Amend #2 37-2416-3

Form AEC 313 (7-57)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved. Budget Bureau No. 38-R027.3.

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 two copies to: U. S. Atomic Energy Commission, P. O. Box E, Oak Ridge, Tenn. Attention: Isotopes Extension, Division of Civilian Application. 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.)

Curtiss-Wright Corporation
Research Division
Quehanna, Pennsylvania

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

Radioactive Materials Laboratory
Building 14
Quehanna, Pennsylvania

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Nuclear Power Department

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

37-2416-2

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.)

Persons designated by the
Isotopes Committee

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.)

John L. Donovan

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

Co^{60}

(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.)

Pellets 1" x 1/4" diameter of solid cobalt metal.
pellets are clad in 1/16" thick 2S aluminum
giving overall dimensions of 1 1/8" x 3/8" diameter
20,000,000 millicuries, approx. 100 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.)

Research and Development
(see attached sheet)

9417

(Continued on reverse side)

A/26

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TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental 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	See previous application		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
		See previous application		

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)
		See previous application			

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

See previous application

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

See previous application

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

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 previous application also

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 previous application also

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. See previous application

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.

Curtiss-Wright Corporation
Applicant named in item 1

Date March 7, 1958

By: C. J. Roberts C. J. Roberts

Chief, Research Reactor Division
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 : 1957 O-F-434008

37-2416-3063

7. Purpose for which by product material will be used.

Curtiss-Wright is initiating a broad research program on the uses of gamma radiation in the food packing and chemical industries. The first step is to set up a high level gamma irradiation facility which will be flexible enough to permit irradiation of a large variety of samples over a wide range of dose rates and total doses. The 20,000 curies for which application is being made will be used in this facility.

13. Facilities and Equipment

Report CWR 474 entitled Description of the Curtiss-Wright Research Reactor and Radioactive Materials Laboratory is enclosed. The hot lab portion of the facility described in this report consists of five high level hot cells, a fifteen foot deep water pool, and complete supporting facilities, (e.g., dark room, machine shop, decontamination room, cask and sample storage areas, and change room.)

The service area of the hot lab contains a fifteen-ton capacity crane which will be used for transferring the cobalt shipping casks from the truck to a dolly or to the cask storage area. The cask dolly can be maneuvered into a hot cell by use of a fork lift truck which is available.

The cobalt will be transferred from the shipping containers to our own container or containers either in a cell or in the pool. Three cells have walls three feet thick with a density of 280 lb. per cubic foot. One of these cells is equipped with a General Mills mechanical arm while all of them are equipped with Argonne Model 8 master-slave manipulators. Details of the design of the cells is contained in CWR 474. The water pool may also be used for sample transfer, the pellets being handled by a long-handled tool. Either the fifteen feet of water or the three feet of ferrophosphorus concrete are sufficient to shield against approximately one megacuries of Co-60.

Following transfer from the shipping containers the material will be stored in casks with 6 and 10 inch thick lead walls either inside the hot cells or at the bottom of the pool.

During actual use the cobalt will be set-up in an irradiator which is not yet designed. This will be done in a hot cell if it is necessary to have a dry chamber to work in, or at the bottom of the pool. In the latter case, samples would be sealed in water-tight containers prior to being placed in the cobalt array.

14. Radiation Protection Program

The radiation protection program has been covered in our previous application which included a copy of our health physics manual, Report CWR-462. Several points deserve further emphasis, however. The entire cell service area is isolated from the rest of the building by locking all doors except the change room door. It is within the cell service area that the cobalt will be stored and handled. Only a few well trained individuals, two of whom are health physicist, will have free access to this area. All untrained individuals, and all individuals not thoroughly acquainted with operations within the service area will be permitted to enter with escort only, or after receiving specific instructions on a Hazard Area Work Permit.

All personnel entering the building are required to sign in and obtain suitable monitoring equipment. The only entrance to the building is guarded 24 hours per day so that unauthorized entrance is prohibited. Health physics personnel are on duty at all times when operations are being carried out.

37-2416-3C63

CURTISS-WRIGHT CORPORATION
RESEARCH DIVISION
QUEHA -NA, PENNSYLVANIA
AMHERST 3-4711

March 7, 1958

Isotopes Branch
Division of Licensing & Regulation
United States Atomic Energy Commission
1717 H Street Northwest
Washington 25, District of Columbia

Gentlemen:

I am enclosing an application on behalf of Curtiss-Wright Corporation to have our broad by-product license 37-2416-2 amended to increase the cobalt possession limit from 145 to 20,000 curies. This material is being obtained from Atomic Energy of Canada, Ltd. It had already been removed from their reactor and is awaiting shipment to us.

Our requirement for this material is very urgent. In order to discuss how best to expedite our application, I telephoned Mr. James R. Mason yesterday. At that time it was suggested that we might quickly obtain a interim license to receive the shipment of cobalt. Then, while we were arranging to ship the material, the application to utilize the material could be processed. If it appears that processing the enclosed application in such a step-wise manner would actually speed up the process, I would appreciate your handling it in this way.

During our phone conversation, Mr. Mason indicated that cobalt pellets used in the manner described in our application were not subject to Condition 18 of our present license which deals with tagging of sealed sources. Will you kindly specifically delete this condition from our amendment when it is issued.

I shall be most happy to furnish any additional information which might be of assistance to you in processing this application. Please call me collect at AMherse 3-4711, extension 693 (Frenchville, Pennsylvania). We would be very pleased to have members of your staff inspect our facilities. There has been considerable progress since we were visited by Mr. William D. Miller of the Isotopes Branch.

