

RADIATION SAFETY EQUIPMENT

OBJECTIVES:

1. LIST THE DIFFERENT TYPES OF EQUIPMENT AND DEVICES USED FOR RADIATION SAFETY
2. STATE THE USES OF THE DIFFERENT TYPES OF EQUIPMENT USED FOR RADIATION SAFETY
3. DESCRIBE THE MAKEUP OF THE DIFFERENT TYPES OF EQUIPMENT AND DEVICES USED FOR RADIATION SAFETY

TYPES OF EQUIPMENT AND DEVICES USED FOR RADIATION SAFETY

1. GEIGER-MUELLER SURVEY METER
2. PANCAKE PROBE
3. SODIUM IODIDE SCINTILLATION DETECTOR SURVEY METER
5. POCKET DOSIMETER
4. "CUTIE-PIE"
6. FILM BADGE
7. TLD
8. LUXEL

GEIGER-MUELLER SURVEY METER

USAGE:

USED TO DETECT LOW ACTIVITY
CONTAMINATION

ROOM SURVEYS

PERSONNEL MONITORING

RECEIVING RADIOACTIVE SHIPMENTS

THERAPY PATIENT MONITORING

G-M SURVEY METER MAKEUP:

ALUMINUM TUBE ENCLOSES GAS

THIN WINDOW FOR MEASURING
PARTICULATE RADIATION

ELECTRIC FIELD ESTABLISHED BETWEEN
TWO ELECTRODES

OPERATES IN THE GEIGER-MUELLER REGION

DISPLAY - CPM OR mR/hr

AUDIBLE SOUND EMITTED (If turned on.)

PANCAKE PROBE

USAGE:

USED TO MEASURE - BETA PARTICLES

VERY LOW ENERGY GAMMA RAYS

MORE SENSITIVE THAN A G-M SURVEY
METER WITH AN ALUMINUM ENCLOSED GAS
DETECTOR PROBE

MAKEUP:

A G-M SURVEY METER WITH A PANCAKE
LOOKING PROBE

PROBE USES A THIN MICA WINDOW
BETWEEN THE RADIATION TO BE MEASURED
AND THE ENCLOSED GAS DETECTOR

THIN WINDOW IS EASILY PENETRATED BY
BETA PARTICLES

SODIUM IODIDE SCINTILLATION DETECTOR SURVEY METER

USAGE:

PRIMARILY USED FOR RADIOACTIVE TRASH
DISPOSAL

MUCH MORE SENSITIVE THAN A G-M SURVEY
METER USED FOR MEASURING GAMMA AND
X-RADIATION

MAKEUP:

EXTERNAL PROBE IS A NaI SCINTILLATION
DETECTOR

DETECTOR CONNECTED TO A PHOTOMULTIPLIER
TUBE TO GENERATE AN ELECTRICAL PULSE IN
RESPONSE TO RADIATION/DETECTOR
INTERACTION

PULSES COUNTED IF THEY EXCEED A THRESHOLD

ON SOME METERS AN ENERGY WINDOW CAN BE
SET TO DETERMINE THE TYPE OF RADIONUCLIDE
BEING MEASURED

DIAMETER AND THICKNESS OF THE PROBE CAN
VARY DEPENDING ON ITS INTENDED USE

POCKET DOSIMETER

USAGE:

USED TO MONITOR THE AMOUNT OF RADIATION AN INDIVIDUAL ABSORBS OVER A SHORT PERIOD OF TIME

CAN GET AN IMMEDIATE READING

MAKEUP:

GAS-FILLED CHAMBER WITH TWO ELECTRODES

OPERATES IN THE IONIZATION REGION

DOSIMETER CHARGER REQUIRED

READOUT IN mR

"CUTIE-PIE"

USAGE:

USED TO MONITOR AREAS WHERE THERE ARE HIGH LEVELS OF RADIOACTIVITY

MAKEUP:

GAS-FILLED CHAMBER WITH TWO ELECTRODES

OPERATES IN THE IONIZATION REGION

RADIATION INTENSITY READ IN mR/hr

FILM BADGE

USAGE:

USED TO ESTIMATE THE AMOUNT OF RADIATION AN INDIVIDUAL RECEIVES

CAN DETERMINE THE TYPE AND ENERGY OF RADIATION EXPOSED TO

CAN DETERMINE HOW PENETRATING THE RADIATION IS

TYPICALLY WORN FOR ONE MONTH

FILM SENT TO AN APPROVED OUTSIDE AGENCY TO BE READ

MAKEUP:

FILM CONTAINED WITHIN PLASTIC HOLDER

FILM DARKENS WITH RADIATION EXPOSURE AND COMPARED WITH STANDARDS

FILTERS USED: SENSITIVE TO HEAT AND HUMIDITY

THERMOLUMINESCENT DOSIMETER

USAGE:

USED TO ESTIMATE RADIATION EXPOSURE
TO PERSONNEL

CAN BE USED TO MONITOR EXTREMITIES:

RING BADGE

WRIST BADGE

CAN BE USED TO ESTIMATE RADIATION
DOSE DELIVERED TO TISSUES
SURROUNDING A THERAPEUTIC TISSUE
IMPLANT SOURCE

THERMOLUMINESCENT DOSIMETER (CONTD.)

MAKEUP:

USUALLY CALCIUM OR LITHIUM FLUORIDE
CHIPS HELD IN FILM BADGE HOLDER OR
RING

CHIPS ABSORB IONIZING RADIATION

STORED ENERGY RELEASED WHEN TLD IS
BROUGHT TO A CERTAIN TEMP. AND LIGHT
WHICH IS GIVEN OFF IS READ

MORE SENSITIVE TO RADIATION AND LESS
SENSITIVE TO HUMIDITY & TEMPERATURE

LUXEL DOSIMETER

USAGE:

USED TO ESTIMATE RADIATION EXPOSURE TO PERSONNEL

CAN MEASURE - X AND GAMMA RADIATION
FROM 1 - 1,000 MREM

- ENERGETIC BETA
FROM 10 - 1,000 MREM

DOSE EQUIVALENT FROM X AND GAMMA RAYS WILL
HAVE A DEEP, EYE AND SHALLOW VALUE REPORTED

BETA READ AS SHALLOW ONLY

MULTIPLE DOSIMETERS WORN:

ONE WORN CLOSEST TO THE EYES GIVE EYE LENS
DOSE

OTHER - WHOLE BODY DOSE

MAKEUP:

CONTAINS AN OPTICALLY STIMULATED
LUMINESCENCE (OSL) DOSIMETER AND FILTER
PACKET

AFTER THE DETECTOR IS EXPOSED TO RADIATION,
THE DETECTOR IS STIMULATED WITH LASER LIGHT
CAUSING IT TO BECOME LUMINESCENT
PROPORTIONAL TO THE EXPOSURE

DOSIMETER HOUSED IN A WATER RESISTANT BLISTER
PACK