

03032602

VOID SHEET

DJP  
✓ 3P  
115843

TO: License Fee Management Branch

FROM: RI

SUBJECT: ~~VOIDED~~ APPLICATION  
Abandoned

Control Number: 114758, 115843, 115847

Applicant: Professional Service Industries, Inc.

Date Voided: 5/25/93

Reason for Void: Licensee did not respond to our Deficiency Letter of April 7, 1993 for additional information. After review. New license application. 030-32383

Rebecca J. Brown 7/19/93  
Signature Date

Attachment:  
Official Record Copy of  
Voided Action

FOR LFMB USE ONLY

- Final Review of VOID Completed:
- Refund Authorized and processed
  - No Refund Due
  - Fee Exempt or Fee Not Required

Comments: After review

Log completed  
Processed by: R - 4/2/93

9312200095 930719  
PDR ADOCK 03032602  
C PDR

APR 07 1993

Docket Nos. 030-32383  
030-32602  
030-32603

Control Nos. 114758  
115843  
115847

Professional Service Industries, Incorporated  
ATTN: John Thornton  
Radiation Safety Director  
510 East 22nd Street  
Lombard, Illinois 60148

Dear Mr. Thornton:

SUBJECT: APPLICATIONS FOR MATERIAL LICENSE DATED MAY 8, 1991 AND  
NOVEMBER 27, 1991 AND OUR REQUEST FOR INFORMATION DATED  
MARCH 2, 1992

This concerns the subject application for material license and our letter in which we notified you that the application was deficient and that certain additional information was required.

You are hereby notified that unless within thirty (30) days from the date of this notice we receive the additional information requested, we will consider that you have abandoned your application. This action is without prejudice to the resubmission of an application.

Sincerely,

Original Signed By:  
Duncan White


*fa*  
Francis M. Costello, Chief  
Industrial Applications Section  
Division of Radiation Safety  
and Safeguards

091194


Enclosure: Letter dated March 2, 1992

OFFICIAL RECORD COPY - S:\PENDING\PSIABAND - 04/06/93

ML 10

 DRSS:RI  
White/smh

04/7/93

 DRSS:RI  
Costello

04/7/93

<b>TELEPHONE CONVERSATION RECORD</b>		
<b>Date:</b> 1-25-93	<b>Time:</b> 12:30 pm	
<b>Mail Control No.:</b> 115843; 116847; 114758	<b>License :</b> new	<b>Docket No.:</b> 030-32602 030-32603 030-32383
<b>Person Called:</b> John Thorton	<b>Organization:</b> PSI - Corporate	<b>Telephone Number:</b> ex:320 (708) 691-1490
<b>Person Calling:</b> Duncan White		
<b>Subject:</b> Status of Training Program TAR		
<p><b>Summary:</b> Mr. Thorton stated that the issues raised in the Region IV TAR concerning PSI's in-house Radiation Safety Officer training have been resolved with M. Lamastra in NMSS. PSI will sending a response to the Region IV deficiency letter this week. A response to the Region I deficiency letter, which concerns the same issues raised in the Region IV TAR, will be sent by mid-February 1993. I informed the licensee that if a response to the deficiency letter is not recieved or a request for an extension at that time, then these licensing actions could be voided.</p>		
<b>Action Required/Taken:</b> Licensee response by 2/19/93		
<b>Signature:</b> <i>Duncan White</i>	<b>Date:</b> January 25, 1993	

DATE 9-9-92  
TIME 2:00  A.M.  P.M.

TELEPHONE OR VERBAL CONVERSATION RECORD

INCOMING CALL

OUTGOING CALL

VISIT

PERSON CALLING

Eli Port

OFFICE/ADDRESS

RSSI

PHONE NUMBER | EXTENSION

708-965-1999

PERSON CALLED

D. White

OFFICE/ADDRESS

PI

PHONE NUMBER | EXTENSION

CONVERSATION

SUBJECT

Status of PSI New License Applications

SUMMARY

Mr. Port is a consultant to PSI. Training program revisioning will be completed in a few weeks and sent to Mike Lamastro in NMSS for review. Mr. Port indicated that PSI response may be sent, as per Lamastro, to PIV and PI reviewers.

MC# 11475B

115847

115843

REFERRED TO:

ACTION REQUESTED

E. Port contact PI re status by end of month

ADVISE ME OF ACTION TAKEN.

INITIALS

DATE

ACTION TAKEN

INITIALS

DATE

NRC FORM 218  
(4-78)  
NRCM 0240

U.S. NUCLEAR REGULATORY COMMISSION

DATE 7-1-92

TELEPHONE OR VERBAL CONVERSATION RECORD

TIME 4:00  A.M.  P.M.

INCOMING CALL

OUTGOING CALL

VISIT

PERSON CALLING

D. White

OFFICE/ADDRESS

R1

PHONE NUMBER

EXTENSION

PERSON CALLED

J. Thornton

OFFICE/ADDRESS

PS1

PHONE NUMBER

EXTENSION

CONVERSATION

SUBJECT

Status of Def. Letters for 30-32383, 30-32602, and 30-32603

SUMMARY

Mr. Thornton stated that his management and NRC HQ are discussing the TAR regarding PSI's training program. He indicated that once PSI ~~and~~ understands the NRC decision (in the TAR) to require changes to their already approved training program, they would respond to R1 and R IV. Mr. Thornton agreed to send a letter request for extension to R1.

REFERRED TO:

ACTION REQUESTED

extension letter from PSI

ADVISE ME OF ACTION TAKEN.

INITIALS

DATE

ACTION TAKEN

INITIALS

DATE

OFFICIAL RECORD COPY ML 10

115843

RECEIVED-REGION I  
APR 1 1992



**Professional Service Industries, Inc.**  
Corporate Office

April 1, 1992

United States Nuclear Regulatory Commission  
Region I  
475 Allendale Road  
King of Prussia, Pennsylvania 19406-1415

Attention: Duncan White

Re: Docket Nos. 030-32383  
030-32602  
030-32603

Control Nos. 114758  
~~115843~~  
115847

Dear Mr. White:

Professional Service Industries, Inc. (PSI) is in receipt of your letter dated March 2, 1992, regarding the pending license applications referenced above. In accordance with our telephone conversation of 3/31/92, PSI is in the process of preparing a response to your letter, and requests a 60 day extension of the due date for the response to your letter. PSI requests the license applications remain active until such time as PSI's response is received by NRC Region I.

Your attention to this matter is appreciated. Should you have any questions, please do not hesitate to contact me at 708/691-1496 (x 320).

Sincerely,

PROFESSIONAL SERVICE INDUSTRIES, INC.

John T. Thornton  
Assistant Radiation Safety Director

JTT/pjp

cc: file

**OFFICIAL RECORD COPY ML 10**

MAR 2 1992

Docket Nos. 030-32383  
030-32602  
030-32603

Control Nos. 114758  
~~115843~~  
115847

Professional Service Industries, Inc.  
ATTN: John Thornton  
Assistant Radiation Safety Director  
510 East 22nd Street  
Lombard, Illinois 60148

Dear Mr. Thornton:

This is in reference to your applications dated May 8, 1991 and November 27, 1991 for Byproduct Material Licenses at your Northeast Testing, CWB Associates and Henry Souther Construction Materials Divisions. In order to continue our review, we need the following additional information:

1. NRC Region IV has recently received an answer to a Technical Assistance Request from the Office of Nuclear Material Safety and Safeguards (NMSS) regarding your proposed in-house Radiation Safety Office (RSO) Instructor Training course. Since the training program proposed to Region IV is the same as the program proposed in these applications, NMSS comments are applicable here.
  - a. NMSS did not recommend approval of the training program as proposed. Their primary concern with the training program is the potential for a pyramiding effect with minimally trained instructors. NMSS stated that we can approve generic qualifications for the instructors, provided PSI makes a commitment that each instructor will have the following minimum qualifications: a.) B.S. degree in Science or Engineering, b.) minimum of three months experience as an operator of a gauge and c.) completion of a 40 hour Radiation Protection Training Course. If PSI does not want to make these commitments, the instructor's qualifications will have to be reviewed on a case-by-case basis.
  - b. PSI stated that instructors would typically have a B.S. degree in Engineering and Science, or equivalent. You should clearly define what is meant by equivalent; i.e. amount of experience and training.



- c. We do not believe that the RSO training manual can be effectively taught in an 8 hour classroom session in addition to viewing the videotape to obtain a sufficient understanding of the material. We believe the course length needed is 40 hours (32 hours of classroom training in addition to the videotape). This amount of training is imperative for individuals who do not have extensive experience in radiation safety.
- d. PSI stated that the RSO/Instructor Training Course is conducted by David Price. However, two additional instructors whose training and experience are not described (J. Thorton and W. Swartendruber) are listed on the course syllabus. PSI should confirm that David Price is present during all lectures presented by these individuals. If Mr. Price is not to be present during their lectures, NRC will need to review their training and experience related to their lecture topics.
- e. PSI should clearly state that gauge operator training will be provided by individuals who have successfully completed PSI's RSO/Instructor Training Course or by the instructors thereof.
- f. In Attachment 1 of your license application, PSI refers to "... approved training by other persons." Please identify "other persons." If these individuals are not part of an approved commercial training course or an approved gauge manufacturer training course, their qualifications need to be reviewed.

In light of the above comments and recommendations, please revise and resubmit your training program.

2. It is not clear from your applications you will notify the NRC if licensed material is either lost, stolen, or involved in an incident. 10 CFR 20.402 requires the licensee to immediately notify the NRC if licensed material is either lost or stolen. 10 CFR 20.403 requires the licensee to notify the NRC in the event of an incident in a timeframe related to the potential threat of radiation exposure. Please modify your emergency procedures to comply with 10 CFR 20.402 and 10 CFR 20.403.
3. Please confirm that individuals performing maintenance and repair on devices containing licensed material as described in Attachment 8 of your applications will be required to wear personnel monitoring devices.

We will continue our review upon receipt of this information. Please reply in duplicate to my attention at the Region I office and refer to Mail Control No. 115843. The reviewer for these licensing actions is Duncan White. If you have any technical questions regarding this deficiency letter please call the reviewer at (215) 337-5042.


Professional Service  
Industries, Inc.


3

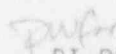
If we do not receive a reply from you within 30 calendar days from the date of this letter, we shall assume that you do not wish to pursue your application.

Sincerely,

Original Signed By:  
Duncan White

 Paul D. Swetland, Chief  
Industrial Applications Section  
Division of Radiation Safety  
and Safeguards

  
RI:DRSS  
White/gc

  
RI:DRSS  
Swetland

03/2/92

03/12/92

OFFICIAL RECORD COPY

ML 060 WHITE - 0002.0.0  
02/28/92



Professional Service Industries, Inc.  
Corporate Office

030-32602

February 11, 1992

United States Nuclear Regulatory Commission  
Region I  
475 Allendale Road  
King of Prussia, Pennsylvania 19406

Attention: Duncan White

Re: Control No. 115843

Dear Mr. White:

In an application dated November 27, 1991 (Control No. 115843), Professional Service Industries, Inc. (PSI) requested the issuance of a USNRC radioactive material license to PSI's Wilder facility. As of the date of this letter, PSI has not received the license or a request for additional information.

PSI has recently acquired a new facility in Taftsville, Vermont, and requests the license be issued to the location at the following address:

Professional Service Industries, Inc.  
Routes 4 and 12  
Taftsville, Vermont 05073  
tele: 802/457-2704

(Note: The facility is located on the Northeast corner of the intersection of Routes 4 and 12.)

A diagram of the Taftsville facility is attached. The gauges will be stored in a plywood cabinet securely fastened to the floor of the laboratory. The gauge storage cabinet is constructed of a 2 x 4 frame with plywood sides and top. The cabinet is secured with a hasp and pad lock, and the hinges are located on the inside of the cabinet. The cabinet will be posted with all required postings in accordance with regulatory requirements.

Should you have any questions, please do not hesitate to contact me at 708/691-1496 (x 320).

Sincerely,

PROFESSIONAL SERVICE INDUSTRIES, INC.

