Form AEC-313
8-64
10 CFR 30

UNITED STATES ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved
Budget Bureau No. 38-R027

INSTRUCTIONS. – Complete Items 1 through 16 if this is an initial application or an application for renewal of a license. Information contained in previous applications filed with the Commisson with respect to Items 8 through 15 may be incorporated by reference provided references are clear and specific. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail two copies to: U.S. Atomic Energy Commission, Washington, D.C., 20545, Attention: Isotopes Branch, Division of Materials Licensing. 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.

1 (a) NAME AND STREET ADDRESS OF APPLICANT (Institution, firm, hospital, person, etc. Include ZIP Code)

Cumberland Research Corporation
P.O. Box 401
Port Norris, New Jersey 08349

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED (If different from 1 (a). Include ZIP Code)

1 Gamma Drive
Port Norris, New Jersey

2 DEPARTMENT TO USE BYPRODUCT MATERIAL

Production

3 PREVIOUS LICENSE NUMBER(S) (If this is an application for renewal of a license, please indicate and give number)

29 - 12346 - 01

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)

Luther Jeffries, Jr.
Charles F. Thompson

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)

6 (a) BYPRODUCT MATERIAL (Elements and mass number of each)

(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)

Cobalt 60	2000 curies as sealed sources or metallic wafers and pellets
Iridium 192	2000 curies as sealed sources or metallic wafers and pellets

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.)

Byproduct material will be used for the following purposes;

a) Incorporation into sealed sources for distribution to licensed users.
b) Incorporation into sealed sources for design and checkout studies of shielded containers, radiography devices and other radiation producing equipment.
c) Unsealed sources will be used only in the hot cell
d) Receipt of sources from licencees for disposal

T01

(Continued on reverse side)

A-4

TRAINING AND EXPER[illegible]E OF EACH INDIVIDUAL NAMED IN ITEM 4 (U[illegible]upplemental sheets if necessary)

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection			Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments	No Changes		Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

9. EXPERIENCE WITH RADIATION (Actual use of radioisotopes or equivalent experience.)

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
		No Changes		

10. RADIATION DETECTION INSTRUMENTS (Use supplemental sheets if necessary.)

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm²)	USE (Monitoring, surveying, measuring)
No changes					

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE

No Changes

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED (For film badges, specify method of calibrating and processing, or name of supplier.)

Change to Tracerlab from R. S. Landauer

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS IN DUPLICATE

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. (Circle answer) Yes No

See revised Supplement 'E'

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

See Supplement 'H' and revised Supp. 'F'

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved.

No change

CERTIFICATE (This item must be completed by applicant)

16. 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 THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

Cumberland Research Corporation
Applicant named in item 1

Date August 29, 1967

By Charles F. Thompson
Charles F. Thompson
President
Title of certifying official

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.

* U.S. GOVERNMENT PRINTING OFFICE : 1964 O—745-381

Supplement E
2(revised 9/14/67)

FACILITIES & EQUIPMENT

1) Main Building - Prints of the main building were filed with original application.

2) Ground & Building Layout - Drawing No. C 101 shows the general layout of the buildings, fence and hot cell in relation to the 2 3/4 acres of ground owned by the company.

3) Hot Cell Layout - Drawing No. C 102 shows the layout of the hot cell and pit areas. Basically it is an 'L' shaped cell having an approximately 5' x 9½' high level area with a 4' x 15' corridor. The window wall and one side wall are constructed of high density concrete (iron ore aggregate) of a density of approximately 240 lbs. per cubic foot. The remaining walls are of concrete block. The three outside walls are surrounded by gravel fill starting about 15' out from the walls and extending to the ceiling. The high level area floor is lined with sheet stainless steel. All other walls, floors, and ceilings are lined with 1/16" aluminum sheet. Joints are lapped and welded. Thus the hot cell is essentially a leak proof room. The 3' high density wall has an opening for the window, two openings for the manipulators and three 2" openings for accessory cables,lines, etc. Stainless steel sumps are provided in the pit and hot area for liquid removal.

4) Hot cell equipment - The following equipment is installed in the hot cell:

a) One 36" thick radiation window - Corning Glass Co. Model 850 assembly, oil filled. Originally used at Philadelphia facility of the Budd Co.

b) Three Central Research Lab Model 8 manipulators. One is used as a spare

c) Ventilation system - Dwg. B 103 shows the hot cell ventilating system. This system is a recirculating, semi-closed type. The four basic components of this system are:

1) Filter box - contains one Cambridge absolute filter - Model 1-600; 24" x 24" x 5 7/8"; rated at 600 cfm. This is preceded by a 24" x 24" x 2" fibre prefilter.

2) Fan - AirChamp Model 120PW radial impeller fan or equivalent. Rating: 765 cfm @ 2300 rpm and 3" s.p.

