

ATOMIC ENERGY COMMISSION
APPLICATION FOR BYPRODUCT MATERIAL LICENSE

INSTRUCTIONS: Complete Items 1 through 19 if this is a new application. If renewal is requested, complete only Items 1 through 11 provided that with respect to the other items there has been no change in the information previously submitted. Mail two copies to: U. S. Atomic Energy Commission, P. O. Box E, Oak Ridge, Tennessee, Attention: Isotopes Extension, Division of Civilian Application. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. General requirements for issuance of an AEC Byproduct Material License are contained in Title 10, Code of Federal Regulations, Part 30.

1. (a) NAME AND SHIPPING ADDRESS OF APPLICANT (Institution, firm, hospital, person, etc.) Sinclair Research Laboratories, Inc. 400 East Sibley Boulevard Harvey, Illinois	(b) ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED (If different from shipping address) Same as shipping address
2. DEPARTMENT TO USE BYPRODUCT MATERIAL Engine Laboratories	
3. INDIVIDUAL USER (Name and title of individual(s) who will use or directly supervise use of byproduct material) Dr. Adolph I. Snow, Sr. Proj. Chem.	
4. RADIOLOGICAL SAFETY OFFICER (Name of person qualified in radiological safety, if other than individual user) Dr. Adolph I. Snow	
5. PREVIOUS LICENSE OR AUTHORIZATION NUMBER (If this is an application for renewal of a license for byproduct material obtained under a prior license or authorization for radioisotope procurement)	

BYPRODUCT MATERIAL OR IRRADIATION SERVICE DESIRED

6. BYPRODUCT MATERIAL (Element and mass number) Cobalt-60 Sulfur-35	7. CHEMICAL AND/OR PHYSICAL FORM (Or catalog number) Co-60-1 (one-tenth unit) S-35-P-3	8. MAXIMUM AMOUNT OF RADIOACTIVITY IN MILLICURIES THAT YOU WILL POSSESS AT ANY ONE TIME 10 mc. Co-60 10 mc. S-35
9. IF IRRADIATION SERVICE IS DESIRED, STATE PERTINENT DETAILS SUCH AS: CHEMICAL COMPOSITION AND WEIGHT IN GRAMS OF TARGET MATERIAL, RADIOACTIVITY, IRRADIATION TIME IN DAYS, AND NEUTRON FLUX		

STATEMENT OF USE

10. (a) DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. (If material is for "human use" complete Supplement A in lieu of this item. If material is to be used in or manufactured as a "sealed source" complete Supplement B in addition to this item.)
These materials will be used to measure thickness of deposits in automobile engines. Cobalt or sulfur will be chemically reacted or electroplated at end of plug to be inserted into engine and covered with a thin layer of nickel for protection of surface. Experiments involve thickness determination by measurement of attenuation of beta rays by the engine deposits after removal of the plug.
- (b) DESCRIBE PROCEDURES WHICH WILL BE OBSERVED TO MINIMIZE HAZARD FROM HANDLING, STORAGE, AND DISPOSAL OF THE BYPRODUCT MATERIAL
Amount of radioactive material on plug and in plating bath around 0.1 microcurie which presents no safety problem. Source material to be stored in concrete lined hole in floor with a 16" concrete plug on top of stored material. Disposal of radioactive material to be made through AEC (Argonne) or authorized private disposal agency.

CERTIFICATE

11. The applicant and any official executing this certificate on behalf of the applicant named in Item 1, certify that this application is prepared in conformity with Title 10, Code of Federal Regulations, Part 30, and do solemnly swear (or affirm) that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief.

State of Illinois
County of Cook
Subscribed and sworn to before me this 15th
day of March, A.D., 1956
Eleanor T. Lindgren
Notary Public Commission Expires June 19, 1959

Sinclair Research Laboratories, Inc.
Applicant named in Item 1
By [Signature]
Vice President and General Manager
Title of Certifying Official
Date March 15, 1956

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.

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

INSTRUCTIONS: Complete Items 12 through 19 if this is a new application. This information may be omitted from subsequent applications provided there is no change in the information previously submitted, and reference is made in Item 5 to the application on which this information appears.

