the maximum dose in any ***unrestricted area*** will be less than 2 millirem in any one hour. The typical limiting case involves the storage of gauges. Several simplifying and conservative assumptions are made in this calculation method:

- No shielding other than the shielding in the gauge is assumed to be present.
- All gauges are assumed to be at the same distance as the closest gauge.
- Sources are assumed to remain in the shielded position within the gauge.
- Each gauge is assumed to be a point source and dose rates are assumed to decrease with the inverse square of distance from the gauge.
- Gauges are assumed to be in storage all of the time.

More realistic assumptions can be made or actual measured dose rates can be used if necessary to demonstrate compliance.

Step	Instruction	Result
	DOSE TO MEMBER OF PUBLIC IN ONE YEAR	
1	Identify the individual member of the public likely to receive the highest dose from gauges in storage. This will be the person who spends the most time in the vicinity of the stored gauges or who is closest to the gauges. This individual will be the focus of the calculation.	ESS SHOP EMPLOYEE T=1
2	Determine the maximum dose rate in mrem/hr at a distance of three feet (1 meter) for each gauge kept in the storage location. This value may be obtained from the radiation profile in the gauge operation manual, from the manufacturer, or from Transport Index on the Yellow II label on the transport case. Calculate the sum of the dose rate values for all of the gauges that may be stored at this location and enter the result. Remember to include both gamma and neutron dose.	.6
3	Enter the distance in feet from the position occupied by the person identified in step 1 to the nearest gauge in the storage area.	60'
4	Calculate the square of the distance from step 3 and enter the result.	3600
5	Divide the value from step 4 by 9 and enter the result. This is a factor that accounts for the difference between the dose rate at 3 feet and the dose rate at the distance at which the person is located.	400
6	Divide the dose rate (mrem/hr) from step 2 by the result from step 5 and enter the result.	.0015
7	Enter the number of hours in a year that the individual will be present in the vicinity of the gauges. For example, an individual working full-time near the near the gauges, would be present approximately 2000 hrs in a year (8 hrs per day x 5 days per week x 50 weeks per year).	2000
8	Multiply the result from step 6 by the result from step 7 and enter the result. This is the maximum dose in mrem the individual could receive in one calendar year. If this value is less than 100 mrem, the annual dose limit is met; continue with step 9 to determine if the unrestricted area dose rate limit is met.	3

PERMANENT STORAGE
2601 N. STADIUM BLVD
COLUMBIA, MO 65202

	DOSE IN UNRESTRICTED AREAS IN ONE HOUR	
9	Determine the minimum distance in feet to any unrestricted area outside the gauge storage area and record the value. This could be an area above, below, or adjacent to the storage area that is unrestricted **for the purpose of radiation control.** The area need not be occupied, just accessible to members of the public, which may include company employees.	2'
10	Calculate the square of the distance from step 9 and enter the result.	4
11	Divide the value from step 10 by 9 and enter the result. This is a factor that accounts for the difference between the dose rate at 3 feet and the dose rate at the distance in step 9.	0.444
12	Divide the dose rate (mrem/hr) from step 2 by the result from step 11 and enter the result. This is the maximum dose in mrem that could be received in one hour in the closest unrestricted area. If this value is less than 2 mrem, the dose limit for unrestricted areas is met.	1.35
Calculations performed by	CHARLES FARRIS	**Date** 6/3/09

If either dose limit is exceeded, you should either recalculate that dose using more realistic assumptions and data or take steps to reduce the dose received by members of the public using the principles of time, distance, and shielding.

- Limit the time personnel spend in the vicinity of the gauges
- Increase the distance between the gauges and personnel
- Add shielding to reduce the dose rate

OCCUPANCY FACTORS

The following occupancy data may be used when data for specific personnel are not available:

Area	Occupancy Factor (T)
Work areas such as offices, laboratories, shops, wards, nurses' stations; living quarters; children's play areas; and occupied space in nearby buildings.	Full Occupancy (T=1)
Corridors, rest rooms, elevators using operators, unattended parking lots.	Partial Occupancy (T=1/4)
Waiting rooms, toilets, stairways, unattended elevators, janitor's closets, outside areas used only for pedestrians or vehicular traffic.	Occasional Occupancy (T=1/16)

Reference: NCRP Report No. 49, *Structural Shielding Design and Evaluation for Medical Use of X-Rays and Gamma Rays of Energies Up to 10 MeV, 1976*

SHIELDING HALF-VALUES*

Material	Cs-137 Gamma Radiation	Am:Be Neutron Radiation
Lead	¼ in.	N/A
Concrete	2 in.	4 in.

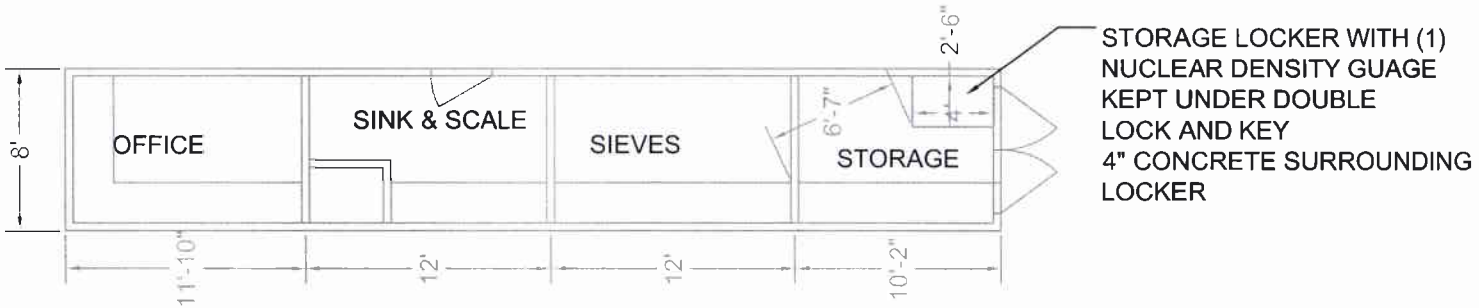
* The half-value is the thickness of material that will reduce the dose rate by one-half.

Nuclear Densily Gauge - Temporary Storage
8574 US 67
Fredericktown, MO 63645

Emery Sapp & Sons, Inc.
2602 N. Stadium Blvd.
Columbia, MO 65202
573.445.8331

May 8, 2009

Sheet: 1 of 1



STORAGE LOCKER WITH (1)
NUCLEAR DENSITY GUAGE
KEPT UNDER DOUBLE
LOCK AND KEY
4" CONCRETE SURROUNDING
LOCKER

SEMI-TRAILER LABORATORY
GRAVEL PARKING SURROUNDING TRAILER

TEMPORARY STORAGE
8574 US 67
FREDERICKTOWN, MO
63645

APPENDIX G
PUBLIC DOSE CALCULATION WORKSHEET

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3	Enter the distance in feet from the position occupied by the person identified in step 1 to the nearest gauge in the storage area.	6'7" (6.583)
4	Calculate the square of the distance from step 3 and enter the result.	43.335
5	Divide the value from step 4 by 9 and enter the result. This is a factor that accounts for the difference between the dose rate at 3 feet and the dose rate at the distance at which the person is located.	4.8151
6	Divide the dose rate (mrem/hr) from step 2 by the result from step 5 and enter the result.	.031152
7	Enter the number of hours in a year that the individual will be present in the vicinity of the gauges. For example, an individual working full-time near the near the gauges, would be present approximately 2000 hrs in a year (8 hrs per day x 5 days per week x 50 weeks per year).	2000
8	Multiply the result from step 6 by the result from step 7 and enter the result. This is the maximum dose in mrem the individual could receive in one calendar year. If this value is less than 100 mrem, the annual dose limit is met; continue with step 9 to determine if the unrestricted area dose rate limit is met.	62.3