3) Damper - The damper will recirculate most of the air back through the duct work to the corridor of the hot cell. A fraction of the air from the fan will be diverted through the stack to the atmosphere, thus creating a negative pressure in the hot cell with respect to the shop.

4) ductwork - All ducting is 7" with sealed joints to prevent leakage. Most of the duct from the filter to the fan is buried underground except where it rises to meet the fan on the roof.

Air sampling connections of the stack exhaust, hot cell, pit areas and shop are provided for use with the Tracerlab continuous air monitor.

d) Alarm system - A micro switch operated by opening door 'R' to the hot cell actuates a light (flashing red) over the door to the pit area. This light is located over the door. An audible alarm on the wall also sounds. This alarm can be disconnected by a wall switch in the pit area.

SUPPLEMENT 'F'
(revised 8/29/670

CUMBERLAND RESEARCH CORP.
PORT NORRIS, N.J.

ADMINISTRATIVE PROCEDURES

1. PURPOSE: The purpose of these procedures is to describe general rules for the operation of radiation facilities of Cumberland Research Corporation.

2. ORGANIZATION: Two individuals are concerned with supervision of all operations involving radioactive materials. Charles F. Thompson, President, is designated Radiation Safety Officer. He is responsible for all compliance with regulations, maintenance of records, and training. Luther Jeffries, Jr. is Secretary-Treasurer and Production Manager and will supervise all operations performed under the license. As such, he is responsible for operations performed under his supervision.

No work will be performed with radiation unless personally supervised by Jeffries or Thompson.

3. PERSONNEL MONITORING: Film Badges and dosimeters will be worn by all persons working in the plant. They will be stored on a rack in the office and will be picked up atthe start of work in the morning and replaced at closing time. Dosimeters will be zeroed daily and read and recorded each day.

4. SURVEY METERS: When working with readiation, an operable Geiger counter or survey meter will be used at all times.

5. AIR MONITORING: The Tracerlab continuous air monitor(s) will be operated in accordance with the following rules:

(a) Continuous sampling of air will be performed at breathing level in the manipulator area and hot cell at all times that personnel are present.

(b) Sampling of air in the shop area will be performed daily as necessary to determine compliance with 10CFR20.

6. PROTECTIVE CLOTHING: Lab coats, rubber gloves, and shoe covers will be worn whenever handling contaminated equipment in the shop. After use, gloves and shoe covers will be placed in covered waste drums. Lab coats may be hung on designated hangers in the shop.

In addition, special clothing is required when working in the manipulator area and ~~xhmp~~ hot cell. This clothing is not to be removed from these areas except in waste drums.

7. CONTAMINATION CONTROL: The following surveys will be made to control contamination;

(a) Personnel - A survey of clothing and exposed body parts will be made: (1) after working with contaminated objects, (2) after leaving the hot cell or manipulator area, and (3) after the shower required of all personnel who have worked in the hot cell.

(b) Shop Area - After working with contaminated equipment, swabs will be taken of the floors, walls, and

other places as required.

(c) Manipulator Area - Swabs of this area will be taken weekly or more often as required. Vacuuming and/or hosing down will be performed as necessary.

(d) Hot Cell - Vacuuming and/or washing down will be done in the hot cell as required. Swabs will be taken as necessary to determine contamination levels.

8. STORAGE: Radioactive materials will be stored both in the main building and in the small storage building. All material in the small storage building will be packed in approved ICC containers. The maximum amount to be stored will be such that the radiation levels at the outside of the restricted areas do not exceed those specified in 10CFR20.

Contaminated clothing, swabs, rags, filters, etc. will be stored in covered containers until prepared for disposal.

Liquid waste will be stored in steel drums until processed or prepared for disposal.

Contaminated equipment in the process of decontamination will be stored at one end of the shop and covered with plastic when necessary. The area will then be roped off and posted with radiation warning signs.

9. WASTE DISPOSAL: Radioactive wastes will normally be disposed of by Nuclear Engineering Co., Morehead, Kentucky, except for liquid wastes which do not exceed $3x10^{-5}$ uc/ml. concentration. No waste will be removed from the building until checked for contamination.

10. SECURITY: Both buildings will be kept locked at all times when not occupied by employees. In addition, the doors to the manipulator area and hot cell will be kept closed and locked at all times except when entry or exit is being made. Radiation warning signs will be posted at all entrances and other places on the premises as required by 10CFR20.

11) LEAK TESTING: Swabs of the surface of sealed sources will be taken after fabrication and at intervals not exceeding six months thereafter. They will also be taken prior to shipment to licensees. If the leak test as shown on the NaI crystal photomultiplier - multiscaler assembly indicates above 0.005 microcuries, the source will be cleaned and/or repaired or disposed of as necessary.