John T. Thornton  
Assistant Radiation Safety Director

JTT/pjp  
attachment

cc: Fred Haag **OFFICIAL RECORD COPY** ML 10

115843  
FEB 13 1992

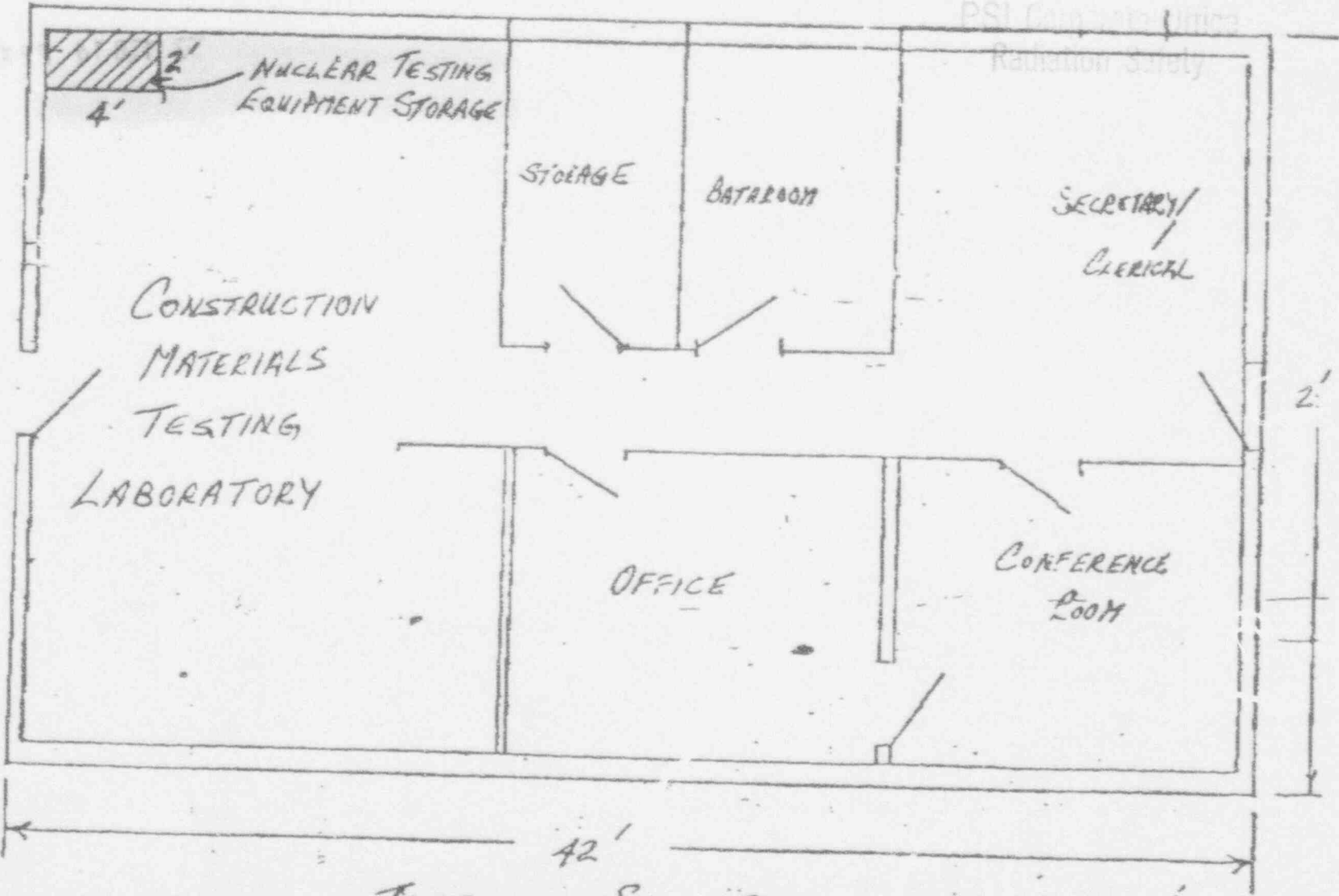
TO: PSI (MIKE KESSEL MAYER)  
 FROM: PSI WILLIS ENGINEERING DIVISION  
 P.O. Box 106, ROUTES 4 & 12  
 TAFTSVILLE, VT. 05073

RECEIVED

FEB 11 1992

PSI Engineering Limited

Radiation Safety



TAFTSVILLE SELF STORAGE  
GROUND FLOOR OFFICE (EXHIBIT "A" TO LEASE)  
 1008 SQ. FT.

MEMORANDUM FOR: L. Joe Callan, Director  
Division of Radiation Safety and Safeguards, RIV

FROM: John E. Glenn, Chief  
Medical, Academic, and Commercial  
Use Safety Branch  
Division of Industrial and  
Medical Nuclear Safety, NMSS

**COPY**

SUBJECT: TECHNICAL ASSISTANCE REQUEST: PROFESSIONAL SERVICE  
INDUSTRIES, INC., CONTROL NOS. 463530 and 463532

This refers to your Technical Assistance Request, dated August 12, 1991, regarding Professional Services Industries, Inc.'s (PSI) proposed in-house radiation safety training for instructors.

We do not recommend that PSI's training program be approved as proposed. Our main concern with the training program is the potential for a pyramiding effect with minimally trained instructors. Policy and Guidance Directive FC 84-24; "Standard Review Plan for Applications of the Use of Sealed Sources in Portable Gauging Devices," recommends radiation safety training equivalent to an 80 hour course in radiation safety principles and practices to avoid pyramiding effects. An alternative to the recommended 80 hours of training is a certain level of academic achievement such as a B.S. degree in one of the Sciences or Engineering, as well as experience as a gauge operator.

We can approve generic qualifications for the instructors provided PSI makes a commitment that each instructor will have the following qualifications as a minimum: a) B.S. degree in Science or Engineering b) minimum of three (3) months experience as an operator of a gauge c) completion of a 40 hour Radiation Protection Training Course. If PSI does not want to make these commitments, the instructor's qualifications will have to be reviewed on a case-by-case basis, as was done in Regions I, II, and III in their review of the training program.

We have comments and recommendations regarding the information submitted by PSI which are outlined in Enclosure 1. PSI should clarify these items in order for you to continue your review of the application. If you have any questions, please contact Torre Taylor on FTS: 964-2611.

Original Signed By  
John E. Glenn, Chief  
Medical, Academic, and Commercial  
Use Safety Branch  
Division of Industrial and  
Medical Nuclear Safety, NMSS

cc: R. Bellamy, RI  
D. Collins, RII  
J. Grobe, RIII

<b>DISTRIBUTION</b>	IMAB-554	<i>w/ incoming</i>	
NRC File Center	TAR r/f	JEGlenn	RECunningham JGreeves
IMNS Central File	PCVacca	RJPate, RV	MShanbacky, RI JKinneman, RI
PSwetland, RI	CHosey, RII	GMMcCann, RIII	BPrange, RV SLBaggett, IMAB
MLamastra	RFonner, OGC	EMcAlpine, RII	VLMiller, GPA/SP WFisher, RIV
JRicci, AEOD/TTC	CCain, RIV	LWCamper,	IMAB r/f JPiccone, IMAB
LFranklin, RII	JJohansen, RI	NMSS r/f	PSantiago TTaylor
OFC: IMAB	:IMAB	:IMAB	:IMAB
NAME:TTaylor:	:PSantiago	:MLamastra	:JEGlenn
ht			
DATE:12/2/91	:12/2/91	:12/ /91	:12/24/91
OFFICIAL RECORD COPY			

OFFICIAL RECORD COPY 554 ML 10

115843  
12/91

COMMENTS AND RECOMMENDATIONS REGARDING  
PROFESSIONAL SERVICES INDUSTRIES IN-HOUSE TRAINING PROGRAM

1. PSI states, in letter dated September 19, 1991, that the individuals providing the training would typically have a B.S. degree in Engineering or Sciences, or equivalent. PSI should clearly define what is meant by equivalent, i.e. amount of experience and training.
2. We believe that the Radiation Safety Officers (RSO) Training manual submitted by PSI cannot be taught in an 8 hour classroom session along with the videotape to allow individuals to obtain a sufficient understanding of the course material. We believe that the course length needed is 40 hours (32 hours of classroom training in addition to the videotape). This is imperative for individuals who do not have extensive experience in radiation safety.
3. PSI stated, in letters dated March 28, 1991 and September 19, 1991, that the Radiation Safety Officer Instructor Training Course is conducted by David Price. However, two additional instructors, J. Thornton and W. Swatzenruber, are listed on the Course syllabus. PSI should confirm that David Price is present during the lectures presented by these individuals. If Mr. Price is not present, we recommend that you review these individuals' training and experience as these individuals are instructing topics in biological effects and regulatory control.
4. PSI should clearly state who will provide training. PSI states in Attachment 1 of their license application, dated March 13, 1991, that training for gauge operators is provided by the RSO. In their letter of March 28, 1991, they state training is provided by individuals who have successfully completed PSI's RSO Instructor Training Course.
5. PSI referenced in Attachment 1 of their license application, dated March 13, 1991, "... approved training by other persons." PSI should identify "other persons." If these individuals are not part of a commercial training course or the gauge manufacturer training course, their qualifications should also be reviewed.
6. It is not clear to us who produces the videotape PSI uses in their training. PSI should specify the origin of the videotape. If the tape is produced by PSI or is otherwise produced by an unfamiliar source, we recommend that the tape be reviewed to ensure the information presented is accurate.

L&L 28718  
030-32602



Professional Service Industries, Inc. 03/21  
Corporate Office

November 27, 1991

U.S. Nuclear Regulatory Commission  
Region I  
475 Allendale Road  
King of Prussia, Pennsylvania 19406

Attention: Licensing Section

Re: Radioactive Material  
License Application

Gentlemen:

Professional Service Industries, Inc. (PSI) requests issuance of a U.S. Nuclear Regulatory Commission Radioactive Materials License for the location indicated below:

Professional Service Industries, Inc.  
Northeast Testing Division  
42 A Street  
Wilder, Vermont 05088

tele: 802/295-6026

Mr. Robert Burns shall serve as Radiation Safety Officer for the license. Mr. Burns has previously served as a Radiation Safety Officer for Conam, a Division of Nuclear Energy Services, Inc. Mr. Burns has been employed by PSI since 1989, and is currently serving as Vice President. Mr. Burns was certified as a Radiation Safety Officer in accordance with PSI's RSO/Instructor training program in November, 1990. (Mr. Burns' qualifications are included in the enclosed license application.)

Daily management of the radiation safety program shall be performed by an Assistant Radiation Safety Officer (ARSO), who is responsible to the RSO. (The ARSO shall receive Radiation Safety Officer training equivalent to that of the RSO.)

The Wilder location is currently operating under the authorization of USNRC Radioactive Materials License No. 12-16941-01, which expires on January 1, 1992. PSI requests that the enclosed license application be processed on a priority basis, so that the license may be issued prior to the expiration of USNRC License No. 12-16941-01. Your assistance in this regard is greatly appreciated.

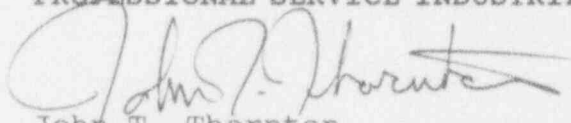
License Fee Information  
on Application

License Application  
November 27, 1991  
Page Two

Enclosed is a complete NRC license application (NRC form 313, plus attachments) and a check in the amount of \$500.00 to cover the license application fee. Should you have any questions, please do not hesitate to contact me.

Sincerely,

PROFESSIONAL SERVICE INDUSTRIES, INC.



John T. Thornton  
Assistant Radiation Safety Director

JTT/pjp  
enclosure



### APPLICATION FOR MATERIAL LICENSE

L4L 28718  
030-32609  
03121

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

**APPLICATIONS FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:**

U.S. NUCLEAR REGULATORY COMMISSION  
DIVISION OF FUEL CYCLE AND MATERIAL SAFETY, NMSS  
WASHINGTON, DC 20545

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

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

U.S. NUCLEAR REGULATORY COMMISSION, REGION I  
NUCLEAR MATERIALS SAFETY SECTION B  
#75 ALLENDALE ROAD  
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  
NUCLEAR MATERIALS SAFETY SECTION  
101 MADNETTA 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  
613 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  
NUCLEAR MATERIALS SAFETY 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)

Professional Service Industries, Inc.  
Northeast Testing Division  
42 "A" Street  
Wilder, Vermont 05088

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

42 "A" Street  
Wilder, Vermont

AND

Temporary job sites of the licensee where NRC maintains jurisdiction

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

John T. Thornton, Assistant Radiation Safety Director

TELEPHONE NUMBER  
708/691-1490

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. (see attachment 2.)	6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED. (see attachment 3.)
7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE. (see attachment 4.)	8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS. (see attachment 1.)
9. FACILITIES AND EQUIPMENT. (see attachment 6.)	10. RADIATION SAFETY PROGRAM (see attachment 7.)
11. WASTE MANAGEMENT. (see attachment 9.)	12. LICENSEE FEES (See 10 CFR 170 and Section 170.31) FEE CATEGORY 3.P. AMOUNT ENCLOSED \$ 500.00

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
	Robert L. Burns	Vice President	12/3/91 11/29/91

FOR NRC USE ONLY

TYPE OF FEE APP	FEE LOG Dec. 81	FEE CATEGORY 3P	COMMENTS	APPROVED BY SK
AMOUNT RECEIVED \$ 500	CHECK NUMBER 444684			DATE 12/27/91

Attachment No.		Page
1.	Operator Training	1
2.	Radioactive Materials	2
3.	Purpose of Use	3
4.	Management Experience and Qualification	4
	-- Organizational Chart	
	-- Resume RSO	
	-- Resume RSD	
5.	Personnel Monitoring	5
6.	Facilities and Equipment	6
7.	Radiation Protection Programs	
	-- Storage	7(a)
	-- Instrument Calibration	7(b)
	-- Leak Testing	7(c)
	-- Physical Inventory	7(d)
	-- Emergency Procedures	7(e)
	-- Transportation	7(f)
	-- Management Review	7(g)
8.	Device Maintenance	8
9.	Disposal	9

SUPPLEMENT TO APPLICATION ATTACHMENT

The following items were requested by Mr. Glenn Roberts as clarification to the license application for USNRC Radioactive Materials License No. 06-28633-01, issued to PSI's New Haven office. The following is submitted for this license application.

1. A copy of USNRC NUREG/BR-0133 will be provided to moisture/density operators trained under the authorization of the license.
2. Radiation safety training for moisture/density gauge operators is administered at the Division office level. Upon completion of the training, a 30 question exam (enclosed) is given to trainees. The exam is submitted to PSI's Corporate office for evaluation and operator certification. (A radiation safety training certificate and wallet card are issued in the individual's name.)
3. PSI requests authorization to possess up to two (2) Troxler model 3241 series asphalt content gauges under the authorization of the license, in addition to the devices listed Attachment 2.
4. In reference to page 7.a. of the license application (storage), moisture/density gauges will be secured by either locking and chaining to an immovable object within a storage facility (job site trainer, field office, etc.) or stored within a lockable cabinet or closet within the job site storage facility. A "CAUTION - RADIOACTIVE MATERIALS" storage sign, NRC "Notice to Employees", copy of applicable license and a notice as to the location of the operating and emergency procedures and the regulations will be posted at the job site.