TEMP. STORAGE
8574 US 67
FREDERICKTOWN, MO
63645

	DOSE IN UNRESTRICTED AREAS IN ONE HOUR	
9	Determine the minimum distance in feet to any unrestricted area outside the gauge storage area and record the value. This could be an area above, below, or adjacent to the storage area that is unrestricted **for the purpose of radiation control.** The area need not be occupied, just accessible to members of the public, which may include company employees.	2'
10	Calculate the square of the distance from step 9 and enter the result.	4
11	Divide the value from step 10 by 9 and enter the result. This is a factor that accounts for the difference between the dose rate at 3 feet and the dose rate at the distance in step 9.	0.444
12	Divide the dose rate (mrem/hr) from step 2 by the result from step 11 and enter the result. This is the maximum dose in mrem that could be received in one hour in the closest unrestricted area. If this value is less than 2 mrem, the dose limit for unrestricted areas is met.	.6751
Calculations performed by CHARLES FERRIS		**Date** 6/3/09

If either dose limit is exceeded, you should either recalculate that dose using more realistic assumptions and data or take steps to reduce the dose received by members of the public using the principles of time, distance, and shielding.

- Limit the time personnel spend in the vicinity of the gauges
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OCCUPANCY FACTORS

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Waiting rooms, toilets, stairways, unattended elevators, janitor's closets, outside areas used only for pedestrians or vehicular traffic.	Occasional Occupancy (T=1/16)

Reference: NCRP Report No. 49, *Structural Shielding Design and Evaluation for Medical Use of X-Rays and Gamma Rays of Energies Up to 10 MeV, 1976*

SHIELDING HALF-VALUES*

Material	Cs-137 Gamma Radiation	Am:Be Neutron Radiation
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EMERY SAPP & SONS

NUCLEAR GAUGE

RADIATION SAFETY PROGRAM

June 2009

TABLE OF CONTENTS

List of Appendices

Introduction

This manual contains policies and procedures to be followed by all employees and to ensure an effective radiation safety program. The requirements in this manual are intended to supplement the instructions and license conditions of the applicable regulatory agency. In the event of conflict, state or federal regulations or license conditions shall supersede the requirements of this manual.

Any questions on the interpretation of the requirements in this manual should be directed to the Company's Radiation Safety Officer.

ALARA Policy

The Company is committed to the ALARA philosophy of maintaining occupational and public radiation doses as low as reasonably achievable. All personnel using nuclear gauges will be made aware of this commitment and will be instructed in the procedures for keeping their exposures ALARA. Management has delegated authority to the Radiation Safety Officer (RSO) to ensure adherence to ALARA principles and will provide all necessary and reasonable resources to implement this policy.

1 Responsibilities

1.1 Radiation Safety Officer (RSO)

The responsibilities of the RSO shall include the following:

1.1.1 Oversee the radiation safety program for all operations and facilities.

1.1.2 Provide technical support and assistance to any Field Office RSO's.

1.1.3 Maintain all records required by the license and applicable regulations, including personnel monitoring records, leak test records, inventory records, training records for users, and receipt, transfer and disposal records;

1.1.4 Ensure audits of the radiation safety program are performed annually and corrective actions are taken.

1.1.5 Ensure the license is maintained current and amendment and renewal requests are submitted in a timely manner.

1.2 All Authorized Gauge Users

The responsibilities of all nuclear gauge users shall include the following:

1.2.1 Adhere to the requirements of all applicable regulations, license conditions, and this manual.

1.2.2 Conduct all activities and operations in a manner consistent with ALARA principles.

1.2.3 Notify the RSO immediately of the loss or theft of radioactive material or any incident involving radioactive contamination, leaking sources, unmonitored exposure to radiation, or other hazardous conditions.

2 Definitions

2.1 ALARA (As Low As Reasonably Achievable)

Making every reasonable effort to maintain exposures to radiation as far below the regulatory dose limits as is practical consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to the utilization of licensed materials in the public interest.

2.2 Authorized User

Employees who supervise the use of radioactive material and who supervise individuals who work with radioactive material. Authorized users are qualified, by training and experience, to assure radioactive material is used for its intended purpose in a manner that protects health and minimizes danger to life or property.

2.3 Background Radiation

The ambient radiation field to which humans are exposed daily, originating from cosmic rays, naturally-occurring radionuclides (40K, etc.) and human endeavors (fallout, fuel cycle, etc.).

2.4 Contamination

The deposition of radioactive material on accessible surfaces of structures, objects, equipment, or personnel.

2.5 Declared Pregnant Woman

A woman who has voluntarily informed her employer, in writing, of her pregnancy and the estimated date of conception.

2.6 Extremity

The hands, elbow, arm below the elbow, foot, knee, or leg below the knee.

2.7 May

The word "may" is to be understood as permission, neither a requirement nor a recommendation.

2.8 Member of the Public

Members of the public include persons who live, work, or may be near locations where portable gauges are used or stored. This includes employees whose assigned duties do not involve using or handling portable gauges or radioactive sources.

2.9 Occupational Dose

The dose received by an individual in a restricted area or in the course of employment in which the individual's assigned duties involve exposure to radiation and to radioactive material from licensed or unlicensed sources of radiation.

2.10 Public Dose

The dose received by a member of the public from exposure to radiation and to radioactive material released by a licensee, or to another source of radiation either within a licensee's controlled area or in unrestricted areas.

2.11 RSO (Radiation Safety Officer)

The term "RSO" when used by itself refers to the Company's Radiation Safety Officer.

2.12 Radiation Area

Any area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of five (5) millirem in one hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.

2.13 Radioactive Material Storage Area

A restricted area where radioactive materials are secured from unauthorized removal or access, or where constant surveillance over the materials is maintained.

2.14 Restricted Area

Any area accessible to individuals to which access is limited by the Company for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials.

2.15 Sealed Source

Any device containing radioactive material that is permanently bonded, fixed, or encapsulated so as to prevent release and dispersal of the radioactive material under the most severe conditions which are likely to be encountered in normal use and handling.

2.16 Shall

The word "shall" is to be understood as a requirement.

2.17 Should

The word "should" is to be understood as a recommendation.

2.18 Unrestricted Area

Any area to which access is neither limited nor controlled by the Company for purposes of controlling exposure to radiation. The Company may control access to these areas for other purposes, such as security. Unrestricted areas may include offices, shops, laboratories, and areas outside buildings.

3 Licenses

3.1 The Radiation Safety Officer shall maintain a current copy of the Company's license to possess, use, and service (if applicable) nuclear gauges. A copy of the license shall be kept on file; a notice shall be posted stating where employees can view copies of the regulations and license.

3.2 Each Temporary Field Office shall maintain a current copy of the Company's license to possess, provide service (if applicable) and use nuclear gauges. A copy of the license shall be kept on file at the Company's main office and Branch Offices and a notice shall be posted at the Temporary field office stating where employees can view copies of the regulations and license.

3.3 License renewals must be submitted at least 30 days prior to the expiration date to ensure "timely renewal" status will be granted.

3.4 The license should be amended whenever any information submitted in the original application is to be modified, e.g., changes to facilities, equipment, procedures, or personnel mentioned or referenced in the license.

3.5 Personnel traveling outside the state with radioactive materials must apply for and receive reciprocity from the appropriate licensing agency in advance of travel. The RSO shall be advised in advance of any such travel.

4 Public Dose

4.1 Dose to members of the public from the use, transport, or storage of all licensed radioactive material shall be kept below 100 mrem in any one year and less than 2 mrem in any one hour in any unrestricted area.

