

PRNC072

PRNC - 72

PUERTO RICO NUCLEAR CENTER

Procedures for Operating CO? Gamma Pool

Irradiation Facility

Mayaguez

?OPERATED BY UNIVERSITY OF PUERTO RICO UNDER CONTRACT

NO. AT (40-1)-1833 FOR U. S. ATOMIC ENERGY COMMISSION

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AUTHORIZATION

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OPERATING PROCEDURES

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GAMMA POOL IRRADIATION FACILITY

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PROCEDURES FOR OPERATING ⁶⁰Co® Gama POOL,

IRRADIATION FACILITY

1. RESPoNsRbILITy

The Reactor Division is directly responsible for the safe opera

?ion and maintenance of the Gamma Pool Irradiation Facility.

cupervisor will appoint the assistant supervisor(s).

11, DESCRIPTION oF souRcE

(A) ROOM (Figure 1)

The PRNC cobalt-60 Gamma Pool Irradiation Facility (GPIF) is

housed in room 421A in the PRNC laboratory building in Mayaguez, This

oom has 2 double door to the rear corridor and one single door to laboratory room 108, The door to room 103 is secured with a breakable seal at all times. The room has a cabinet for storing accessory equipment and survey meters. It also has work tables and a water circulating system for the pool. Oxygen, nitrogen, and compressed air will be

Provided according to the needs of an experiment.

(8) POOL (Figure 2)

A pool 9' x 8' x 1416" deep, located in room 121, contains the

GoF using water as a shield. A dry well is adjacent to one end of the

pool

with an aluminum plate separating the two sides. Covers provide suitable scattered radiation protection on top of the dry well.

A well with a lead cover is located at the bottom of the pool,

A portable steel bridge across the top of the pool serves as

the base for the operator conducting irradiations

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pool. This platform has twelve <j! odessa

It also holds the hollow syliedes Yacsapar 5

A radiation monit=s 48 \$4

?The probe is attached to che

area where the irradiations are cundusted

(©) HOLLOW CYLINIER VARIABLE GEOMETRY IRRADLATOR

?The Co[®]0 is contained ar twelve pensi2

?taining approximately 200 curses. the sspsu!

Hollow Cylinder Variable Geometzy frost

ie renotely and contin

ay adgusmab:

5 inches to 19 1/2 inches in duenerer A spsme

by using 3, 6 or 12 capeuies

(D) SAMPLE HOLDERS

Samples to be irradiated may be p42

which can be lowered by means of » 5y

wire or rod will be provided with 4 27

being removed it will reach a

Container caps may be fitted with conne

the desired atmosphere.

TET, AUTHORIZED PERSONNEL AND RESPONS

(A) SUPERVISOR:

1. The supervisor is respons

bie

a. the facility

b, training assistacr superv.2

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keys for CPIF

4. changing geometry of variable geometry irradiator

@, seeing that procedures are fully complied with!

scheduling use of GPIF

ing to Health Physics the personnel to

be assistant supervisors

(B) ASSISTANT SUPERVISOR

1. The assistant supervisor is responsible for items c,

4, ey and £ under supervisor.

(c) PERSONNEL USING FACILITY:

1, Personnel using the facility are responsible for

a. filing form 663 with Health Physics

b. making appointment to use facility

c. providing materials placed in pool 49 not
contaminate facility

4, placing and removing materials to be irradiated

1. source

LOADING AND UNLOADING PROCEDURE

(A) STORAGE CONDITIONS.

At time

Lt may be necessary to unload the variable geometry

irradiator for maintenance of the irradiator mechanism, to attach or

remove auxiliary equipment on or around the irradiator, or to drain

and clean the pool.

The capsules will be stored in individual cylinders in the

underwater platform when it becomes necessary to remove the irradiator

mechanism, or they will be stored in the lead shield provided in the

bottom of the pool when drainage of water is necessary. Normally, the

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the capsules will be kept in position in the irradiator

The grapples and irradiator geometry adjusting tool will be kept

locked in their special holders.

(3) LOADING AND UNLOADING SOURCE

There will always be two persons from the Reactor Division

Involved in loading and unloading the VGI; one supervisor or assistant

supervisor and a regular operator. The supervisor in charge is respon

sible for 8

ng that the following steps are carried out

4. Lock entrance door

2. Unlock grapplers and secure portable survey meter.

8. Supervisor check and assure proper function of radiation monitor and alarm, using low level gamma source. Check survey meter.

