

<b>NRC Form 313 I</b> (12-81) 10 CFR 30		<b>U.S. NUCLEAR REGULATORY COMMISSION</b>		
<b>APPLICATION FOR BYPRODUCT MATERIAL LICENSE INDUSTRIAL</b>		<b>1. APPLICATION FOR:</b> <i>(Check and/or complete as appropriate)</i>		
<i>See attached instructions for details.</i>  <i>Completed applications are filed in duplicate with the Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety, and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555 or applications may be filed in person at the Commission's office at 1717 H Street, NW, Washington, D. C. or 7915 Eastern Avenue, Silver Spring, Maryland.</i>		a. NEW LICENSE		
		b. AMENDMENT TO: LICENSE NUMBER XX 43-03238-01		
		c. RENEWAL OF: LICENSE NUMBER		
<b>2. APPLICANT'S NAME</b> <i>(Institution, firm, person, etc.)</i> Department of the Interior U.S. Bureau of Mines TELEPHONE NUMBER: AREA CODE - NUMBER EXTENSION (801) 524-6113		<b>3. NAME AND TITLE OF PERSON TO BE CONTACTED REGARDING THIS APPLICATION</b> William I. Nissen TELEPHONE NUMBER: AREA CODE - NUMBER EXTENSION (801) 524-6113		
<b>4. APPLICANT'S MAILING ADDRESS</b> <i>(Include Zip Code)</i> <i>(Address to which NRC correspondence, notices, bulletins, etc., should be sent.)</i>  729 Arapeen Drive Salt Lake City, Utah 84108		<b>5. STREET ADDRESS WHERE LICENSED MATERIAL WILL BE USED</b> <i>(Include Zip Code)</i>  SAME		
(IF MORE SPACE IS NEEDED FOR ANY ITEM, USE ADDITIONAL PROPERLY KEYED PAGES.)				
<b>6. INDIVIDUAL(S) WHO WILL USE OR DIRECTLY SUPERVISE THE USE OF LICENSED MATERIAL</b> <i>(See Items 16 and 17 for required training and experience of each individual named below)</i>				
FULL NAME		TITLE		
a. Howard Richard Beard		Research Chemist		
b. Lorin Dean Redden		Chemical Engineer		
c.				
<b>7. RADIATION PROTECTION OFFICER</b>		Attach a resume of person's training and experience as outlined in Items 16 and 17 and describe his responsibilities under Item 15.		
<b>8. LICENSED MATERIAL</b>				
LINE NO.	ELEMENT AND MASS NUMBER  A	CHEMICAL AND/OR PHYSICAL FORM  B	NAME OF MANUFACTURER AND MODEL NUMBER <i>(If Sealed Source)</i>  C	MAXIMUM NUMBER OF MILLICURIES AND/OR SEALED SOURCES AND MAXIMUM ACTI- VITY PER SOURCE WHICH WILL BE POSSESSED AT ANY ONE TIME  D
(1)				
(2)				
(3)				
(4)				
DESCRIBE USE OF LICENSED MATERIAL E				
(1)				
(2)				
(3)	8508050208 850715 REG4 LIC30 43-03238-01 PDR			
(4)				

### 9. STORAGE OF SEALED SOURCES

LINE NO.	CONTAINER AND/OR DEVICE IN WHICH EACH SEALED SOURCE WILL BE STORED OR USED. A.	NAME OF MANUFACTURER B.	MODEL NUMBER C.
(1)			
(2)			
(3)			
(4)			

### 10. RADIATION DETECTION INSTRUMENTS

LINE NO.	TYPE OF INSTRUMENT A.	MANUFACTURER'S NAME B.	MODEL NUMBER C.	NUMBER AVAILABLE D.	RADIATION DETECTED (alpha, beta, gamma, neutron) E.	SENSITIVITY RANGE (milliroentgens/hour or counts/minute) F.
(1)						
(2)						
(3)						
(4)						

### 11. CALIBRATION OF INSTRUMENTS LISTED IN ITEM 10

<input type="checkbox"/> a. CALIBRATED BY SERVICE COMPANY NAME, ADDRESS, AND FREQUENCY	<input type="checkbox"/> b. CALIBRATED BY APPLICANT <i>Attach a separate sheet describing method, frequency and standards used for calibrating instruments.</i>
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### 12. PERSONNEL MONITORING DEVICES

TYPE (Check and/or complete as appropriate.) A.	SUPPLIER (Service Company) B.	EXCHANGE FREQUENCY C.
<input type="checkbox"/> (1) FILM BADGE  <input type="checkbox"/> (2) THERMOLUMINESCENCE DOSIMETER (TLD)  <input type="checkbox"/> (3) OTHER (Specify): _____ _____		<input type="checkbox"/> MONTHLY  <input type="checkbox"/> QUARTERLY  <input type="checkbox"/> OTHER (Specify): _____ _____