4.2 Documentation shall be maintained demonstrating by calculation, measurement, or a combination of both that the above limits are met. See Appendix J for further guidance.

5 Occupational Dose

5.1 Each individual working in a restricted area or handling nuclear gauges shall be assigned a whole-body radiation monitoring device (e.g., TLD or film badge) capable of measuring gamma and neutron radiation if required. Film or TLD badges are assigned to specific individuals and shall not be used by any other employee.

5.2 The assigned film or TLD badge shall be worn at all times while working at the facility. When not being worn the badge shall be stored in a low background area.

5.3 Film or TLD badges shall be read monthly or quarterly by a NVLAP-accredited processor.

5.4 The dose report shall be reviewed by the RSO to determine compliance with regulatory occupational exposure limits and to confirm that personnel exposures are ALARA. In the event of an unusually high exposure, the RSO shall notify the employee in question and initiate a review of the safety procedures with regards to the employee's work.

5.5 A copy of the monitoring report shall be maintained on file and exposure results made available annually to all badged individuals.

5.6 Upon written request, former employees are entitled to receive a report of the radiation exposure received during their employment with this company.

5.7 Employees whose work requires their hands to be in close proximity to the gauge may be assigned an extremity dosimeter which shall be worn on the wrist or hand.

6 Embryo/Fetus Dose

6.1 Employees are encouraged to notify supervision upon becoming pregnant, however, declaration of pregnancy is voluntary and implies a willingness to abide by lower dose limits for the protection of the embryo/fetus and accept temporary changes in work schedules, location, or assignments.

6.2 All declarations of pregnancy shall be made in writing to the individual's supervisor, the RSO, or the personnel department and shall include the estimated date of conception. A sample form for declaring pregnancy is contained in Appendix E. A doctor's statement is not required. A woman may withdraw a declaration of pregnancy at any time by providing written notice.

6.3 Upon declaration of pregnancy, an evaluation shall be performed to determine the potential for the employee to exceed the regulatory exposure limit during the nine month gestation period. If the potential for exposure in excess of the dose limits exists, the employee may be transferred to a different job assignment.

6.4 Declared pregnant women with the potential to exceed 50 millirem during the course of pregnancy shall be assigned a film or TLD badge.

6.5 Dose to an embryo/fetus of a declared pregnant woman shall not exceed 500 millirem during the entire pregnancy.

6.6 If the dose to an embryo/fetus is found to have exceeded 450 millirem by the time the woman declares the pregnancy, additional dose to the embryo/fetus shall not exceed 50 millirem during the remainder of the pregnancy.

6.7 If a woman does not declare pregnancy, she will be subject to the normal occupational exposure limits.

7 Training

7.1 All employees shall attend an approved Nuclear Gauge Safety Training course presented by a qualified instructor prior to using nuclear gauges. This course shall address the types and quantities of radioactive material used in nuclear gauge equipment, the types of radiation emitted by this material, exposure levels associated with using these gauges, and safety precautions for all gauge related activities. An outline for the Nuclear Gauge Safety Training course is contained in Attachment B.

7.2 In addition, all new gauge operators shall be instructed in the requirements of the Radiation Safety Program as contained in this manual and the radiation safety procedures that must be observed in performing assigned duties.

7.3 All gauge certified employees shall receive refresher training in radiation protection annually and in Hazmat transportation requirements every three years (per US DOT regulations) or every two years (per IATA regulations).

7.4 Documentation of all training shall include the employees name, social security number, description of training, date trained, and name of person conducting the training.

8 Authorized Users

8.1 Each employee who will perform RSO duties, operate or transport nuclear gauges shall be approved by the RSO.

8.2 A list of approved individuals shall be maintained by the RSO.

8.3 Approved individuals shall possess a combination of training and experience sufficient to perform the duties assigned as follows:

8.3.1 Nuclear gauge operators shall report directly to the RSO in all matters relating to radiation safety.

8.3.2 The individual shall have completed an 8-hour radiation safety officer training course or have equivalent experience in radiation safety.

8.3.3 The individual shall be instructed by the RSO as needed in licensing and the Company's radiation safety policies and procedures.

9 Surveys

9.1 Radiation surveys shall be performed in all restricted and unrestricted areas (e.g., gauge storage areas and offices) as required.

9.2 Radiation surveys (if required) shall be performed using a beta-gamma survey meter.

9.3 Radiation survey results shall be documented on Appendix A and reviewed by the RSO. A copy of each survey record shall be maintained on file by the RSO.

10 Receipt of Gauges

10.1 Upon receipt of a nuclear gauge for service, visually inspect the shipping container for damage. If there appears to be any evidence that the container has been involved in an accident or has been tampered with, notify the RSO.

10.2 Perform a radiation survey on contact with the surface of the package, paying particular attention to the area adjacent to where the sliding block is located. If the maximum surface dose rate as measured with a survey meter is greater than 10 mrem/hr, immediately perform a sliding block inspection and document the results in accordance with 17.1. Ensure the sliding block is fully closed before placing the gauge in the storage area.

10.3 Before any further handling of the gauge, perform a leak test of the gauge in accordance with Section 18.

10.4 Enter the gauge information on the Gauge Inventory Log or equivalent form. A sample of the log is contained in Appendix I.

10.5 Deliver the gauge to the designated storage area.

11 Radioactive Material Inventories

11.1 A complete written inventory of all gauges possessed under the license shall be maintained at all times.

11.2 A physical inventory of all licensed radioactive material shall be conducted at least semiannually. The inventory shall include customer gauges being held for service.

11.3 The inventory records shall include the following information:

- Model and serial number of each gauge
- Serial number, radionuclide, and activity of each sealed source
- The physical location of each gauge
- The date the inventory was conducted
- The signature of the RSO or designee

12 Posting and Labeling

12.1 Any container used to store radioactive material must be marked with the radiation warning symbol and the words "Caution - Radioactive Material". In addition, the container shall be labeled with sufficient information, such as the radionuclides present, estimated activity, and date of measurement, to permit individuals handling the materials or working in the vicinity to take appropriate precautions to minimize exposure. This requirement does not apply to any container used to temporarily store radioactive material for periods of less than 8 hours while under supervision or to gauge transport cases marked and labeled in accordance with DOT requirements.

12.2 The above referenced labels must be removed once the container no longer holds radioactive material.

12.3 Each Radiation Area shall be posted with a sign bearing the radiation symbol and the words "Caution - Radiation Area".

12.4 Each area in which nuclear gauges are used or stored shall be posted with a sign bearing the radiation symbol and the words "Caution - Radioactive Material(s)".

12.5 Posting of caution signs is not required in areas or rooms containing radioactive materials for periods of less than eight (8) hours if the materials are constantly attended and the area or room is under the RSO or his representative's control.

13 Working at Temporary Job Sites

13.1 Complete the gauge utilization log or equivalent form whenever a gauge is checked out for use at a temporary job site or returned to storage. A sample utilization log is contained in Appendix G.

13.2 When working at a temporary job site ensure that the license terms and conditions, and all applicable rules and regulations, are observed and that copies of the following documents are in your possession:

- License
- Gauge operation manual
- Latest leak test results
- Emergency procedures

13.3 Carry all proper shipping documents as required by transportation regulations including:

- Bill of lading
- Emergency response information

13.4 Maintain control over the gauges assigned to you at all times. The rear of a vehicle may be used as a temporary storage area when traveling. Ensure that the vehicle is locked at all times and that the gauges are not carried in the passenger area of the vehicle.

13.5 The RSO shall maintain a list of all gauges assigned to temporary field office personnel.

13.6 Ensure all gauges are leak tested at intervals not to exceed every 6 months in accordance with the procedures in this manual.

