PRNC199

PRNC-199

PUERTO RICO NUCLEAR CENTER

HEALTH AND SAFETY REGULATIONS MANUAL

Health and safety Division

Sune 30, 2976

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PUERTO RICO NUCLEAR CENTER

HEALTH AND SAPETY REGULATIONS MANUAL

Health and Safety Division

June 30, 1976

Operated by University of Puerto Rico under Contract

No. E (40-1)-1833 for

Energy Research and Development Administration

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AUTHORIZATION

?THE REVISED HEALTH AND SAFETY REGULATIONS MANUAL (PRNC-199)

FOR THE PUERTO RICO NUCLEAR CENTER

IS HEREBY APPROVED AND MADE OPERATIVE AS OF JUNE 30, 1976.

?THIS EDITION SUPERSEDES

RADIATION SAFETY REGULATIONS (PRNC-172) DATED OCTOBER 1973.

dd

ISMAEL ALMODOVAR

Director

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5 seen Be emee es eee ee

Goch: pe Bee See

UMC usgiccbgugchy

Sgt geil ae babel hg

PCCM HES Ee Ee

gudegs sehad2 23828 3828822. 868828828

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CONTROL OF RADIATION SOURCES. . . .

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INTRODUCTION

?The Puerto Rico Nuclear Center is authorized by the Energy

Research and Development Administration to produce, procure,

and use radioactive nuclides, and to operate certain sourc

of high energy radiation. The validity of this authorization

is contingent upon the existence of a radiation safety org:

?This document is

nization and certain advisory groups

designed to

ablish guidelines for the effective function-

ing of the various groups concerned with radiation and indus-

trial safety within PRNC, However, it must be remembered

that Safety is Everyone's Busine:

ence of any potential hazard is of concern to every PRNC

The exist-

at ALL Zines.

employee who should take appropriate action whether or not

he has a directly assigned responsibility in the safety

Program,

RESPONSIBILITIES

Director PRNC

1, Has the ultimate responsibility and authority for all

activitii

including those of health and safety. Tt

is recognized that safety ie a line responsibility and

?that independent review of that responsibility is

mandatory, and in this respect, the Director will

obtain competent advice. The Director will tesue

regulations governing the use of radiation and other

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hazardous agents within areas controlled by the PRNC.

He will supervise the enforcement of these regulations

and will personally determine the need and extent
of any @isciplinary action.

Shall establish, implement, and maintain an internal
review systen for Reactor facilities that complies
with the requirements of ERDA IAD~8401-7, This review
system shall be implenented by the Technical Committee.
?The system shall be reviewed by management for adequacy
of performance every three years or more often as
required.

Shall establish, implement, and maintain an initial
training and qualification program as well as a
retraining and requalification program for Reactor
operators and Reactor supervisors, that complies

with the requirements of ERDA Appendix 8401 and

ERDA IAD-8401-6. The Head, Nuclear Engineering

Division has been appointed as examiner. the Director

shall be the Certifying office

Shall maintain an up-to-date Quality Assurance

Program for the operation of the Reactors and shall

Prepare Quality Assurance Plans for any modifications

to, oF eventual decommissioning of the Reactors.

Shall maintain, through the Head of the Reactor Division,

a training program for Reactor maintenance personnel

that complies with the requirements of the Nuclear

---Page Break---

Reactor Safety contract claui

6. Shall establish and maintain a plan for the inspection

of the physical plant at least annually,

Associate Director

1, Represents the Director in all matters concerning Mayaguez operations. He is responsible for general managenent and assures safe operations at the

Mayaguez site,

C. Head, Health and Safety Division

1, Represents the Director in all natters relating to safety. Proposes regulations regarding safety and 4s responsible for implementing all PRNC safety regulations and applicable ERDA and Connonwealth radiation safety regulations. 1s a menber of the Safety Advisory Committee, the Technical Committee

and the Human Applications Committee.

IIT. COMMITTEES AND SUBCOMMITTEES

A, ?Technical Connittee

Charter

Scope: To assure that Reactor and Accelerator

operations (including experiments) are conducted in

@ safe manner, and to consider any other matter

assigned by the Director.

Chatrman: ?The Chairman shall be appointed by the

Dixector and shall be an individual who does not

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have a line responsibility for Reactor operations.

?The Chairman shall chair the meetings of the Conmittee

and enter into the discussions, but shall not vote

fon any issue before the Committee except in the cas
of a tie vote.

Secretary: The Secretary of the Committee is appointed
by the Chairman and does not need to be a menber of

the Comittee.

Membership: Membership 1s selected from different
disciplines pertinent to reactor safety. The Chairman,
with the approval of the Director, chooses the menbers
of the Technical Committee which should include the
following

Ex officio member: The Health and Safety Division

Head or representative,

b. Members:

1) A physicist

2) A chemist

3) A nuclear engineer

4) A mechanical engineer

5) An environmental scientist

Requirements: Each member shall be competent in his

field and shall have a keen interest in the business

of the Committee,

term:

a, A new chairman shall be appointed every two years.

b. ?Two new members shall be appointed each year

replacing the two menbere with the longest tenure.

?

---Page Break---

Duties

The Director may extend the term of the chairman

or the members at his option.