TRAINING AND EXPERIENCE WITH RADIOACTIVITY OF INDIVIDUAL USER NAMED IN ITEM 3

12. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)		FORMAL COURSE (Circle answer)	
			Yes	No	Yes	No
1. Principles and practices of radiological health safety.	SEE ATTACHED SHEETS					
2. Radioactivity measurement standardization and monitoring techniques and instruments						
3. Mathematics and calculations basic to the use and measurement of radioactivity.						
4. Biological effects of radiation. . .						
5. Actual use of radioisotopes in the types and quantities for which application is being made, or equivalent experience						

13. ISOTOPE HANDLING EXPERIENCE				
ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
SEE ATTACHED SHEETS				

14. If Radiological Safety Officer named in Item 4 is different from individual user named in Item 3, use supplementary sheet to provide equivalent information on "Training and Experience With Radioactivity of Radiological Safety Officer." Supplementary sheet is attached (Circle answer)

Yes No

PHYSICAL FACILITIES, EQUIPMENT, AND RADIATION INSTRUMENTATION

15. RADIATION DETECTION INSTRUMENTS (Use separate sheet if necessary)					
TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm ²)	USE (Monitoring, surveying, measuring)
SEE ATTACHED SHEETS					

16. FILM BADGES, DOSIMETERS, AND OTHER PERSONNEL MONITORING DEVICES INCLUDING BIO-ASSAY PROCEDURES

SEE ATTACHED SHEETS

17. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE (For film badges specify method of calibration and processing, or name supplier)

SEE ATTACHED SHEETS

18. (a) DESCRIBE BRIEFLY REMOTE HANDLING EQUIPMENT, STORAGE CONTAINERS, SHIELDING, AND LABORATORY FACILITIES (Working areas, fume hoods, etc.)

SEE ATTACHED SHEETS

(b) SKETCHES OF SUCH FACILITIES ARE ATTACHED (Circle answer)

Yes No

19. DESCRIBE BRIEFLY RADIATION SURVEYING PROCEDURES AND METHODS OF DISPOSING OF RADIOACTIVE WASTES

SEE ATTACHED SHEETS

12. Type of Training	Where Trained	Duration of Training	On the Job	Formal Course
1.	Ames Laboratory of the AEC Sinclair Research Labs., Inc. University of Chicago	7 Years 2 Years 1 Year	Yes Yes Yes	No No No
2.	Ames Laboratory of the AEC Sinclair Research Labs., Inc. University of Chicago	7 Years 2 Years 1 Year	Yes Yes Yes	Yes No No
3.	Ames Laboratory of the AEC University of Chicago Sinclair Research Labs., Inc.	7 Years 2 Years 3 Years	Yes Yes Yes	Yes No No
4.	Sinclair Research Labs., Inc.	2 Years	Yes	No
5.	Ames Laboratory of the AEC (Sinclair Research Labs., Inc. & University of Chicago - includes experience with X-ray and neutron diffraction equipment)	7 Years	Yes	No

13. Isotope Handling Experience

Isotope	Maximum Amount	Where Experience was Gained	Duration of Experience	Type of Use
Uranium and decay products	Many pounds	Ames Laboratory of the AEC	7 Years	Metallurgical, X-ray diffraction, preparation of compounds.
Thorium and decay products	Many pounds			
Cobalt 60	Around 1 millicurie	Sinclair Research Labs., Inc.	6 Months	Preparation of demonstration samples.
Tantalum 182	Around 200 millicuries of gamma activity	Sinclair Research Labs., Inc.	3 Months	Cutting tools for wear tests.
Iron 59	Around 30 millicuries of gamma activity	Sinclair Research Labs., Inc.	2 Months	Piston ring wear tests.
X-ray diffraction equipment Neutron diffraction equipment		Ames Laboratory of the AEC	7 Years	Diffraction studies.