13.7 In the event of an accident that could possibly compromise the shielding or encapsulation of the source material, immediately notify the RSO and follow the emergency procedures in Section 22.

13.8 In the event that a gauge is lost or stolen, immediately notify the RSO.

14 Utilization Procedures

14.1 When the gauge is in the field, the authorized user must maintain control over the gauge at all times. The gauge must never be left unattended.

14.2 When not taking measurements, the gauge should be placed in the transportation case and returned to its permanent storage areas as soon as possible. The gauge is to be used only for its intended purpose.

15 Shipping Nuclear Gauges

15.1 Inspect each package of radioactive material prior to each shipment to verify that it is in proper condition for transport.

15.2 Document the inspection on the "Radiation Safety Shipping Checklist" (Appendix K) and retain on file with the shipping papers for 1 year following the shipment.

16 Transferring Gauges

16.1 This section applies whenever physical possession of a gauge is transferred from one licensed organization/individual to another for any reason (e.g., transferring a gauge to the main office or another field office).

16.2 Complete a Radioactive Material Transfer Request Form (Appendix H) and obtain authorization for the transfer from the Radiation Safety Officer.

16.3 When a loaner gauge is received from another organization, complete a Radioactive Material Transfer Request Form (Appendix H) to document receipt and addition of the gauge to the permanent inventory.

17 Gauge Maintenance

17.1 Inspect the sliding block on each 3400 and 4640 series gauge according to the "Inspecting the Sliding Block" procedure (Troxler P/N 108547) and document the "as found" condition on the "Gauge Safety Inspection Report" (Troxler P/N 108542). During sliding block inspections, keep body out of potential path of radiation beam.

17.2 Inspect the source rod inspection on each 3400 and 4640 series gauges according to the "Inspecting Source Rods" procedure (Troxler P/N 107259) and the document results on the "Gauge Safety Inspection Report" (Troxler P/N 108542). Report any cracked source rods to Corporate Radiation Safety and forward a copy of the Gauge Safety Inspection Report to the RSO.

17.3 Clean and lubricate the gauge in accordance with the instructions in the Troxler gauge operation and instruction manual.

17.4 In the event of an accident involving a source, follow the emergency instructions in Section 22.

17.5 Follow all safety instructions found in Troxler gauge service manuals.

18 Leak Testing

The procedures listed below are to be employed by all employees when leak testing gauges. The leak test procedure described is performed utilizing the Troxler Model 3880 leak test kit. If another type kit is used then follow the appropriate instructions for that kit.

18.1 Complete the information on the leak test report form. The information concerning the source material and serial number can be found on a label affixed to the gauge. Make sure you complete the block for the return address.

18.2 Complete the information of the label. Affix the label to the plastic bag.

18.3 On the filter paper, write the gauge model and serial number along the edge. Using the tongs, grasp the filter paper (Notation: Once you wipe the gauge, do not touch the filter paper. If a gauge were leaking, there would be radioactive material on the filter.) Wet approximately half the filter paper using the Radiac Wash which is a mild detergent that aids in holding any radioactive material that might be present.

18.4 Holding the tongs in one hand and the wood dowel in the other, wipe the area of the gauge as indicated in Appendix D. The wood dowel helps in making a firm contact between the filter paper and the gauge.

18.5 After performing the leak test, allow the filter paper to dry before placing in the plastic bag.

18.5.1 Send the leak test sample and form to Troxler Electronic Laboratories for analysis in the envelope provided.

19 Radiation Detection Instruments

19.1 If required, each office shall maintain radiation detection instruments for measuring beta-gamma radiation and contamination.

19.2 All radiation detection instruments used for purposes of demonstrating compliance with regulatory requirements shall be calibrated at least annually by an organization licensed by the NRC or an Agreement State to perform such calibrations.

19.3 The following checks shall be performed on an instrument prior to each use:

- Battery check
- Calibration date check
- Response check using a gauge or check source

20 Loss or Theft of Gauges

20.1 Upon determination that a gauge is stolen or lost during shipment, notify the RSO immediately. A gauge shipped by common carrier is not considered lost until 7 days after shipment, unless a customer has received a partial shipment which was missing a package with radioactive contents. A gauge shipped by Federal Express is considered lost if not received within one day of the expected date.

20.2 Complete the Gauge Incident Report (Appendix C) and notify the RSO.

20.3 For lost gauges, notify the carrier and request assistance in locating the package.

20.3.1 If the package was shipped by Federal Express, contact the Dangerous Goods Administration unit.

20.3.2 Ensure the carrier is aware the package contains radioactive material and provide the proper shipping name, waybill or tracking number, and a description of the package.

20.3.3 If the gauge has not been located within 2 full business days for common carrier shipment or 1 day for Federal Express shipment, initiate notification of the proper authorities in accordance with Section 23.

21 Returning a Damaged Gauge to the gauge manufacturer

21.1 In the event that a damaged gauge must be returned to the manufacturer for repair or disposal, contact the manufacturer's RSO to make arrangements.

21.2 Do not ship a damaged gauge to the manufacturer without having first obtained a Returned Goods Authorization from their Radiation Safety Department.

21.3 If the gauge cannot be returned to the shielded position so that it can be transported in the shipping case, an alternate Type A package can be obtained from the manufacturer.

21.4 Under no circumstances should a damaged gauge be shipped without leak testing and the approval of the RSO.

22 Emergency Procedures

22.1 In the event of physical damage to a gauge, the following steps must be taken:

22.1.1 Locate the source(s).

22.1.2 An area 15 feet in radius from the gauge must be sealed or cordoned off to prevent entry by unauthorized persons.

22.1.3 If a vehicle is involved, it must not be moved until the extent of the contamination (if any) of the vehicle is determined.

22.1.4 Visually inspect the gauge to determine whether any damage to the source, housing, or shield has been sustained.

22.1.5 As soon as possible, after the situation has been stabilized and is under control, notify the RSO. Describe the present conditions and follow the instructions of the RSO.

22.2 The RSO shall take the following actions:

22.2.1 Arrange for a radiation survey to be conducted as soon as possible by a knowledgeable person using appropriate radiation detection instrumentation to assess the integrity of the source encapsulation and shielding and determine the extent of contamination, if any, of personnel, equipment, and facilities, or areas.

22.2.2 Notify regulatory authorities as required.

23 Notifications

23.1 The following occurrences must be reported to the regulatory authorities in accordance with the time frames and methods specified in the applicable regulations.

- Lost, stolen or missing sources
- Events that cause or threaten to cause exposures to individuals in excess of regulatory limits
- Leaking or contaminated sealed sources

23.2 When initial reports are made by phone, written reports must be submitted within 30 days.

24 Audits

24.1 An audit of the content and implementation of the radiation safety program shall be performed annually. A sample checklist for performing the audit is contained in Appendix F.

24.2 Problems identified by the audit shall be corrected in a timely manner.

24.3 The audit may be performed by the Company RSO, or other individual designated by the Company RSO.

24.4 A copy of the audit shall be provided to the Company RSO.

25 Records

The following records and documents shall be maintained for at least the minimum time period specified in the license or applicable NRC or Agreement State regulations unless permanent retention is specified below. In the absence of a specific requirement, retain records for at least 5 years.

