

PRNC006

PRIC = 6

(Health Physics)

?PROCEDURES HNUAL FOR PERSONNEL MONITORING

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operated by

university of Puerto Rico

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PUERTO RICO NUCLEAR CENTER

Operated by

UNIVERSITY OF PUERTO RICO

for

Unit 8, ATOMIC ENERGY COMMISSION

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This Procedures Manual for Personnel Monitoring has been
Reviewed and approved by the Safety Committee. It is hereby

approved and under operative as of April 30, 196k.

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PROCEDURES MANUAL FOR PERSONNEL MONITORING

INTRODUCTION

In all installations where external or internal exposure to radiation may occur as a result of handling or using radioactive materials and sources of radiation a Radiation Safety or Health Physics

Group is organized. One of the functions of

this group is the safeguard of personnel, the calculation of radiation exposures, record keeping of such exposures and counseling as to the best methods for protection from radiation,

In personnel monitoring several devices or instruments are used, of which the most practical ones are the pocket-type Ionization chamber and 2h. film badge devices

The Procedures and techniques presented in the following pages

have two purposes:

To provide standard techniques on personnel non-

toring resulting in reliable records of personnel exposure and to provide instruction for new employees as well as training for participants in various programs offered by the Puerto Rico Nuclear Center.

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1 Personnel Monitoring Devices, Description and Use.

There are a number of personnel monitoring devices, all of which have a definite use for a particular type of work with radioactive material, with the purpose of gathering information in regard to exposure dose received by personnel. These devices shall be worn as indicated. Failure to do so will be detrimental mainly to the wearer.

A. Film badges - these badges, made of plastic about 2 2/4 x 1 3/4 inches in size, have a beta-gamma film only or a beta gamma film and a neutron film depending on the need.

1. Types - three types of badges will be assigned.

a. Permanent badges - these have a picture of the person to whom they are assigned in the front, with the badge number at the top of the picture. The serial number is preceded by a set of capital letters indicating the area where the badge is used and its permanent status.

The following set of letters has been assigned so far:

8) WP - Mayaguez permanent badge

9) RP - Rio Piedras permanent badge

b. Temporary badges - these are similar to permanent badges but they do not have a picture of the wearer. Instead, the name of the person is typed on a white cardboard front with the badge number at the top. The serial number is preceded by a set of capital letters indicating the area where the badge is used and its temporary status.

The following set of letters has been assigned so far:

9) ME - Mayaguez temporary badge

2) RE - Rio Piedras temporary badge

3) OP - Cancer Hospital temporary badge

Note:

Of badges have been assigned to Cancer Hospital employees to

A differentiate then from the PRNC employees which are either FP for Ri. Although the badge bears letters suggesting temporary Status it is meant merely to provide identification regardless of their permanent or temporary status in the institution for which they work.

ce Short term badges - these badges have a yellow cardboard front with the serial number typed at the top. This number is preceded by a set of capital letters indicating the area where the badge is used and its short-term status. The following set of letters has been assigned 90 Zar:

- a) MB ~ Mayaguez short - term badge
- ») RS = Rio Piedras short-term badge

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Due to the diversity of facilities in PRIC @ color coding scheme is used for safety and operational purposes. Badges will have a red, yellow, or green stripe in the bottom front depending on the wearer's duties and needs.

. Regardless of type of badge, this shall be worn with the serial number toward the front.

+ The badges shall be worn centered between the chest and waist level outside of all clothing.

Permanent and temporary badges shall be picked up from a badge rack located in the main lobby then entering the installation. The rack is numbered serially to correspond with the facility badge. Badges shall be returned to their proper place in the rack upon leaving the installation.

Short-term badges are supplied by the receptionist and in special cases, by the Health Service Division directly. On leaving the installation the wearer shall return the badge to the receptionist or to the rack if he is staying

ore than om day.

Besides radiation, films are sensitive to 2 certain extent to humidity and changes in temperature, therefore, the badges shall never be tarpered with, taken home, left in the drawers, near radiation sources or on top of cold or hot surfaces, etc. If this is done, an erroneous reading may be recorded for the Person to whom the badge was assigned.

B. Pocket dosimeters - these are self-reading pen type electroscopes.

1. These will be used by personnel working in radiation areas where the possibility exists of getting an exposure dose greater than 60 millirems of X or beta-gamma radiation in 6 hours (See Table T for Maximum Permissible Exposures to External Radiation).

