

Frisk With Your Friends



An 8-Hour, 10 Station, Non-CBT, Interactive Training Course

Planning Matrix

How →

↓ What

	Radodex	Picture Station	Paperwork Place	Photo Shoot	The Doors	Go Frisk	The Black Box	Code Breaker	Swipes	Bag it & Tag it
Fundamental Concepts Biological Effects & Risk Awareness	▲	○				○				
ALARA & Radiation Limits	○	▲		○	○	○	○	○	○	○
Procurement & Accountability			▲							○
Workplace Setup & Design	○	○		▲	○	○				
Posting & Labeling		○		○	▲	○		○	○	
Frisking & Dosimeters	○	○		○	○	▲	○	○	○	○
General Instrumentation		○					▲	○	○	○
Direct Survey & Monitoring		○		○	○	○	○	▲	○	○
Indirect Surveying		○		○	○	○	○	○	▲	○
Rad Waste Spill Cleanups & Release Emergencies			○	○			○	○	○	▲

▲ = Target

○ = Relevant or can include

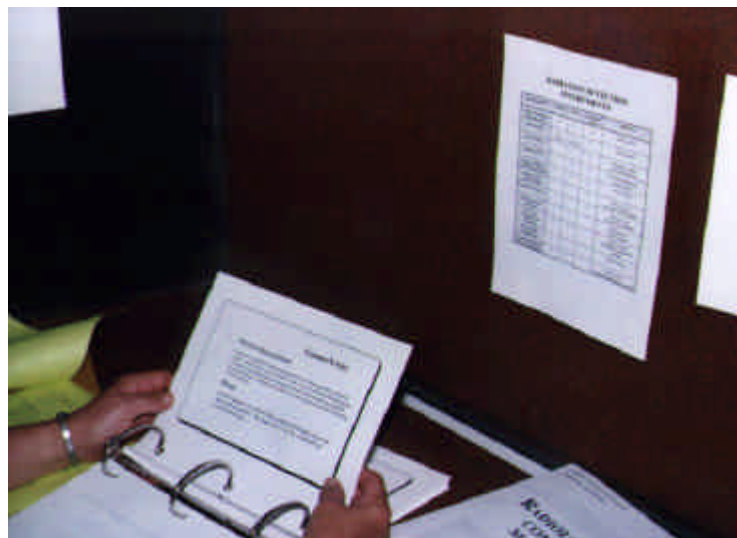
This is an explanation and intro....

RADODEX



Radodex is a rolling file of discrete facts and tables dealing with definitions and fundamental concepts of radiation. The facts are discretely presented in as interesting a fashion as possible with many tables and pictures describing radiation, radiation risk, natural and manmade sources of radiation. Participants respond to a 25 item multiple choice quiz by punching a ticket to test their choices. The “radodex” has all the information necessary to answer the questions about radiological fundamentals and risk awareness. When the answer holes line up with the facilitator's key holes, a completion coupon is given to the participant - redeemable on break at the company snack-bar for coffee or a soft drink and an ice-cream cone.

This station is a mandatory first stop for "newbies" to radiation work. It can take as long as an hour or more for first-timers or for meticulous scientist-researcher types. Two of these stations are provided. The reward coupons are appropriate as participants are generally ready for a break hereafter. They seem to enjoy the punch cards and will be seen whistling and humming along with a radio that we provide in the alternate reading and listening room off to one side for those who want to be alone with their “radodex.” Those who are in a hurry and who also already know their stuff about atoms, types of radiation, etc., can speed through *Radodex* in as little as twenty minutes. A few have successfully challenged *Radodex* without using the reference material at all and simply moved on to another station (after suitable bragging to their coworkers, of course).



Materials

Written/Reproduced Handouts Available to Students:
Glossary

Written Material Displayed on Display Boards:
Station Title
SI Units Table
Conversions Table
Annual Dose Pie Chart
Properties of Radiation Chart
Radiation Survey Techniques Chart

Pictures Displayed on Display Boards:
None

Table-top Items (equipment, manuals, etc.):
Radodex - Flip-index (Reference)
Multiple Choice Quiz
(25 Items - 5 Choices)
Punch Cards
Paper Hole Punch
Company Radiological
Control Manual (Reference)