12. AREA SURVEYS: a) Hot Cell - Prior to production operations Cobalt 60 and Iridium 192 sources of activities less than the maximum allowed under the license will be exposed in the hot cell to determine the integrity of the shielding. Surveys will be made around the periphery of the facility and throughout the building to determine compliance with 10CFR20. This procedure

will be followed with increased amounts exposed until the maximum is determined.

b) Shop Area - It is not expected that sources will be exposed in an open air manner in the shop. Surveys will be made of all exposures as required to determine compliance with A.E.C. regulations.

Supplement 'G'
(revised 9/12/67)

DECONTAMINATION PROCEDURES

Most equipment subject to contamination will be cleaned by ultrasonic cleaning methods.

Fabricated sources will be cleaned in a small ultrasonic tank located in the hot cell proper. Other objects will be decontaminated in a large tank located in the shop.

In both cases the liquid will be pumped from the tank through a double set of filters and then back to the tank. The filters will initially retain 1 micron and 25 micron particles respectively, but may be changed as conditions warrant.

If the concentration of the liquids after filtering operations is less than 3×10^{-5} uc/ml, disposal will be made into the sanitary sewer system. Levels in excess of this concentration will be pumped into the holding tank for further filtration or dilution to the proper level.

In addition to the above, liquid contamination will result from "washing down" in the hot cell and pit area. The floors and side walls will be washed down occasionally using water, steam or other liquid. The liquid will be pumped from the stainless steel sumps located in each area through

the above mentioned dual filter into steel drumsor the holding tank for checkout and further processing if necessary.

Before disposal, all liquid wastes will be checked out using the NaI(Th) crystal-photomultiplier and scaler.

Supplement 'H'

Operating procedures for Hot Cell

In addition to the general requirements of Supplement 'F', "Administrative Procedures", as filed with our A.E.C. license application, the following specific rules apply to all operations in the hot cell and pit areas.

1) ENTRY - No one is to enter either area without specific permission of L. Jeffries or C. Thompson, from whom the keys may be obtained. After work in either area is completed, the doors are to be locked and the keys returned.

2) FILM BADGES & DOSIMETERS - When the key(s) for the areas are obtained, a zeroed 5R or 10R dosimeter will be given out. This additional dosimeter must be worn while working in the areas. It must be turned in with the keys.

3) SURVEY METERS - An operable Eberline Atometer or other high levevl instrument must be used when entering the hot cell or pit areas. This instrument must be kept on at all times while in the area and must be held or placed where it can be conveniently read while working. When bringing material out of the hot cell into the corridor for transfer to the shop, the survey meter must be used to determine if high levels of radiation are being brought out.

4) AIR MONITOR - The air monitor must be turned on at least 30 minutes before entry into either area. If readings above 4×10^{-9} uc/ml are shown on the recorder, entry is not to be made. Either C. Thompson or L Jeffries are to be notified so that corrective steps may be taken.

5) PROTECTIVE CLOTHING - (a) Pit Area and entrance to Hot Cell - Paper Lab coats, rubber gloves and shoe covers are to be put on prior to entering the pit area. This clothing is adequate for working in the pit or the entrance to the hot cell for removing containers, etc. Upon leaving , the shoe covers and gloves are to be removed and disposed of in the waste container. Lab coats may be stored on the hooks provided.

(b) HOT CELL Area - Whenever entry is to be made into the hot cell past the first bend, paper lab pants, head covers, and plastic boots must be worn in addition to the clothing required in the pit area. Immediately after exit from the hot cell area, all protective clothing is to be disposed of in the waste container.

6) CONTAMINATION CONTROLS - Immediately after leaving the hot cell or pit areas, all personnel must be checked out with the thin window geiger counter for body and clothing contamination. This checkout will be performed by L. Jeffries or C. Thompson.

All containers, equipment, etc., removed from the hot cell, or pit area are to be wiped down before removal to the shop. All rags are to be placed in the waste containers.

PHONE 609-785-1050

CUMBERLAND RESEARCH CORPORATION
1 GAMMA DRIVE
PORT NORRIS, NEW JERSEY

September 15, 1967

U. S. Atomic Energy Commission
Division of Materials Licensing
Isotopes Branch
Washington, D.C. 20545

Gentlemen:

Enclosed please find an AEC 313 application for amendment to our license 29-12346-01.

This application is a major revision to allow handling of bare Cobalt 60 and Iridium 192 in quantities of up to 2000 curies each. The primary purpose is to permit the manufacture of sealed sources for eventual distribution to licensees. Distribution, of course, will not be made until final designs have been submitted for approval.

Supplements A,B,C, and D to our original application remain the same. All others are revised and copies are enclosed. Supplement 'H' is added.

If you have any questions concerning this application or our facilities, please contact me by collect telephone. We will appreciate any effort you can make to expedite processing of this application.

Very truly yours,
Charles F. Thompson
Charles F. Thompson
President