Review and evaluate all new experinents which will utilize a reactor or accelerator irradiation facility. ?This review must cover the areas of safety and related technical and operational soundness.

Review all previously approved experiments still in progress, at least once a year,

Provide technical assistance to the Reactor

Division Head whenever requested to do so.
Review safety documentation or changes to the @ocunentation including safety analysis reports, technical specifications, operating, administrative and maintenance procedures, quality assurance

Plans as well as proposed modifications to reactor equipment and instrumentation for reactor,

accelerator and radiation facilities with sources

above 1,000 curs

Review operating incidents, including any operations
beyond the authorized limits as set forth in the
Technical Specifications.

Carry out a formal PRNC Reactor Audit at least

once a y

Fas required by ERDA~IAD-8401-7. This
shall be performed by the PRNC Reactor Audit Group
appointed by the Technical Committee.

Review other safety matters as requested by

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10.

n.

the Director.

Quorum: A quorum shall consist of more than half of the members of the Conmittee,

Requirements for Holding Meetings: The Committee shall meet no less than once every six months. The Chairman shall call a meeting at his discretion or upon the recommendation of the Director, the Head

of the Health and Safety Division or the Head of the Reactor Division. The meetings are restricted to the secretary ané members of the Committee. However, when necessary, the Reactor Divieion Head or other persons designated by the Committee or the Chairman nay be invited.

Rules: The meetings will be conducted according to

the Robert's Rules of order.

Note: Formality should not be allowed to overwhelm

the meetings and inhibit free and frank discussions.

sch will be maintained.

An atmosphere of freedom of ¢}

Reporting: The reviewed written reports, PRNC Reactor

Audit Group reports and the minutes of the Committee

shall be submitted to the Director.

Reactor Audit Group

charter

Le

Scope: The Reactor Audit Group is a subcommittee of

the Technical Committee. The members shall be elected

by the Technical Committee, with eligibility not

---Page Break---

2.

Limited to members of the Technical Committ

Reactor Audit Group shall appraise annually the

following items for the TRIGA and the L~77 reactors:

a. Technical specifications

b. Operating Procedures

©. Reactor Operator Training Program

4, Maintenance

fe. Monthly Reports of Reactor Operations

f. Prints and Drawings of Facility

g. Housekeeping

h, Security ané Visitor Control

4, Incident Reporting

3+ General Organization

x. Any other

fety related matter deened appropriate

Chairman: The senior member of the Reactor Audit

Group shall be the Chairman.

Membership:

2, The Audit Group shall consist of three members,

with membership limited to three consecutive

years. One menber shall be replaced each year.

b, Menters must have familiarity with nuclear reactors

and/or the pertinent regulations.

©. At least one member shall be a nuclear engineer.

@, One member may be elected from outside the

Puerto Rico Nuclear Center.

Reporting: A written report of the findings shall be

submitted to the Technical Committee, the report

shall be submitted within @ period of one month fron

---Page Break---

the time of the audit. the Technical Conmittee shall

review the report and forward it, together with

comments, to the Director.

Safety Advisory Committee

Charter

le

Scope: To advise the Director and to assure that all

operations besides those related to the Reactor

Division and the Accelerator facility are conducted

in a safe manner and to consider any other matter

assigned by the Director.

Chairman: Mayaguez operations - The Associate Director

Rfo Piedras operations ~ The Technical Assistant to

the Director

Secretary: The Secretary of the Committee is appointed

by the Chairman,

Membership: The SAC shall be composed of two branche:

Mayaguer operations and Rfo Piedras operations.

a. Mayaguez operations

1) Associate Director - chairman

2) Head, Health and safety pivision

3) Division Heads

4) Other persons as invited by the Chairman

Rfo Piedras operations:

2) Technical Assistant to the Director - chairman

2) Associate Director for Medical Prograns

3) Head, Health and safety Division

4) Division Heads

5) Other persons as invited by the Chairman

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Review regulations, procedures and reports in all

safety matters, such as, radiation protection,

industrial hygien

industrial safety and fire

protection.

. Review proposed location of radiation areas.

c. Receive, examine, discui

and make appropriate

recommendations on accident reports.

4. Investigate serious accidents or hazardous

situations.

6. Quorum: ?The Chairman shall decide whether there is

quorum.

7. Requirements for Holding Meetings: the Committee

shall meet as frequently as required but at least

once every six months.

8. Rules: The meetings will be conducted according to

the Robert's Rules of order.

9. Reporting: ?The reports and the minutes of the

Committee meetings shall be eubmitted to the Director.

Hunan Applications Committee

charter

1, Scope: The Human Applications Committee shall advise
the Director and the Associate Director for Medical
Programs on all clinical uses of radionuclides in
hunans,

2. Chaggman: The Associate Director for Medical Programs
shall be the chairman.

°

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3. Secretary: ?The Secretary of the Committee shall be

appointed by the Chairman,

Membership: Human Applications Committee membership

guidelines are as follow:

4, Associate Director for Medical Prograns ~ chairman

b, Head, Health and Safety Division - Ex officio menber

©. Naclear Medicine Specialist

4, Radiobiologist

@. Radtoecologist

£. Henatologist

5, Duties:

Review all proposals for the applications of

radionuclides to humans, including research and routine clinical proposals, and make appropriate recommendations to the Director.