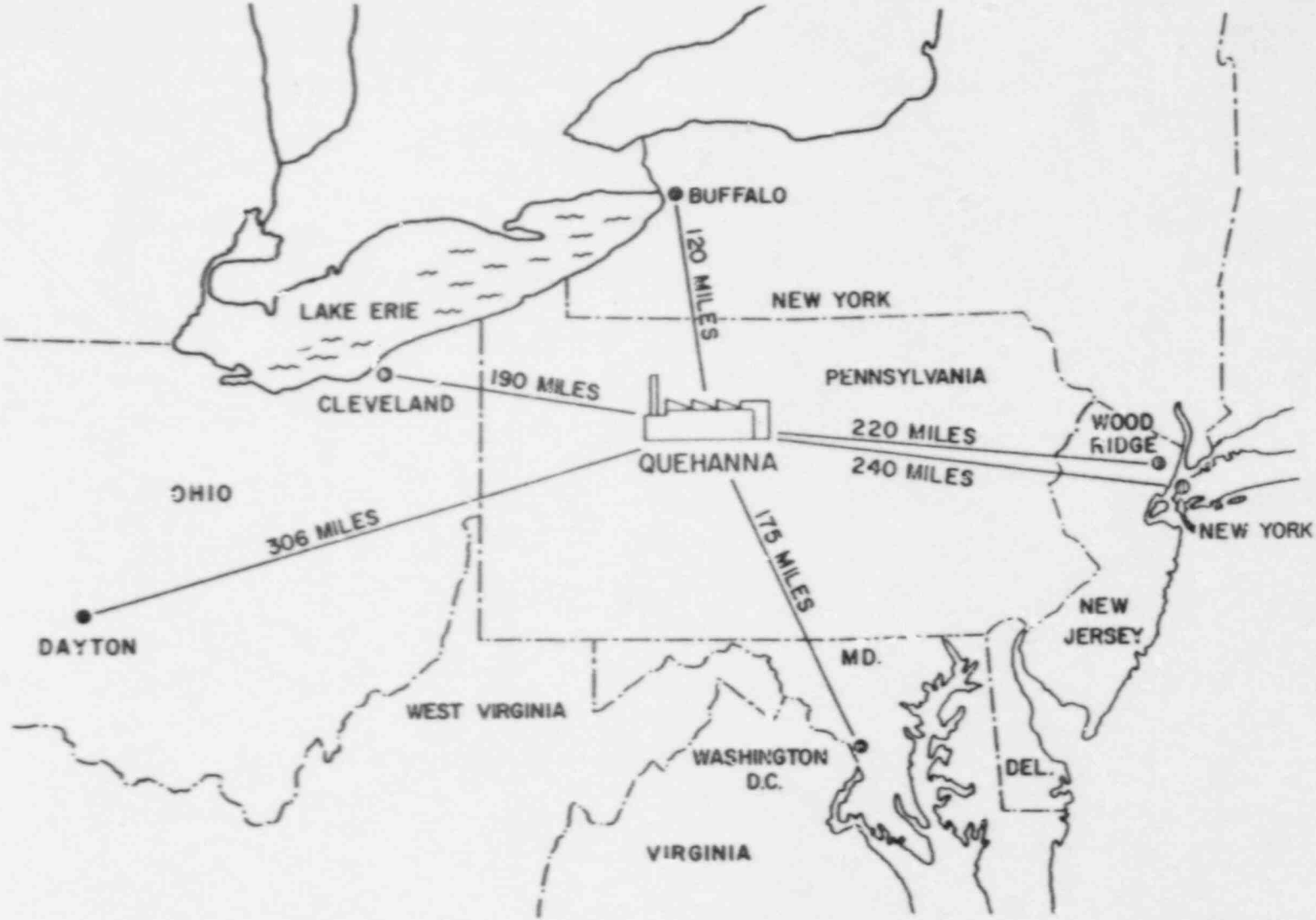
Very truly yours,

CURTISS-WRIGHT CORPORATION
RESEARCH DIVISION

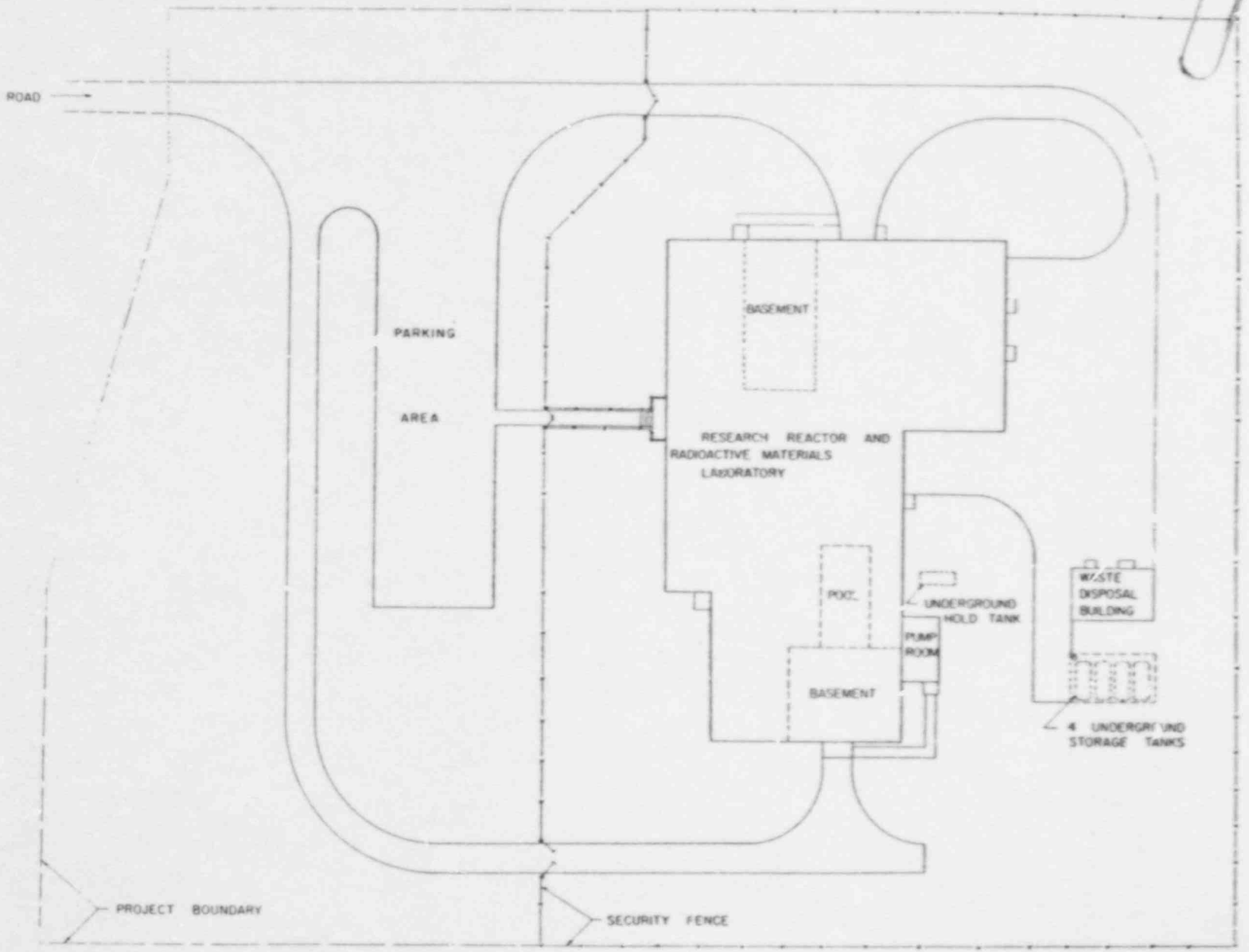
C. J. Roberts
Chief, Research Reactor Division