2. Pocket dosimeters shall be placed in boxes clearly marked "Dosimeters".

Such boxes shall be located in the:

a) Lobby dosimeter rack (Noyagacs and San Juan)

2) Reactor building main entrance door

ø) Amex building bat

Personnel using pocket dosimeters shall be instructed by their supervisors on how to read them and when to use them.

4. Whenever such a dosimeter is to be used the person interested should pick one from the box, write down in a slip of paper provided for, the name, number of dosimeter, initial reading of dosimeter and date.

When duaving the area the wearer shall read the dosimeter record its final reading in the slip of paper, attach the slip to the dosimeter, clip, and return both to its appropriate place. If meter shows reading off-scale notify Health Physics Division immediately.

In case a dosimeter is to be used for more than one day, the wearer should return it to its corresponding place in the rack,

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?Table I. KOCCAMNDED LIMITS OF OCCUPATIONAL EXPOSURE TO KXTERIUAL SOURCE

RDUATOR

EXPOGIRE 10 corprstow ose (54)

whole boty, head and secumulated dose 9 (w= 18)

?erunk, blood forming

organs, gonads, lens 5 weeks

Steyes (qasrterty) 3

Skin of stole boty yeor 30

and thyraia 15 weeks

(quartersy) 10

Extrencties yar

1B vecks °

(quertery) 2

#1 is the age and greater than 18.

Revised: January 2, 1965

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6. Pocket dosimeters shall never be handled roughly or left near a source of radiation.

Pocket chambers - these devices are similar to pocket dosimeters, except they are not self-reading and have to be read with a special instrument.

Le These will be used by personnel working in radiation areas where the possibility exists of receiving a dose greater than 20 millirems of

or beta-gamma radiation in 8 hours

Pocket chambers shall be used and handled in the same manner as pocket dosimeters.

D. Others

1. The HPD keeps a number of high range pocket dosimeters for emergency

2. Use of audible alarms is required for the operation of certain

irradiation facilities such as the gym room, and reactor facilities.

Specific instructions on their use are given in the operating procedure of the facility.

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Procedures and Criteria for the Assignment of Personal Monitoring Devices

TEL Procedure on arrival to PANG

New Personnel

The receptionist will instruct new employees reporting to work for

the first time to contact KPD before they are admitted to work.

2. Health Physics will proceed as follows:

as Request two photographs (2 X 2 inches) from the Administration

of new employers authorized for a period of no less than one calendar year.

1b. FALL Form PRC HED (Pi) 602. The Division hiring the person will supply the information called for in this form

c. FALL in a reference card (Figure 2) for every person for whom Form PRUC-HPD (Fi) 6G2 is completed. If the person's stay is for more than six months, two cards, a white and a pink one, will be issued, in addition to the blue one. The blue card will be kept in alphabetical order in a file in the HPD Director's office, the pink and white one in a file in the Record Keeper's office. The white card will be filed by name, while the pink one will be filed by badge number. If a person terminates the pink card can be discarded. The white and blue ones are clipped together and placed in a file drawer headed "Terminate" in the HPD Director's Office.

1. Instructions for setting up reference card

a: Type badge number

b: Type name of Person

c: Type division (actor, Health Physics, Radiotopes

Application, etc.)

a. Type PME, PMO, and termination date. FMT is the date when the person shall start wearing the film badge.

FuO 4z the date when the person stops wearing the film badge of meter.

Termination date 6 when the person terminates

4, Tsque a provisional badge or pocket chamber until the final badge is assigned, if one is needed. The cause a film badge is assigned, its purpose? shall be explained to the person.

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PUERTO RICO NUCLEAR CENTER

Notice of Arrival and Departure

?TO BE FILLED BY SUPERVISOR

Expected Date of Position Division

Arrival and Departure

be

a,

5.

10,

Supervisor Date

ro. cad Yo. Renare

10,

yoter if no MT or Mite wecTed write Under Tir TW ney plats under veeearss, IF
MT is needed put a chec!: mark under TAT ond MI and write fil badge number assigned
next to FAI. "Do the sane for pocct neters.