Review regulations and procedures pertaining to human applications of radionuclides, and make appropriate recommendations to the Director.

©. Keep records of a11 Human Applications Conmittee activities,

6. Quorum: The Chairman will decide whether there is quorun,

Requirements for Holding Meetings: ?The Chairman shall call the meeting as frequently as required.

Rules: The meetings will be conducted according to the Robert's Rules of order,

9. Reporting: The reports and the minutes of the

Committee meetings shall be submitted to the Director.

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A, Health and Safety Division

?The Health and Safety Division has operational respon-

sibility for all matters of health and safety excest

those medical matters directly involving patient

treatment. ?The Head of the Health and Safety Division

shall have full authority to stop without consultation

any procedure deemed unsafe, The Health and Safety

Division is responsible for:

a

Radiation Protection:

DV) The general surveillance of all activities Pertaining to radiation safety including the acquisition, use and disposition of all radioactive materials and radiation sources.

2) Analyzing the operations involving radioactive materials or radiation sources with a view to

minimize the radiation exposur.

resulting

from their us

3) Reviewing for approval all requisitions for the Purchase of radioactive materials and radiation sources prior to the issuance of a purchase requisition,

4) Reviewing for approval all requests for the

use of Reactor and other irradiation facilities.

5) Receiving, delivering, shipping, storing, and

teposal of all radioactive materials.

an

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6) Furnishing consultation

rvices to personnel

?at all levels on all

pects of radiation

protection,

7) Maintaining and operating a personnel and area monitoring service suitable for the radiations being used or contemplated.

8) Maintaining a calibration facility for all survey instruments and monitoring devices.

9) Maintaining and operating a comprehensive environmental monitoring service for all

PRNC-controlled areas, with due consideration

to the needs for off-site monitoring.

10) Maintaining an inventory of all radioactive materials under PRNC control except source material.

11) Performing leak tests on all sealed sources under PRNC control.

12) Supervising decontamination procedures in

of accidents involving radioactive
contamination.

13) Notifying indiviguale and the proper
authorities whenever a radiation exposure
reaches reportable levels as prescribed by
regulations.

14) Organizing indoctrination courses for all
new PRNC personnel,

b. Industrial, Fire and Laboratory Safety:
1) Supervising the proper storage and use of all

a2

---Page Break---

2)

3)

4

3)

6)

n

8)

9)

10)

a)

12)

flanmable materials

Checking and maintaining the emergency Lanp

systen.

Enforcing the procedure of ?Safety Standard

for Compressed Gas Cylinders" (PRNC-175) .

Maintaining general safety procedures in

laboratories.

Enhancing the continuous practice of good

housekeeping as essential to the prevention of accidents.

Checking the operability of the safety showers and eye fountains.

Checking to make sure the exhaust hood systens are operating properly.

Enforcing the use of safety devices such as safety glasses, shoes, etc.

Collaborating in the safety training of the investigators and employees who are using biohazardous materials, and correcting work errors and defective conditions which could result in personnel injury and/or property damage.

Enforcing all regulations pertaining to the use and handling of biohazard agents

Reviewing all construction plans and inspecting construction work.

Performing regular inspections of research

field work.

13

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13) Assuring that all electrical equipment ts

properly grounded and is used ina safe

nanner.

14) Enforcing all other ERDA applicable occupa~

tional safety regulations.

15) Conduct seminars on safety related matters

as may be deemed appropriate.

|. Administration and Services Division

re

Administration and Services Division - Rfo Piedras

and Mayaguez, play an important role in the control
of radioactive and other hazardous materials entering
or leaving PRNC installations, The Administration

and Servict

shall:

a, Withhold processing of all requisitions, or other
Procurement documents relating to the acquisition
by PRNC of any radioactive materials and other
hazardous materials, by purchase, loan, transfer,
or gift, unless the acquisition te approved by
the Health and Safety Division.

b. Notify the Health and Safety Division of the
arrival of all radioactive materials that cone
under administrative cognizance, and deliver
these materials to the Health and Safety Division.

c. Notify the Health and Safety Division of pending

and actual arrivals for duty of new PRNC personnel,

and the interdivision transfer of personnel within

PRNC.

4. Notify the Health and Safety Division of

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separations from PRNG.

Individual Employes

i. Each euployee 4

9.

sponsible for:

Conducting himself with respect to radiation and other potentially hazardous agents in such a manner as to minimize his chances of undue radiation exposure or injury.

Wearing any prescribed monitoring devices such as film badges or pocket dosineters and leaving then after working hours on rack provided for that purpose.

Wearing clothing appropriate to the task being performed.

Wearing protective devices such

gloves,
coveralls, or respirators when such used is required.

Having hinself and his clothing surveyed for possible contamination before leaving an area where there is a possibility of contact with

radioactive material

Requesting that Health and Safety monitor ar:

where radioactive materials are being used.

Properly labeling hazardous materials and

equipment that have been used with them.

Keeping areas where hazardous materials are used

neat and clean.

Refraining from smoking, drinking, eating or

using cosmetics in any room or laboratory where

1s.

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x.

hazardous materials are used.

Making use of those techniques that will prevent a spill or other accident.