CJR:bb

C427



LOCATION OF CROSS-LOUISVILLE CHURCH AND RE-EIGHTEEN CHURCH, QUEHANNA, PENNSYLVANIA TABLE 1



SITE LAYOUT FIGURE 2

37-246-3063

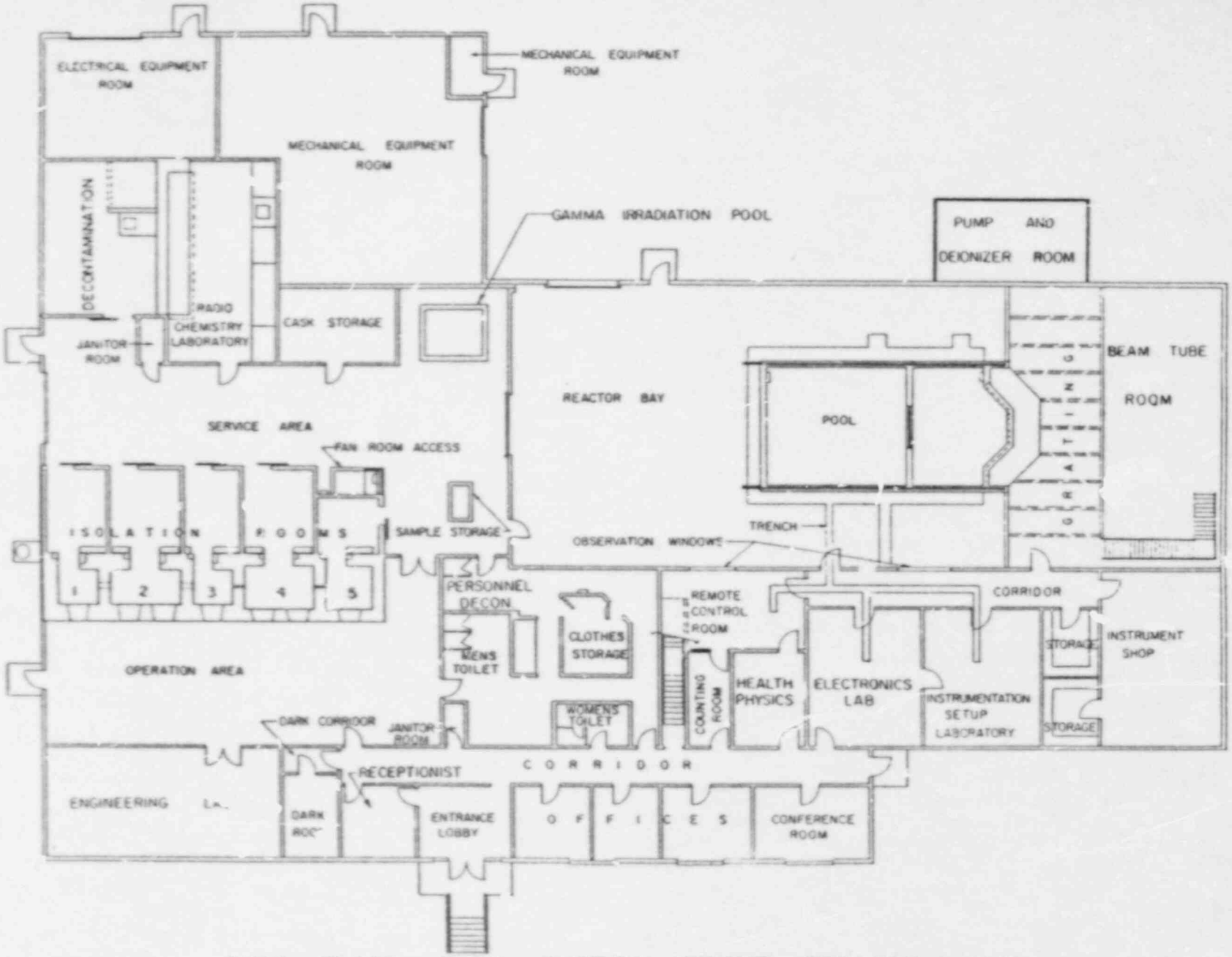


Fig 3 MAIN FLOOR PLAN CURTISS - WRIGHT REACTOR AND RADIOACTIVE MATERIALS LABORATORY

37-2 Pr.-3c.