ORM PRIC-EFD (74) 602

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wp-con M0

ohn Doe

Health Physics

ma ?0

a Termination date

Fig. 1

B. students

1. The receptionist will refer students to the HPD where Form 662 will be filled and the type of badge to be worn determined.

2. Health Physics will proceed with steps c and d of IT.1, A, 2 above.

c. Visitors

ALL visitors shall be interviewed by the receptionist who will decide which type of monitoring device is necessary. In case of doubt, the receptionist will contact EPD.

II. 2 Criteria for Issuance of Personal Monitoring Devices

A. Film Badges

2. All persons associated with PRNC shall wear a film badge. The following badges will be issued depending on their association with PRC.

8. Permanent badges - are assigned to permanent employees or persons associated with PRC for a relatively long period of time (one year or more). Permanent badge number shall be assigned to a person for life. It shall never be reassigned to any other person.

9. Temporary badges - are assigned to employees or persons associated with PRC for a period less than one year, but more than six months.

Part-time employees and full-time PANG students are also assigned temporary badges. This badge can be reassigned.

c. Short-term badges - are assigned to employees or persons associated, for a short-time (six months or less) with PRNC. They are also assigned to PRNC San Juan (area personnel visiting or temporarily assigned at the Mayaguez area and vice versa. Students attending classes at PRKC (other than full time PRC students) also fall in this category. This badge can be reassigned.

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criteria for Color Coding

1. Red - persons wearing a badge with a red stripe have access to all facilities within PRIC. Issuance of red badges will be done after consulting with the Reactor Division Head.

2, Yellow - persons wearing a badge with a yellow stripe have access to any facility within PRIC except the Reactor Building, which they can visit provided they are escorted by a person wearing a red striped badge or by previously notifying the reactor supervisor and getting his approval.

3+ Green = persons wearing a badge with a green stripe have access to all facilities of PRIC except Reactor Building, laboratories and

fedlation areas in general which they can visit, provided they are
Cacorted by a person vearing @ red or yellov striped badge according
to tho area visitod, or receiving approval from the person working
in the area.

1B. Pocket Chambers

The receptionist will give pocket chanbers tot

Individued visitors to offices within o laboratory or visiting an
?area vhere they may be exposed.

Prior approval mist be had from person to be vielted.

2. Employees of sorvice companies (typewriter, telerhone, clectricity,
ete.) after due identification. However, the Division Head shall
Fequist a film bedge or pockst dosineter fron HD if this vork 40
to be performed nan area where the servicenan nay be exposed to
ionizing radiation.

3. One out of every 5 persons of touring group:

C. Pocket Dosimeters

Will be used by personnel as described in Section 1.1 B.

D. others

1. The HPD keeps a number of high range pocket dosimeters for emergency

2. Use of audible alarms as required for the operation of certain irradiation facilities such as the gamma room and reactor facilities.

Specific instructions on their use is given in the operating procedure of the facility.

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1.5 Notification to Interested Parties

Upon completion of reference cans and assignment of proper personnel

monitoring devices the HPD technician in charge of personnel monitoring

will notify the interested person using Phone PRIC-HPD (PM) 6028.

Before you have

been assigned FM Title. FM Ho.

which is located in the rack in the Lobby.

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SECTION III

Procedures for the Distribution, Reeding and Colicction of Mont-
?toring Devices

TII-1 Pocket Meters

A

Distribution - pocket chasbers and dosimeters are distributed

?a5 follow

1. Dosimeters used by personnel are routinely charged and ais-
tributed weekly, according to section I.3. The slips of
paper referred to in Section T.2, B.4-5 with the readings
WALL be collected daily. ?This vill deteraine if a dosimeter
needs to be charged more frequently.

2 Pocket chambers assigned to visitors are read, charged and returned daily to their assigned place in the receptionist's desk.

Reading of meters

2. Meter number 1s recorded in Dews. (For 600)

2. For pocket chambers, the reading is recorded in the DOWS before removing meter from charger reader. When dealing with pocket

Gosimeters, the reading is transferred daily from the slip of Paper to the DOW3.