Never under any circumstance, pipetting any radioactive or potentially dangerous solution

by mouth,

?The custody of the radioactive materials in his possession. These materials shall not be loaned, given, or otherwise transferred without prior approval by the Health and Safety Division, Reporting promptly to the supervisor and the Health and Safety Division any accident.

Taking prompt action to prevent the spread of any released or spilled material.

Carrying out decontamination procedures under the direction of a competent authority.

Never under any circumstances, working with

hazardous solutions while having an exposed wound.

In the case of female personnel, reporting

pregnancy,

soon as it is confirmed, to the

supervisor and to the Health and Safety Division,

Prior to separation, leaving the working area

t condition.

in a clean, safe ané n

D. Supervisory Personnel

a

Supervisory personnel shall insure that individual

responsibilities are carried out by those under their

direction and shall further be responsible for:

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Adequate planning of procedures and supervision
to inaure safety to personnel and to property.
Whenever there may be an appreciable health hazard,
the Health and Safety Division shall be consulted
before proceeding.

Instructing those personnel for whon they are

ponaible in the techniques necessary to
maximize safety.

Making all new employees available for any
indoctrination course sponsored by the Health

and Safety Division.

Requesting the issuance of a film badge using

Form HPD 602 for all new employees one week before they start work, and notifying the Health and Safety Division within two weeks of any transfor or termination of employment.

Procuring, using and @isposing of radioactive or other hazardous materials in accordance with these regulations.

Guarding against the transfer of hazardous materials to unauthorized individuals.

Insuring that the Health and safety Division has been notified of any accident within his division oF project. An immediate oral report shall be nade, followed by a written report.

Assuring that all persons associated with their

Sivision or project, whether a PRNC employee or

a7

---Page Break---

not, are familiar with, and are complying with
this Health and Safety Regulations Manual.

Obtaining clearance from the Health and Safety

Division before any equipment that may be con~

taninated is

nt from a working area for
cleaning, repair, or modification, to surplus, or
to ultimate disposal.

4. Notifying the Health and Safety Division before
any service or maintenance work is done on
plumbing, ventilation, or other components in
any area where hazardous materials have been
used.

k. Obtaining approval from Health and Safety Division
for the procurenent of hazardous materials.

1, Prior to separation, leaving working areas in a

clean, safe and neat condition.

CONTROL OF RADIATION SOURCES

A, Acquisition of Radiation Source

?The following procedures are to be followed in the acquisition of any radioactive material or other source of ionizing radiation, In developing these procedures every attempt has been made to achieve simplicity while at the same time complying with all applicable regula~

tions and the requirements of general safety.

+ Radiation Producing Devic

Division shall be notified in advance of the intent

The Health and safety

to procure any radiation-producing device such as

1s

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an X-ray generator, high voltage accelerator, or sealed radioactive source, Notification shall consist of a menorandun describing the radiation output of the device, its proposed location, plans for operation, safety considerations and any other pertinent details. In some cases a catalog description or a purchase specification will suffice for the technical submission. Health and Safety will advise on the installation and operation at the proposed lecation. Installations and preliminary operation of any such device shall be carried out in coordination with the Health and Safety Division, The Health and Safety Division will be responsible for determining any hazards that may arise from use of the source, and will assist in developing operating procedures designed to minimize these

hazards.

Radioactive Materials from Outside PRNC: only those individuals who have been approved by the Health and Safety Division are permitted to acquire, by whatever means, radioactive materials from outeide of PRNC.

A request for procurement 1s initiated by submitting two copies of PRNC Form 660 to the Health and Safety Division, If the application is approved, Health and Safety will return one copy of Form 660 bearing an approval number, This nunber, valid for the current fiscal year, will authorize the procurement of the listed radionuclides in the amounts and for the use specified. If the proposed acquisition or

as

---Page Break---

use 1s unacceptable on safety grounds, the Health and Safety Division will consult promptly with the origin= ator to determine the modifications needed to satisty safety requirements. When an approved user desires to acquire radioactive material as specified on approved

Form 660, he will submit to the Health and safety Division, Form 661 in triplicate together with the standard PRNC purchase requisition form where appli~ cable. When the request is approved Health and Safety will:

2. Return one approved copy of PRNC 661 to the originator.

Note approval on the purchase requisition and on

one copy of PRNC 661 and forward it to the Administration and Services Division - Procurement

Office for proce:

ing. ?The Procurement office will not initiate procurement without this approval.

All incoming radioactive materials shall be delivered to Health and Safety Division. upon receipt of a shipment the Health and Safety Division wil

2. Check the shipping data against the anount

requested.

b. Monitor the package and any inner containers for

surface contamination or br

cage.

©. Where possible, make at least a rough check on the

activity received.

4, If acceptable, deliver the material promptly to

the requisitioner.

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Radioactive Materials Produced Within PRNC: Only those individuals who have been approved by the Health and Safety Division are permitted to acquire or have produced radioactive materials. A request for production of radioactive materials is initiated by

submitting three copies of Form 664 to the Health and Safety Division, If the application is approved, one copy of Form 664 bearing an approval number will be returned to the user and one copy to the Head, Reactor Division. The approval number is valid for the current fiscal year and will authorize the production of the listed radionuclides in the amounts and for the uses specified, If the proposed production or use

is unacceptable on

fety grounds, Health and Safety

wi11 consult promptly with the originator to determine

the modifications needed to satisfy safety requirenents.