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15. Radiation Detection Instruments

Type of Instruments	Number Available	Radiation Detected	Sensitivity Range	Window Thickness	Use
Nuclear Instrument & Chemical Co. survey meter Model #2612	1	Alpha, beta, gamma	0.2, 2, and 20 mr/hr	1.4	Surveying
Tracerlab Cutie Pie Model SULH	1	Beta, gamma	25, 250, 2500 mr/hr Full scale accuracy + 10% of full scale	2-3	Surveying
Tracerlab Laboratory Monitor Model SU-3C	1	Alpha, beta, gamma	200, 2000, 20,000, Cpm full scale	1.9	Monitoring
Tracerlab Superscaler Model SC-18A	1		Input sensitivity from 0.2 to 0.35 volts		Detector for measuring
Tracerlab 1-1/2 x 1" long sodium iodide (Tl) crystal connected to P-20 amplifier - Shield 2" of lead	1	Gamma			
Nuclear Instrument and Chemical Co. D-34 detector in Model 3031B 2" lead shield		Beta, gamma		1.4	Detector for measuring
Tracerlab Piston Ring Wear Analyzer consisting of 1-3/4" D x 2" long sodium iodide (Tl) crystal plus SC-34A precision ratemeter plus P-20A scintillation detector, plus SC-51 autoscaler plus SC-SF Tracergraph printing interval time recorder plus Brown recorder	1	Gamma			Measuring

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16. Film Badges, Dosimeters, and other Personnel Monitoring Devices including Bio-Assay Procedures:

12 Film badges from Nuclear Instrument and Chemical Co. processed weekly, 12 direct reading pocket dosimeters, Tracerlab Model K-112-full scale 200 mr. accuracy + 5% of full scale. Dosimeters and film badges worn at all times. Standard sources - 1) Tracerlab 12-7 calibrated gamma source 11.1×10^{-1} microcuries covered with 1.3 gm/cm^2 of lead; 2) Nuclear Instrument and Chemical Co. Model R2 uncalibrated source containing 2-3 micrograms of radium in a plastic cylinder $1" \times 1/2"$; 3) Three 2-milligram samples of radium sulfate.

Physical Examinations include initial and semi-annual complete blood counts, urinalysis, chest X-ray plus a routine general physical examination for all personnel handling radioactive materials.

17. Method, Frequency, and Standards used in Calibrating Instruments Listed Above

Film badges - obtained from and processed by Nuclear Instrument and Chemical Company.

Dosimeters, etc. are intercompared by exposure to same source and calibrated against sources. Frequency of calibration - monthly.

18. Description of Remote Handling Equipment, Storage Containers, Shielding, and Laboratory Facilities

Remote Handling Equipment - 5 foot long handled tongs, magnetic pickup with 5 foot handle.

Storage Containers - Concrete lined holes in floor, stoppered by 16" long concrete plugs. Special lead storage containers for radioactive piston rings and cutting tools.

Blickman A-1 modified low intensity dry box.

Storage area in special locked room. Counting area in special designated location. Alberene stone hoods.

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19. Brief Description of Radiation Surveying Procedures and Methods of Disposing of Radioactive Wastes.

Use of Cutie Pie, and survey meter on working areas. All personnel handling or near radioactive material wear film badges. Those working with such materials also wear pocket dosimeters. Laboratory monitor used to monitor personnel and clothing.

Waste disposal - Relatively short lived waste such as Iron-59 stored until activity decays to a safe level for local disposal. Highly active or long lived waste will be sent to Argonne National Laboratory, or other authorized private disposal agency for disposal.

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	Sinclair Research Labs., Inc.	2 Years	Yes	No
	University of Chicago	1 Year	Yes	No
2.	Ames Laboratory of the AEC	7 Years	Yes	Yes
	Sinclair Research Labs., Inc.	2 Years	Yes	No
	University of Chicago	1 Year	Yes	No
3.	Ames Laboratory of the AEC	7 Years	Yes	Yes
	University of Chicago	2 Years	Yes	No
	Sinclair Research Labs., Inc.	3 Years	Yes	No
4.	Sinclair Research Labs., Inc.	2 Years	Yes	No
5.	Ames Laboratory of the AEC (Sinclair Research Labs., Inc. & University of Chicago - includes experience with X-ray and neutron diffraction equipment)	7 Years	Yes	No

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