The storage enclosure at the licensed facility (office) will be secured to the floor or wall of the office to prevent repositioning or removal.

PROFESSIONAL SERVICE INDUSTRIES, INC.

TRAINING FOR INDIVIDUALS WORKING IN  
OR FREQUENTING RESTRICTING AREAS

Radiation safety officers and their assistants shall be trained by the corporate radiation safety officer. Each individual selected as a radiation safety officer or a radiation safety officer's assistant shall have a degree in Engineering or Science, or equivalent, and at least 1 week of experience with moisture/density gauges.

Training will consist of a combination of self-study material consisting of text and videotape information estimated to require a minimum of one day. One day of formal training administered by the corporate Health Physicist and a 50 question exam to be graded by the corporate radiation safety officer, who shall approve the RSO and the RSO's assistants. The outline of the training course is attached.

"The Story of Radiation is the most objective, high-quality, instructional television program we could find on the market today."

—Administrator, Media Resources Center,  
Oklahoma State Department of Education

**What Is It?: Energy in Motion**

Part 1

The introductory film in the series—lays the groundwork for a basic understanding of radiation. Topics include the electromagnetic spectrum; a definition of radiation as a form of energy conversion; changes caused by radiation in living cells, with potentially beneficial and harmful results; and relative amounts of exposure from background and other sources of radiation.

Videotape (specify format)  
Order Code: A903-0AB.

**What Is It Made Of?: Particles & Waves**

Part 2

Includes a historical review of the discovery, study, and uses of radiation; fundamental explanation of atomic structure; origin and composition of alpha, beta, neutrons, gamma, and x-rays; and production of bremsstrahlung (demonstrated by analogy).

Videotape (specify format)  
Order Code: A904-9AB.

**What Does It Do?: Interaction with Matter**

Part 3

Covers the development of atomic theory; basic concept of ionization; interaction of common types of radiation with matter; and how the different interactions determine uses of each radiation form.

Videotape (specify format)  
Order Code: A905-7AB.

**Where Is It?: Measurement & Detection**

Part 4

Covers detection and measurement survey instruments and how they function; precise laboratory measurement techniques; why we conduct monitoring activities; and examination of Geiger counters, ion chambers, scintillation detectors, and personnel monitoring devices (film and TLD).

Videotape (specify format)  
Order Code: A906-3AB.

**What Effect Does It Have?: Biological Effects**

Part 5

Points out that all forms of life are composed of cells that can be affected by radiation. Uses a genetic cell to illustrate cellular components and functions. Other topics include the role of DNA and its effect on future generations, comparison of the effects of high- and low-level radiation, and an experiment that studies the role of radiation in causing leukemia.

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"An effective, objective program which involves and motivates the viewer to learn about radiation."

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New Hampshire House of Representatives

**Does It Affect Us?: Human Effects**

Part 6

Includes discussions of background radiation, "average annual exposure," natural and man-made sources, differences in cell radiosensitivity throughout the body, somatic and genetic effects, and predictions of biological effects for high- and low-level exposure.

Videotape (specify format)  
Order Code: A908-1AB.

**Is It Safe?: Interpretation of Dose**

Part 7

Covers sources of low-level exposure and efforts to predict their effects on humans, findings of the Biological Effects of Ionizing Radiation (BEIR) Committee, and three primary models for predicting radiation effects. Also discusses a specific case study for occupational workers; a "safe" level requires an interpretation of the quantified risk.

Videotape (specify format)  
Order Code: A909-3AB.

**Can We Use It?: Risk vs. Benefit**

Part 8

Topics include definitions of quantified risk and perceptions of risk, common risks and how we decide about them, the difficulties in quantifying and making decisions about probable risks, and the concept of risk/benefit analysis.

Videotape (specify format)  
Order Code: A910-3AB

**Can We Control It?: Safety Precautions**

Part 9

Includes the historical evolution of safety standards, formation of rules of the National and International Councils on Radiation Protection (NCRP and ICRP), the relationship between state and federal regulatory agencies for use and disposal of radioactive materials, and political and economic barriers that affect determination of radiation standards.

Videotape (specify format)  
Order Code: A911-1AB

**Where Do We Go from Here?: Issues**

Part 10

Includes a review of the potential risks of radiation from various sources; interviews with personnel from government and various national organizations, who give their views on radiation-related issues; and exploration of the role of the individual in making decisions about technology and so values. Points out that individuals, government, business, and citizen groups will ultimately define the future of nuclear radiation and its use.

Videotape (specify format)  
Order Code: A912-3AB

"... an excellent technical presentation that can be used for occupational workers, professional staff, students, patients, and the public."

—Dr. John W. Paston  
Associate Professor,  
Georgia Institute of Technology

## COURSE SCHEDULE

Radiation Safety Officers Training  
(Portable Moisture/Density Gauges)

---

6:00 AM	Welcome and Introductions	L. LEWIS
8:30 AM	Introduction to Radiation Definition of Terms Periodic Properties of Elements Early Models of Atomic Structure Bohr Atom Isotopes Environmental Radiation Cosmic Terrestrial Man-made Radiation Consumer Products	D. PRICE
9:00	Types of Radiation X-Rays Alpha Beta Gamma Neutron	D. PRICE
9:30	Radioactive Material Sealed Sources "Normal Form" "Special Form" Gamma Radium-226 Cesium-137 Neutron Radium/Beryllium Americium/Beryllium	D. PRICE
9:45	BREAK	
10:00	Radiation Interactions Radioactive Decay Half-Life Attenuation Ionization Units of Measurement Detection Survey Meter Dosimeter	D. PRICE

10:30	Radiation Exposure	W. SWARTZENDRUBER
	Units	
	Dose & Dose Rates	
	Biological Effects & Hazards	
	Contamination	
	Exposure	
	Internal Hazards	
	Biological Half-Life	
	Effective Half-Life	
	External Hazards	
	Prompt Effects	
	Radiation Injury	
	Acute Exposure	
	Delayed Effects	
	Cancer	
	Genetic Defects	
	Exposure of Pregnant Women	
	Occupational Exposure	
	Risk vs. Benefit	
12:00 NOON	LUNCH	
1:00 PM	Reduction of Radiation Exposure	D. PRICE
	Time	
	Distance	
	Divergence	
	Inverse-Square Law	
	Shielding	
	Materials	
	For Gamma Sources	
	For Neutron Sources	
	Half-Value Layer	
	ALARA - Philosophy & Application	
1:30	Regulatory Control	J. THORNTON
	Governmental Agencies	
	U.S. Nuclear Regulatory Commission	
	Agreement States Program	
	U.S. Department of Transportation	
	Byproduct Material	
	Regulations	
	"Notices, Instructions and Reports to Workers"	
	"Standards for Protection Against Radiation"	
	"Rules of General Applicability to Domestic Licensing..."	
	"Packaging of Radioactive Material for Transport..."	
	Occupational Exposure Limits	
	Personnel Monitoring	

Regulatory Control (continued)  
License Authorizations  
    Materials  
        Transfer  
        Inventory  
    Storage  
    Use  
    Personnel  
    Service  
    Commitments  
Reciprocity  
Radiation Area  
Restricted/Unrestricted Areas  
Posting of Signs  
Sealed Source Leak Testing  
    Requirements  
    Sample Collection  
Security  
    In Storage  
    In Use  
Transportation  
    Packaging  
        "Type-A Package"  
        Radiation Limits  
        Marking  
        Labeling  
    Paperwork  
    Transport  
    Shipping  
Records & Documentation  
Operations  
    Safety  
    Supervision  
    Use of Equipment  
    Records  
Governmental Inspections

2:45 BREAK

3:00 Occupational Responsibilities  
    Individual Users  
    Radiation Safety Officer  
    Corporate Officers  
    Legal Considerations  
    Liability vs. Benefit

J. THORNTON



Course Schedule (continued)  
Page Four

3:15	Training & Instruction of Operators	W. SWARTZENDRUBER
	Topics	
	Examination	
	Certification	
	Documentation	
3:30	Emergency Response	D. PRICE
	Loss	
	Accident	
	Hazards	
	Immediate Action	
	Recovery	
	The Human Factor	
	Overexposure	
	Case Histories	

4:00 EXAMINATION

Final Score: \_\_\_\_\_

Certification Date: 11

ANSWER Key

passing score: 80%

PROFESSIONAL SERVICE INDUSTRIES, INC.  
RADIATION SAFETY EXAMINATION

\_\_\_\_\_  
DATE

\_\_\_\_\_  
NAME

SS#: \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

BIRTH DATE: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

1. The smallest part of an element that retains the properties of that element is called:

- a. atom
- b. electron
- c. alpha particle
- d. proton

2. High energy, short wave length electromagnetic radiation emitted during radioactive decay is called a (an):

- a. alpha particle
- b. beta particle
- c. x-ray
- d. gamma ray

3. The number of disintegrations that occur for a given radioisotope during a given length of time is a measurement of the:

- a. average gradient
- b. latitude
- c. activity
- d. ionization

4. Compton scatter, pair production and the photoelectric effect are all processes by which electromagnetic radiation is absorbed.

- a. True
- b. False

5. In comparing the wave length of x and gamma rays to the wave length found in the visible light spectrum, it is noticed that the wave lengths of x and gamma rays are:

- a. longer by comparison
- b. higher by comparison
- c. lower by comparison
- d. shorter by comparison

6. The term ALARA, when dealing with radiation safety stands for:

- a. At last, a Roentgen analyzer
- b. As low as is reasonably achievable
- c. As low as regulations allow
- d. As long as readings allow

7. When x and gamma rays pass through matter, the matter becomes radioactive for a few minutes.

- a. True
- b. False

8. What is the required posting for a moisture/density gauge storage enclosure?

- a. "Caution - Radioactive Materials"
- b. "Caution - Radiation Area"
- c. "Caution - High Radiation Area"

9. The abbreviation "rem" represents:

- a. radiation effect on man
- b. roentgen equivalent man
- c. regulations equivalent man
- d. milliroentgen equivalent man

10. Alpha particles are considered to be more highly ionizing than x or gamma rays.

- a. True
- b. False

11. X-rays were discovered in Germany in 1895 by:

- a. Wilhelm Roentgen
- b. Almer Conrad
- c. Marie Curie
- d. Henri Becquerel

12. Which of the following is not required to be posted?:

- a. "Notice to Employees"
- b. Last Notice of Violation
- c. Statement as to location of regulations and procedures
- d. Leak test certificate

13. The Code of Federal Regulations in Title 10 Part 20 establishes the maximum permissible occupational dose limits in rem per calendar quarter for different parts of the body. These limits apply to individuals 18 years of age or older in restricted areas. In an individual's lifetime, these limits allow a maximum permissible occupational dose of radiation that is not expected to cause appreciable body injury. The whole body, head and trunk, activate blood-forming organs, gonads, or lens of the eyes may receive no more than \_\_\_\_\_ rem per calendar quarter:

- a. 3
- b. 1/4
- c. 2
- d. 1 1/4

14. So long as an operator maintains visual surveillance of a gauge, he is in compliance with regulations:

- a. True
- b. False

15. Describe the basic structure of the atom:

The atom structure consists of the nucleus (Proton(s) (+) and Neutron(s) (0)) and orbiting electron(s) (-), which are 1/1870<sup>th</sup> the mass of protons or neutrons


16. Which of the following is not true for requirements of reciprocity:

- a. must notify state prior to entry
- b. must remain only at jobsite location
- c. may store gauge at jobsite
- d. must operate in accordance with the license
- e. must adhere to regulations of "home" state


17. Elements with common atomic numbers but with different atomic weights are called:

- a. Ions
- b. Isotopes
- c. Radioactive
- d. Elements


18. The radiation dose that will result in the death of 50 percent of the people exposed is called the:

- a. maximum permissible dose
- b. daily occupational dose
-  c. median lethal dose
- d. maximum lethal dose


19. The presence of unwanted radioactive matter or the tainting of objects with radioactive "dust" or "dirt" is referred to as:

- a. high risk area
- b. occupational hazard
-  c. contamination
- d. none of the above


20. Regulations require that personnel monitoring be provided to:

- a. only individuals who work at nuclear power plants
- b. all employees
-  c. all individuals likely to receive 25% of quarterly limit
- d. only individuals under 18 years of age and pregnant women

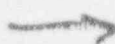
21. When x and gamma rays pass through the human body, the primary cause of damage is a direct result of ionization:

-  a. True
- b. False

22. The term "somatic effect" applies to:

-  a. the physical effects on the human body, as a result of cell damage
- b. mutation caused by genetic damage
- c. the physical effects on the iris of the eye, as a result of cell damage
- d. none of the above

23. Density gauges are shipped:

- a. in approved DOT shipping cases
- b. on cargo aircraft only
- c. in accordance with DOT regulations and procedures
- d. as a "Yellow II" package
-  e. all of the above

24. The attenuation (reduction) in the radiation as it passes through material is caused by:

- a. absorption
- b. osmosis
- c. backscatter
- d. epidemiology

25. Leak tests of moisture/density sources are performed:

- a. annually
- b. only if a leak is suspected
- c. every six months by certified individual(s) only
- d. daily

26. The total number of protons in the nucleus of an atom represents the:

- a. number of subatomic particles
- b. the neutrons
- c. the atomic number
- d. the atomic weight

