

42-107-3

Form AEC-618  
(7-55)ATOMIC ENERGY COMMISSION  
APPLICATION FOR BYPRODUCT MATERIAL LICENSEForm approved.  
Budget Bureau No. 20-20073

**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.)Shell Oil Company  
P.O. Box 2527, Houston, Texas(b) ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED  
(If different from shipping address)Shell Oil Company, Refinery, Norco, La.  
Shell Development Co., Emeryville, Calif.

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Houston Research Laboratory

3. INDIVIDUAL USER (Name and title of individual(s) who will use or directly supervise use of byproduct material)

Dr. T. Brooks METCALFE

4. RADIOLOGICAL SAFETY OFFICER (Name of person qualified in radiological safety, if other than individual user)

Dr. Richard H. HUNT

5. PREVIOUS LICENSE OR AUTHORIZATION NUMBER (If this is an application for renewal of a license for radiological procurement)

None

## CAUTION

Information contained in this document is  
considered "COMPANY CONFIDENTIAL"by the applicant and should be treated as  
byproduct material obtained under a prior license or authorization for  
use within the AEC.

## BYPRODUCT MATERIAL OR IRRADIATION SERVICE DESIRED

6. BYPRODUCT MATERIAL (Element and mass number) 7. CHEMICAL AND/OR PHYSICAL FORM (Or catalog number)

Scandium-46 5.

Chloride (aqueous sol'n)

Cerium-144 a

Chloride (aqueous sol'n)

8. MAXIMUM AMOUNT OF RADIOACTIVITY IN MILLICURIES THAT YOU WILL POSSESS AT ANY ONE TIME

10 millicuries

100 millicuries

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.)

Both Sc-46 and Ce-144 will be used to label cracking catalysts by adsorption of the isotopes on the catalyst surface. The labeled catalyst will be injected, totally, into the commercial cracking unit at Norco, Louisiana.

(b) DESCRIBE PROCEDURES WHICH WILL BE OBSERVED TO MINIMIZE HAZARD FROM HANDLING, STORAGE, AND DISPOSAL OF THE BYPRODUCT MATERIAL

Labeling will be accomplished in Shell Development radiochemistry laboratory in Emeryville, California. Labeled catalyst will be shipped in ICC approved container to Norco, Louisiana. The total ten pounds of radioactive catalyst will be diluted in 600 tons of unit catalyst inventory. The shipping container will be returned to Shell Development Laboratory, Emeryville, California.

## 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

TEXAS

County of

HARRIS

Subscribed and sworn to before me this

21

day of

JUNE, 1956

Notary Public

V. J. Ellis

Shell Oil Company

Applicant named in Item 1

By

Title of Executing Official

Refinery Manager

Date June 29, 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.

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PDR FOIA  
MAYGARD96-307 PDR

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ATOMIC ENERGY COMMISSION  
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 2**

12. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
1. Principles and practices of radiological health safety. . . . .	Western Div., Tracerlab, Inc.	2 weeks	Yes <input type="radio"/> No <input checked="" type="radio"/>	Yes <input type="radio"/> No <input checked="" type="radio"/>
2. Radioactivity measurement standardization and monitoring techniques and instruments . . . . .	Western Div., Tracerlab, Inc.	2 weeks	Yes <input type="radio"/> No <input checked="" type="radio"/>	Yes <input type="radio"/> No <input checked="" type="radio"/>
3. Mathematics and calculations basic to the use and measurement of radioactivity. . . . .	Western Div., Tracerlab, Inc.	2 weeks	Yes <input type="radio"/> No <input checked="" type="radio"/>	Yes <input type="radio"/> No <input checked="" type="radio"/>
4. Biological effects of radiation. . . . .	Western Div., Tracerlab, Inc.	2 weeks	Yes <input type="radio"/> No <input checked="" type="radio"/>	Yes <input type="radio"/> No <input checked="" type="radio"/>
5. Actual use of radioisotopes in the types and quantities for which application is being made, or equivalent experience . . . . .	Shell Oil Company	1 1/2 years	Yes <input type="radio"/> No <input checked="" type="radio"/>	Yes <input type="radio"/> No <input checked="" type="radio"/>

**13. ISOTOPE HANDLING EXPERIENCE**

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
See attached sheet				

14. If Radiological Safety Officer named in Item 4 is different from individual user named in Item 2, use supplementary sheet to provide equivalent information on "Training and Experience With Radioactivity of Radiological Safety Officer." Supplementary sheet is attached (Circle answer) See application 42-553-1  
Yes ☐ No ☒

**PHYSICAL FACILITIES, EQUIPMENT, AND RADIATION INSTRUMENTATION**

**15. RADIATION DETECTION INSTRUMENTS** (Use separate sheet if necessary)

TYPE OF INSTRUMENTS (Indicate make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm <sup>2</sup> )	USE (Labeling, sampling, measuring)
See attached sheet					

**16. FILM BADGES, DOSIMETERS, AND OTHER PERSONNEL MONITORING DEVICES INCLUDING REC-ALAY PROCEDURES**

Film Badge Service (Tracerlab)  
Pocket Dosimeters (Kaleket - Model K-112)  
SU-12 Cutie Pie (Tracerlab)  
SU-10 Radiac (Tracerlab)

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

Film Badge, Tracerlab, Inc.  
Pocket Dosimeters ) Calibrated against 1 mg radium needles at approximately 6 months  
Radiac and Cutie Pie) intervals or when batteries were changed. Radiac has internal check.