- Current license
- Current copies of the applicable state and federal regulations
- Instrument calibration records (retain permanently)
- Personnel exposure records (retain permanently)
- Evaluation of dose to members of the public
- Records of receipt of radioactive material
- Physical inventory of radioactive material
- Records of transfer or shipment of radioactive material
- Gauge utilization log
- Radiation safety training documentation (initial and refresher)
- Hazmat training documentation (initial and refresher)
- Radiation and contamination surveys (retain permanently)
- Leak test records
- Audits of the radiation safety program
- Copy of the IAEA Certificate of Competent Authority for each source
- Type A package testing results
- Shipping papers

Appendix A

RADIOLOGICAL SURVEY FORM

Instrument:	S/N:	Cal Due:	Date:	Time:
Instrument:	S/N:	Cal Due:	Area:	
Instrument:	S/N:	Cal Due:	Purpose:	
Survey Performed By (Print):	Survey Performed By (Signature):	Reviewed by (Signature):	Review Date:	

Results (Modify Units as Necessary)			
No:	Location	mR/hr	cpm
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			

Symbols:
S = Smear Location -x-x- = Restricted Area Boundary
C = Contact Reading RM = Radioactive Materials Storage
R = Radiation Area

Appendix B

NUCLEAR GAUGE SAFETY TRAINING PROGRAM OUTLINE

Introduction - 15 minutes
A. Purpose of course
B. Types of Troxler gauges and their field applications
C. Review course outline
D. Explain exam

Radiation Theory - 30 minutes
A. Atomic and subatomic structure
B. Definition of radioactivity
C. Types of radiation
D. Sources of radioactivity
E. Isotopes and periodic table
F. Units of radiation measurement and half-life

Radiation Safety - 90 minutes
A. ALARA
B. Time, distance, shielding to minimize exposure
C. Biological effects of radiation
D. Occupational dose limits
E. Personnel monitoring
F. Survey meters

Regulatory Requirements - 120 minutes
A. Licensing
B. Storage of licensed material
C. Control of licensed material not in storage
D. Personnel monitoring
E. Leak testing
F. Gauge maintenance
G. Audits, recordkeeping
H. Reciprocity
I. Disposal
J. Operating and emergency procedures
K. Incidents
L. RSO requirements and duties

Transportation - 30 minutes
A. Requirements (NRC, Agreement States, USDOT)
B. Transportation of licensed material in vehicles
C. Shipping by motor freight or air freight
D. Hazmat certification

NUCLEAR GAUGE SAFETY TRAINING PROGRAM OUTLINE

Gauge Theory and Design - 30 minutes

A. Gamma ray attenuation
B. Neutron thermalization
C. Standard counts
D. Environmental effects on measurements

Gauge Operation - 60 minutes

A. Testing modes - backscatter, thin layer, direct transmission, moisture
B. Surface preparation/across hole for direct transmission
C. Proper testing techniques
D. Trench corrections
E. Moisture offsets/corrections
F. Review of Marshall Test, Proctor Test, Oven Dry, Sand Cone, Water Balloon - comparison with nuclear test methods

Gauge Maintenance/Troubleshooting - 20 minutes

A. Cleaning/lubrication
B. Removal of deposits of asphalt on base
C. Protection from moisture/proper storage
D. Battery pack replacement

Exam - 45 minutes

A. Students complete exam
B. Review answers

Hands on Training - 40 minutes

Note: All times are approximate and will vary slightly depending on questions and education/experience level of the group. Total instruction time will be at lest eight (8) hours.

Appendix C

GAUGE INCIDENT REPORT

GAUGE IDENTIFICATION

Model no. _____ Serial no. _____ Sources & serial nos.

REPORTED BY:

Name _____ Phone

Company

Address

STOLEN GAUGE:

Date stolen _____ Location stolen from

DAMAGED GAUGE:

Description of incident:

Instructions given to caller:

LOST GAUGE:

Date shipped

Shipped to

Address

Carrier

Address

Contact

Phone

Route

REPORTED TO:

Emery Sapp & Sons employee _____ Date/time

RADIATION SAFETY USE:

Date/time form received ____/____ Date/time agency notified _____/

Agency name

Person notified _____ Notified by _____

Appendix D

AREAS OF GAUGES TO BE WIPED FOR LEAK TEST

The area to be wiped is dependent on the gauge being tested. The regulations governing the testing of sealed sources indicates that the source itself or the closest accessible point to the source is to be wiped. With this regulation in mind and remembering to always maintain the exposure to the individual to as low as reasonably achievable, the following areas should be wiped:

1. Model number: 3400 series

   The 3400 series gauge contains two sources of radioactive material. To wipe this gauge, first, remove the scaler module from the front of the gauge. Looking down into the scaler cavity, locate the yellow radiation label approximately in the middle of the gauge base and to the top of the circuit board. Wipe the yellow label. Second, turn the gauge on one side. On the bottom of the gauge locate the opening through which the source rod indexes. Wipe around and into this opening.

2. Model numbers: 3205, 3216, 3218

   These gauges contain one source of radioactive material which is mounted in a stainless steel cylinder attached to the base of the gauge. To leak test, remove the top cover of the gauge and the circuit board. On top of the stainless steel cylinder is the yellow radiation label. Wipe the yellow label.

3. Model numbers: 3220 series, 1351, 1352, 1200, 4300, 3300 series

   These gauges contain one source of radioactive material which is encased in a stainless steel probe. To leak test, turn the gauge on one side and wipe around the bottom opening through which the probe indexes.

4. Model numbers: 2226, 3241, 3242, and 4232

   These gauges contain one source of radioactive material which is encased in a lead lined polyethylene shield mounted in the top of the gauge. To leak test, remove the drawer assembly from the front of the gauge. Looking into the top of the cavity, locate the yellow radiation label. Wipe the yellow label.

5. Model number: 3565

   This gauge contains one source of radioactive material which is encased in a stainless steel rod. To leak test, wipe around the area of the rod approximately 3.5 inches from the bottom of the rod. This is the point at which the rod tip meets the rod extension.

6. Model number: 2376

   This gauge contains one source of radioactive material which is encased in a stainless steel source holder. To leak test, remove the source holder from the storage pig by threading the holder onto the extension rod. Wipe the outer surface of the source holder.

7. Model number: 2401

   This gauge contains one source of radioactive material which is encased in a stainless steel source rod. To leak test, turn the gauge on one side and wipe around and into the opening in the bottom of the gauge through which the source rod indexes.

8. Model number: 4640 series

   This gauge contains one source of radioactive material which is encased in a lead and tungsten source housing. To leak test, wipe around the opening in the top of the gauge where the source rod enters.

9. Model number: 4545

   This gauge contains one source of radioactive material which is encased in a stainless steel source rod. To leak test, wipe around the opening in the side of the gauge where the handle mechanism enters the body of the gauge.

10. Model Number: 4430

    This gauge contains two separate probes with one source in each probe. To leak test, use one wipe disc to wipe the bottom of each probe and around the circumference at the radiation label on each probe.

11. Model number: 4350

    Two radioactive sources and electronics are contained within the probe. Remove the standard fixture cap so that the communication end of probe is exposed. Holding the wipe disk with tongs, wipe around the end of the probe.

Appendix E

DECLARATION OF PREGNANCY

I hereby voluntarily declare that I am pregnant.

My best estimate of the date of conception is _____ (mo/day/yr)

While this declaration is in effect, I agree to abide by all restrictions deemed necessary by Emery Sapp & Sons to keep the occupational exposure to my unborn child below 500 mrem. This may include accepting reassignment to different job at equal pay for the duration of the pregnancy.

I understand that I may revoke this declaration at any time by providing written notification to the Radiation Safety Officer.

Name (print) _____ SSN

Signature _____ Date

TO BE COMPLETED BY EMERY SAPP & SONS

Received by _____ Date
Radiation Safety Officer

1. Dose estimate for period from conception to declaration: _____ mrem

2. Dose that may be received during remainder of pregnancy: _____ mrem
(500 mrem - line 1) If line 1 > 450 mrem, enter 50 mrem.