27. An electrically balanced atom containing two protons in the nucleus would contain how many orbital electrons:

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

28. All isotopes are unstable and therefore radioactive.

- a. True
- b. False

29. Radiation from nuclear decay may be found in three basic types of emission. They are:

- a. alpha, beta and x
- b. gamma, alpha and x
- c. beta, x and alpha
- d. gamma, beta and alpha

30. What term is used as a measure of the activity of a radioisotope?

- a. curies
- b. ions
- c. isotopes
- d. electrons

31. Gauges transported in a personal vehicle are exempt from DOT regulations:

- a. True
- b. False

32. The time required for one half the atoms in a radioactive substance to disintegrate is called the:

- a. specific activity
- b. half-life
- c. shelf life
- d. wave length

33. The shorter the wave length of electromagnetic radiation, the lower the energy level.

- a. True
- b. False

34. One of the most critical factors when considering human safety when working with x and gamma rays is:

- a. that they can only be detected by smell
- b. they may be detected only by touch
- c. they cannot be detected by the human senses
- d. there is no critical factor

35. The abbreviation of "rad" is representative of:

- a. roentgen absorbed data
- b. radiation absorbed dose
- c. 1/100 of a roentgen
- d. 1/10th of a roentgen

36. Dosimetry reports must be maintained:

- a. for 1 year
- b. for 3 years
- c. for 5 years
- d. forever

37. Any area for which access is controlled for purpose of protection of individuals from exposure to radiation and radioactive materials is called:

- a. a quiet area
- b. a hazardous area
- c. a vacated area
- d. a restricted area



38. List four characteristics of x-rays and gamma rays:

- a. Both are electromagnetic radiation
- b. High energy
- c. Short wavelength or high frequency
- d. No mass or electrical charge

39. An ion is a(n) \_\_\_\_\_ with either a positive or negative charge.

- a. atom
- b. group of atoms
- c. free particle
- d. all of the above

40. Which of the following may be completely absorbed by a piece of paper?

- a. alpha particles
- b. beta particles
- c. gamma rays
- d. high energy x-rays

41. The symbol "R" stands for:

- a. radiation absorbed dose
- b. relative biological effectiveness
- c. roentgen equivalent man
- d. none of the above

42. Which of the following types of radiation has the greatest biological effect?

- a. x-ray
- b. gamma ray
- c. alpha particles
- d. beta particles

43. To determine rem (roentgen equivalent man) values one would multiply:

- a. roentgen times rad
- b. roentgen times ICE
- c. rad times RBE
- d. RBE divided by rad

44. Regulations require that individuals under 18 years of age receive no more than 10% of 1 1/4 rem (whole body) per calendar quarter.

- a. True  
b. False

45. Cell damage due to radiation exposure increases as cell reproduction rate increases:

- a. True  
b. False

46. When one looks at the human cell sensitivity, it may be noted that the most sensitive cells in the human body are the:

- a. digestive system lining cells  
b. cells of the gonad  
c. blood vessel cells  
→ d. white blood cells

47. It is expected that a dose of over 1,000 rem in any 24 hour period, will result in:

- a. 100% fatalities  
b. 50% fatalities  
c. 25% fatalities  
d. 10% fatalities

48. List the primary factors that determine a cell's sensitivity to radiation damage.

Age of the cell  
Reproduction Rate  
Degree of differentiation

49. What are the two general categories of cellular damage? (Pick two)

- a. cancer  
→ b. somatic effects  
→ c. genetic effects  
d. radiation burns

50. Which of the following doses is likely to be the most damaging?

- a. 25 rem over a 24 hour period
- b. 25 rem over a 1 year period
- c. 25 rem over a 5 year period
- d. 25 rem over a 10 year period

51. What is the likely effect to an individual if the individual were to receive 1000 mrem in less than 24 hours?

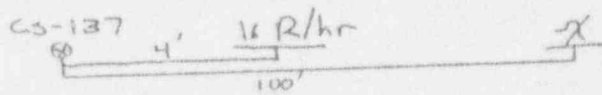
- a. No obvious injury
- b. Possible disability
- c. Possible death
- d. Certain death

52. Regulations require that radioactive material, while stored, must be:

- a. kept warm and dry
- b. accessible to all employees whether certified or not
- c. secured against unauthorized removal at all times
- d. kept in office lab

53. The dose rate at 4 feet from a Cesium 137 source is 16 R/hr. What would the dose rate be at 100 feet? (Note units of exposure.)

- a. 16 mR/hr
- b. 26 mR/hr
- c. 160 mR/hr
- d. 260 mR/hr



$$\frac{I_1}{I_2} = \frac{(d_2)^2}{(d_1)^2}$$

$$\frac{16 \text{ R/hr}}{X} = \frac{(100)^2}{(4)^2} \text{ or } \frac{10,000}{16} \text{ so,}$$

$$10,000 X = 256 \text{ R/hr}$$

$$X = .0256 \text{ R/hr}$$

$$\text{or } 25.6 \text{ mR/hr}$$

54. The dose rate indicated on your survey meter is 25 mR/hr. If you were to stay in that location for 5 minutes, 15 minutes, 1 hour, or 8 hours, what would your dose be?

- a. 5 minutes 2.083 mREM  $(25 \text{ mR/hr} \div \frac{60}{5})$
- b. 15 minutes 6.25 mREM  $(25 \text{ mR/hr} \div \frac{60}{15})$
- c. 1 hour 25 mREM  $(25 \text{ mR/hr} \times 1)$
- d. 8 hours 200 mREM  $(25 \text{ mR/hr} \times 8)$

Licensed material shall be used only by individuals who have received specific training in the use of the device or who have successfully completed the manufacturer's training course and who have been certified by the Corporate Office. Each individual who uses or directly supervises the use of licensed material will receive one day of training in the basics of radiation safety and regulatory requirements and additional four days of on-the-job training and supervised experience administered by the Radiation Safety Officer. Prior experience may be accepted in lieu of field training.

This additional training will include radioactivity measurements, mathematics and calculations basic to the use of moisture density gauges and the manufacturer's routine and emergency instructions.

Approved training provided by other persons may be used to satisfy these training requirements.

The manufacturer's operating and emergency instructions will be supplied to each user of a gauge. Where necessary, the manufacturer's instructions will be supplemented to add:

1. Use of personnel monitoring devices
2. Step-by-step operating instructions
3. Storage
4. Transportation
5. Leak testing
6. Emergency procedures

Copy of sample test (with answers) is attached.

COURSE OUTLINE  
 RADIATION SAFETY TRAINING PROGRAM  
 FOR  
 NUCLEAR DENSITY GAUGE OPERATOR

<u>Topic</u>	<u>Allotted Time</u>
I. Gauge Operation	
a. Theory - - - - -	1/2 hr.
b. Operation - - - - -	3/4 hr.
c. Maintenance - - - - -	1/4 hr.
d. Field Use	
1. Soil - - - - -	1/2 hr.
2. Asphalt - - - - -	1/2 hr.
II. Radiation Safety	
a. Principles of Radiation Safety and General Safety - - - - -	3/4 hr.
b. Shipping and Storage - - - - -	1/4 hr.
c. Detection and Measurement - - - - -	1/2 hr.
d. Biological Effects - - - - -	1/2 hr.
e. Emergency Procedures - - - - -	1/2 hr.
III. Exam - - - - -	1 hr. (150 pts.)

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Covers detection and measurement; survey instruments and how they function; direct laboratory measurement techniques; why we conduct monitoring activities; and examination of Geiger counters, ion chambers, scintillation detectors, and personnel monitoring devices (film and TLD).

Videotape (specify format) Order Code: A906-5A8.

What Effect Does It Have?: Biological Effects Part 5

Points out that all forms of life are composed of cells that can be affected by radiation. Uses a genetic cell to illustrate cellular components and functions. Other topics include the role of DNA and its effect on future generations; comparison of the effects of high- and low-level radiation; and an experiment that studies the role of radiation in causing leukemia.

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Videotape (specify format) Order Code: A908-1A8.

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Videotape (specify format) Order Code: A909-3A8.

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Topics include definitions of quantified risk and perceptions of risk, common risks and how we decide about them, the difficulties in quantifying and making decisions about probable risks, and the concept of risk/benefit analysis.

Videotape (specify format) Order Code: A910-3A8

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Includes the historical evolution of safety standards, formation of roles of the National and International Councils on Radiation Protection (NCRP and ICRP), the relationship between state and federal regulatory agencies for use and disposal of radioactive materials, and political and economic realities that affect determination of radiation standards.

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Includes a review of the potential risks of radiation from various sources; interviews with personnel from government and various national organizations, who give their views on radiation-related issues; and explanation of the role of the individual in making decisions about technology and social values. Points out that individuals, government, business, and citizen groups will ultimately determine the future of nuclear radiation and its use.

Videotape (specify format) Order Code: A912-3A8

"... an excellent technical presentation that can be used for occupational workers, professional staff, students, patients, and the public."

—Dr. John W. Posson, Associate Professor, Georgia Institute of Technology

## COURSE OUTLINE

### Training for PSI Employee Operators of Portable Moisture/Density Gauges

---

Initial instruction in radiation safety is provided by the video tape, "The Story of Radiation" (with companion study guide), requiring a minimum of four to five hours for completion. Additional training, requiring a minimum of four hours, is provided by the RSO/instructor, covering supplementary detailed information, the use of radioactive material by PSI, and regulatory and corporate requirements (*see below*). Field training, covering the operation of portable moisture density gauges, calculations, implementation of requirements, and supervised use of a gauge in field applications will take place over the subsequent four-to-five days.

#### RSO/Instructor Training of Operator:

##### Moisture/Density Gauge Radioactive Materials

- "Normal Form"

- "Special Form"

- Gamma

  - Radium-226

  - Cesium-137

- Neutron

  - Radium/Beryllium

  - Americium/Beryllium

##### Reduction of Radiation Exposure

- Time

- Distance

  - Divergence

  - Inverse-Square Law

- Shielding

  - For Gamma Sources

  - For Neutron Sources

- ALARA - Philosophy & Application

##### Operator Responsibilities

- Safety

- Regulatory Compliance

- Corporate Compliance

- Disciplinary Action

##### Emergency Response

- Loss

- Accident

- Hazards

- Immediate Action

- The Human Factor

- Case Histories

RSO/Instructor Training of Operator: (continued)

Regulatory Control

Governmental Agencies

U.S. Nuclear Regulatory Commission

Agreement States Program

U.S. Department of Transportation

"Byproduct" Material

Regulations

"Notices, Instructions and Reports to Workers"

"Standards for Protection Against Radiation"

"Rules of General Applicability to Domestic Licensing..."

"Packaging of Radioactive Material for Transport..."

Occupational Exposure Limits

Personnel Monitoring

License Authorizations

Materials

Transfer

Inventory

Storage

Use

Personnel

Service

Commitments

Reciprocity

Radiation Area

Restricted/Unrestricted Areas

Posting of Signs

Sealed Source Leak Testing

Requirements

Sample Collection

Security

In Storage

In Use

Transportation

Packaging

"Type-A Package"

Radiation Limits

Marking

Labeling

Paperwork

Transport

Shipping

Records & Documentation

Operations

Safety

Supervision

Use of Equipment

Records



PROFESSIONAL SERVICE INDUSTRIES, INC.  
RADIATION SAFETY TEST FOR  
NUCLEAR MOISTURE/DENSITY GAUGE OPERATORS

FULL NAME John T. Thornton DATE 10/3/89  
SOCIAL SECURITY NO. 345-66-5801 DATE OF BIRTH 10/22/66  
OFFICE Lombard SEX Male

Please print legibly. Be specific and give as much detail as possible.

1. What item is required to be worn by all personnel working with a Nuclear Density Gauge?

"P1" Film badge; which measures accumulated exposure.

2. What are the most common radioisotopes used in moisture/density gauges?

cesium-137, radium-226, americium-241, beryllium.

3. Where is the Corporate Radiation Safety Officer located and what is his telephone number?

312/691-1490 or 800/426-2897  
Lombard, Illinois

4. What are the three (3) basic ways to reduce radiation exposure?

A. Time - reduce time spent near source  
B. Distance - maintain safe distance from source.  
C. Shielding - blocking between operator and source

5. How often are sealed sources leak tested?

Twice a year (or every 6 months) or when leak is suspected.

6. What does the term "Half-Life" refer to?

The amount of time required for 1/2 of the unstable atoms to decay ~~and~~ to a stable form.

7. At what distance from the gauge should all unauthorized persons be kept?

15' or 5 meters

8. What does the term "Rem" refer to?

(Roentgen Equivalent Man) It is the estimated biological effect to the human body determined by the effect of the exposure to radiation of the tissue by one roentgen (R) of X-rays.

9. What is a "Curie"?  
 The number of radioactive atoms that will decay and emit radiation in one second of time. ~~(3.7 x 10<sup>10</sup> dps)~~ (3.7 x 10<sup>10</sup> dps)
10. Define "Milli" (in regards to milliCurie and milliRem).  
 1/1000, → 1 milliRem = 1/1000<sup>th</sup> of a Rem.  
 → 1 milliCurie = 1/1000<sup>th</sup> of a Curie.
11. What types of radiation are emitted from Moisture/Density Gauges?  
 Gamma rays, neutrons, alpha particles, beta particles } essentially stopped by encapsulation.
12. What is the half-life of the following materials?  
 Radium 226 1620 years  
 Cesium 137 30 years
13. How often should the sliding shield on a nuclear density gauge be cleaned and lubricated?  
once a week, and more frequently if used in wet, sandy soil or clay.
14. What is the suggested whole body exposure limit for one quarter (13 weeks) in mRem? (As set by the Atomic Energy Commission) 1,250
15. What is ALARA? As low as reasonably achievable.