GENERAL EMERGENCY PROCEDURES FOR THE RESEARCH REACTOR SITE

I. Purpose

Emergency conditions which may involve a serious hazard to personnel may arise in the reactor or hot lab areas, building 14, and require special action. This procedure defines the general action which will be required in such emergencies. In addition, each Supervisor is to prepare and put into effect such supplementary procedures as may be necessary to assure that those employees working under him are prepared to meet such emergencies in an organized manner. These supplementary procedures shall be approved by Health Physics prior to posting.

II. Definition of Emergency Conditions

Emergency conditions, for purposes of this procedure, shall be—

(1) Unusual hazardous conditions which cannot be handled by the existing personnel in the immediate vicinity,

(2) and/or conditions not fully under control in which potential or actual hazards exist to the personnel in the immediate vicinity or any greater area.

The health hazard is liable to arise from two conditions which may appear independently or simultaneously:

(a) a high level of external radiation

(b) a release of radioactive contamination, particularly as fine dust in the atmosphere.

The first, (a), would affect only a small area except under extreme conditions. The most likely hazard arises from the second possibility of a spread of contamination. The chief hazard would arise from breathing in the radioactive dust or from getting radioactive matter in cuts or wounds.

III. Announcement and Termination of Emergency

1. Announcement of Emergency:

Any employee who finds any condition which he believes to be an emergency as defined above, shall report it immediately to his supervisor. The

supervisor, if he agrees that an emergency exists shall ensure that the siren is sounded and shall announce the location and nature of the emergency over the public address system.

If the supervisor is not present and immediate action seems necessary the person discovering the emergency shall take this action.

2. Termination of Emergency:

When it has been decided that the state of emergency should be terminated this should be announced over the public address system. If personnel have been sent to building 7, they should be notified.

IV. General Procedures Applicable to An Emergency Condition

1. The building 14 guard upon hearing the announcement of an emergency condition shall notify the Communication Center in building 7 (8:00 a.m. to 5:30 p.m. Telephone 411 - 5:30 p.m. to 8:00 a.m. Telephone 645). If the telephones are busy or unserviceable, he shall use the radio communication set.

The Security Manager or his delegate will act as co-ordinator at the Communication Center.

2. Upon receiving notice of an emergency condition in building 14, the guard at the Communication Center in building 7 shall notify the following in the order shown --

During the Day

(a) Fire Department	Ext.	333
(b) Security Manager	"	645
(c) General Offices (Transportation)	"	401-400
(d) Nurse in Building 7	"	511
(e) Health Physics Section, Building 7	"	365-347
(f) Office of Manager of Nuclear Power Department		387-388
(g) Plant Engineer		382-383

During holidays, week-ends, or between the hours of 4:30 P.M. and 8:00 A.M. daily, the following should be notified,

(a)	Fire Department	Ext. 333
(b)	Security Manager	Snow Shoe, EV 7-4495
(c)	Research Reactor Division Chief	State College, AD 7-7161
(d)	General Offices (Transportation)	Ext. 400
(e)	Research Reactor Health Physics Supvsr.	Clearfield 5-9536
(f)	Manager of Nuclear Power Dept.	Snow Shoe EV 7-6302
(g)	Health Physics Section Head	Bellefonte EL 5-3679
(h)	Plant Engineer	Clearfield 5-4787

Personnel as notified above will stop at the Communication Center in Building 7 prior to proceeding to building 14.

3. The fire department on receipt of notification, shall proceed to building 14 with all available firemen.

4. The nurse on receipt of notification shall proceed to the main lobby of bldg.7, carrying her emergency kit with her, and take any available transportation to bldg. 14 or the assembly point.

5. General Offices on receipt of notification shall immediately dispatch all available vehicles to building 7 to transport necessary personnel and equipment to the scene of the emergency. If plant transportation is not available, it will be necessary to use privately owned vehicles.
In addition, it shall be the responsibility of the General Offices Supervisor to dispatch the radio-equipped vehicle to building 14 as quickly as possible where it will be used as an outdoor control point.

6. The General Offices Supervisor and the Plant Engineer shall arrange to provide all available services under their control in order to best meet the emergency.

7. In addition to his duties delegated in Section VI the Head of Health Physics will ensure that personnel, equipped with appropriate radiation monitoring

instruments, proceed to the assembly point as defined in Section V where they will monitor all personnel arriving from the bldg. 14 area.

8. The Chief of the Research Reactor Division or his delegate shall direct the handling of the emergency at bldg. 14. In particular, he shall have collected immediately, the following information:

(a) Data on the number of injured or trapped persons in the emergency area.

(b) The results of an activity survey for radiation and contamination hazards.

(c) Condition of all building services, steam, water, etc.

9. Telephones or radio at the emergency site are not to be used during the time of the emergency except by persons delegated by the Chief of the Research Reactor Division. It is essential that this regulation be obeyed strictly in order that the Communication channels may be clear to facilitate handling of the emergency.

10. Supervisory personnal are responsible for the alerting of personnal under their jurisdiction who are working in areas in or around the reactor building in which the emergency signals cannot be heard.

V Special Procedures Applicable to An Emergency Condition

On the sounding of the siren and/or the announcement of an emergency condition over the P. A. System the following procedures shall become operative —

1. Concerning personnel not required to remain to combat the emergency —

(a) Such personnal shall don their respirators and shall leave the building at once, after locking up classified documents and taking elementary precautions to prevent fire and other similar damage. They shall proceed approximately 50 yards upwind of building 14 and await instructions.

(b) When notified by the Research Reactor Division Chief or his delegate, that their services are not required, they will take any available transportation and proceed to building 7.

(c) An assembly point, designated by the Communication Center co-ordinator,

will be set up beyond the hazard area where outgoing vehicles will be held until such time as complete monitoring of the people leaving the area can be arranged. All incoming vehicles, except those necessary to combat the emergency, will be stopped and not allowed to proceed to the bldg. 14 area.