3. Likely to receive > 50 mrem during pregnancy? Yes ___ No
(If yes, monitoring required.)

Appendix F

RADIATION SAFETY PROGRAM AUDIT CHECKLIST

Licensee name _____ License No.

Auditor's name (print) _____ Date of Audit

Auditor's signature

Audit Item	Yes	No	Comments
1. Audit History			
a. Last audit at this location (date)?			
b. Were previous audits conducted yearly?			
c. Were any deficiencies noted during the last two audits? Any deficiencies repeated?			
d. Were corrective actions taken?			
2. Organization and Scope of Program			
a. If the mailing address or place of use changed, was the license amended?			
b. If the RSO changed, was the license amended? Does the new RSO meet the training requirements?			
c. Does the license authorize all of the radionuclides in the gauges possessed?			
d. Are the actual uses of gauges consistent with the authorized uses on the license?			
e. Is the RSO fulfilling his/her duties?			
3. Training and Instructions to Workers			
a. Have all workers received initial radiation safety training? Refresher training?			
b. Have all workers received required Hazmat training? Refresher training?			
c. Are training records maintained for each individual?			
d. Did interviews/observations reveal gauge operators know emergency procedures? Leak testing procedures? Service procedures? Transportation procedures?			

4. Radiation Detection Instruments			
a. Is a survey meter available for radiation measurements? Frisker for contamination measurements?			
b. Have the instruments been calibrated within the last year?			
c. Are calibration records maintained?			
d. Are operation checks performed prior to use?			
5. Gauge Inventory			
a. Is a record kept showing receipt of each gauge?			
b. Are all gauges physically inventoried at least every six months?			
c. Are records of inventories maintained?			
6. Personnel Radiation Protection			
a. Are ALARA considerations incorporated into the radiation safety program?			
b. Are all branch office personnel assigned TLD badges?			
c. Do all personnel wear their TLD badges in the restricted area and when handling gauges? Are badges properly stored when not in use?			
d. Are TLD badges exchanged at least quarterly and processed by a NVLAP accredited organization?			
e. Are dosimetry reports reviewed by the RSO when received?			
f. If a worker declared her pregnancy, were the applicable requirements met?			
g. Were radiation and contamination surveys in restricted and unrestricted areas performed quarterly?			
h. Are records of surveys maintained?			
7. Public Dose			
a. Are gauges used and stored in a manner to keep public doses below 100 mrem in a year?			
b. Has a survey or evaluation been performed to demonstrate public dose limits are met? (indicate the date)			
c. Have there been any changes in the use or			

storage of gauges or in the use of surrounding areas that would necessitate a new survey or evaluation?			
d. Are unrestricted area radiation levels less than 2 mrem in any one hour?			
e. Are gauges stored in a manner to prevent unauthorized use or removal?			
f. Are records maintained?			
8. Operating and Emergency Procedures			
a. Are current copies of operating and emergency procedures available to each individual?			
b. Did any emergencies occur? Were they properly handled?			
9. Leak Tests			
a. Was each customer gauge leak tested upon receipt?			
b. Are leak tests performed in accordance with procedures?			
c. Is each gauge in inventory leak tested at least every 6 months?			
d. Are records of leak test results maintained for each gauge?			
e. Were any sources found leaking?			
10. Maintenance of Gauges			
a. Are procedures followed for cleaning and lubrication of gauges?			
b. When the source rod is removed from the gauge is it stored in a shielded pig?			
c. Do personnel observe good ALARA practices?			
11. Transportation			
a. Are DOT 7A packages used for transport of gauges? Is documentation of package testing maintained?			
b. Is special form source documentation maintained?			
c. Packages have two labels (e.g. Yellow-II) on opposite sides with TI, nuclide, activity, and hazard class? Cargo only label?			
d. Packages are properly marked?			

e. Packages are inspected prior to shipment?			
f. Packages are sealed (cases locked)?			
g. Shipping papers are properly prepared for all gauges shipped?			
h. Bill of lading (shipping papers) and emergency instructions are within drivers reach during transport?			
i. Packages are not carried in passenger compartment of vehicle?			
j. Packages are secured against movement in vehicle?			
12. Notifications and Reports			
a. Was any radioactive material lost or stolen? Were reports made?			
b. Did any overexposures occur? Were reports made?			
c. If any events occurred, was the root cause determined and corrective actions taken?			
13. Posting and Labeling			
a. "Notice to Workers" posted?			
b. Notice posted stating where workers can read a copy of the regulations and license?			

14. Summary of Deficiencies Identified During Audit (attach additional sheets as necessary)	
Deficiencies	Proposed Corrective Actions/Planned Completion Date

15. Other Recommendations for Improvement (attach additional sheets as necessary)

Appendix G

GAUGE UTILIZATION LOG

Gauge Model _____ Serial Number

Operator	Location	Check-out		Check-in	
		Date	Initials	Date	Initials

Appendix H

Radioactive Material Transfer Request

Each transfer must be authorized by Corporate Radiation Safety prior to transfer. Please complete the applicable sections below:

Transfer requested by:

Branch or Department: _____

Device being transferred:

Gauge Model: _____ Serial Number: _____

Source Serial Numbers: _____/_____

Transferring a device to another organization:

Organization: _____

Address: _____

Transfer Authorized by: _____ Date: _____
(Corporate Radiation Safety)

Transferred by: _____ Date: _____
(Employee)

Receiving a device from another organization:

Receiving from: (organization) _____

Return Authorized by: _____ Date: _____
(Corporate Radiation Safety)

Received by: _____ Date: _____
(Employee)

Appendix I

GAUGE INVENTORY LOG

Company	Model No.	Serial No.	Source 1 Serial #	Source 2 Serial #	Date In	Leak Test Date	Ship/Pickup Date	RO#	Comments

Appendix J

Public Dose Calculation Worksheet

To demonstrate compliance, you must show that the maximum dose to any ***member of the public*** will be less 100 millirem in a year and that the maximum dose in any ***unrestricted area*** will be less than 2 millirem in any one hour. The typical limiting case involves the storage of gauges. Several simplifying and conservative assumptions are made in this calculation method.

- No shielding other than the shielding in the gauge is assumed to be present.
    - All gauges are assumed to be at the same distance as the closest gauge.
    - Sources are assumed to remain in the shielded position within the gauge.
    - Each gauge is assumed to be a point source and dose rates are assumed to decrease with the inverse square of distance from the gauge.
    - Gauges are assumed to be in storage all of the time.

More realistic assumptions can be made or actual measured dose rates can be used if necessary to demonstrate compliance.

Step	Instruction	Result
	DOSE TO MEMBER OF PUBLIC IN ONE YEAR	
1.	Identify the individual member of the public likely to receive the highest dose from gauges in storage. This will be the person who spends the most time in the vicinity of the stored gauges or who is closest to the gauges. This individual will be the focus of the calculation.	
2.	Determine the maximum dose rate in mrem/hr at a distance of three feet (1 meter) for each gauge kept in the storage location. This value may be obtained from the radiation profile in the gauge operation manual, from the manufacturer, or from Transport Index on the Yellow II label on the transport case. Calculate the sum of the dose rate values for all of the gauges that may be stored at this location and enter the result. Remember to include both gamma and neutron dose.	
3.	Enter the distance in feet from the position occupied by the person identified in step 1 to the nearest gauge in the storage area.	
4.	Calculate the square of the distance from step 3 and enter the result.	
5.	Divide the value from step 4 by 9 and enter the result. This is a factor which accounts for the difference between the dose rate at 3 feet and the dose rate at the distance at which the person is located.	
6.	Divide the dose rate (mrem/hr) from step 2 by the result from step 5 and enter the result.	
7.	Enter the number of hours in a year that the individual will be present in the vicinity of the gauges. For example, an individual working full-time near the near the gauges, would be present approximately 2000 hrs in a year (8 hrs per day x 5 days per week x 50 weeks per year).	
8.	Multiply the result from step 6 by the result from step 7 and enter the result. This is the maximum dose in mrem the individual could receive in one calendar year. If this value is less than 100 mrem, the annual dose limit is met; continue with step 9 to determine if the unrestricted area dose rate limit is met.	