Please circle the correct answer(s) for each of the following questions.

16. What age must a person be before he/she can operate a nuclear density gauge?
- 16 years
  - 18 years
  - 21 years
17. A film badge measures:
- dosage rate
  - accumulated dose
  - both a and b

18. Which of the following is not required with the use of Nuclear Moisture/Density Gauges?

- a. film badge
- b. maintain a record of every place of use
- c. locked storage area
- d. approved protective clothing

19. Which of the following documents are you required to have with you at all times when using or transporting a gauge?

- a. copy of last leak test certificate
- b. copy of license
- c. bill of lading
- d. "In Event of an Accident" sheet
- e. certification card
- f. completed shippers declaration of dangerous goods

20. Which of the following actions contribute to false readings of a film badge?

- a. heat
- b. direct sunlight
- c. cold
- d. television radiation or microwaves
- e. getting badge wet
- f. storing badge with or near the nuclear density gauge

21. Which of the following areas of the body are especially sensitive to the effects of radiation?

higher intensity radiation →

- a. bone and other blood forming organs (N/A)
- b. reproductive organs
- c. feet and hands
- d. eyes

If the following statements are true, please write TRUE in the blank space.

If the statement is false, please write FALSE in the blank space.

- 22. True Always transport a gauge in its storage container, chained to the back wall of the truck, in the trunk of a car, or in the far right rear of a hatchback.
- 23. False You can take the gauge home overnight.
- 24. False The source emits radiation only when the gauge is turned on and the probe is exposed.

25. False Man can detect radiation with his senses.
26. False If the encapsulated source should come in direct contact with your hand or the ground, you will have radioactive contamination on that area.
27. True Never remove the scaler module of a nuclear density gauge in the field.

Answer the following questions in detail.

28. Explain in detail what should be done in case of an accident involving a radioactive source.
1. Isolate accident area
  2. stop all equipment involved in accident
  3. Keep all unauthorized individuals at least 15' feet away from accident site.
  4. Do not leave area (but stay 15' away) send someone else to contact your Branch Radiation Safety officer (BRSO.)
  6. If your BRSO is unavailable, have person contact the Radiation Safety Director at the corporate office.
  6. If the Radiation Safety Director is unavailable, have person ask for Radiation Records Officer or Corporate Secretary
  7. If you are unable to reach RSI management, contact the appropriate state agency in the state in which you are working.
  8. state police are contacted.
29. Explain how to dry out a nuclear density gauge if moisture builds up internally.

Remove scaler unit (or front panel) from gauge and recharge the gauge overnight. The heat generated during recharge process will dry out gauge.  
(never remove scaler in the field.)

30. Explain where the Information Pouch should be kept when transporting and using a gauge.

During transportation, pouch must be on operator's right on front seat of vehicle, in plain view.

During use, pouch must be on operator's person.

optional → \* During shipping, pouch must be in gauge case.

Professional Service Industries, Inc.  
Confirmation Form  
(to be completed in ink)

To PSI Corporate Radiation Safety Officer, Corporate Office

I, John T. Thornton, have read and fully  
(Printed Full Name)

understand the PSI Nuclear Moisture/Density Gauge Training Manual.

I understand I may consult with my Branch Radiation Safety Officer or telephone the Corporate Radiation Safety Officer at 1-800-426-2897 for explanation to any questions I may have.

I will utilize my constant awareness and PSI's safety procedures to protect life and property while working with radioactive materials.

John T. Thornton  
Trainee Signature

10/3/89  
Date

\_\_\_\_\_  
Branch Radiation Safety Officer / Office

\_\_\_\_\_  
Date

\* must be signed by an approved RSO before grading test.

PROFESSIONAL SERVICE INDUSTRIES, INC.

RADIOACTIVE MATERIAL

- A. Cs-137 in sealed sources not to exceed 10 mCi each  
Maximum Activity: 1 curie
- B. Am-241 in sealed sources not to exceed 50 mCi each  
Maximum Activity: 5 curies

Sealed sources incorporated in Campbell Pacific Nuclear Corporation (CPN), Humboldt Scientific, Inc., Seaman Nuclear Corporation, and/or Troxler Electronic Laboratories, Inc. devices which have been registered pursuant to 10CFR 32.210 and distributed in accordance with an NRC or Agreement State Specific license for use by persons specifically authorized by licensee.

Material authorized for distribution to persons exempt from the license and material that may be possessed pursuant to a general license shall not be subject to the condition of this license.

The maximum activity to be possessed shall not exceed 1 curie of Cs-137 and 5 curies of Am-241. These are below the limits for which a decommissioning plan is required for sealed sources.

# SCHEDULE OF RADIOACTIVE SOURCES (MOISTURE/DENSITY GAUGES)

Radionuclide(s)	Sealed Source	No single source to exceed
A. Cs-137	Campbell Pacific Nuclear Model CPN-131	10 millicuries
B. Am-241:Be	Campbell Pacific Nuclear Model CPN-131	50 millicuries
C. Cs-137/Am-241:Be	Combination Source; Campbell Pacific Nuclear Model CPN-131	10 millicuries of Cs-137 & 50 millicuries of Am-241
D. Cs-137	Humboldt Scientific Dwg.# 2200064	11 millicuries
E. Am-241:Be	Humboldt Scientific Dwg.# 2200067	44 millicuries
F. Cs-137	Seaman Nuclear Dwg.# 450-000	8 millicuries
G. Am-241:Be	Seaman Nuclear Dwg.# 450-000	40 millicuries
H. Cs-137	Seaman Nuclear Dwg.# 5118-083	8 millicuries
I. Am-241:Be	Seaman Nuclear Dwg.# 5118-083	40 millicuries
J. Cs-137	Troxler Dwg.# A-102112	9 millicuries
K. Am-241:Be	Troxler Dwg.# A-102451	44 millicuries
L. Am-241:Be	Troxler Dwg.# A-102700	10 millicuries
M. Am-241:Be	Troxler Dwg.# A-100608	100 millicuries
N. Am-241:Be	Troxler Dwg.# A-100337	300 millicuries
O. Cs-137/Am-241:Be	Combination Source; Troxler Dwg.# A-100281	10 millicuries of Cs-137 & 50 millicuries of Am-241
P. Cs-137/Am-241:Be	Combination Source; Troxler Dwg.# A-100281, Rev.B	10 millicuries of Cs-137 & 50 millicuries of Am-241

- A. For use in Campbell Pacific Nuclear Corporation Model Portaprobe MC-Series, and 500 Series Depth Probe gauges; to measure moisture/density of construction materials.
- B. For use in Campbell Pacific Nuclear Corporation Model AC-Series, Portaprobe MC-Series, MC-M, and 500 Series Depth Probe gauges; to measure hydrogen content and moisture/density of construction materials.
- C. For use in Campbell Pacific Nuclear Corporation Model Portaprobe B(R) and 500 Series Depth Probe gauges; to measure moisture/density of construction materials.
- D. & E. For use in Humboldt Scientific, Inc. Model 5001 gauge; to measure moisture/density of construction materials.
- F. & G. For use in Seaman Nuclear Corporation Model C-75 and R-75 gauges; to measure moisture/density of construction materials.
- H. & I. For use in Seaman Nuclear Corporation Model C-100 and C-200 gauges; to measure moisture/density of construction materials.
- J. For use in Troxler Electronic Laboratories Model 3400 and 4640 series and 3565 gauges; to measure moisture/density of construction materials.
- K. For use in Troxler Electronic Laboratories Model 3205, 3215, 3216, 3217, 3218 and 3400 Series gauges; to measure moisture/density of construction materials.
- L. For use in Troxler Electronic Laboratories Model 4300 series gauges; to measure moisture content of construction materials.
- M. & N. For use in Troxler Electronic Laboratories Model 3241 series gauges; to measure asphalt content of construction materials.
- O. For use in Troxler Electronic Laboratories Model 2401 gauge; to measure moisture/density of construction materials.
- P. For use in Troxler Electronic Laboratories Model 2402, 2451, and 2452 gauges; to measure moisture/density of construction materials.

## USNRC REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES

MANUFACTURER/DISTRIBUTOR	REGISTRY NO.	MODEL NUMBER
CAMPBELL PACIFIC NUCLEAR CORP.	CA-208-D-102-S	PORTAPROBE B(R) AND MC SERIES
CAMPBELL PACIFIC NUCLEAR CORP.	CA-208-D-103-S	MC-M
CAMPBELL PACIFIC NUCLEAR CORP.	CA-208-D-104-S	500 SERIES DEPTH PROBES
CAMPBELL PACIFIC NUCLEAR CORP.	CA-208-D-105-S	AC SERIES
HUMBOLDT SCIENTIFIC INC.	NC-356-D-101-S	5001
SEAMAN NUCLEAR CORPORATION	NR-587-D-104-S	C-100, C-200
SEAMAN NUCLEAR CORPORATION	NR-587-D-105-S	C-75BP AND R-75BP
TROXLER ELECTRONIC LABS INC.	NC-646-D-115-S	2401
TROXLER ELECTRONIC LABS INC.	NC-646-D-116-U	2402
TROXLER ELECTRONIC LABS INC.	NC-646-D-117-U	2451
TROXLER ELECTRONIC LABS INC.	NC-646-D-118-U	2452
TROXLER ELECTRONIC LABS INC.	NC-646-D-122-S	3205 AND 3215
TROXLER ELECTRONIC LABS INC.	NC-646-D-124-S	3565
TROXLER ELECTRONIC LABS INC.	NC-646-D-126-S	3216, 3217 AND 3218
TROXLER ELECTRONIC LABS INC.	NC-646-D-128-S	3241 SERIES
TROXLER ELECTRONIC LABS INC.	NC-646-D-130-S	3400 SERIES
TROXLER ELECTRONIC LABS INC.	NC-646-D-131-S	4640 SERIES
TROXLER ELECTRONIC LABS INC.	NC-646-D-134-S	4300 SERIES

PROFESSIONAL SERVICE INDUSTRIES, INC.

PURPOSES FOR WHICH LICENSED MATERIAL WILL BE USED

For use in gauging devices whose designs have been reviewed and approved by the NRC or an Agreement State to measure moisture/density of materials in accordance with the manufacturer's instructions. Storage only at licensed location(s) or at temporary jobsite(s). No service or repair requiring removal of the source will be performed.



PROFESSIONAL SERVICE INDUSTRIES, INC.

INDIVIDUAL RESPONSIBLE FOR  
RADIATION SAFETY PROGRAM  
AND HIS TRAINING AND EXPERIENCE

The Radiation Safety Officer is responsible for the day-to-day operation of the radiation safety program. The Radiation Safety Officer has the authority to alter, modify, suspend or terminate any use of licensed materials he judges to be a threat to health, safety or the environment or to be a violation of rules, regulations or the conditions of license.

The Radiation Safety Officer's duties and responsibilities include review and maintenance of records and documents necessary for compliance with the procedures, regulations, and license conditions and the performance of the radiation safety activities.

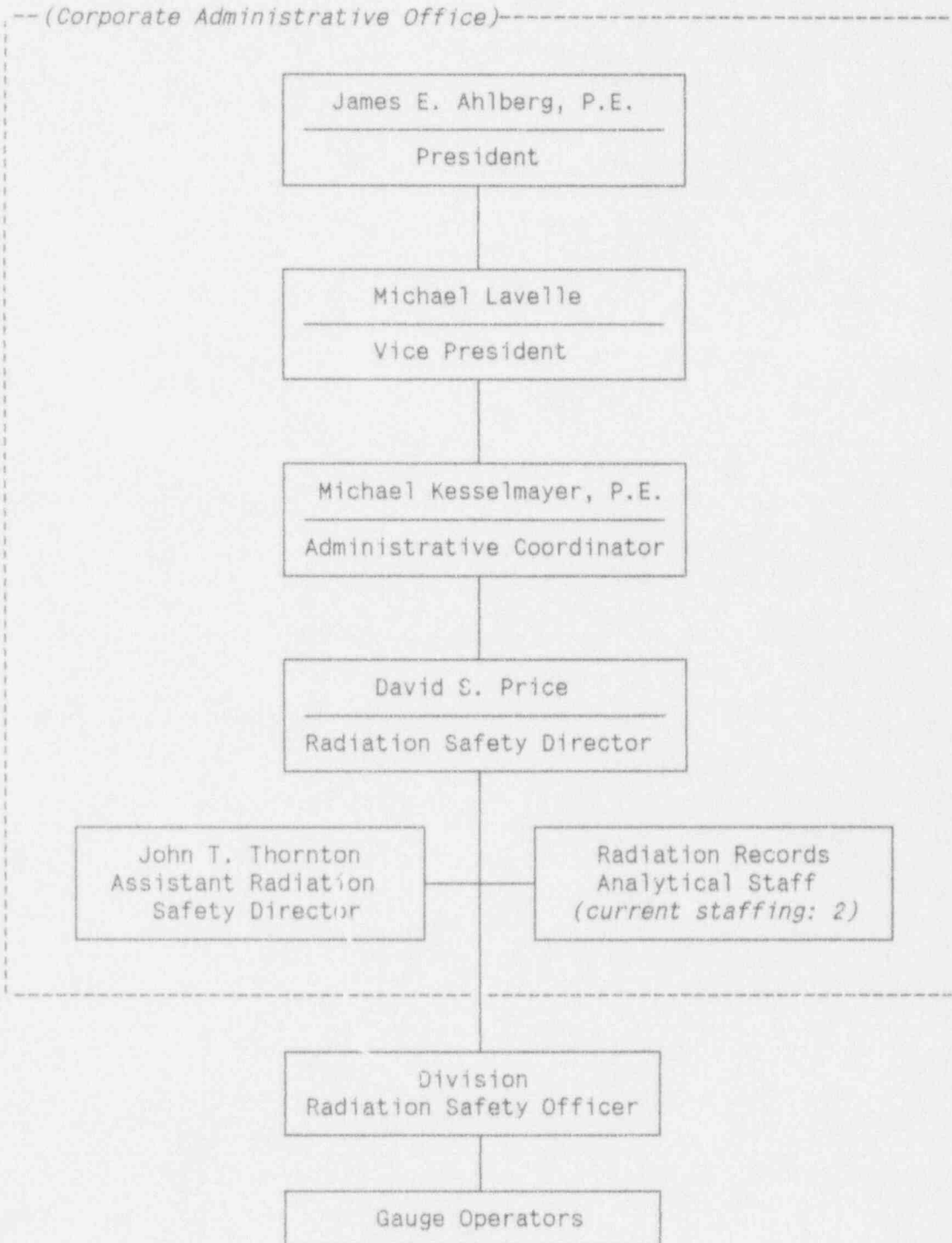
The duties of the Radiation Safety Officer shall also include (but not be limited to) the following:

- a. To ensure that the use of licensed material is by or under the supervision of individuals meeting training requirements.
- b. To ensure that users wear issued personnel monitoring devices and to review the results of this monitoring.
- c. To ensure that licensed material is properly secured to prevent unauthorized use or removal when not in use.
- d. To perform routine inspections and surveys of areas where licensed material is stored.
- e. To perform leak tests and appropriate safety tests of equipment containing licensed material.
- f. To ensure that the requirements of 10 CFR 20 are met for restricted and unrestricted areas.
- g. To maintain all records of activities for which documentation is required by regulation or as a condition of license.
- h. To provide emergency response for incidents involving licensed materials.