2. The following personnel, equipped with respirators, shall remain at building 14 to combat the emergency unless otherwise instructed:
   (a) The Research Reactor Division Chief.
   (b) The Supervisor and all Operational Staff of the section where the emergency occurred.
   (c) The Reactor Health Physicist and all Radiation Surveyors on duty.
   (d) The building 14 guard.
   (e) The maintenance Supervisor
   (f) Any other staff whose absence would create another hazard.
3. All personnel remaining at the scene of the emergency shall wear respirators previously issued until notified by Health Physics that this is no longer necessary. Personnel who for any reason have not a respirator or who find their respirator is not functioning properly, will obtain a replacement from Health Physics.
4. If an emergency exists at a time when a change of shift is scheduled, the new shift may not be allowed to proceed to the reactor building, but should remain available at building 7 until directed by the Communication Center co-ordinator to proceed to building 14.
5. It shall be the responsibility of the Chief of the Reactor Research Division, in consultation with Health Physics, to determine when the emergency no longer exists and to advise the Communication Center co-ordinator who shall arrange to terminate the emergency. Any special precautions regarding the existence of residual contamination shall be issued by Health Physics before personnel are allowed to return to the areas so affected.

Procedures for Notifying Surrounding Communities of an Impending Radiation Hazard.

Although very elaborate control instrumentation and safety interlocks have been installed in the reactor system, it is always possible, although most highly improbable, that an emergency could arise whereby a portion of the reactor core could become atomized. In such an occurrence a cloud of fission products could form which might drift across the countryside towards an area of habitation. Dispersion of the cloud with the atmosphere is dependent on weather conditions at the time of the accident.

If such a situation occurs it is the responsibility of the Head of Health Physics to collect the following data immediately and to ensure that the required action is carried out:

1. From information available such as direction of travel of the cloud, weather conditions and an estimate of the amount of fuel atomized, to decide if it will be necessary to advise any of the surrounding communities such as Earthaus, Driftwood, Sinnemahoning and etc., of an impending radiation hazard.
2. If from the data collected, a hazard to any community cannot be ruled out he will advise the Industrial Relations Manager of the Research Division giving him all necessary information. The Industrial Relations Manager will in turn notify the community which might be affected, advising them if they should:
   (a) Vacate the community and in which direction, or
   (b) Proceed or remain indoors with all windows and doors closed until notified that the emergency is terminated.
3. The radiation monitoring trailer shall proceed to the community nearest to the passage of the cloud, take radiation readings and continuously sample the air to determine the exposure, if any, to the general populace.

4. Following dispersion of the cloud the amount and location of fallout shall be determined and adequate action taken to prevent exposure of personnel to this fallout. Particular attention shall be paid to water supplies, grazing lands and any area inhabited by humans.

II. Emergency Drills

Emergency drills will be held at least four times per year and at intervals of no longer than four months. The Research Reactor Division Chief shall be responsible for the initiation of such drills and supervisory staff are to ensure that all their personnel participate.

Prior notice of an emergency drill may or may not be given.

EMERGENCY PROCEDURES FOR THE REACTOR BAY

The following emergency procedures are in addition to those laid down in "General Emergency Procedures for the Research Reactor Site."

Purpose.

These procedures are devised to outline the general course of action which should be followed in case of an emergency as defined in "General Emergency Procedures for the Reactor Site." It should be recognised that it is impossible to define every emergency which could possibly occur and to lay down counteractive action for each set of circumstances. These regulations should therefore be considered as a guide and the definitive action to be taken may be changed to suit the peculiarities of the particular emergency.

Emergency Procedures

(a) High Radiation Level due to unknown cause, failure of reactor control instrumentation or reactor runaway.

Action to be taken

1. Scram reactor
2. Ascertain if hazard has ceased.
3. If not, sound emergency siren and evacuate the area.
4. Announce the emergency over the P. A. System.

(b) Minor Spills involving no hazard to personnel

Action to be taken

1. Immediately notify all persons in the room.
2. Refuse access to the area by personnel not required to deal with the spill.
3. Confine the spill immediately.
4. Notify Health Physics.

   Dry Spills: Don protective gloves.

   Dampen thoroughly, but do not spread.

   Liquid Spills: Don protective gloves.

   Drop rags or absorbent paper on the spill.

5. See that the spill is decontaminated.

6. Monitor all personnel involved.

7. Permit no person to resume work in the area until a survey is made and approval of Health Physics is obtained.

(c) Major spills involving hazard to personnel

Action to be taken

1. Notify all persons not involved in the spill to vacate the room immediately via the change room.

2. Put on respirators.

3. If the spill is on the skin, flush thoroughly.

4. If the spill is on the clothing, discard clothing at once.

5. Vacate the room via the change room discarding footwear at the exit door or at outer edge of contaminated area. Do not walk about once you are outside the area of influence of the spill.

6. Notify Health Physics immediately and wait to be monitored.

7. Take immediate action to decontaminate personnel.

8. Decontaminate the area using adequate protective measures.

9. Monitor all persons involved in the spill and cleaning after they have washed and showered.

10. Permit no person to resume work in the area until a survey is made and approval of Health Physics is obtained.

(d) Accidents Involving Radioactive Atmosphere Contamination

Action to be taken

1. Notify all other persons to vacate the room immediately, via the change room.

2. Hold breath or don respirator and take corrective measures if time permits, then vacate the room via the change room.

3. Notify Health Physics immediately.

4. Lock post or guard the doors to prevent entry.

5. Evaluate hazard and required safety devices for re-entry.

6. Determine cause of contamination and rectify.
7. Decontaminate the area.
8. See that air survey is made before work is resumed.
9. Notify Health Physics of known or suspected inhalations of radioactive materials.

(e) Injuries to personnel involving radiation hazard

Action to be taken

1. Wash minor wounds under running water immediately while spreading the edge of the wound.
2. Give a complete report to Health Physics as soon as possible.
3. If advised by Health Physics, call a physician qualified to treat radiation injuries.
4. Permit no person involved in a radiation injury to return to work without prior approval by the physician and Health Physics.