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PUERTO RICO NUCLEAR CENTER

PERSONNEL, MONITORING

DAILY DOSIMETER AND CHAMBER WORK

Distributed by

collected by pave

Recorded by,

Ta roe

Ties Pane (cmren) | feren) | rest Remarks

[FORY FRAC-HPD (7%) 600

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TIT-03

Rejects

a. Meters reading more than 30 mrens in one 8 hr. day shall be placed in a box mirked 'Exanine'.

b. the meter number is entered in the IOVS. Under the corresponding colum, record the exposure dose followed by the letter (B) or write (08) if the neter reads off-scale.

Mechanical and leak tests are carried out on the meters and the results are recorded under the column "TUSY" of DCW3) My L = Ok shows satisfactory results on both tests, N. referring to mechanics) dosage test and L to leak test. "If one of the tests, Zaile, then an X is written after the identifying letter (Mer 1), for example, L - OK, M- X means leak test satisfactory, and mechanical damage of the meter.

4. If both tests are satisfactory the meter reading previously recorded will be accepted. In the case of a meter reading off-scale an investigation is started to determine the reason for such a high reading (e.g. the meter was left inadvertently near a radiation source). Use Form 601.

5. If one of both tests show the meter is beyond repair discard at

©. Procedures for Off-Scale Readings

aL

Whenever an investigation for the off-scale reading indicates that a person received more than 200 mR or mrem, the film in the badge shall be removed and processed immediately. The film exposure reading will be entered in column 3 or 4 of DOWS making a note under remarks that each exposure is due to film dosimeter.

D. Miscellaneous

Keep the form DOvS until final results have been obtained and recorded in "Kardex? curds or Short~Tema records (sec next section).

IL-2 Film Baages

As Collection and Processing

a

?Permanent and temporary badges issued, are assigned a place in the rack at the lobby of the building, vaere they will be kept when not in use. The film shall be collected and processed routinely as fowlows:

es Neutron film

(2) tice a month- for personnel that can be exposed to neutrons routinely.

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PUERTO RICO MUCLEAR CENTER

Personnel Exposure questionnaire Information

?Thi report shall be mde only after a pocket chamber or pocket

dosineter reading OS has been tested for leakage and mechanics] damage

and found in good vorking condition.

Meter Bo. Identification Ho.

Date vhen meter read 05

Nase Diviston

last, Fist, Taaaie}

Mechanical damage test satisfactory (108 or no)

Leakage test satisfactory, (veo or no)

Pins density equivalent to, pens of
radiation.

Neutron tracke/ca? equivalent to, reno of
neutrons.

TED to date when meter read 0\$ (TCD dose obtained from Kardex Reconts
or Short-Term Records)

Betinated exposure dose

Person (e) vorking in the sane area where possible overexposure
occurred and meter readings.

ene A Ho.

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[| |

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mo.)

rr

rrr ee

?

Description of vork performed by person during the day ven meter

?vas found OS.

Description of work performed by another person or persons in the
same area or nearby area where possible overexposure occurred.

Action taken upon disclosure of possible overexposure.

Is an Investigation Report of Radiation Exposure in process?

yes or no

Responsible

Investigated by. Date

Approved by.

Head, Weal ca Division

?FORM PRIC-HPD(Ft) 601

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I-06

(2) once every three months (quarterly) - for personnel whose duties routinely do not imply exposure to

Beta-gamme film

(2) once a month = for personnel that can be exposed to these radiations routinely.

(2) once every three months (quarterly) - for personnel

?whose duties routinely 4c not imply exposure to these rodiation.

2 Short term badges - shall be assigned a place in the rack only when the Weorer vicits PRIC for pore than one day, othorvize, ?they Vili be returned to the receptionist. The Fils shall be

collected the same day the person leaves PRNC and are processed
together with films of permanent and temporary badges.

WOE: In special cases films can be processed at an interval
other than indicated above.

Bs Schedule of Film Processing

The procedure outlined below is to be followed:

1. ALL films will be processed within 2 days after change date
except when this comes on a Friday. In this case wait until
first working day in the next week.

2 ALL films not processed at this time will be designated
"not received"

3+ If film appears later it will be developed with the next
batch.

4s If at the end of this second period the film has not been
found record in appropriate form as film lost.

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Ww.

rv-01

SECTION IV

Records

Two types of records will be kept: "Kardex" and Short-Term Personnel

Exposure record

"Kardex" records will be kept only for persons employed, associated or visiting for a period of not less than 6 months. For other persons, exposure records are kept in a different system called Short-Term Personnel Exposure Records.