When an approved user desires to have produced radio~

active material as specified on approved Form 664, the

following steps will be taken:

a. He will submit PRNC Form 665 in triplicate to the

Health and Safety Division for approval.

b. Upon approval, the Form 665 will be forwarded in triplicate to the Head of the Reactor Division.

©. Reactor Division Head will sign Form 665 and forward one copy to the user with time of irradiation indicated, The original will be returned

to the Health and Safety Division.

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Unless a specific exception is granted, all production

sampli

shall be monitored by Health and safety prior to renoval from the Reactor building. To facilitate this monitoring, the Head of the Reactor Division shall furnish the Health and Safety Division daily irradiation

schedules with the estimated tines of sample removals.

It will be the responsibility of Health and safety

Division to monitor the renoved samples and to determine

?the times of cooling required before they can be turned

over to the requester. Unless there has been a special

pre-arrangement, Health and Safety will not releace

from the Reactor building any sample reading more

than 300 mR/hr on contact.

B. Disposition of Radioactive Sources

1, Radioisotope Inventory: With the exception of certain

Radioisotope Inventory: Ps

low activity sources which may be specifically exempted,

all radioactive materials in PRNC custody will be carried

on an inventory list maintained by the Health and Safety

Division, The Division will make inventory checks

every six months to determine the activities remaining

in stock, the amounts used, and the amounts disposed

of

waste. It is recognized that a high accuracy
cannot be achieved on some inventory items. However,
each custodian is expected to make best estimates in
cases where exact figures are not available.

2. Radioisotope transfe

tions control the physical and custodial transfer of

Complex governmental regula-

---Page Break---

Tadioactive isotopes. No physical transfer of radio~
active materials involving transport over public
highways or in any type of vehicle shall be nade with=
out the supervision of the Health and Safety Division,
Strict compliance with the following procedures will

be needed to avoid violations.

No custodian of radioactive
materiel shall transfer custody within PRNC without the approval of the Health and safety Division. This approvel is requested by submitting Form PRNC 662. Approval will be granted only if the recipient is an approved user of that particular material, Upon receiving approval the radioactive naterial {8 given to the Health and Safety Division to accomplish the actual transfer, Such transfer will be by means approved by the Head of the Health and Safety Division and in all cases will be in compliance with all ERDA, Conmonwealth, and applicable regulations. the above regulations also apply to cases whore the user is transferring his own material to locations within PRNC other than that specified in Form 660 (Application for Radioisotope Procurement) or Form 664 (Application for Radioisotope Production) .

b. Bransfer Outside Pave

1) The

lth and Safety Division shall be
notified in writing of any desired transfer of

---Page Break---

radioactive materials to an individual outaide
of PRNC. The license status of the intended
recipient will be determined. If he is
qualified, the sender will be promptly notified.
Health and Safety will supervise the packaging
and shipment to insure compliance with all
packaging and transportation regulations.

2) When returnable radioisotope containers are
ready for shipment back to the supplier, the
responsible custodian chal! a0 notify the Health
and Safety Division, The Health and Safety
Division will ascertain that the containers are
free of contamination before releasing then for
return through normal channels.

Radioactive Waste Disposal. Dangerous chemicals and

other toxic materials can be rendered harmless by

various treatments, such as incineration or neutralization.

Tis {8 not

e case with radioactivity. once made,

each radioactive nuclide decays at its own characteristic

rate and nothing that man can do will change this rate

For this reason strict regulations govern the disposal

of radioactive materials, At PRNC, the Health and

Safety Division is responsible for the ultimate disposal

of all radioactive wastes, The following simplified

regulations apply to all users of radioactive nuclides

For more specific instructions on solid waste disposal

refer to "Procedure for Solid Waste Disposal".

---Page Break---

The total amount of radioactive materials released

into the municipal sewerage ayatem by PRNC at either Rfo Piedras or Mayaguer shall not exceed one curie per year. In addition, certain other conditions on quantity and type of material govern any discharge into the sewerage system. To insure

compliance with th

f¢ conditions no person shall discharge any radioactive waste into the municipal sewerage systen without the specific approval of the Health and Safety Division.

Under no circumstance shall radioactive materials be discharged into waste baskets or other containers which would permit the contamination of the regular

trash. Containers for liquid and solid wast

are available from the Health and Safety Division.

Animal care:

6 containing radioactive nuclides

shall not be disposed off by incineration without

the prior approval of the Health and safety

Diviaton.

Bach user must make as good an estinate as possible

of the amount of radioactive nuclide deposited in

the waste containers, These estimates are essential

because all activities that are shipped from PRNC

for ultimate disposal must be reported.

Wastes will be collected at regular intervals, or

upon call.

?The Health and Safety Division shall be notified

---Page Break---

promptly if there has been any accidental violation

of any of the provisions of this section.

VI. PERSONNEL MONITORING

1

Pilm Badges*

Each PRNC employee will be

signed a film badge dosi-

meter. Badges will have a photograph of the employee

and will also serve as an identification badge.

Visitors who are not required to wear film badge will

be issued a pocke® dosimeter.