The Radiation Safety Officer shall be appointed by the Corporate Radiation Safety Director, who is responsible for the Corporate Radiation Safety oversight program.

These duties shall be performed by the radiation safety officer or his assistant who has received the same training as the radiation safety officer.

PROFESSIONAL SERVICE INDUSTRIES, INC.  
Radiation Safety Program Management  
Organizational Structure



10/01/91

Radiation Safety Program Management  
Qualifications Summary

Name: Robert L. Burns

Title: Vice President

Current Position:	Vice President
Number of years:	2.5 yrs.
College Degree(s):	Business Administration (Associate Degree)
Professional Affiliation(s):	ACIL, ASQC
Number of years with PSI:	2.5 yrs.
Number of offices managed:	11 offices
Number of years experience with Radiation Safety Program:	11 yrs.

Additional comments:

Mr. Burns served as Radiation Safety Manager (responsible for four industrial radiography Radiation Safety Supervisors) for Conam, a Division of Nuclear Energy Services, Inc. Mr. Burns has also completed the Conam Radiation Safety Course.

# Professional Service Industries, Inc.

## RADIATION SAFETY TRAINING PROGRAM

FOR

## RADIATION SAFETY OFFICERS

FOR

MOISTURE DENSITY GAUGES

THIS IS TO CERTIFY THAT

ROBERT L. BURNS

Has Successfully Completed the Approved Corporate Radiation Safety  
Training Program for Radiation Safety Officers/Instructors.

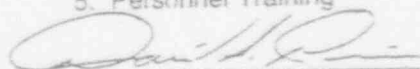
Subjects included in the course were as follows:

### REGULATIONS:

1. Security and Control
2. License Conditions
3. Records
4. Transportation
5. Personnel Training

### RADIATION SAFETY

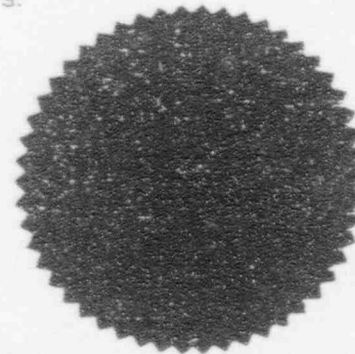
1. Principles of Radiation Safety
2. Radiation Dosage Calculations
3. Radiation Detection and Measurement
4. Biological Effects
5. Emergency Procedures



Corporate Radiation Safety Director

11/06/90

Date



DAVID S. PRICE  
Professional Service Industries, Inc.  
Corporate Office  
510 East 22nd Street  
Lombard, Illinois 60148  
708/691-1490

CURRENT POSITION: Corporate Radiation Safety Director  
(since December 20, 1987)

EDUCATION:

B.A.E. Physics - University of Mississippi, 1976

PROFESSIONAL TRAINING:

U.S. NUCLEAR REGULATORY COMMISSION (USNRC):

- "Ten-Week Course in Health Physics and Radiation Protection"  
Jan 25 - Apr 2, 1982 (Oak Ridge Associated Universities - 376 hrs.)
- "Safety Aspects of Industrial Radiography for Regulatory Personnel"  
Aug 2-6, 1982 (Gamma Industries, Inc - 36 hrs.)
- "Orientation in Licensing Practices & Procedures for Regulatory Personnel"  
Sep 13-24, 1982 (USNRC Headquarters - 80 hrs.)
- "Medical Use of Radionuclides for Regulatory Personnel"  
Sep 27 - Oct 1, 1982 (University of Oklahoma - 36 hrs.)
- "Cobalt Teletherapy Calibration"  
Apr 27-29, 1983 (M.D. Anderson Hospital - 20 hrs.)
- "Inspection Procedures"  
Aug 1-5, 1983 (USNRC Region II - 36 hrs.)
- "Gas & Oil Well Logging for Regulatory Personnel"  
Nov 7-11, 1983 (Schlumberger, Inc - 36 hrs.)
- "Radiation Protection Engineering"  
Nov 26-30, 1984 (Oak Ridge Associated Universities - 36 hrs.)
- "Advanced Licensing Procedures"  
Aug 25-28, 1987 (USNRC Headquarters - 28 hrs.)

FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA):

- "Nuclear Power Plant Off-Site Accident Assessment"  
May 21-25, 1984 (FEMA - Emmitsburg, Maryland - 36 hrs.)
- "Radiological Emergency Response Operations"  
Aug 1-10, 1984 (DOE test site; Mercury, Nevada - 72 hrs.)

RADIOLOGICAL EMPLOYMENT HISTORY:

David S. Price

Illinois Department of Nuclear Safety - Division of Radioactive Materials

*Radioactive Materials Licensing Section - 1/87 to 12/87*

Coordinated development of radioactive material licensing policies and procedures for the new Illinois Agreement State program, implemented upon assumption of authority from the USNRC in June, 1987. Assisted in development of Illinois regulations, regulatory guides and position/policy statements, applicable to medical and industrial radioactive material use programs. Standardized license format and conditions, form letters and application review guidelines. Directed and supervised licensing staff in the review of radioactive material license applications. Reviewed complex or unique applications, and conducted pre-licensing inspection of such facilities to identify special considerations for licensing action.

Louisiana Department of Environmental Quality - Nuclear Energy Division

*Radioactive Materials Licensing Coordinator - 5/85 to 12/86*

Reviewed license applications for use of radioactive material in industry, verifying adequate programs and facilities. Developed regulatory guides for radiation safety programs. Developed criteria for remedial revisions to licensee safety programs. Evaluated applications for design approval of radioactive sealed sources and devices. Supervised investigations into incidents and problem licensee programs. Performed periodic inspections of the larger, complex licensed programs and facilities to verify compliance with license conditions and regulations. Evaluated shielding design and engineering for fixed facilities. Provided computer dose assessment support for nuclear power plant emergency exercises.

*Environmental Program Specialist - 11/82 to 5/85*

Evaluated license applications for use of radioactive material in industry. Drafted licenses and performed inspections of licensed programs. Proposed compliance and enforcement actions. Directed field team during nuclear power plant emergency exercises.

*Radiation Specialist - 1/81 to 11/82*

Reviewed applications for registration of medical and industrial X-ray machines. Inspected facilities for compliance with X-ray regulations. Evaluated shielding design for X-ray facilities. Participated in nuclear power plant emergency exercises as field team member.

Professional Associations & Appointments:

Health Physics Society, member 1982-present

*Secretary of Deep South Chapter, 1985-86*

*Member of Midwest Chapter, 1987-present*

Conference of Radiation Control Program Directors

*Associate member, 1984-1987*

*Emeritus member, 1987-present*

Illinois Radiation Protection Advisory Council

*Industrial Use Advisory Board, 1988-present*

PROFESSIONAL SERVICE INDUSTRIES, INC.

Personnel Monitoring

Film or TLD whole body and/or TLD extremity dosimeters are to be provided to the following:

- A. Individuals for whom personnel monitoring is required by 10 CFR 20.202(a) (1) or applicable Agreement State Regulation (25% of 1.25 rem/quarter).
- B. individuals responding to radiological emergencies.
- C. Individuals who request dosimeters because of personal concern.

Film badge dosimeters shall be supplied by Tech/Ops Landauer, Inc., Glenwood, Illinois or by any other dosimetry service that is NVALP accredited. Film type dosimeters shall be exchanged monthly. TLD dosimeters shall be exchanged quarterly. Personnel monitoring shall be supplied to RSOs and RSOs' assistants and individuals servicing gauges.

Film badge dosimetry reports for badges worn by 850 users during 1989 indicate that the highest quarterly dose recorded for a user of moisture/density gauges is 200 mrem. Most dosimetry records reported no measurable dose. Higher reports were found to be for badges stored with gauges. The measured exposure rate to the user's trunk during normal activities is 0.1 mR per hour. It therefore appears unlikely that in excess of 25% of the applicable value specified in 10 CFR 20.101(a) or applicable Agreement State Regulations and we shall not be monitoring users on a routine basis.

Film badge dosimetry data shows that employees performing routine activities are unlikely to receive doses in excess of 25% of the limits in 10 CFR 20.101. Attached is a summary of the data.

Summary of 1989 personnel monitoring data for PSI moisture density gauge technicians operating in USNRC Regions:

Reported whole body exposure (millirem per quarter)	Number of exposures in each range
No measurable exposure ("M")	828
10 to 20	50
20 to 30	31
30 to 40	18
40 to 50	12
50 to 60	3
60 to 70	4
70 to 80	4
80 to 90	3
90 to 100	2
100 to 110	6
110 to 120	
120 to 130	3
130 to 140	1
140 to 150	
150 to 160	
160 to 170	
170 to 180	
180 to 190	
190 to 200	2
200 to 210	
210 to 220	
220 to 230	
230 to 240	
240 to 250	
250 to 260	
260 to 270	
270 to 280	
280 to 290	
290 to 300	
300 to 310	
310 to 320	
320 to 330	
330 to 340	
340 to 350	
350 to 360	
360 to 370	
370 to 380	
380 to 390	
390 to 400	
400 to 410	
410 to 420	
420 to 430	
430 to 440	
440 to 450	
450 to 460	
460 to 470	
470 to 480	
480 to 490	
490 to 500	
500 +	

Supplier: Tech/Ops Landauer, Inc.  
2 Science Road  
Glenwood, Illinois 60425

Exchange period: monthly

Dose equivalents below the minimum measurable quantity are reported as "M". The film badge worn by PSI operators (type "P1" badge) has a minimum reporting value of 10 mrem for both gamma rays and thermal neutrons.

Individual values exactly equal to the values separating exposure ranges are reported in the higher range.

PSI corporate radiation safety staff investigated film badge exposure reports exceeding 40 mrem per month (the "wear period"). In each 40+ mrem exposure, investigation revealed that the badge(s) alone had been exposed to elevated radiation levels adjacent to radioactive material storage, or had been temporarily stored in the transportation case with the moisture density gauge. No actual personnel exposure over 40 mrem per month has ever been substantiated. Investigations reveal that operators "peeking" at the source rod, which is against PSI procedures, could receive as much as 30 mrem per month, while operators following proper procedures typically receive a minimal ("M") exposure report from their film badge.



PROFESSIONAL SERVICE INDUSTRIES, INC.

FACILITIES AND EQUIPMENT

A facility diagram of the storage location is attached, describing the physical facilities.