"Kardex" Record Cards - Description

The "Kardex" record consists of two "Kardex" cards designated Card A (see figure 2) and Card B (see figure 3). Cards A and B are printed on both sides and provide record space up to 26 weeks or two quarters each.

B. Card 4 is used to record exposure as obtained from the reading of pocket meters only, while Card B is used to record exposure as obtained from the reading of badge film as well as pocket meter. In the lower left hand corner of Card B on both sides shall be written the name of the person whose records to be kept. Next, the division to which the person belongs. Then, the film badge number.

o. Transfer of Exposure Reading to "Kardex" cards

421 exposure entries shall be made in pencil. Other entries in ink. No erasures are allowed. If a mistake is made in an entry, cross out such entry, enter the correct one and initial the correction. Since "Kardex" cards are filed in numerical order and pocket meters and film badges are read also in numerical order:

1. Find card number corresponding to first meter number listed in the Daily Dosemeter and Chamber Worksheet (DOWS).

Now make the appropriate transfer from DOWS to card and cross out meter number in DOWS. Complete ALL necessary entries in one card before proceeding to the next one.

3. Repeat step 2 until all meter numbers in DCWS have been crossed

ute

4, always pull out drawers in order and work with one drawer at a

time only.

D. Specific Procedure

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MN

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fa. First column WK in Kandex card refers to Health Physics week. HP week No. 1 always starts on January 1st of each year.

b. Write MI (meter issued) and date on side of card A corresponding to date of issuance as illustrated in Figure 4. The Subscript denotes type of radiation meter issued, thus My means meter for X or γ radiation.

e+ The second column "Days" is subdivided into seven sub-columns, one for each day of the week.

4. Each week is divided into two sections, by a horizontal line. Each day in any week is divided into four sections by two diagonal lines. In some cases, two types of meters may be used in certain cases, one for X and/or gamma radiation and another for thermal neutron radiation. The following figure illustrates how the sections, which are numbered 1 to 8, are filled.

2) Enter daily exposure due to X and/or gamma radiation in this space.

2) Enter daily exposure due to thermal neutrons in this space.

3) Enter the sum of 1 for the day plus 3 of previous day.

8) Enter 2 for the day plus 4 of previous day.

5) Enter sum total of 1 for the whole week.

6) Enter sum total of 2 for the whole week.

7) Enter total of 7 of previous week plus 5 of present week
except as noted below.

8) Enter total of 8 of previous week plus 6 of present week
except as noted below.

Hot

+ [and 8 will be equal to 9 and 6 respectively only
for the first week an entry is made.

Figure 9 illustrates an exposure record with entries for
the first 15 weeks.

fe. Whenever an irregularity occurs it shall be indicated in the
last column "IRR" and dated. The following shall be considered
irregularities:

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ERANAAAAAM

KANN

" RRR

PAA

PARAS

PANSY

SRARAKNIS

PASS

CANAAN R

SAN

AAAS

RI

PANS

---Page Break---

Cote: 1- Meter contaminated

2 Meter damaged

Mr Meter lost

Whenever @ meter is taken out of service, type below ME, MO and date. The same procedures will be used when a meter is reissued. (See Figure 5)

6: The last column of to the right of the card will be used to accumulate any thirteen consecutive weeks. The weeks covered will be written on top of the accumulated exposure dose as shown in Fig. 5 for the first consecutive thirteen weeks.

2. card B

4 Write Mi (film meter issued) and date at bottom of Card B
#5 Illustrated in Figure 6.

>. First column "WIC in Kardex cards refer to Health Physics week.

?The second column (Film Badge) subdivided into six subcolumns, and the three columns following, are all numbered in Figure 6.

?fn explanction of each one follows.

a

Enter open window density.

2 Enter open window dose (mrom equivalent of density).

3. Enter chielded window density.

4. inter shielded window dose (mrem equivalent of density).

5+ Enter total of 5 of previous entry plus 2 of current entry
except as noted below.

6. Enter totel of 6 of previous entry plus & of current entry
?except as noted below.

7. Mater current fast neutron dose (mrens).

5. Enter total of 8 of previous entry plus 7 of current entry
except es noted belo.

Wote: 2 and 5, and 6, and 7 and 8 vill be equal in the
first entry mie:

9+ Enter in this space the value for TSR, fron card A for the

corresponding week. Sev part E of thts section.