	DOSE IN UNRESTRICTED AREAS IN ONE HOUR	
9.	Determine the minimum distance in feet to any unrestricted area outside the gauge storage area and record the value. This could be an area above, below, or adjacent to the storage area that is unrestricted **for the purpose of radiation control.** The area need not be occupied, just accessible to members of the public, which may include company employees.	
10.	Calculate the square of the distance from step 9 and enter the result.	
11.	Divide the value from step 10 by 9 and enter the result. This is a factor which accounts for the difference between the dose rate at 3 feet and the dose rate at the distance in step 9.	
12.	Divide the dose rate (mrem/hr) from step 2 by the result from step 11 and enter the result. This is the maximum dose in mrem that could be received in one hour in the closest unrestricted area. If this value is less than 2 mrem, the dose limit for unrestricted areas is met.	

Calculations performed by _____ Date _____

If either dose limit is exceeded, you should either recalculate that dose using more realistic assumptions and data or take steps to reduce the dose received by members of the public using the principles of time, distance, and shielding.

- Limit the time personnel spend in the vicinity of the gauges
- Increase the distance between the gauges and personnel
- Add shielding to reduce the dose rate

Occupancy Factors

The following occupancy data may be used when data for specific personnel are not available.

Area	Occupancy Factor (T)
Work areas such as offices, laboratories, shops, wards, nurses' stations; living quarters; children's play areas; and occupied space in nearby buildings.	Full Occupancy (T=1)
Corridors, rest rooms, elevators using operators, unattended parking lots.	Partial Occupancy (T=1/4)
Waiting rooms, toilets, stairways, unattended elevators, janitor's closets, outside areas used only for pedestrians or vehicular traffic.	Occasional Occupancy (T=1/16)

Reference: NCRP Report No. 49, Structural Shielding Design and Evaluation for Medical Use of X-Rays and Gamma Rays of Energies Up to 10 MeV, 1976

Shielding Half-Values*

Material	Cs-137 Gamma Radiation	AmBe Neutron Radiation
Lead	¼ in.	N/A
Concrete	2 in.	4 in.

* The half-value is the thickness of material that will reduce the dose rate by one-half.

Appendix K

Radiation Safety Shipping Checklist

Gauge Model _____ Serial Number _____

PLEASE CHECK:

_____ Current leak test certification (within previous 6 months)
_____ Serial numbers match leak test certificate
_____ Sealed with security seal
_____ Gauge locked in safety position
_____ Shipping case in unimpaired physical condition except for superficial marks

TYPE A PACKAGE (shipping case) LABELS:

_____ Proper shipping name (with RQ, if applicable)
_____ Correct label type (Yellow II, White I)
_____ Correct nuclide(s), activities in SI units (i.e. GBq)
_____ Correct Transport Index (If applicable)
_____ Type A package label
_____ Ship-to address matches label, bill of lading
_____ Cargo Aircraft Only Label (for air shipments)

OVERPACK: (IF APPLICABLE)

_____ Proper shipping name (with RQ, if applicable)
_____ Correct label type (Yellow II, White I)
_____ Correct nuclide(s), activities in SI units (i.e. GBq)
_____ Correct Transport Index (If applicable)
_____ Inner package complies notification (if applicable)
_____ Ship-to address matches label, bill of lading
_____ Cargo Aircraft Only Label (for air shipments)

SHIPPING PAPER:

_____ Proper shipping name, UN ID, and class (with RQ if applicable)
_____ Nuclide(s) and activities in SI units (i.e. GBq)
_____ Type A package specification, if applicable
_____ Label specification (Yellow II, White I)
_____ Package dimensions (with unit of measure)
_____ Emergency contact telephone number
_____ Shipper's certification signed
_____ Emergency response sheet attached
_____ IAEA Certificates listed (for air shipments)
_____ IAEA Certificates attached (for air shipments)

RADIATION SURVEY:

_____ External radiation survey results <10 millirem/hr at surface of package

Checked by (Initials): _____ **Date** _____

St. Charles County

Emergency Management Agency

TO ALL WHO SHALL SEE THESE PRESENTS, GREETINGS:

KNOW YE, THAT Jeffrey Stephens

OF St. Charles

HAS SATISFACTORILY COMPLETED A

RADIOLOGICAL MONITORING COURSE

AS RECOMMENDED BY THE COUNTY EMERGENCY MANAGEMENT AGENCY

THIS *Certificate of Credit*

IS HEREBY AWARDED THIS 11th **DAY OF** June, 1989

EMERGENCY MANAGEMENT DIRECTOR

INSTRUCTOR/TRAINING OFFICIAL

United States Department of Labor

OSHA Training Institute Southwest Education Center

This is to certify that on January 27, 1995

Jeffrey C. Stephens

has diligently and with merit completed training in

OSHA Course 500
Instructor Course in Occupational Safety and Health
Standards for the Construction Industry

TEEX TSA

Director, Southwest Education Center

Director, OSHA Training Institute

METCALF AND ASSOCIATES

ENVIRONMENTAL MANAGEMENT SERVICES

THIS CERTIFIES THAT

JEFFREY C. STEPHENS

HAS COMPLETED 40 HOURS OF INITIAL INSTRUCTIONS FOR HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE UNDER REGULATIONS PURSUANT TO 29 CFR PART 1910.120.

SPECIFIC TRAINING INCLUDED

HEALTH HAZARDS
HAZARDOUS MATERIALS
PERSONAL PROTECTIVE EQUIPMENT

SITE CONTROLS
SITE EMERGENCIES
CONTAINER HANDLING

DATE OF CERTIFICATION:

MARCH 24, 1989

INSTRUCTOR: Kristen J. Andersen

KRIS ANDERSEN
METCALF AND ASSOCIATES

LITHO IN U.S.A.

Certificate of Completion

awarded to

Jeff Stephens

For completing the 32 hour

Emergency Response Management I - Pre-Incident Planning

Conducted at the KN Processing Facility, Bushton, Kansas

presented by

Emergency Response Team Consulting, Inc.

September 23, 1997

Mark Jordan President

Steven A. Jordan Vice-President

3M

Respirator Training

Respirator Training Instructor

JEFFREY C. STEPHENS

Has been trained on the proper protocol to be followed when fit testing 3M Brand respirators.

ITP-TC

CERTIFICATE OF COMPLETION

Awarded to

Jeffrey Stephens

has successfully completed the required courses to become proficient as a Certified Mine Safety and Health Administration Instructor.

Class IS/IU

Thursday, June 8, 2006

Steve W Dunn

Department of Labor and Industrial Relations
Division of Labor Standards

Supervisory Training Program

This is to certify that:

JEFF STEPHENS

has successfully completed an AGC-sponsored education program entitled:

HEAVY/HIGHWAY CONSTRUCTION SUPERVISOR

And has been awarded this certificate in recognition of this effort and accomplishment in increasing professional ability.

Date: JANUARY 25, 2006

Emery Sapp and Sons, Inc.