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

Adsorption of isotope on catalyst will be done in the radiochemical laboratory at Shell Development Co., Emeryville, California. The activity will be handled in aliquots of less than 1 mc. Total aggregate will be shipped in plastic film containers to Norco, Louisiana where total will be injected into the commercial cracking unit.  
(b) SKETCHES OF SUCH FACILITIES ARE ATTACHED (Circle answer) Yes ☐ No ☒

**19. DESCRIBE BRIEFLY RADIATION SURVEYING PROCEDURES AND METHODS OF DISPOSING OF RADIOACTIVE WASTE** All operations to be monitored with radiac or cutie pie for radiation level at position of workers. Plastic shipping container will be returned to Shell Development, Emeryville, for disposal in the usual manner for dry waste (Tracer Lab). (See also application No. 25272)

Item 13 - Isotope Handling Experience

<u>Isotope</u>	<u>Maximum Amount</u>	<u>Where Experience was Gained</u>	<u>Duration of Experience</u>	<u>Type of Use</u>
Cerium-144	10 mc	Shell Oil Company		labeled
Scandium-46	10 mc	Norco Refinery		catalyst
Chromium-51	4 mc	Shellburn Refinery		studies
		Houston Refinery		
		Houston Research Lab.	1 1/2 years	
Co-60	15 mc	Norco Refinery	1 week	radiography
Cs-137	85 mc			fluid catalyst
				density by
				gamma-ray
				absorption

Item 15 - Radiation Detection Instruments

<u>Type of Instrument</u>	<u>Number Available</u>	<u>Radiation Detected</u>	<u>Sensitivity Range</u>	<u>Window Thickness</u>	<u>Use</u>
Tracerlab SU 10	1	gamma	1-50 K	--	Surveying
Tracerlab SU 1E	1	beta-gamma	0-1500	2-3	Surveying
Tracerlab SC-18-A	2	--	--	--	Scalers - suitable for scintillation counting
Tracerlab SC-51	1	--	--	--	Scalers - suitable for scintillation counting
Tracerlab SC-100	1	--	--	--	Scaler - GM counting
Tracerlab SC-2A	1	--	--	--	Scaler - GM counting
Tracerlab SC-40	2	--	--	--	Plug-in rate meter for SC-18-A
Tracerlab SC-54	1	--	--	--	Precision rate meter GM counting
Kelley-Koett K-112 and Tracerlab SU 9	5	gamma	0-200 mr	--	Pocket dosimeter and charger
Tracerlab P-20A	3	gamma	--	--	Scintillation detector with 1 1/2" 2" NaI(Tl) Cryst
General Electric 421C 196G	1	beta, gamma	--	--	

Item 15 - (Continued)

<u>Type of Instrument</u>	<u>Number Available</u>	<u>Radiation Detected</u>	<u>Sensitivity Range</u>	<u>Thickness</u>	<u>Use</u>
Shell Development design	2 (2 more being built)	gamma	--	--	Scintillation detector suitable for gamma-ray spectrometry
Tracerlab CE1	1	beta	--	--	Liquid scintillation counter
Atomic Inst. Co. 510	2	--	--	--	Pulse height analyzer
Atomic Inst. Co. 218	2	--	--	--	Linear amplifier with pulse height analyzer and pre-amplifier forms gamma-ray spectrometer
Applied Physics Corp. 3095	1	alpha, beta, gamma	--	--	Ionization chamber
Applied Physics Corp. 30 L	1	--	--	--	Vibrating reed electrometer

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REPRODUCE THIS SIDE

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7-25-56

Phone Call fr: Dr. Richard H. Hunt, Research Lab., Shell Oil Co., Houston, Texas  
Phone Greenwood 9 2311 RE: Pending Control No. 1403 which RD was handling. This  
application had been submitted in June and Dr. Hunt was attempting to establish the  
present status. He stated that there were several Shell Oil groups in Houston which  
were not directly connected. The use of the materials being presently requested is  
dependent upon tight schedule, refinery operations at the Narco, La. facilities.  
The labeled catalysts are actually to be prepared in the Shell Oil Dev. Co. Lab. in  
Emeryville, Calif. and shipped to Narco, La. in a container meeting IOC regulations.  
Dr. Hunt insisted that it was necessary to expedite this matter at this time as much  
as possible to meet the refinery's schedule. Therefore, promised him that RD and LRD  
would review his application and call him back this afternoon. He, therefore, stated  
that he would wait at this phone until he heard from us in the next hour or so. It  
appeared that no action had been taken upon this application.

7-25-56

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to: Dr. R. H. Hunt, Shell Oil Co., Houston, Texas, re: RD, LRD, and  
for use of Scandium and Zirconium for use in catalytic cracking operations. Dr. Hunt indicated that the use  
of the catalysts outlined in the application No. 25273. The end product is a catalyst  
which is 270 ft high and has an air flow of 10 to 15,000 cu ft per hour. Dr.  
H. stated that we have a report of the sampling operation which is very low. I requested that he send us a copy of the sampling report. He  
was unaware that we had it on our files. 25 to 26 of a catalyst which is very fine  
into a 300 tons of catalyst. The catalyst is a solid catalyst and is very fine  
particles. It is called a liquid catalyst due to the fact that it flows under pressure  
as used in the operations. The labeled catalyst after use is withdrawn slowly from  
the operation stored and used in later operations. Eventually the catalyst is lost  
through the stack over a long period of time. Dr. H. requested that this application  
be treated as company confidential as previous applications have been treated. He  
is specifically interested in the use of the catalyst in the use of the catalyst. A license  
42-1-1-1 was issued and formal license will follow.