20. Enter sum of 6 plus 6 for the corresponding week.

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VV)

EV

"| Le | te

a) || LIV |

Se eee eee | 4 |

- TTT Va fet tol TT

Pld) [TI [il | | | a [

Ba BECEEZEVEe

?a sEHEHEEH EH ?a

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a

Enter irregularities if any.

The following will be considered as 20.

code

1 film fogged

2. £m contaminated

3. film damaged

- fim missing

- film damaged in proce

4.

5

6. film lost in process

7. evidence of X-ray exposure

a

- evidence of Light exposure

FUL - film meter ost

MM - film meter not processed

Whenever a film badge is taken out of service, write at bottos
of card B, under FMI, PMO and date. If badge is reissued follow
?the cane procedure (see figure 6).

Wotice froa figure 7:

1. That in thie example in veeks 1, 2 ani 3 no entries vere
made under O¥, Ou, SH, SVD and? OND assuming film for beta,
X and/or guam radiation vas processed normlly every four
weeks.

2, Similarly every two weeks on entry was made for FX (fast neutron dose) since this film was processed every two weeks.

3. SuD represents the dose due to penetrating radiation. This is the one of most interest.

A. Beta dose 49 not recorded directly in the exposure record. However, this can be calculated at any time from the OW and 5H densities:

Exposure reconstructions are based on personnel monitoring film except as provided below.

If film is lost or damaged such that it is not usable for determining the exposure, then readings from meters will be used provided these readings cover the same period of time as the film. This implies that the person was using a meter plus a badge simultaneously.

---Page Break---

Ww 3

1-08

2, If film is lost or damaged such that it is not usable for deter=

fining the exposure and no meter reading is available as provided in 1 above, then the exposure from the previous monitoring period will be used to prorate the exposure for the current period up to the time a new film was issued.

Short-term recons - are kept for persons associated with PRIC for periods of less than 6 months other than one time visitors. Records ALL be Kept in Form 603.

Film from SP badges are processed in accordance with Section TIT.2, however the exposure dose is not measured and recorded unless there is reason to suspect that the exposure may be significant, which is determined by the type of work performed by the individual.

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PUERTO RICO MUCCLAAR CENTER

SHORT TERM PERSONNEL EXPOSURE RECORD

PDE

DATE

vocxeton | pose REMARKS,

[Eno FD, WD or FO was used indicate none. Under location enter: visiting reactor,

of person, etc.

FORM PRNC-HPD(PA)G03

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SECTION V

Exposure Reports

Ve1 A report of whole body exposure to external penetrating radiation shall

be submitted by the HPD to PRIC's Director, Associate Directors and Heads of Divisions, using Form 603a in accordance with 11.2, a, La-b

Ve2 An exposure report will be sent to institutions to which service is given whenever tests are developed.

V.3 An annual summary report of whole body radiation exposure to external penetrating radiation accumulated during the year shall be submitted in duplicate to the Area Manager using Form AEC 190.

Similar reports are submitted to PRIC Director, and Associate Directors in Form PRIC 604.

V.b an annual summary report of internal body exposure from deposition of radioactive material during the year, shall be submitted to the Area Manager using Form AEC 191.

Similar reports to PRIC Director and Associate Directors are submitted in Form PRIC 604.

Whenever an external exposure greater than 25+ rons occurs the Director should be informed immediately by telephone

A. If the incident occurs outside of working hours, San Juan area personnel are to telephone the Director and Associate Director (San Juan area) and Mayaguez area personnel are to telephone the Deputy Director and Associate Director (Mayaguez area).

B. Start and investigation of incident and submit an Investigation Report of Radiation Exposure. Send four copies to AEC Area Manager, one copy to PRIC Director and Associate Directors and one to HPD Head.

Use Form PRIC-HPD (PM) 60Wb for this report.

V.6 Whenever an external exposure: as determined from badge film exceeds 3 rons in any 15 consecutive weeks, start an investigation using Form 6040 in triplicate. Send three copies to PRIC Director and two copies to HPD Head. The director will send one copy each to the associate director and investigation head concerned.