### 13. FACILITIES AND EQUIPMENT (Check where appropriate and attach annotated sketch(es) and description(s).)

- ☐ a. LABORATORY FACILITIES, PLANT FACILITIES, FUME HOODS (Include filtration, if any), ETC.  
☐ b. STORAGE FACILITIES, CONTAINERS, SPECIAL SHIELDING (fixed and/or temporary), ETC.  
☐ c. REMOTE HANDLING TOOLS OR EQUIPMENT, ETC.  
☐ d. RESPIRATORY PROTECTIVE EQUIPMENT, ETC.

### 14. WASTE DISPOSAL

- a. NAME OF COMMERCIAL WASTE DISPOSAL SERVICE EMPLOYED
- b. IF COMMERCIAL WASTE DISPOSAL SERVICE IS NOT EMPLOYED, SUBMIT A DETAILED DESCRIPTION OF METHODS WHICH WILL BE USED FOR DISPOSING OF RADIOACTIVE WASTES AND ESTIMATES OF THE TYPE AND AMOUNT OF ACTIVITY INVOLVED. IF THE APPLICATION IS FOR SEALED SOURCES AND DEVICES AND THEY WILL BE RETURNED TO THE MANUFACTURER, SO STATE

# INFORMATION REQUIRED FOR ITEMS 15, 16 AND 17

Describe in detail the information required for Items 15, 16 and 17. Begin each item on a separate page and key to the application as follows:

15. **RADIATION PROTECTION PROGRAM.** Describe the radiation protection program as appropriate for the material to be used including the duties and responsibilities of the Radiation Protection Officer, control measures, bioassay procedures (if needed), day-to-day general safety instruction to be followed, etc. If the application is for sealed source's also submit leak testing procedures, or if leak testing will be performed using a leak test kit, specify manufacturer and model number of the leak test kit.
16. **FORMAL TRAINING IN RADIATION SAFETY.** Attach a resume for each individual named in Items 6 and 7. Describe individual's formal training in the following areas where applicable. Include the name of person or institution providing the training, duration of training, when training was received, etc.
  - a. Principles and practices of radiation protection.
  - b. Radioactivity measurement standardization and monitoring techniques and instruments.
  - c. Mathematics and calculations basic to the use and measurement of radioactivity.
  - d. Biological effects of radiation.
17. **EXPERIENCE.** Attach a resume for each individual named in Items 6 and 7. Describe individual's work experience with radiation, including where experience was obtained. Work experience or on-the-job training should be commensurate with the proposed use. Include list of radioisotopes and maximum activity of each used.

## 18. CERTIFICATE

(This item must be completed by applicant)

*The applicant and any official executing this certificate on behalf of the applicant named in Item 2, certify that this application is prepared in conformity with Title 10, Code of Federal Regulations, Part 30, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of our 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.

a. LICENSE FEE REQUIRED  
(See Section 170.31, 10 CFR 170)

b. CERTIFYING OFFICIAL (Signature)

c. NAME (Type or print)

William I. Nissen

(1) LICENSE FEE CATEGORY:

d. TITLE

Chairman, Radiation Safety Committee

(2) LICENSE FEE ENCLOSED: \$

e. DATE

# OKLAHOMA STATE UNIVERSITY

Division of Engineering, Technology & Architecture Extension

960679

*This is to certify that*

Lorin Redden

*Has successfully completed the*

RADIATION SAFETY SPECIALIST TRAINING PROGRAM

*conducted by Oklahoma State University*

*and in recognition thereof is hereby awarded this certificate.*

*Given at* Oklahoma City, *Oklahoma this* 8th *day of* March  
*in the year of* 1985.

*Howard M. Johnson*

Howard M. Johnson, Ph.D.  
Associate Professor

*Robert B. Weaver*

Robert B. Weaver  
Program Coordinator

12 June 1985

Lorin Redden's qualifications to be included on the NRC License.

Education

B. S., Metallurgical Engineering  
University of Utah

June 1982  
Salt Lake City, Utah

Courses included an instrumentation class that covered the safe operation of X-ray diffraction and X-ray fluorescence instruments.

Radiation Safety Specialist Training  
Oklahoma State University

March 1985  
Oklahoma City, Oklahoma

Passed course taught by Howard Johnson. Material covered in the course is outlined in attached letter.