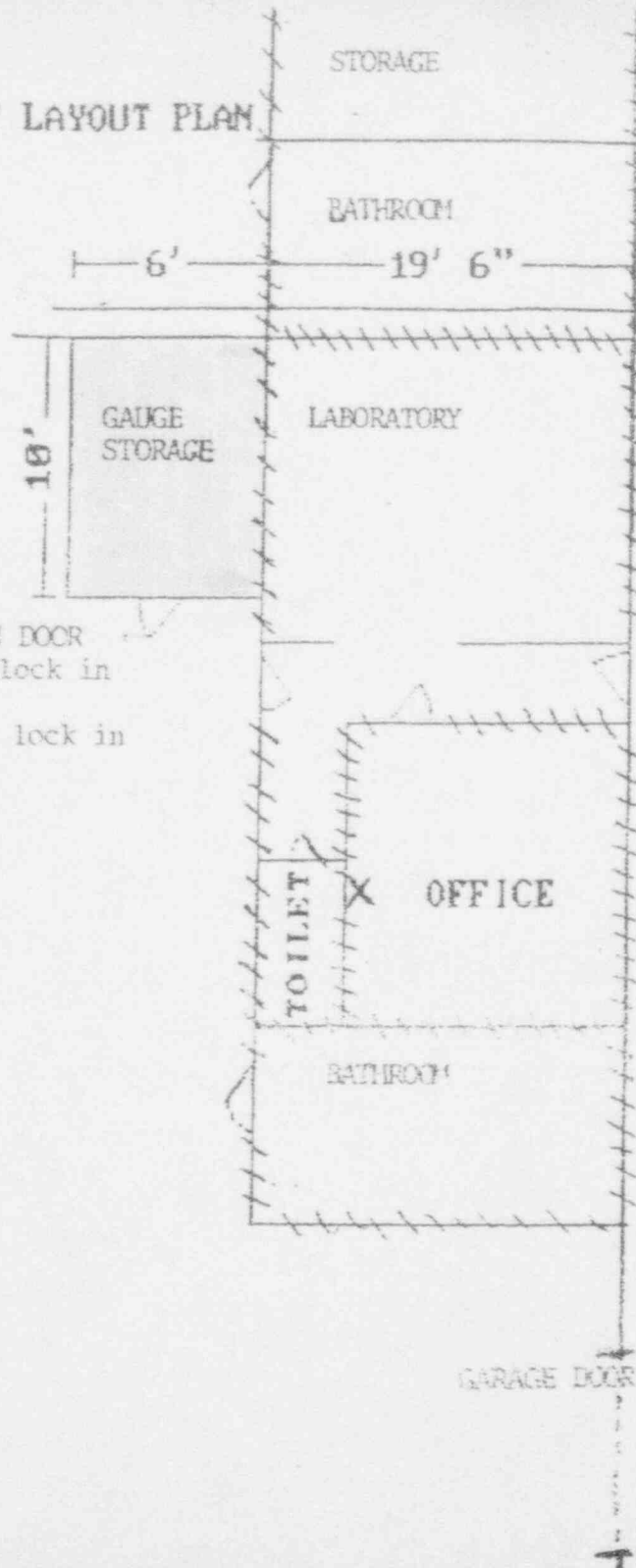
Access to devices in secure storage is restricted to certified operators only.

The following radiation detection instrument or it's equivalent is available to the Radiation Safety Officer.

<u>Type</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Radiation Detected</u>	<u>Sensitivity Range</u>
G-M	NDS Products P.O. Box 1896 Pasadena, Texas 77501	ND 500 A	Gamma	0-500 mR/hr
	Texas License No. L00991			

# OFFICE FACILITY LAYOUT PLAN

PSI/NTD  
 42 "A" St.  
 Wilder, VT



REQUIRED SIGNS ON DOOR  
 Door locked with lock in  
 door handle.  
 Gauges stored and lock in  
 transport cases.

OPEN WAREHOUSE SPACE

PARKING LOT

- = WOOD FRAME WALL
- //// = CONCRETE BLOCK WALL
- x = STORAGE AREA FOR ASSIGNED, SPARE AND CONTROL BADGES

Wildcat

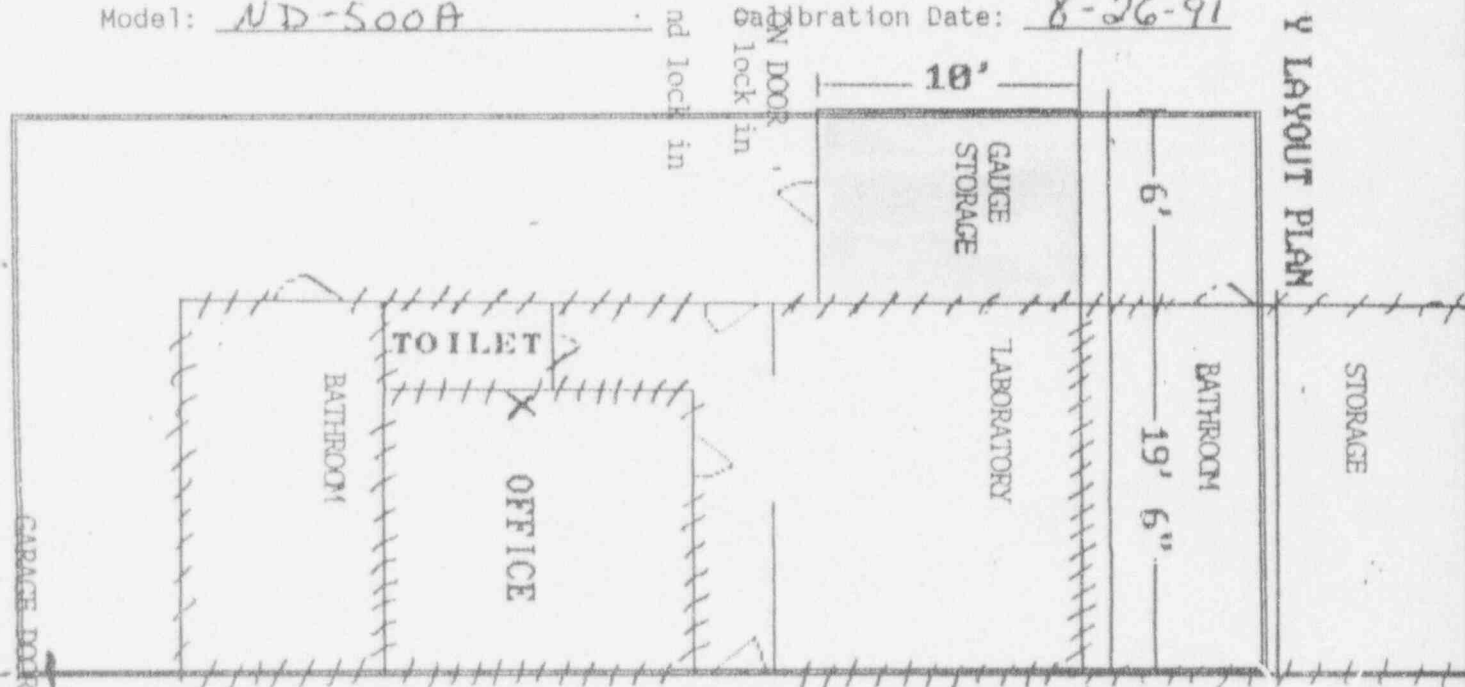
In order to demonstrate compliance with State or Federal regulations regarding radiation levels in unrestricted areas, it is necessary to perform a radiation survey of your device storage enclosure.

A radiation survey meter should have been sent to your office. To perform the survey, please sketch the gauge storage enclosure at your office in the space provided below and complete the information regarding the survey meter. Test the meter to assure proper operation. Determine the radiation levels on all sides of the storage enclosure by slowly passing the meter over each surface of the storage area. (Please make sure all gauges assigned to your office are in the enclosure during the survey.) If the storage enclosure is adjacent to outer walls of your facility, you will need to survey the outside walls of your building. Please indicate the radiation levels for each side of the storage enclosure below. (If you do not have a meter at your location, please indicate so on the space provided.)

No meter possessed at this office.

Survey Meter:

Make: NDS Products Serial Number: 8534  
Model: ND-500A Calibration Date: 8-26-91



Radiation Levels:

Top less than 0.1 mR/hr  
Front < 0.1 mR/hr  
Backside < 0.1 mR/hr

PARKING LOT

Right Side < 0.1 mR/hr  
Left Side < 0.1 mR/hr

[Signature] 9/19/91  
RSO Signature Date

PROFESSIONAL SERVICE INDUSTRIES, INC.

Storage of Licensed Material When Not In Use

Radioactive material shall be stored when appropriate in shielded containers so that radiation levels in unrestricted areas do not exceed the limits specified in 10 CFR 20.105 or applicable Agreement State regulation.

Where appropriate, radiation labels and warning signs will be provided for areas, rooms and storage containers as required by 10 CFR 20.204 or applicable Agreement State regulation.

Radioactive material stored in unrestricted areas shall be secured against unauthorized removal in their transport cases.

Gauge cases shall be locked to the transportation vehicle or locked in the vehicle or locked room or area which the licensee controls.

## TEMPORARY JOBSITE STORAGE

The use of portable moisture/density gauges often involves storage at remote locations (jobsites) due to long distances between the licensed storage facility and the jobsite. Devices that are stored at the jobsite on a temporary basis must be used only at the specific site where stored, and must be returned to the licensed location upon completion of activities at the jobsite. Devices may not be stored at an individual's residence, in a hotel room or in the transport vehicle overnight. Temporary jobsites may not be used as a "base of operations" for servicing other customers or performing work at other sites in the area.

Device(s) stored at temporary jobsites must be stored in the following manner:

1. All device(s) stored at jobsites must be secured with a padlock inserted into the source rod handle or trigger mechanism to prevent extension of the source rod.
2. All device(s) stored at jobsites must be stored in a Department of Transportation (DOT) approved shipping case. Storage of the device(s) in the shipping case provides the necessary distance to decrease to radiation levels to below regulatory limits in an unrestricted area (less than 2 mR/hr or 100 mR in 7 consecutive days).
3. All device(s) stored at temporary jobsites must be secured against unauthorized removal at all times. Device(s) stored in a trailer at the jobsite must be secured in a locked enclosure, such as a cabinet or a closet. Only individuals certified in accordance with licensed procedures are to have keys to the storage cabinet. A "Caution - Radioactive Materials" sign must be posted on the door of the cabinet or closet.
4. A copy of the complete, unexpired radioactive materials license must be available for review at the jobsite. A copy of the appropriate "Notice to Employees" and a statement as to where a copy of the current regulations may be reviewed must be posted at the jobsite.

Storage of the gauge(s) in a manner other than that described above must be approved by the Corporate Radiation Safety Director. To obtain approval, contact the Corporate Office prior to storing the gauge(s) at the jobsite.

PROFESSIONAL SERVICE INDUSTRIES, INC.

Instrument Calibration

Radiation survey instruments will be calibrated by the manufacturer or by an individual or firm approved to perform calibrations, under authority of a specific license issued by the USNRC or an Agreement State, e.g. Radiation Safety Services, Inc. Illinois License No. 12-20424-01(IL). Alternately instruments will be calibrated by:

Professional Service Industries, Inc.  
Pittsburgh Testing Laboratory Division  
850 Poplar Street  
Pittsburgh, Pennsylvania 15220

USNRC License No. 37-00276-25

using the following procedures:

- Instruments will be calibrated at intervals not to exceed 12 months, or after servicing.
- Instrument reading for each scale must be accurate to within  $\pm 10\%$  of actual radiation levels, when measured at two points separated by 35-50% of the scale. If accuracy within  $\pm 10\%$  cannot be achieved, a correction factor shall be determined and specified on a label affixed to the instrument. Any range or scale which cannot be adjusted to within  $\pm 20\%$  of actual radiation levels will not be used for measurement purposes.
- If survey instruments are calibrated at 2 points separated only by 35% of full scale, then these 2 points will be approximately 1/3 and 2/3 of full scale.
- The date of calibration, due date of next calibration, calibrating individual or firm, and correction factor (if applicable) shall be indicated on a label affixed to the instrument.
- Calibration documentation supplied by the calibrating licensee will be maintained for a minimum of three years after each calibration.

PROFESSIONAL SERVICE INDUSTRIES, INC.

Leak Testing of Sealed Sources

Each gauge containing licensed material will be tested for leakage and/or contamination at intervals not to exceed six months with the following exception:

Sources in storage will not be tested. When a source is removed from storage that has not been leak tested within the past six months, it shall be leak tested before being placed in service.

Leak test samples will be analyzed by commercial leak test service providers authorized by the U.S. Nuclear Regulatory Commission or an Agreement State, e.g. Microtec Services, Texas License L00991.

The following safety precautions will be followed when taking leak test samples:

1. Assigned dosimeters will be worn.
2. The instructions provided in the leak-test kit will be followed in collection of the wipe sample. (A copy of the instructions are attached, and a sample leak test kit is enclosed.)

## INSTRUCTIONS FOR LEAK-TEST KIT

Do all work quickly and safely. Handle cotton swab applicator by screw cap only!

Individuals assigned film badges by name must wear their film badges!

### ALL EQUIPMENT CONTAINING RADIOACTIVE MATERIAL

(Survey meters with krypton gas check sources are exempt from leak testing)

#### BEFORE THE TEST

1. Survey area and device with a calibrated survey instrument to assure the source is in the safe-lock position.
2. Complete the self-adhesive test tube label and a photocopy of the leak-test form (PSI B-900-140) with a ball point pen. Make two copies the completed form. Attach test tube label on the side of the test tube, and attach address label to the box.
3. Remove screw cap swab applicator from the test tube, and check to see that the swab is moist. If the swab has dried out, moisten the tip with water. Now, begin the leak-test.

#### AFTER THE TEST

4. Place the swab cap applicator back into the test tube and securely tighten the cap. Place test tube and completed PSI B-900-140 form in the box. Send one copy of the leak-test form to Corporate Radiation Safety Office, and maintain the second copy for your records. Do a survey of the box with a calibrated survey meter. If the survey is above normal background reading, DO NOT MAIL THE BOX - CALL THE CORPORATE RADIATION SAFETY OFFICE FOR INSTRUCTIONS!

#### MOISTURE/DENSITY GAUGE

- A. Follow steps 1, 2, and 3 from above (BEFORE THE TEST).
- B. Stand gauge on end. Leave source rod locked in the safe position.
- C. With the moistened swab, wipe around inside the source rod hole at the bottom of the gauge. DO NOT wipe the source rod.
- D. Set the gauge upright, and remove the screws holding the electronics. Raise the electronics into the service position.
- E. Wipe the source "spot" in the lower section of the device, adjacent to the internal radiation label.
- F. Replace the electronics and screws.
- G. Follow step 4 from above (AFTER THE TEST).