4, Make an inventory of capsules (a portion may be in the

irradiator and the remainder must be in their individual

storage cylinders)

The reactor operator aiding in the unloa:

ing and loading

operation will remain on one side of the pool with a portable survey meter to check for radiation during the

rest of the procedure

Using grappler, remove Co⁶⁰ capsules one by one from

Vet and place in storage cylinders

7. Have the vid check and confirm the fact that the VGI

is unloaded.

Remove VGI from pool and perform the necessary work on it.

Return Vol to underwater plat

40. Using grappler, replace CoO capsules in VG one by one.

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(©) caters ver cEonetey

Vor geometry may be changed only by the supervisor or assistant supervisor using the following procedure

4, Unlock geometry adjusting tool.

1 desired radius

2. Insert tool in rotating gear and turn until

is indicated by position indicator

3. Remove and lock tool in its holder.

TYPICAL IRRADIATION PROCEDURE

The supervisor or assistant supervisor in charge will be responsible

for the irradiation operation. The person (or his designated

representative) requesting the use of the facility will insert the samples

into the irradiator and remove them from the irradiator

The following precautions will be observed by the supervisor

or assistant supervisor in charge

1. Supervisor check and assure proper function of radiation

monitor and alarm, using 2

level gamma source, Check survey meter.

2, Make sure that samples to be irradiated are properly p.

a,

packed or sealed so that pool water is not contaminated.

3. If gas under pressure is to be used in a container make sure

fall connections are tight and proper pressure is maintained.

4, Make sure that the stop on the lowering line, wire or red

is properly latched under the c.

on the bridge

5. Observe insertion of sample into irradiator to insure that capsules and irradiator mechanisms are not damaged or that setting is

not altered.

After irradiation is completed, observe removal of sample

while at the same time monitoring with survey netes.

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7. While the sample is kept under five feet of water after catching on the stop, visually check irradiator and sample to insure that all capsules are in proper place

8. Record irradiation in log book.

VI. SAFETY PROVISIONS IN CASE OF UTILITIES FAILURE OR MALFUNCTION

(a) WATER Loss

Water may be lost from the pool in three ways: (1) evaporation

(2) pumping (3) earthquake cracking the walls. Evaporation loss will be compensated by the water supply line with a float valve that opens when the water level drops one inch. All permanent connections to and from the pump are not more than one foot below the normal level of the waters therefore, it is impossible to drain the pool below that level

only in the event that the pool is to be deliberately drained

will a temporary connection be used so that water may be completely

pumped out. This connection

to be removed after refilling pool.

If an earthquake of sufficient magnitude to crack the reinforced concrete walls should occur, resulting in a loss of water, the area would be vacated. Health Physics would be notified and necessary remedial action taken. As an example, the source might be covered with sand or dirt to provide temporary shielding. Specific remedies will depend on circumstances.

(8) Power FAILURE

The operation of the GPIF is entirely manual with the exception of the alarm systems and lights. A battery-operated portable light is

available. In the event of elec?

In the event of power failure, all experiments will be stopped and the GPIF put in stand-by (storage) condition. Following the previously outlined procedure.

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There are various events in which a capsule incident is conceivable.

4. Drop

TE a capsule is dropped it would always fall to the bottom of the pool or to the platform or other object above the bottom. Whenever a drop occurs, the capsule will not present a radiation hazard. The capsule

is to be picked up with the grapple and returned to its place

2. Jamming in VOI

The capsule

are not forced into place so any jamming should be of a minor degree, although if this incident occurs, a Health Physicist will be called before proceeding further

The VOI is made of aluminum and a capsule could become wedged in it. If this does occur, all other capsules will be removed from the VOI. The capsule will be pulled up with the VGI held in place until the cones are loose. A sudden release of the capsule cannot produce a radiation hazard because it can be lifted over four feet before abnormal radiation

levels can be detected at the surface.

9. Accidental Catching With Experiment

one or more capsules may accidentally hook or otherwise catch

on a sample container and be pulled out of the VGI while the sample is

being removed

The nylon line, wire or rod used to lower and raise samples

into and from the irradiator will be provided with a stop. Prior to an

irradiation the nylon line, wire or rod will be engaged in the catch on

the bridge so that when the sample is removed from the irradiator it will

remain under at least five feet of water

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At this time the supervisor in charge will inspect both irra

diator and samples. If a capsule has been

identally raised,? will be

Gislodged from the sample and loved to its proper position.

4. In case of malfunction the Health Physics Division should be

notified,

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GAMMA POOL CROSS SECTION

figure 2

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