(f) Fires or other major emergencies

Action to be taken

1. Sound the fire alarm.
2. Deal with the fire if there is no radiation hazard.
3. Notify fire department.
4. Notify Health Physics.
5. Govern action by the restrictions of Health Physics.
6. Following the emergency, monitor the area and determine the protective devices necessary for safe decontamination.
7. Permit no person to resume work without approval of Health Physics.
8. Monitor all persons involved.

CURTISS-WRIGHT RADIOACTIVE MATERIALS LABORATORY (RML)
at QUEHANNA

Description and Operations Manual

I. General Description

A. Quehanna

The Quehanna site of the Curtiss-Wright Research Division is approximately a circular area of 10 miles diameter located in north-central Pennsylvania, 35 miles N W of State College. (see Fig. 1) The surrounding area has a low population density and a large portion consists of state forest lands. The main research buildings are located at the perimeter to the S E. A main road, controlled by Curtiss-Wright, runs from the main area to the center of the site and thence to the N W toward the village of Medix Run. A road runs from the main road at the site center S W to the R M L, which is 8 road miles from the main area.

B. The RML and Research Reactor (Building 14)

The Building 14 plot plan is shown in Figure 2. The entire plot is completely enclosed by an 8 foot high security fence topped with barbed wire. All truck gates are kept locked and can only be opened by the building guard, after checking with Health Physics. All exterior doors to Building 14 are kept locked at all times. The only exception is the main lobby door which is guarded 24 hours a day by an armed member of the security force.

The floor plan of Bldg. 14 (Fig. 3) shows that approximately one half of the building is devoted to the hot laboratory and one half to the reactor and supporting facilities. The reactor is of the swimming pool type and is currently rated at one megawatt power.

C. Hot Laboratory Facility.

The Main hot facilities consist of a bank of 5 hot cells and a subcell. Cells 1, 2 and 3 have three foot thick walls of ferro-phosphorous concrete of density 4.7. Cells 4 and 5 and the walls between all cells are two foot thick. The high level cells have 1 1/2 foot steel doors and the low level cells have 1 foot steel doors. Viewing is by means of lead glass windows and a periscope.

The cells are lined with steel and coated with Amercoat paint to facilitate decontamination.

In-cell manipulation is accomplished by five (5) pairs of Argonne Model 8 Master-Slave manipulators and a General Mills Mechanical Arm.

There is a low level Radio-Chemistry laboratory for work at the curie level or less. Other supporting facilities include an Engineering Lab, dark room, cask storage room, a fifteen foot deep pool, a dry sample storage facility and a decontamination room. A more complete description of the laboratory is given in CWR 474.

II. Administration

A. The RML and Research Reactor are under the administration of the Research Reactor Division. This is a sub-division of the Nuclear Power Department of the Curtiss-Wright Research Division.

B. The RML is under the supervision of the Head of the Hot Laboratory Operations Section (HHLO), who reports to the Chief of the Research Reactor Division. The HHLO is responsible for the use and security of radioactive sources and for radiation safety in the RML. He is advised in this latter duty by the Health Physics section (HP) of the Nuclear Power Department.

C. The HHLO has the authority to issue or change operating instructions in the RML.

D. The HHLO designates an acting HHLO during an absence from the laboratory.

E. All programs at Research Division, Curtiss-Wright Corporation, involving the use of by product material, including those conducted at the RML, are reviewed by the Radiation Safety Committee (Isotopes Committee). The approval of this committee must be obtained before the byproduct material is procured.

In those cases in which the AEC Byproduct Material License specifies no individual user, the designation of individual user shall be made by the Radiation Safety Committee. Generally, if the work is to be done at the RML, the individual user will be the HHLO. In some instances, a qualified person other than the HHLO may be designated the individual user. All individual users of byproduct material utilizing hot laboratory facilities do so under the direction of the HHLO and must comply with the operating instructions issued by him.

III. Operations

A. Personnel Instruction

1. All regular members of the RML Staff will familiarize themselves with the rules governing all areas they enter and with the Health Physics Manual CWR-462. The basic rules of radiation safety are the subject of periodic lectures by HP and attendance is required.

2. All other workers will be governed by instructions issued in the Hazard Area Work Permit (see CWR 462).

3. All visitors must be escorted by a member of the RML staff.

4. All personnel at Building 14 and all visitors to hot areas will be issued and must wear film badge dosimeters. In addition, entrance into areas marked "high radiation area" requires the wearing of two pocket ionization chamber dosimeters.

5. Protective clothing shall be worn in all areas when posted as required in CWR 462.

B. Clean Areas

It is expected that the Operations Area, Engineering Laboratory, dark room and half of the change room can be maintained as a clean area. The presence of active material in these areas must be restricted as far as possible. Any person entering a clean area from a contaminated one must come through the change room and monitor himself and his equipment.

C. Contaminated Areas

It is expected that the Service Area and rooms opening off it (with the exception of the Reactor Bay) can be contaminated. Therefore access to the Service Area is restricted.

1. Entrance to the Service Area is normally by way of the change room only.

2. The following additional entrances to the Service Area are kept locked under normal operation and the keys kept in the possession of the H&LO. His approval is required for opening these doors.

a. Pedestrian door to the Reactor Bay.
b. Overhead door to the Reactor Bay.
c. Pedestrian door to the outside.
d. Overhead door to the outside.
e. Door to Operations Area.
f. Door from equipment room located over the change room to the roof of the hot cells.

D. Hot Cells.

1. All hot cell doors including the sub-cell under Cell No. 1 will be locked when they contain active materials. There shall be two locks on the doors such that both locks must be opened before the doors may be opened. The key to one lock is held by the H&LO and the key to the other by HP.

2. When cell doors are opened HP will conduct a survey before entry is attempted.

3. The Cell Roofs may be removed only with the approval of the H&LO and the presence of a HP surveyor.

4. Inasmuch as the roof of the cells are undershielded access to the roof is restricted. The door from the equipment room to the roof is kept locked. A ladder located behind isolation room No. 5 has a warning posted and required the presence of a HP surveyor before use.