The Division Heads and Project Leaders shall request

a £41m badge for any new employee prior to the date of employment.

Request for film badges shall be made by filing out PRNC Form 602.

No person shall start working in controlled areas without a film badge, A pocket dosimeter can be used for a few days until a badge is issued.

the:

are two types of film badg

a, A red badge entities the wearer to enter any area controlled by PRNC.

A green badge entitles the wearer to enter any area controlled by PRNC with the exception of the Reactor control room (Mayaguez), the beam tube

floor of the Reactor building (Mayaguez), and any

?These badges are expensive and a1

badge shall be treated like any other

the property of PRNC. The

nsitive instrument. Any

attempt made to open the badge may destroy its

---Page Break---

20.

Entry into

is permitted when accompanied by

a red badge holder.

A red badge will be issued on reques: if the applicant's

Work assignment requires access to an exclusion area,

if he has an acceptable knowledge of radiation hazards,

and 1? he appreciates the philosophy and practices of

radiation protection. Film badge requested will be

issued within a week after request.

Film badges shall be worn at all times, while at PRNC.

They shall not be left in or on desks, laboratories,

coats or benches. Routinely, each employee shall leave

his badge in the rack provided whenever he leaves the

building and shall pick it up from the rack on his

return to work.

?The badge shall be worn, face outward, outside of all

clothing on that part of the body where the greatest

radiation exposure is anticipated. This will usually

be at about chest level.

Any changes (termination, transfer from division or

extension of appointment) should be reported in

writing to the Health and Safety Division within two

Weeks after the change is made. (Use the Exposure

Record Receiving Report, that is attached to each

monthly Exposure Report.)

No names will be removed from the Health and Safety

Division records unless reported by Division Heads.

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11, A person who loses his film badge shall make a request for a new badge, to the Health and Safety Division through his Division Head or Project Leader, After the application is received by the Health and safety Division, a new film badge will be issued.

12. Film badges will be changed monthly or quarterly as assigned.

13, Personnel exposures to ionizing radiation are submitted by the Health and Safety Division to the Division Heads. Information can be made available to any individual through their division head or the Health and Safety Division upon request.

14, In special cases the regular badge will be supplenented with wrist badges, finger ring badges, or with other

types of personnel dosimeters.

15. PRNC employees from Rfo Piedras visiting Mayaguez, or vice versa, shall not take their film badges with then.

Regular visitore will be ai

igned a badge at each installation.

16. PRNC personnel whose official duties take them into a potential radiation exposure area not controlled by PRNC should consult the Health and Safety Division regarding the desirability of wearing their regular badge while in the area.

17, ?The receptionist will provide each individual visitor with a pocket ionization chamber or other personnel

monitoring device.

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Personnel monitoring devices will be issued to represent~ ative menbers or visiting groups who will remain together during a guided tour of PRNC facilities.

19. The Health and Safety Division will determine the type of personnel monitoring devices to be issued to service © contractor pergonnel making repeated visits to PRNC-controlled areas. Service company enployees (telephone, typewriter repair, etc.) on occasional

visits are considered as visitors.

Permissible Radiation Exposure Guidelines

There is no particular radiation dose at which injury sud= denly occurs and which could, therefore, be defined as ?maximun permissible". Radiation sources have been uscd in medicine and industry for more than 60 years and this experience has been supplemented in the past 20 years by extensive studies on the damaging effects of radiation.

AS a result of this experience and ri

earch, responsible

organizations uch as the National Council on Radiation

Protection and Measurements (NCRP) and the Federal Radiaticn

Council (FRC) have been able to set a series of Guides or

Feconmended Limits of radiation exposure considered to be

acceptable in connection with an occupation, any radiation

received for medical reasons is not to be counted as an

occupational exposure, It is the responsibility of the

Health and Safety Division, PRNC, to be familiar with all

ented in

the Guides, which are too complex to be pri

Getail here, the Puerto Rico tuclear Center operates

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under the dosage schedules given by the ERDA 0524 and the

United stat

?The basic regulations governing penetrating radiation such

as would be measured by a film badge are given in units of

roms per calendar quarter.

2. Guide for PRNC employees:

Whole body, head and trunck, gonads, lens of the

eye, red bone marrow, active blood forming organs

shall not exceed a maximun dose or dose comnitnent

of 5 rems per year or 3 rems per calendar quarter.

A beta exposure below an average energy of 700 Kev

will not penetrate the lens of the eye; therefore,

the applicable limit for these energies would be

that for the skin (15 ren/year).

Unlimited areas of the skin (except hands and

forearms). Other organs, tissues, and organ systens (except bone) shall not exceed a maximum dose or dose commitment of 15 rems per year or 5 rens per calendar quarter.

. Bone shall not exceed a maximum dose or dose commitment of 30 rems per year or 10 res per calendar quarter.

Forearms shall not exceed a maximum dose or dose commitment of 30 rems per year or 10 rens per calendar quarter.

e. Hands and feet shall not exceed a maximum dose or dose commitment of 75 rems per year or 25 rens per

calendar quarter.