#### REMOTE TYPE RADIOGRAPHY EXPOSURE DEVICE

- A. Follow steps 1, 2, and 3 from above (BEFORE THE TEST).
- B. Remove the safety plug from the source tube end of the exposure device.
- C. Wipe the interior of the device opening by inserting the cotton swab tip 2 to 3 inches and rotating the swab around the interior. Remove swab and replace safety plug.
- D. Follow step 4 from above (AFTER THE TEST).

#### BEAM TYPE RADIOGRAPHY EXPOSURE DEVICE

- A. Follow steps 1, 2, and 3 from above (BEFORE THE TEST).
- B. Wipe around all seams, such as the screw mounted access plate.
- C. Follow step 4 from above (AFTER THE TEST).



PROFESSIONAL SERVICE INDUSTRIES, INC.

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PROFESSIONAL SERVICE INDUSTRIES, INC.

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(Survey meters with krypton gas check sources are exempt from leak testing)

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1. Survey area and device with a calibrated survey instrument to assure the source is in the safe-lock position.
2. Complete the self-adhesive test tube label and a photocopy of the leak-test form (PSI B-900-140) with a ball point pen. Make two copies the completed form. Attach test tube label on the side of the test tube, and attach address label to the box.
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PROFESSIONAL SERVICE INDUSTRIES, INC.

Physical Inventory

A physical inventory of gauges shall be performed at intervals not to exceed six months. The inventory shall include (where applicable) make, serial number, model, radionuclide, activity, source s/n and location of storage. Copies of the Inventory report shall be maintained on file for review.

PROFESSIONAL SERVICE INDUSTRIES, INC.

Emergency Procedures

A. General Guidelines

Even in a well-planned and executed program the possibility exists that incidents will occur. Recognition of this fact requires that suitable emergency procedures be prepared beforehand and be made known to all persons potentially involved. Each user should give consideration to the nature of possible accidents and be familiar with the following procedures.

B. Missing Material

When radioactive material is suspected of or confirmed to be missing, report the event to the Radiation Safety Officer immediately. The Radiation Safety Officer will determine what further action must be taken.

C. Source Damage

1. If source damage is suspected, secure the area restricting access and immediately notify the Radiation Safety Officer. Do not leave the gauge unsecured.
2. If you have a survey meter, determine if exposure rates exceed 2 mR/hr and restrict the area.
3. When necessary, protect the gauge or source from water by covering it with a plastic sheet.
4. Do not disturb or handle the source.

# IN EVENT OF AN ACCIDENT

## ACTIONS TO BE TAKEN BY THE DEVICE OPERATOR

(In this order!)

1. Evacuate and isolate entire accident area. Keep all unauthorized individuals at least 15 feet away from the entire area of accident.
2. Do not move device or other equipment involved in the accident.
3. Do not leave area (but stay 15 feet away). Send someone else to call your Manager to report the incident.

Manager's (RSO's) name

Division Office telephone number

Manager's (RSO's) home telephone number

/	-
/	-

4. If your Division Manager is unavailable, contact the Radiation Safety Director at the Corporate Office.

Corporate Office telephone number - 708/691-1490  
or - 800/426-2897

5. If the Radiation Safety Director is unavailable, ask for the Assistant Radiation Safety Director or the Administrative Coordinator.

6. If the incident occurs during non-business hours and you cannot contact the above, please contact the SKYTALK PAGER NUMBER listed below and enter the personnel identification number (PIN), then press "#" button.

SKYTALK PAGER NUMBER - 800/759-8255  
ENTER PIN NUMBER - 5132816, then "#"

Please leave a clear, detailed voice message including the phone number from where you are calling, than hang up. (Please remain near the phone, and do not allow others to use the phone. You will immediately be contacted by a member of the Corporate Radiation Safety Staff.)

7. If you are not contacted within fifteen (15) minutes, please repeat step six, or contact the Radiation Safety staff at home at:

David Price, Radiation Safety Director - 708/682-5641  
John Thornton, Assistant Radiation Safety Director - 708/495-0449  
Michael Kesselmayr, Administrative Coordinator - 708/393-0306

8. If you are unable to reach PSI management, call the appropriate government agency number for the State in which you are working. (Most are 24-hour numbers.)

Alabama	205/242-5000	Maryland	DAY 301/631-3300	Ohio	301/951-0550
Alaska	301/951-0550	"	NIGHT 301/922-7609	Oklahoma	301/951-0550
Arizona	602/262-8011	Massachusetts	301/951-0550	Oregon	503/229-5797
Arkansas	501/661-2136	Michigan	301/951-0550	Pennsylvania	301/951-0550
California	916/391-7716	Minnesota	301/951-0550	Rhode Island	401/621-1600
Colorado	303/320-8333	Mississippi	DAY 601/354-6657	S. Carolina	DAY 803/734-4700
Connecticut	301/951-0550	"	NIGHT 601/856-5256	"	NIGHT 803/253-6488
Delaware	301/951-0550	Missouri	301/951-0550	South Dakota	301/951-0550
Florida	407/297-2095	Montana	301/951-0550	Tennessee	615/252-3300
Georgia	404/656-4300	Nebraska	DAY 402/471-2168	Texas	512/458-7460
Idaho	301/951-0550	"	NIGHT 402/421-2882	Utah	DAY 801/538-6734
Illinois	217/785-9900	Nevada	702/687-5300	"	NIGHT 801/756-8023
Indiana	301/951-0550	New Hampshire	603/271-3636	Vermont	301/951-0550
Iowa	DAY 515/281-3478	New Jersey	301/951-0550	Virginia	301/951-0550
"	NIGHT 515/993-5386	New Mexico	DAY 505/827-2956	Washington	206/682-5327
Kansas	913/296-3176	"	NIGHT 505/351-4651	W. Virginia	301/951-0550
Kentucky	502/564-7815	New York	518/457-2200	Wisconsin	301/951-0550
Louisiana	504/925-4518	N. Carolina	919/733-3861	Wyoming	301/951-0550
Maine	301/951-0550	North Dakota	701/224-2121		

9. If you cannot contact persons listed in items 3 through 7 above, call the State Police, Hazardous Materials Unit.

State Police telephone number

/	-

PROFESSIONAL SERVICE INDUSTRIES, INC.

Transportation Requirements

Licensed material transported by PSI, or delivered by PSI to a carrier for transport, shall be packaged in accordance with the provisions in 10 CFR 71 (Packaging of Radioactive Materials for Transport) and Title 49 Code of Federal Regulations. These provisions require:

- a. a type A package or excepted shipments.
- b. determination of exposure rate at surface and at one meter.
- c. for shipments that are not excepted, proper shipping paper, certification, marking and labeling.
- d. placement of the shipment as far from the driver's position as possible.
- e. accessibility of shipping papers within reach of the seat-belted individual in the driver's position of a vehicle.
- f. proper bracing and securing.

PROFESSIONAL SERVICE INDUSTRIES, INC.

1. The individual offices are to be audited annually by the respective Vice President. The audit shall include a review of documents and records required by regulations and license conditions. The records shall include but will not be limited to:
  - a. Training
  - b. Surveys
  - c. Leak Test Records
  - d. Transportation Records
  - e. Utilization Logs
  - f. Personnel Dosimetry Records
  - g. Instrument Calibration



PROFESSIONAL SERVICE INDUSTRIES, INC.

1. Licensee shall not perform any repairs involving removal of sealed sources from the device, and all repairs on the devices shall be performed with the radioactive source in the fully retracted "safe" position.
2. Licensee may perform maintenance and repairs on the device including replacement of batteries, repair or replacement of electronic components, leak test sample taking and cleaning and lubricating bearings. All other repairs shall be provided by individuals specifically licensed to perform such services.

PROFESSIONAL SERVICE INDUSTRIES, INC.

WASTE MANAGEMENT

Radioactive waste will be disposed of in the following ways:

- A. Transfer to persons licensed to receive such material, e.g., ADCO or the manufacturer.
- B. Any other method permitted by NRC or Agreement State regulations.

Purpose:

The U.S. Nuclear Regulatory Commission's Regulatory Guide 8.10, "OPERATING PHILOSOPHY FOR MAINTAINING OCCUPATIONAL RADIATION EXPOSURES AS LOW AS IS REASONABLY ACHIEVABLE", describes the philosophy that the NRC staff expects all USNRC and Agreement State licensees to follow to keep occupational exposures to radiation *As Low As Reasonably Achievable (ALARA)*. The primary underlying concept of this philosophy is that, even though current regulatory occupational exposure limits provide a very low risk of injury, it is obviously beneficial to avoid unnecessary exposure to radiation whenever possible.

Operations:

ALARA reduction in radiation exposure is achievable by means of good radiation protection planning and practice, and by management commitment to policies that foster vigilance against departures from good practice. Professional Service Industries, Inc. operating procedures for the use of radioactive devices were developed and established in accordance and agreement with this ALARA philosophy.

Procedural requirements, which often go beyond regulatory requirements, are clearly defined in PSI radiation safety procedure manuals. PSI corporate and executive management expects employee compliance with these procedural requirements. Corporate management commitment to the ALARA philosophy is further reflected in disciplinary action taken in cases of non-compliance with regulations and PSI procedures. Personnel responsible for radiation safety management at PSI offices are expected to share in this ALARA commitment and ensure that employees under their management comply with PSI requirements. In addition, office radiation safety management should be continually vigilant for further means to reduce exposures, and make ALARA recommendations to the Corporate Office when reduction methods could benefit other PSI offices.

Instructions to Personnel:

The ALARA philosophy shall be included in all radiation safety training of PSI management and field personnel. After training, during regular operations, the Radiation Safety Officer should take advantage of every opportunity to encourage field personnel in the avoidance of unnecessary radiation exposure through the use of *TIME, SHIELDING and DISTANCE* principles covered in training. Regulatory and corporate radiation-safety-awareness postings should be maintained in good condition, in readily visible locations, to help ensure that employees are regularly reminded of good radiation safety practice. No employee should be unfamiliar with the ALARA philosophy and how to actively participate in the application of ALARA practices in their work.

Periodic Management Audits:

In the interests of ALARA and procedural and regulatory compliance, PSI initiated annual corporate radiation safety audits to review operations at local offices. This program has been included in current PSI standard procedures, and has resulted in demonstrated improvements in compliance and operational safety. Corporate management audits will continue to include the application of the ALARA philosophy in the review of operations, exposures, transportation and facility provisions at each office.

The office Radiation Safety Officer is also expected to include ALARA principles and practices in their reviews, audits and evaluations of office operations and personnel performance. In reviewing their own operations, the Radiation Safety Officer is expected to promptly communicate to the corporate radiation safety staff their impressions regarding any practice or policy that they deem to be unsafe or that could be improved by modification.

It is the responsibility of the Radiation Safety Officer, who has the most frequent contact with operations personnel, to encourage their participation in the corporate ALARA program by regularly seeking their comments and suggestions for reducing radiation exposure. No one else is better suited than field personnel to know when corporate policy and practice could be improved to achieve reduced radiation exposure. The Radiation Safety Officer is expected to make good use of this information and evaluation resource.

Corporate Responsibilities:

Corporate radiation safety and operations management are continually pursuing improvements to ensure that PSI personnel and office management have the training, equipment and support they need to work safely with radiation. The primary reason the Corporate Office provides notices of leak-tests-due, periodic inventory documentation, training certifications, film badge exposure monitoring, and other notice, regulatory and licensing services is to permit the local Radiation Safety Officer to more readily attend to daily supervision over the safe use of radioactive material. The Radiation Safety Officer serves "*on the front line*," and holds immediate responsibility for ensuring the proper implementation of PSI radiation procedures and regulatory requirements.

Radiation safety and regulatory compliance is not solely the responsibility of the Corporate Office. Without the active and responsible participation of the regional corporate officers, local radiation safety officers and field personnel, Professional Service Industries can not expect to maintain the radiation safety performance standard expected of us by the regulatory community and the public.

Without the application of radiation devices, PSI can not provide the services demanded by our clients. Maintaining occupational radiation exposures "*as low as reasonably achievable*" is a requisite philosophy for maintenance of Professional Service Industries' authorization to use radioactive materials.

Expedite Requested

Please see letter:  
Dtd 11/27/81.

(FOR LFMS USE)  
INFORMATION FROM LTS  
-----

BETWEEN:

LICENSE FEE MANAGEMENT BRANCH, ARM  
AND  
REGIONAL LICENSING SECTIONS

PROGRAM CODE: 03121  
STATUS CODE: 3  
FEE CATEGORY: -----  
EXP. DATE: 0  
FEE COMMENTS: -----  
DECOM FIN ASSUR REQD: -----  
:::.....

LICENSE FEE TRANSMITTAL

A. REGION

1. APPLICATION ATTACHED

APPLICANT/LICENSEE: PROFESSIONAL SERVICE INDUSTRIES, INC  
RECEIVED DATE: 911209  
DOCKET NO: 3032602  
CONTROL NO.: 115843  
LICENSE NO.:  
ACTION TYPE: NEW LICENSEE

2. FEE ATTACHED

AMOUNT: \$500.00  
CHECK NO.: ~~494684~~

3. COMMENTS

Ref, 115847

SIGNED Rebecca J. Brown  
DATE 12/12/91

B. LICENSE FEE MANAGEMENT BRANCH (CHECK WHEN MILESTONE 03 IS ENTERED 1 1)

1. FEE CATEGORY AND AMOUNT: 3P \$500

2. CORRECT FEE PAID. APPLICATION MAY BE PROCESSED FOR:

AMENDMENT -----  
RENEWAL -----  
LICENSE / -----

3. OTHER -----

SIGNED \_\_\_\_\_  
DATE 12/20/91