5. There is a transfer drawer at the operating face of Cell No. 1, illustrated in Figure 18 of CWR 474, intended for the introduction of cold material into the cell. The lead shield on either end of the drawer is 8 inches thick. In operation at least one section of shielding remains in the wall and stops prevent overshoot.

6. Intercell transfer ports. The existing transfer drawers similar to the one above are to be replaced with hinged doors on either side of the port. These doors will automatically latch when closed. They are to remain closed except during an actual transfer.

7. Cells 1, 2 and 3 have transfer ports at the rear wall. ~~A special transfer ports at the rear wall.~~ A special transfer cask described in CWR 474, p. 49 is required for sample entry or removal.

8. Access ports on the operating face of the cell (Fig. 19 CWR 474) will generally not be removed when active material is in the cell. When active material is in the cell, the plug may be removed only with a HP surveyor present. If plugs are left out the cell wall will be posted with a warning sign and the port surveyed periodically by HP. There is a radiation monitor in constant operation in the operations area as well as in the service area.

9. Floor plugs in Cell No. 1 leading to Sub-Cell No. 1 may be removed to permit use of tall equipment. This can be done only when no sources are in the cell and entry is possible since there is no remote manipulation in the cell capable of removing the blocks.

D. Source Storage

1. Sources not in use in the hot cells must be stored so as not to constitute a radiation hazard. The following storage areas are available.

a. The cask storage room. A number of lead shielding containers with walls ranging up to 10 inches thick are available here. Unsealed sources must be packaged so as not to contaminate these containers.

b. Dry sample storage facility (described in CMR 474, p. 49). The shielding plug is one foot of ordinary concrete.

c. Storage Pool (described in CMR 474 p. 51). Storage in this pool will be on a temporary basis to permit the pool to be used in source transfer and irradiations. All source containers will be loaded so that they will not float in water.

d. Storage Pit in Cell No. 2. This pit, 28 inches deep, is capped by a lead plug 3 inches thick. This is meant for storage of sources that will be used in the cells. All transfers must be made with cell doors locked.

E. Source Transfer.

1. Sources may be brought into the cell in two ways:

(a) The storage container may be taken directly into Cell No. 2 where the Mechanical Arm can remove the lid and remove the source. The source may be used here or passed to other cells by the intercell transfer ports.

(b) The special transfer cask mentioned in IV D7 above may introduce the sample into the cell. Usually the source will previously have been transferred to this cask underwater from another cask.

2. Sources may be transferred from one container to another either in the pool or in Cell No. 2.

3. Low level sources that may be handled in the open with tongs for short periods may be transferred from a shielded container to the dry sample storage facility. This operation requires the presence of a HP surveyor.

F. Radiation Surveys.

The RML is equipped with continuous recording air monitors and with direct radiation monitors with alarms. The HP section conducts routine surveys of the entire area daily. Additional surveys are made when hot cell doors are opened, sources are transferred, accidents involving spills or whenever requested by an operating group.

G. Records

1. All sources are logged and surveyed by HP on receipt. Their location at all times is recorded up to and including disposal.

2. All cell utilization time is logged.

3. All pool irradiation time is logged.

IV. Emergency Procedures.

A. General Emergencies Procedures for the Building 11 area are attached to this report.

B. The following additional regulations apply to the Hot Laboratory Area.

1. Minor Spills Involving No Hazard to Personnel

a. Immediately notify all persons in the room.
b. Refuse access to the area by personnel not required to deal with the spill
c. Confine the spill immediately.
d. Notify Health Physics.
Liquid Spills: Don Protective gloves
Drop rags or absorbent paper on the spill
Dry Spills: Don Protective gloves
Dampen thoroughly, but do not spread.
e. See that the spill is decontaminated.
f. Monitor all personnel involved.
g. Permit no person to resume work in the area until a survey is made and approval of Health Physics is obtained.

2. Major Spills Involving Hazard to Personnel
a. Notify all persons not invovled in the spill to vacate the room immediately.
b. If the spill is on the skin, flush thoroughly.
c. If the spill is on the clothing, discard clothing at once.
d. Vacate the room discarding footwear at the exit door or at outer edge of contaminated area. Do not walk about once you are outside the area of influence of the spill.
e. Notify Health Physics immediately and wait to be monitored.
f. Take immediate action to decontaminate personnel.
g. Decontaminate the area using adequate protective measures.
h. Monitor all persons invdved in the spill and cleaning after they have washed and showered.
i. Permit no person to resume work in the area until a survey is made and approval of Health Physics is obtained.

3. Accidents Involving Radioactive Atmosphere Contamination
a. Notify all other persons to vacate the room immediately.
b. Hold breath and take corrective measures if time permits, then vacate the room.
c. Notify Health Physics immediately.
d. Lock, post or guard the door to prevent entry.
e. Evaluate hazard and required safety devices for re-entry.
f. Determine cause of contamination and rectify.
g. Decontaminate the area.
h. See that air survey is made before work is resumed.
i. Notify Health Physics of known or suspected inhalations of radioactive materials.

4. Injuries to Personnel Involving Radiation Hazard
a. Wash minor wounds under running water immediately while spreading the edge of the wound.

b. Give a complete report of Health Physics as soon as possible.

c. If advised by Health Physics, call a physician qualified to treat radiation injuries.

d. Permit no person involved in a radiation injury to return to work without prior approval by the physician and Health Physics.

C. At the termination of an emergency a written report of length and detail appropriate to the magnitude of the emergency will be submitted by the group concerned and by HP to the HHLO. The HHLO will then prepare a report of the incident and possible corrective actions and submit it to the Chief of the Research Reactor Division, the Isotopes Committee and HP.

Specific Information Regarding the Handling
and use of the 16KC CO-60 Sources at the HML

I. Source Storage

It is expected that the approximately 14,000 CO-60 slugs will arrive in two (2) shielded containers. The sources may be transferred from this container in one of the following ways.