Program Sponsor

Program Instructor

OSHA
TRAINING INSTITUTE

EDUCATION CENTERS

MCC Metropolitan Community College
Business & Technology

This is to certify that

Jeffrey Stephens

has diligently and with merit completed training in

OSHA 500 Trnr Course Const Ind
November 06, 2008

Approved by:
Occupational Safety and Health Administration
United States Department of Labor

DEPARTMENT OF LABOR · UNITED STATES OF AMERICA ·

David T. Ayers
Program Director,
MCC-Business & Technology

Charles J. Thwaldo
Director of OSHA Training Institute

Central Missouri State University

Warrensburg, Missouri

has conferred upon

Jeffrey Claude Stephens

The Degree of

Bachelor of Science

and all the rights and privileges thereto appertaining

In witness thereof, this diploma, duly signed and the seal of the University affixed has been issued by the Board of Regents, upon recommendation of the faculty, on this 14th day of May, 1988 A.D.

Industrial Safety

President of the University

President of the Board of Regents

Chairman of the Board of Regents

Secretary of the Board of Regents

HAZMAT Certification

as required by U.S. DOT and IATA

This certifies that

Jeff Stephens

has been trained and tested in accordance with the U.S. Department of Transportation and International Air Transport Association (IATA) hazardous material requirements for general awareness/familiarization, function-specific, safety, and security awareness training as related to the transportation of nuclear gauges. A description of the training course materials is available from Troxler Electronic Laboratories, Inc.

Training Date	*Expiration Date*	*Instructor*
April 7, 2009	3 years from date of class	Robert Joines

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The Leader in Construction Testing Equipment

Troxler Electronic Laboratories, Inc.
PO Box 12057 •3008 Cornwallis Road • ResearchTriangle Park,NC 27709
Phone (919) 549-8661 • Fax: (919) 549-0761 •www.troxlerlabs.com

Hazmat Employer Certification

Company:

Company Official: _____ *Date:* _____

Enrollment ID. 17287389

Certificate of Completion

This certifies that

Jeff Stephens

has successfully completed the

Nuclear Gauge Safety Training Class

conducted by the training department of

Troxler Electronic Laboratories, Inc.

Robert Joines
Instructor

April 7, 2009
Date

William F. Troxler, Jr.
President

Pass-Certifed to operate Nuclear Gauges
17287389

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BOARD OF CERTIFIED SAFETY PROFESSIONALS

affirms that

Jeffrey C Stephens

Having made application for and given satisfactory evidence of qualification as required in the By-Laws; is qualified to receive and is hereby authorized to use the designation

Certified Safety Professional

in

Comprehensive Practice

So long as this certificate of qualification is renewed annually and not revoked

Board of Examiners in witness whereof we have here unto set our hands and affixed the Seal of the Board this 19th Day of October, 1996

President Brian Boothe

Secretary Scott W. Ostrowski

Serial No. 14960

BOARD OF CERTIFIED SAFETY PROFESSIONALS

Certificate of Completion

This certifies that

Pedro Aguilar, IV

has successfully completed the

Nuclear Gauge Safety Training Class

conducted by the training department of

Troxler Electronic Laboratories, Inc.

Harvey Dunlevy

Harvey Dunlevy
Instructor

4/27/2005
Date

William F. Troxler, Jr.
President

Enrollment ID: **12571**

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HAZMAT Certification

as required by U.S. DOT and IATA

This certifies that

Pedro Aguilar IV

has been trained and tested in accordance with the U.S. Department of Transportation and International Air Transport Association (IATA) hazardous material requirements for general awareness/familiarization, function-specific, safety, and security awareness training as related to the transportation of nuclear gauges. A description of the training course materials is available from Troxler Electronic Laboratories, Inc.

Training Date	*Expiration Date*	*Instructor*
February 7, 2008	3 years from date of class	Patrick Schroeder

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Hazmat Employer Certification

Company:

Company Official: _____ *Date:* _____

Enrollment ID: 10387416

HAZMAT Certification

as required by U.S. DOT and IATA

This certifies that

Charley Farris

has been trained and tested in accordance with the U.S. Department of Transportation and International Air Transport Association (IATA) hazardous material requirements for general awareness/familiarization, function specific, safety, and security awareness training as related to the transportation of nuclear gauges. A description of the training course materials is available from Troxler Electronic Laboratories, Inc.

Training Date	*Expiration Date*	*Instructor*
April 8, 2009	3 Years from Date of Class	Robert Joines

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Hazmat Employer Certification

Company:

Company Official: _____ *Date:* _____

Enrollment ID: 17286940

Certificate of Completion

This certifies that

Charley Farris

has successfully completed the

Radiation Safety Officer Training Class

conducted by the training department of

Troxler Electronic Laboratories, Inc.

Robert Joines
Instructor

April 8, 2009
Date

William F. Troxler, Jr.
President

Troxler Electronic Laboratories, Inc.
PO Box 12057 * 3008 Cornwallis Rd. * Research Triangle Park, NC 27709
Phone: (919) 549-8661 * Fax: (919) 549-0761 * Web site: www.troxlerlabs.com

17286940

HAZMAT Certification

as required by U.S. DOT and IATA

This certifies that

Charley Farris

has been trained and tested in accordance with the U.S. Department of Transportation and International Air Transport Association (IATA) hazardous material requirements for general awareness/familiarization, function specific, safety, and security awareness training as related to the transportation of nuclear gauges. A description of the training course materials is available from Troxler Electronic Laboratories, Inc.

Training Date	*Expiration Date*	*Instructor*
April 7, 2009	3 years from date of class	Robert Joines

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Hazmat Employer Certification

Company:

Company Official: _____ *Date:* _____

Enrollment ID. 17287326

Certificate of Completion

This certifies that

Charley Farris

has successfully completed the

Nuclear Gauge Safety Training Class

conducted by the training department of

Troxler Electronic Laboratories, Inc.

Robert Joines
Instructor

April 7, 2009
Date

William F. Troxler, Jr.
President

Pass-Certifed to operate Nuclear Gauges
17287326

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Certificate of Completion

This certifies that

Kyle Smith

has successfully completed the

Nuclear Gauge Safety Training Class

conducted by the training department of

Troxler Electronic Laboratories, Inc.

Michael Dixon
Instructor

5/3/2007
Date

William F. Troxler, Jr.
President

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Phone: (919) 549-8661 • Fax: (919) 549-0761 • Web site: www.troxlerlabs.com

Enrollment ID: **23166**

HAZMAT Certification

as required by U.S. DOT and IATA

This certifies that

Kyle Smith

has been trained and tested in accordance with the U.S. Department of Transportation and International Air Transport Association (IATA) hazardous material requirements for general awareness/familiarization, function-specific, safety, and security awareness training as related to the transportation of nuclear gauges. A description of the training course materials is available from Troxler Electronic Laboratories, Inc.

5/3/2007	5/3/2010	Michael Dixon
Training Date	*Expiration Date*	*Instructor*

Troxler Electronic Laboratories, Inc.
PO Box 12057 • 3008 Cornwallis Rd. • Research Triangle Park, NC 27709
Phone: (919) 549-8661 • Fax: (919) 549-0761 • www.troxlerlabs.com

---

Hazmat Employer Certification

Company: Koss Construction Co.
5830 SW Drury Lane
Topeka, KS 66604

Company Official: _____ *Date:* 14 MAY 2007

Enrollment ID: 23166

From: Origin ID: COUA (573) 445-8331
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EMERY SAPP & SONS, INC
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COLUMBIA, MO 65202

FedEx Express

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Ship Date: 03JUN09
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Account#: S *********

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US Nuclear Regulatory Commission
Materials Licensing Branch
2443 WARRENVILLE RD STE 210

LISLE, IL 60532

Ref # ESS 2003
Invoice #
PO #
Dept #

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