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Th special cases with the approval of the Direetor, a worker may exceed 5 rem/year provided that the total

accumulated dose for any of the organ systems listed

does not exceed 5(N-18) rems where N is the individual's

age at his last birthday. It 4s evident from this that individuals below the age of 18 must be excluded from occupations involving a radiation exposure, To mect the above dose connitnent standards, operations must be conducted in such a manner that it would be un-Likely that an individual would assimilate in a eritical organ, by inhalation, ingestion, or absorption, @ quantity of a radionuelide(s) that would commit the individual to an organ dose which exceeds the limits specified above. All reasonable effort shall be made to keep exposures of forearms and hands to the gencra? Limit for the skin, The Health and Safety Division, PRNC, attempts to control operations so that no individual receives a radiation dose approaching the guide values given above, but without imposing undue Festrictions on the activities for which PRNC was stablished, In the case of occupational exposure, arrangenents should be made so that, when an employee's Pregnancy is confirmed, the average dose to her fetus during the entire pregnancy period doea not exceed

0.5 xem. As soon as pregnancy is known, the supervisor and the Health and Safety Division must be notified and arrangements must be made for a new job assignment if

4 potential to exceed thie limit exists.

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Guide for Students: Students form a special group because tney are not employees covered by the usual provisions of workmen's compensation, but may never-

theless be subjected to radiation exposures by

ignment. The recommendations in Report No. 32 of the NCRP will be used as exposure guides for those students for whon PRC has accepted responsibility.

?The pertinent provisions are

Students of any age shall not receive an exposure

exceeding 0.5 rem per year in addition to natural

If a teacher

background an¢ medical exposure!

age 18 or higher is routinely exposed to work

involving radiation, he becomes an occupational

worker and the corr

ponding exposure limits apply.

Persons under 18 years of age shall not be occupa~

tionally exposed to radiation, They should not be

employed or trained in an X-ray department, radio-

isotope laboratory, or industrial radiation

facility.

c. Students under 18 years of age should not receive

more than 0,1 rem per year from educational

activities, It is recommended that each experiment

be so planned that no student receiv

more than :

0,01 rem while carrying it out.

The Health and Safety Division will keep current and

cumulative exposure records on all PRNC personnel,

Any employee may discuss his record with the Safety

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officer at any time. Upon a change of employment the

exposure record will be made available to the new

?employer upon the written request of the individual

concerned.

Guide for vii All visitors to PRNC will be issued

an appropriate monitoring device, and are required to

wear it, The Health and Safety Division will maintain

such service and keep a permanent record of all
exposures received by visitors. The following provi-
sions apply:

a. If the visitor receives an exposure of 50 aren or
greater, an exposure report will be furnished to
the visitor's employer within 30 days following
tte determination, Upon written request, however,
all exposure information (zero and up) will be
Provided to the visitor's employer.

b. Any radiation exposure in excess of the permissible
levels established by Section VI.B,1 (Guide for

PRNC employe

) shall be reported mediately to

the visitor's employer by telephone or teletype.

©. Visitors below 18 years of age shall not enter any

area wherein they are Liable to receive an exposure

greater than 1/10 that of the occupationally

exposed personnel. Furthermore, they shall not

receive at any one time an exposure exceeding

10 neem. This exposure ts not to be repeated within

one calendar quarter.

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VII, HANDLING RADIOACTIVE MATERIALS

No exposure guide or permissible dose should be considered as

fan allowable outer limit which can be approached with complete

safety. Every practical effort must be made to keep exposure

far below the guides as is consistent with program efficiency and economy, The Health and Safety Division will assist in determining the laboratory areas in which certain operations can be carried out and will assist in planning procedures that will mininize personnel exposures. A continuous monitor on

procedures will be provided where this seems indicated.

A, Designation of Areas

?The regulations of ERDA carefully define certain areas

with respect to radiation sources.

An unrestricted area is an area into which access is

not controlled for the purpose of protecting individuals from radiation exposure.

2. A restricted area is an area into which access is

controlled for the purpose of protecting individuals

from radiation exposure, All buildings and grounds

controlled by PRNC, except for a few excepted areas,

are restricted area

3. A radiation area is any area wh

¢ an individual coula

receive to a major portion of his body a dose greater

?than 5 mens in one hour or 100 mrens in five consecu~

tive days. Each radiation area shall be conspicuously

posted with a sign or signs in English and/or Spanish

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bearing the words:

CAUTION RADIATION AREA or DANGER RADIATION AREA

4, A bigh radiation area is any area where an individual could receive, to a major portion of his body, a dose greater than 100 mrems in one hour. Each high radiation area shall be conspicuously posted with a sign or signs in English or Spanish bearing the words:

cAUTION DANGER

HIGH RADIATION AREA or HIGH RADIATION AREA

5. An airborne radioactivity area is any area or enclocure in which radioactive gases or other radioactive materials creating airborne harards are present. Each airborne radioactivity area shall be conspicuously posted with a sign or signs in English and/or Spanish bearing the words:

CAUTION.

AIRBORNE RADIOACTIVITY AREA

or

DANGER

AIRBORNE RADIOACTIVITY AREA

Laboratory Practice

Tt is not poi

ible to present here in detail all of the

techniques and procedures applicable to the proper use

of radioactive materials and other sources. Some of the

more important requirements are given below; the Health

and Safety Division will supply detailed information on

request:

i. Each entrance into an area where radioactive materials

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are used or stored in such a manner as to make that

area a Radiation Area, or a High Radiation Area, or

an Airborne Radioactivity Area shall be conspicuously

marked with a sign identifying the area in accordance

with the definitions given above. The signs shall

remain in place as long as the area conforms with the

definitions. Signs will be renoved by the Health and '

Safety Division only after appropriate radiation

surveys.

