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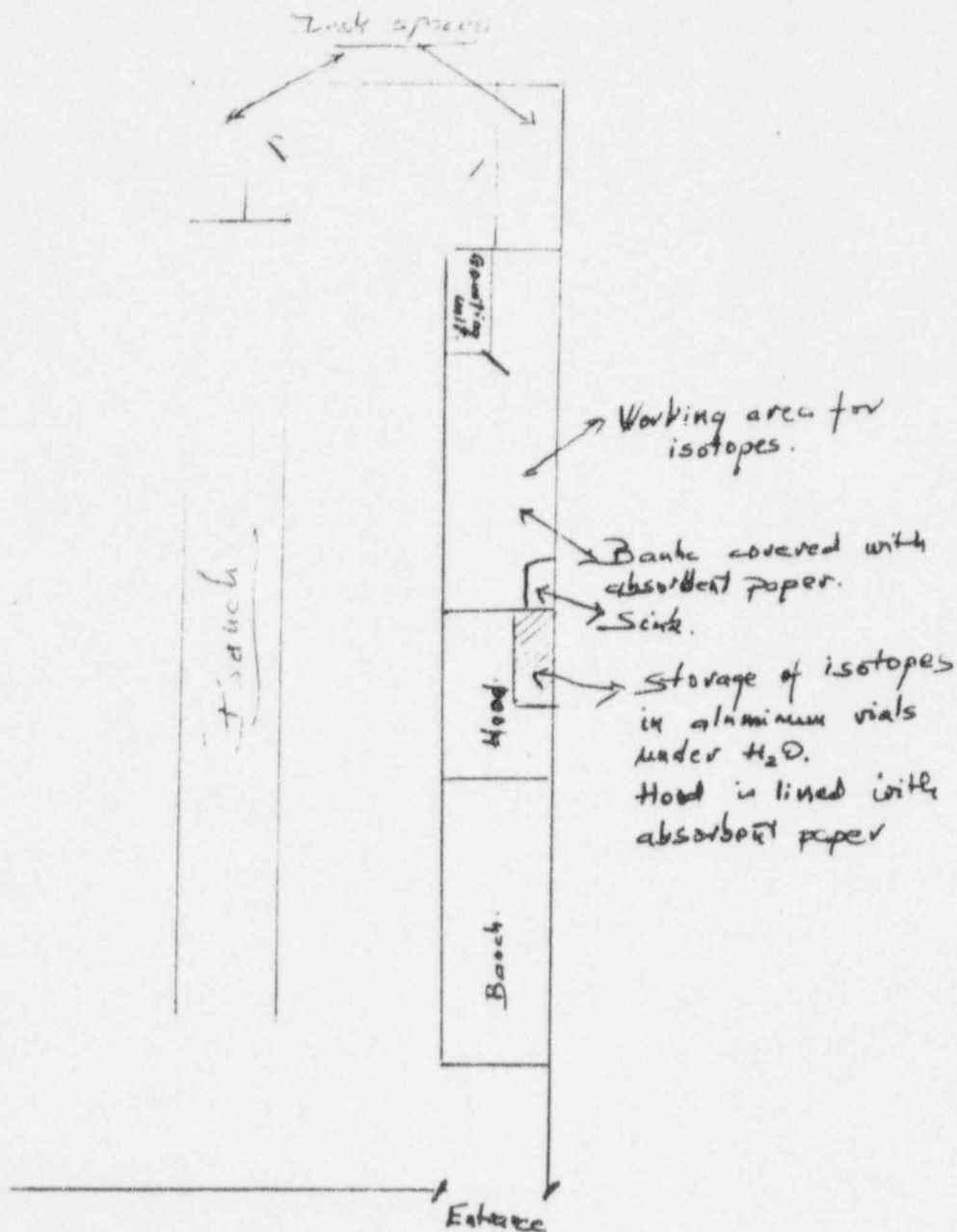
Form AEC-313 (5-58)	ATOMIC ENERGY COMMISSION APPLICATION FOR BYPRODUCT MATERIAL LICENSE		Form approved Budget Bureau No. 38-R027.3
<p>INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.</p>			
<p>1. (a) NAME AND STREET ADDRESS OF APPLICANT. (Institution, firm, hospital, person, etc.)</p> <p>Monsanto Chemical Company Inorganic Research 800 N. Lindbergh Blvd. St. Louis 66, Missouri</p>		<p>(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. (If different from 1 (a).)</p> <p>Same as 1 (a)</p>	
<p>2. DEPARTMENT TO USE BYPRODUCT MATERIAL</p> <p>Inorganic Research</p>		<p>3. PREVIOUS LICENSE NUMBER(S). (If this is an application for renewal of a license, please indicate and give number.)</p> <p>None</p>	
<p>4. INDIVIDUAL USER(S). (Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)</p> <p>Thos. Schiff, DMD Howard L. Vandersall</p>		<p>5. RADIATION PROTECTION OFFICER (Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)</p> <p>Individual User (a) Calcium Phosphorous 32 Uranium 234 (sealed standard source)</p>	
<p>6. (a) BYPRODUCT MATERIAL. (Elements and mass number of each.)</p> <p>Calcium 45 Phosphorous 32 Uranium 234 (sealed standard source)</p>		<p>(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. (If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.) We are interested in using irradiated teeth (human). They are freshly extracted and stored in a weak formaldehyde solution so the bacterial action is cut down, and the moisture content of the teeth is kept constant.</p> <p>(See 6 (b) Attached.</p>	
<p>7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. (If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.) This product will be used for the determination of the abrasiveness of polishing agents. The teeth will be pre-extracted and at no time will humans use the material. The sealed source will be used for standardization purposes.</p> <p style="text-align: right;">A/SS 35121</p>			