Related Work Experience

U. S. Bureau of Mines

July 1982 to present

I have used radio-tracers for laboratory test work which included solvent extraction, ion exchange, and selective precipitation. In addition, I have been functioning for the past nine months as the Assistant Radiation Protection Officer whose duties include: lab monitoring, sealed source leak testing, and the corresponding instrument operation and activities.

Isotopes Handled and Activities

I have worked with W<sup>185</sup>, Co<sup>60</sup>, Fe<sup>59</sup>, Mn<sup>54</sup>, and Cr<sup>51</sup>. All activities were less than or equal to 1.0 mCi.

Direction From RPO

I have reviewed and discussed with the RPO, H. Richard Beard, the Radiation Safety Program at the S. L. C. Research Center.

*Lorin D. Redden*

Lorin D. Redden

460679



# Oklahoma State University

ENGINEERING TECHNOLOGY EXTENSION

April 11, 1985

STILLWATER, OKLAHOMA 74078  
313 CRUTCHFIELD  
(405) 624-5714

## TO WHOM IT MAY CONCERN:

Lorin Redden has successfully completed the thirty-two (32) hour Radiation Safety Specialist Training Program and has passed the four (4) hour comprehensive examination. This course was conducted by Oklahoma State University in Oklahoma City, Oklahoma, March 11-15, 1985, and consisted of the following topics:

### 1) Atomic and Nuclear Structure

- a) Nuclear notation
- b) Nuclear stability
- c) Isotopes

### 2) Radioactive Decay

- a) Decay schemes
- b) Half-life
- c) Chart of the nuclides
- d) Curie and Becquerel

### 3) Types of Radiation and Interaction

- a) X and gamma
- b) Alpha and beta
- c) Neutrons
- d) Bremsstrahlung

### 4) Radiation Dosimetry

- a) Absorbed dose: rad, gray
- b) Exposure dose: roentgen, C/kg
- c) Dose equivalent: rem, Sievert
- d) Quality factor

### 5) Biological Effects of Radiation

- a) Acute and chronic effects
- b) Radiation and protection guides
- c) Dose limits

### 6) External Radiation Protection

- a) Time
- b) Distance
- c) Shielding

### 7) Internal Radiation Protection

- a) Internal radiation hazards
- b) Control of contamination
- c) Waste disposal

### 8) Radiation Safety Instrumentation

- a) Survey meters
- b) Radiation scalars
- c) Personnel dosimeters

### 9) Regulatory Control

- a) Licensing procedures
- b) Agreement and nonagreement states
- c) Code of Federal Regulations

### 10) Compliance

- a) Establishing and posting radiation areas
- b) Surveying and wipe testing work areas
- c) Leak testing sealed sources
- d) Counting statistics
- e) Transportation of radioactive materials

Successful completion of the above training and examination has demonstrated that Lorin Redden is competent to perform the following tasks which are expected of a Radiation Safety Specialist:

- 1) Use the Radiological Health Handbook and the Chart of the Nuclides.
- 2) Determine decay characteristics of a radionuclide from the Radiological Health Handbook and the Chart of the Nuclides.
- 3) Use standard calibration sources and perform DPM-Curie and Becquerel conversions.
- 4) Perform radioactive decay corrections.
- 5) Apply statistics to the counting of radioactive sample and express in correct form.
- 6) Use of the following instruments to perform area surveys and express reading in correct units:
  - a) Geiger-Mueller survey meter
  - b) Cutie Pie survey meter
  - c) Neutron survey meter
  - d) Alpha survey meter
- 7) Use of film badges, thermoluminescent dosimeters and pocket dosimeters for personnel dosimetry.
- 8) Calculate the dose rate from: (a) point gamma source, (b) point beta source, (c) point neutron source, and (d) point beta source producing bremsstrahlung.
- 9) Perform shielding calculations on gamma, X-rays, beta, bremsstrahlung, and neutrons to reduce the dose to an acceptable level.
- 10) Use time, distance and shielding as protective measures.
- 11) Perform calculations pertinent to leak tests, wipe tests, and air samples, to determine if contamination is present and the amount.
- 12) Apply MPC values to a practical situation.
- 13) Establish a radiation safety unit within an organization utilizing:
  - a) Restricted areas
  - b) RSO
  - c) Radiation safety committee
  - d) Personnel monitoring
  - e) Area surveys
  - f) Leak tests
  - g) Wipe tests
  - h) Posting
  - i) Pertinent record
  - j) Radioactive storage and disposal
  - k) Receiving and shipping

April 11, 1985

Date

Howard M. Johnson  
HOWARD M. JOHNSON, Ph.D.  
Associate Professor  
Div. of Engineering Technology  
Oklahoma State University

460679