Containers in which radioactive materials are being

stored or transported sholl be appropriately marked

with labels or Jecals available from the Health and

Safety Division. Each label or decal shall identify

the nuclide, give the activity within the container,

the date of the activity estimate, and the initials

of the responsible custodian. ?This labeling shail

not be required for laboratory containers such as

beakers and flasks being used in laboratory procedures

during the presence of the user,

Stock solutions or sources in use may be kept in a

laboratory area inside sufficient shielding to

reduce the exposure dose-rate at the closest access

point outside the shield to 1 mi/hr. The shield

should be posted as a "Radiation Area" or a ?High

Radiation Area", as appropriate, even though a major

portion of a body could not be exposed inside the :

shield.

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Manipulations involving radioactive materials shall be carried out inside glove boxes or hoods as far as is practicable. Radioactive gases shall be used and stored only in areas approved by the Health and Safety Division.

Handling of radioactive gases or other material creat~ ing an airborne radioactivity hazard, shall be done within exhaust hoods approved by the Health and safety Division.

As extensive use as possible should be made of protec- tive devices such as trays, glass plates, or absorbent paper in order to prevent contamination of permanent building structures such as bench tops, hoods, and floors. Absorbent paper should be discarded frequently to prevent the dusting off of spills that have dried.
Fach user of radioactive nuclides shall make periodic surveys of his area to search for contamination.

Ko detectable contamination of any basic building component can be tolerated. Consult the Health and Safety Division upon discovery, or suspicion, of contamination and follow instructions.

Equipment used with radioactive nuclides shall not be released to other workers, sent to a shop for repair or modifications, or to excess, and shall not be @iscarded until it is denonstrated by the Health and Safety Division to be free of contamination. Repairs

or modifications that must be made on contaminated

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equipment shall be done under the supervision of the

ui

th and Safety Division.

No maintenance work or repair shall be mde 97 ary

laboratory sink traps or waste lines or on a>

ducts, exhaust systems, or house vacuun lines until

the areas involved have been cleared by the tlealth

and Safety Division.

Protective gloves of surgical rubber or disposable

Plastic and lab coats should be worn when working

with radioactive materials,

Each division shall provide its employees with gloves,

lab coats and other protective equipment according

to the work area and duties.

Protective equipment such as laboratory coats, surgical or disposable gloves, ete., should not be worn outside the laboratories or working area.

Mechanical pipette-filling devices shall always be used with radioactive solutions. Never Use the Mouth to Pipette Radioactive Solutions.

Smoking, eating, drinking, and use of cosmetics are forbidden in areas where radioactive nuclides are used. Liguid radioactive wastes shall not be put into the regular laboratory sewerage system unless they are known to conform to the requirements specified by the Health and Safety Division (See V.B.3 (Radioactive Waste Dispoval).

Radiation solid waste should be stored in the

containers provided for it.

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Decontamination Practice

Equipment Decontamination

When equipment has been contaminated, a decision must be made as to whether it is most advantageous to @iscard, set aside for decay, or to decontaminate,

Tf to be discarded such equipment shall be considered as radioactive waste and shall be turned over to the Health and Safety Division for disposal. The Wealth and Safety Division will also assist in storing equipment during decay to usable levels, It 18 usually advantageous to start decontamination procedures Promptly. Delay frequently fixes the contaminants more firmly onto surfaces. During decontamination proce dures protective gloves shail always be worn, supple~ mented by protective clothing if it is indicated. In general, the user can choose the most effective decon~ tamination procedure from a knowledge of the properties Of the contaminant. iicalth and Safety Division will

Provide advice, and assistance, and will supervise

@isposai of the cleaning materials.

Personnel Decontamination

When radioactive nuclides come in contact with the

skin, the radiation dose-rate at the contaminated area

may be very high. In addition, many contaminants are

in form that are readily absorbed through the intact

skin, and, to a much greater extent, through cuts ané

abrasions. Any contaminating event must be considered

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to create a situation roguiring prompt attention,

Whenever there has been any personal contamination,

Health and Safety should be called at once to assist

in the decontanination. When large areas of the

body are involved, showering may be required, utiliz~

ing either the regular shower facilities at Rio Piedras

or the special decontamination room at Mayaguez. With-

out waiting for Health ané Safety Division assistance

to arrive, start decontamination procedures at once.
Personnel handling radioactive nuclides shall become
acquainted with proper personnel decontamination
Procedures. If contasination persists, Health and
Safety shall call a physician to direct the use of

more Grastic cleansing agents. The decontamination

of wounds and skin abrasions should also be carricd out
under the direction of a physician. when the skin is
injured, an important barrier to the entry of contam=
inants is lost and mismanagement of cleansing procedures
an do more harm than good. I? several vigorous
washings do not sharply reduce the decontamination of
body hair, it should be cut short, using extreme care |
not to injure the intact skin, Removal of the hair

Will permit nore effective treatment of the underlying

skin, {

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