See ABC Manual Appendix 902, April 4, 1962 and Chapter OR-0502 and OR Appendix 090, November 9, 1962 for classification of accidents and reporting instructions in detail.

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v.02

PUERTO RICO NUCLEAR CENTER

Monthly Report of Whole Body Radiation Exposure

to External Penetrating Radiation

Division Month,

Send Report to: Division Yoaa

Same Toes Taree

Baseline | Annual Yearly

Month Cumulative Counts

FORM PRIO-FED (PA) 6030 MPD, Personnel Monitoring Supervisor

Date

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rex zon

spsoom WEY 430Np WOES TO/pHE (q_pEED) spODKEL ,XOPI, WoLy pauTOAgO AID saKop

War SOF BOFAGUO O90

Teer

|

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{

|

ars ar-mfr-orf or-6] Gal etl asf os] caf re] ce] et] to

?eSBaE FUPROTIOS BT Jo GUS UT SsSop WAY PSTETRUTOGS PSyMATTES Jo ?OH ann

gon a0 8g tr rparanog 19x Aq posedoxg

+4q gouzane Apoq ong typ a0 av po.msvoyt

sperodsag 2700

reak of Dupre poywTrumosy worsUTPRY Suproxquey TMS

0g amsodxa uoraorped Apor stou Jo Areumg 220d TonuNy

?WSINED HVETONN OOTS ODN

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PUERTO RICO MUCLEAR GEYTER

Operated by

University Of Puerto Rico

For

U.S. ATOMIC ENERGY COMMISSION

College Station

Mayaguez, Puerto Rico

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ADDAPION ELEOSURE

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one Adress

Date of Birth 5. Place

Sex Te 8.8. Yow 8. Occupation

(at time of exposure)

Employer's Name & Address

Other individual exposed? (Add your List under stom 2h and
Judge an additional form for each one).

Any animals exposed? (If yes report on a separate

sheet and attach to this report).

External exposure Internal exposure (check)

External estimated total exposure (rena)

Procedure for converting units of measurement to rena:

at survey meter reading in r times RBE of ____ for radiation

bi density of Film in terms of r times REE of for _radiation

neutron tracks/en² equals one

8

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49+ Isotope (6) delivered,

16. Internal estimated total deposition (microcuries)

Af. Bstimated fraction of P.C. deposited in organ (3) of interest,
(sderocaries)

3B. Biological cs

xy OF procedure used to estimate deposition including

snotrumentation.

at abr sumpling. Instrument

br Bloassey Instrunent

er other

19. Method of transportation und probible mode of entry into the body.

geseous effluent, ingestion or/ané inhelution (underline)

aquecus effluent, Angestion or/ent inhalation (underline).

?airbone particles, Angestion or/and inhalation (underline).

other

20. Date (s) covering period in which exposure occurred

21. Description of events leading up to and including occurrence of exposure.

22. Role played by person(s).

23. Suggestions for preventing similar incidents.

2b. Name(s) of other person (s) exposed. (see item 10)

25. PRC Insurance Company

4: Company has been notified 7

Submitted by

Wealth Fysies bivision

Approved by

PREC SSUTY conETTE

FORM PRIC-HED (Fu) 60M

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v8

v9

vor

Whenever an unplanned release of radioactive material in concentrations which, if averaged over a period of 24 hours would exceed 5000 times the Limits for that material specified in appendix 5, table IT, 10 CFR 20 or if the release

is offsite and may cause the general population to receive an exposure greater than the values set forth in the Radiation Protection Guide for Federal Agencies, the Director

shall be notified immediately by telephone,

A. Start an investigation of incident and submit an Investigation Report of Radiation Exposure. Distribution will

be the same as for §.3 above.

The HPD will determine the action to be taken in case a person (s) exceeds the MPE in order to bring the cumulated

?exposure total within the established Limits. These are
discussed fully in Section 6.

?A. The Radiation Safety Officer will notify in writing the
supervisor concerned. One copy will be sent to PRNC's
Director.

PRNC will notify any person receiving an overexposure (see
Section VI-1) of the nature and extent of exposure. Such
notice shall be in writing in accordance with CFR Section
20.103(b).

4% See ABC Appendix 0302, annex 2.