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PDR FOIA
NEITZEL96-314 PDR

MONSANTO CHEMICAL COMPANY

INORGANIC CHEMICALS DIVISION
RESEARCH DEPARTMENT
800 NORTH LINDBERGH BOULEVARD
Box 520
ST. LOUIS 68, MISSOURI

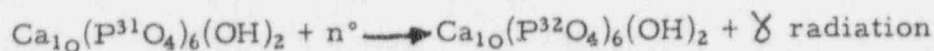


6(b) The inorganic content of the teeth are: (20 teeth)

Ca	3.63 gm
P	1.71
carbon dioxide	0.4
Mg	0.6
Na	0.1
K	0.035
Cl	0.015
Fl	0.008
S	0.1
Cu	-
Si	-
Iron	-
Zn	0.009

The above analysis is calculated on the basis of 100 gm of ash. The total element content of 20 teeth is reported, since this number will be required in our possession.

During irradiation, part of the P^{31} in hydroxyapatite is converted into P^{32} as follows:



Ca - by neutron capture gives rise to small amounts of isotopes which emit β radiation

O - produces β & γ emitters of very short half life

H - produces stable deuterium

The measured isotope is P^{32} -- half life 14.3 days. Before using the teeth, we allow it to stand in its vial for approximately 1 week in order to allow the minute Na^{24} content to decay. Its half life is 15.5 hrs.

We will have approximately 20 teeth in our storage at a time which will have approximately 16 mc total radiation.

The irradiation will be accomplished as follows: neutron flux of $10 \times 10^{10} \text{ n}^0/\text{cm}^2/\text{sec}$ at 40°C for 1 week.

In addition, we will use a sealed standard source for calibrating the counter unit and as standard for our experiment. This source will be UX_2^{234} -- obtained from Baird Atomic Inc., Cambridge, Mass. Its activity is $1.6 \times 10^{-5} \text{ mc}$.

TRAINING AND EXPERIENCE WITH RADIO ACTIVITY
OF
DR. THOMAS SCHIFF

Item 8

<u>Type of Training</u>	<u>Where Trained</u>	<u>Duration</u>	<u>On the Job</u>	<u>Formal Course</u>
a. Principles and practices of Radiation Protection	U. of Alabama School of Dentistry	4 mo.	No.	Yes
b. Standardization and Monitoring Techniques	U. of Alabama School of Dentistry	4 mo.	No	Yes
c. Mathematics and Calculations	U. of Alabama School of Dentistry	4 mo.	No	Yes
d. Biological Effects	U. of Alabama School of Dentistry	4 mo.	No	Yes

Item 9

Experience with Radiation

<u>Isotope</u>	<u>Max. Amount</u>	<u>Where</u>	<u>Duration</u>	<u>Type of Use</u>
I ¹³¹	5 MC	Veterans Hospital St. Louis, Missouri	3 mo.	Medical Research

35121

Item 8

TRAINING AND EXPERIENCE WITH RADIOACTIVITY
OF
HOWARD L. VANDERSALL

<u>Type of Training</u>	<u>Where Trained</u>	<u>Duration</u>	<u>On the Job</u>	<u>Formal Course</u>
a. Principles and Practices of Radiation Protection	Bowling Green State Univ. Bowling Green, Ohio	2 weeks	No	Yes
b. Standardization and Monitoring Techniques	Bowling Green State Univ. Bowling Green, Ohio	2 weeks	No	Yes
c. Mathematics and Calculations	Bowling Green State Univ. Bowling Green, Ohio	2 weeks	No	Yes
d. Biological Effects	Bowling Green State Univ. Bowling Green, Ohio	informal reading	No	No

Item 9Experience with Radiation

<u>Isotope</u>	<u>Max. Amount</u>	<u>Where</u>	<u>Duration</u>	<u>Type of Use</u>
I ¹³¹	5 MC	Bowling Green State Univ.	2 weeks	College laboratory work
P ³²		Monsanto Chemical Co.	2 weeks	Industrial research

Item 11 (Continued)

housing. Measure the abraded tooth, Volume by its radiation uptake.

Item 12 (Continued)

Film badges will be used. Given to every person in laboratory. Will be monitored every 2 week. Company: Picker's X-ray Company, St. Louis, Missouri.

Item 14

GM Counter will be used on the area counted 3 times daily where isotopes are used.

Item 15

Since the materials we will use have short half lives, we will store it until the ^{COUNT} ~~test~~ will be negligible, then dispose of it through regular waste, i.e., dissolution in acid and sewerage.