A. Under water in the pool to a Curtiss-Wright storage cask or transfer cask.

B. Directly to the storage Pit in Cell 2.

II. Source Security

A. The Curtiss-Wright storage Casks are fitted with padlocks. The key is in possession of the HHLO.

B. All pool handling tools are locked and the key is in possession of HHLO.

C. The key to the General Mills Mechanical Arm, necessary to remove the lid from the Cell No. 2 storage pit is in the possession of the HHLO when the cell is not in use.

III. Source Handling.

A. The sources when brought into the cell will be assayed and leak tested. They will then be placed in marked stainless steel tubes as shown in the accompanying sketch. When each tube is filled, it will be sealed to prevent spilling the individual slugs. A record will be kept of the activity of each tube.

B. The tubes will be assembled in the grid plate shown in the sketch in a suitable configuration for the irradiation contemplated.

C. Irradiations will take place either in the hot cells or in the pool.

D. It is not anticipated that the individual slugs once canned will be removed. The number of tubes used in any irradiation may vary.

IV. Responsibility for Control

A. The Head of the Hot Laboratory Operations Section, M. J. Abbate, is the individual user of the 16KC CO-60 source.

B. Operating instructions are issued or revised by M. J. Abbate. This applies to instructions governing use of the HML in general, and the 16 KC Co-60 source in particular.

C. The Health Physics Supervisor at the HML is M. T. Beam. He will be consulted on all phases of operations involving the 16KC of CO-60 and will retain possession of one of the sets of keys required to enter the hot cells. In addition to Beam, there is a Health Physics surveyor on full time duty at the HML. They are backed up by an additional HP staff of four with laboratory space in the main research building.

D. The attached memo from B. J. Metzger, Manager, Nuclear Power Department to all Nuclear Power Department personnel dated March 3, 1958, lists the individuals who administer the Curtiss-Wright nuclear safety programs at Quehanna.

Licensee: The Atlantic Refining Co.

Research & Development Dept.

2700 Passyunk Avenue
Philadelphia, Penna.

INFORMATION ON DISPOSAL OF RADIOACTIVE WASTES AT SEA

1. Locations and Depths of Disposals:

a. Location (Degrees And Minutes of Latitude and Longitude) 38° 30' N and 72° 45' W

b. Distance From Coast 180 miles

c. Depth at Disposal Locations 1700 fathoms

*This location accurate with a radius of 10 miles

2. Method of Packaging (Indicate Whether Concrete Bulk Package, Steel Drum Filled With Reinforced Concrete and Capped; Etc. Annotated Sketches Will Be Helpful)

55 gallon steel drum filled with concrete and capped.

3. Number of Packages of Radioactive Wastes Dumped Since September 30, 1955 3

4. Activity And Isotopes Per Package Dumped Since September 30, 1955

April '57	28 mc	Fe^{55}, Fe^{59}, Co^{60}
May '56	33 mc	Fe^{55}, Fe^{59}, Co^{60}
Nov. '55	76 mc	Fe^{55}, Fe^{59}, Co^{60}

A/24

5. Total Quantities of Material Dumped (Gross Curie Content) Since September 30, 1955

197 millicuries

6. An Estimate of the Quantities and Types (by Radioisotopes) Of Radioactive Wastes Which You Anticipate Will Be Disposed By Your Disposal Program In The Next 5 Years

Almost impossible to forecast accurately because of the sporadic nature of research efforts employing isot[illegible]es

50 - 250 mc of Sb^{125}, Co^{60}, Fe^{55}, Fe^{59}

Date November 11, 1957 Signed Hugh R. Jackson

Hugh R. Jackson

intra

CURTISS-WRIGHT CORPORATION
NUCLEONICS DIVISION
Inter-Office Memorandum

To: All Nuclear Power Department Personnel
Department Heads) Research Division
Division Chiefs)

From: D. J. Menger

Date: March 3, 1958

Subject: Appointment of Individuals to Administer Nuclear Safety Programs

cc: Messrs. R. Campbell
R. D. Harris
[illegible]
[illegible]

In order to protect the health and safety of Curtiss-Wright employees, as well as the general public, it is necessary to carefully control the use of source, special nuclear and by-product materials. To insure adequate control of the use of these radioactive materials certain procedures have been set forth in the Health Physics Manual, CWR L-52 and the Hazards Evaluation Report, Curtiss-Wright Research Reactor, CWR L-00-2.

All Nuclear Power Department personnel are required to be familiar with and understand the contents of the Health Physics Manual. The Manual requires that all personnel desiring to utilize source, special nuclear or by-product material shall first obtain the consent of the Radiation Safety Committee (Isotopes Committee) or its delegate. This committee is chaired by the Health Physics Officer (Radiological Safety Officer). Actual procurement is handled by the Source Custodian in the case of by-product material and by the Accountability Officer in the case of SS material.

The following assignments are made or reconfirmed effective immediately:

Radiation Safety Committee (Isotopes Committee)
J. L. Donovan, Chairman
P. I. Amundson
D. T. Galm

Health Physics Officer (Radiological Safety Officer)
J. L. Donovan

Source Custodian
M. T. Beam

Accountability Officer
N. R. Wheelock

In addition to being familiar with the Health Physics Manual, all personnel utilizing any experimental facilities in Buildings 14 or 15 shall be familiar with and understand the applicable portions of CWR L-00-2. All reactor experiments must be approved by the Research Reactor Division Chief and the Reactor Operations Section Head. In addition, experiments worth more than 0.2% $\Delta k/k$ must be approved by the Curtiss-Wright Reactor Safeguards Committee. The composition of this committee shall be as follows:

To: Nuclear Power Dept. Personnel,
Dept. Heads) Research Div.
Division Chiefs)

Reactor Safeguards Committee
H. Reese, Jr., Chairman
H. T. Bean
P. R. Miller
R. A. Loos
W. J. Roberts

Your cooperation with these individuals and committees to ensure [illegible] order that we comply with existing Federal, State and Civil [illegible]. More important to each individual, however, is the fact that [illegible] will result in a much smoother, more efficient operation and [illegible] his own time.

D. J. Bregar
Manager
Nuclear Power Department

CJR/her