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vE-08

sector v

Permissible Occupational Levels of Exposure to
External Sources of Radiation

VI-1 Beginning with 1958 and thereafter, the maximum permissible accum-
ulated exposure dose, MPB, in rems at any age, is equal to 5 times the
number of years beyond age 18,

?A. To calculate MPE to critical organs (whole body, gonads, blood for-

For sensitive organs, lens of the eye) the MPE = 5 (-18)** rem.

For " = 30

MPE = 5(30-18) = 60 rems

3. In any one year a maximum of 12 rems is allowed, provided the average of 5 rems/year is not violated. ##*

Cs The MPE allowed to the skin of the whole body (non-penetrating radiation) is 30 rems per year

Ds The MPE to the extremities is 75 rems/year.

B. The MPE for one quarter (13 weeks) is 3 rems averaged over a period of 15 weeks.

P, The MPE for one week (40 hours) is 0.3 rems. This is an administrative value.

G. The MPE for 1 day (8 hours) is 0.06 rems. This is an administrative value. Likewise for administrative purposes the MPE per hour is,

7.5 mrem.

#3c0 Addendum of April 15, 1958 to WBS Handbook 59, Permissible Dose from External Sources of Ionizing Radiation,

#This is the basic equation in determining permissible exposure levels.

sec Addendum of April 15, 1958 to HES Handbook 59, Permissible Dose from External Sources of Ionizing Radiation, Section 7, page (6). In this case 12 rems/yr may be allowed under certain circumstances. The age at which a person will reach his age prorated until he obtained by $x = + (+18)$.

238).

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V2.

In calculating MPE accumulated using MPE - 5(1%18) previous exposure shall be taken in consideration,

Whenever a previous radiation exposure record exists, this

shall be used in calculating MPE accumulated at age I This

will allow 4 person to use his reserve exposure as explained under VI IB, (See footnote ###* on previous page)

B. Whenever previous radiation exposure record is not available, assume that the MPE beyond 18 years of age has been accumulated.

©. To the effect of making the calculations required under VI-2h or

VI-28, an Occupational Radiation Exposure History (Form PRNC-HFD

(e) 604d) shall be filed with the Health Physics Division not

later than two weeks after employment, provided such person is

expected to be employed, associated or visiting for a period not

less than six months consecutively (See subsection IV.)

The individual folder will be used to keep all exposure records, reports, etc, for each person with a "Kardex" record.

A. The front and back covers are printed as shown in Figures 8 and 9.

B. On the front cover of the Folder is printed an exposure record diagram. The recordgraph to be prepared and read as follows (see

figure 8):

1, Draw (using black ink) a point in the absolute -

Age in Years (#A) ~ ot which the person starts vorking to a point corresponding to the sane age in the right ordinate - Age in Years (Ri). ead in the left ordinate the accumulated doce to any ago up to 65 agsuning that the 5 rene per year exposure Lintt is not cxcseded, In the example {2lustrated ?tho porson started to vert at age 35, therefore at 65 years of age the MPE accumlated 1s 150 rens.

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a 5 MG SCC

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Vi-05

2. At the end of each year the cumulated dose is entered in the summary record, Form 605, and plotted in red ink in the record graph. If the individual annual dose rate (for the period since the person started working) does not exceed 5 rads per year, the red line should fall under the black line. In case the red line is observed to approach the black line corrective measures should be taken. The total cumulative dose for an individual is always given by 5 (128) with an allowable maximum of 12 rads in one year, the black line indicating when 5 rads per year average is exceeded during the period covered since starting to work).

3. On the back cover of the folder is printed a table (For PRIC-HPD (BO Goke) indicating all the records of the person in regard to

radiation safety. space 1s provided for at least

20 year records.

The columns shall be filled as follows:

(2) "Wardex" record. this column shall be filled twice a year

(July and January).

(2) Cumulative survey. This column shall be filled twice a

year (July & January).

(3) 42 others as needed (see instructions in the folder).

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PUERTO RICO NUCLEAR CENTER

SUMMARY OF RADIATION EXPOSURE RECORDS

None Division Date

The radiation exposure records of the Health Physics Division show that the above-named

person received, during the time indicated, the following doses of external radiation.

The complete radiation exposures of this employee are kept in the files of the Health Physics Division, PRIC.

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Remarks

JFORM, PRUC+HPD(PM)605

Director, Health Physics Division

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