RADODEX					
1	a	b	c	d	e
2	a	b	c	d	e
3	a	b	c	d	e
4	a	b	c	d	e
5	a	b	c	d	e
6	a	b	c	d	e
7	a	b	c	d	e
8	a	b	c	d	e
9	a	b	c	d	e
10	a	b	c	d	e
11	a	b	c	d	e
12	a	b	c	d	e
13	a	b	c	d	e
14	a	b	c	d	e
15	a	b	c	d	e
16	a	b	c	d	e
17	a	b	c	d	e
18	a	b	c	d	e
19	a	b	c	d	e
20	a	b	c	d	e
21	a	b	c	d	e
22	a	b	c	d	e
23	a	b	c	d	e
24	a	b	c	d	e
25	a	b	c	d	e

Name: _____

Date: _____

PICTURE STATION



Another early station for new radiation workers, the Picture Station emphasizes the concepts of ALARA. Here, the participant identifies the basic protective measures of time, distance and shielding and source type (reductions) and utilizes methods for reducing external and internal radiation dose.

An enlarged and simplified floor plan, having a source (emitter) placed "in" one of the rooms and is skirted by a hand-maneuvered probe ("Darby the Dose Dodger") from an Eberline ESP-1 (dose equivalent meter). In addition to finding a path through the building that minimizes exposure to Darby and the speakered noise it emits. The participant is then invited to use a source (Sr-90 or P-32) and gamma-emitting sources, plastic and brass shields and a clock to figure exposure outside and inside a movable "skin" shield on the probe. An album of pictures with scenes from various radiation laboratories and their friends at work is also at this table station with explanatory labels on the back of each picture indicating the protective ALARA concept being utilized.



This is a popular station for some reason, with most students lingering and studying the materials more than we expected. They seem to "play" more at this station than any other except for *Code Breaker* which has more items to manipulate, and at *Swiper* which involves "work" in a glove box. There is great interest in the picture album and much staring at faces in the pictures along with conjectures about who is doing what.

Materials

Written/Reproduced Handouts Available to Students:

Picture Station Evaluation
(questions and miniature floor plan)

Written Material Displayed on Display Boards:

Station Title
Radiation Properties Table
Selection for Protective Clothing Chart
Radiation Detection Instruments Table

Internal Radiation Dose Reduction
ALARA - What Does It Mean?
Minimize Exposure Time
Minimize Distance From Sources
Maximize Shielding
Source Reduction

Pictures Displayed on Display Boards:

Aerosol Release by Welding and Cutting
Worker using Scanning Electron Microscope

Table-top Items (equipment, manuals, etc.):

2 Radiation Sources
1 Radiation Dose Equivalent Meter
1 Clock with Minute and Hour Hands Removed and Rad
Symbol on Second Hand
1 Photo Album
1 Rad Control Manual
Brass and Plastic Shields
2 Display Cards:
"Checklist for Reducing Occupational Radiation
Exposures"
"Criteria for Posting for Contaminants in High
Contamination and Airborne Radioactivity Areas"



DOORS



Doors is an activity that involves peering behind small panels (the doors) to discover what the signs on the doors (postings, signs and labels) really mean. If the participant already knows the characteristic differences in radiological posting, the 7 item matching evaluation can be quickly filled out and they can move on. If not, a table of radiological posting criteria is provided (and available as a take home handout) and a specially tabbed rad control manual is available.



Materials

Written/Reproduced Handouts Available to Students:

Doors Evaluation Table:
Criteria for Posting Contamination,
High Contamination and Airborne

Written Material Displayed on Display Boards:

Station Title
14 "Doors"
panels with posting and explanation sheets under each
(The door marked "Never Open This Door" has a rubber cockroach rigged to fall out with a small radiation symbol on it's back.)
5 plastic and metal postings (signage)
Radiological Areas - List
Radiation Areas - Table
Contamination Areas - Table

Pictures Displayed on Display Boards:

None

Table-top Items (equipment, manuals, etc.):

Radiological Control Manual - tabbed

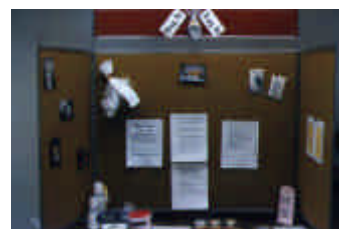


BAG IT AND TAG IT



Participants doing *Bag It and Tag It* are working with hypothetical low level radiological wastes to dispose of them according to local laboratory protocols and "Nevada" protocols. These require that all liquid wastes be solidified and that all of a bag or boxes contents be properly shoe-tagged.

The participants work with plaster of paris, Dixie cups, coffee stirrers, tape, plastic bags and low level radioactive waste bags on a liquid splash tray to "clean up" a spill (of H₂O) and properly fill out their LLW disposal tag.



Materials

Written/Reproduced Handouts Available to Students:

Brochure: Radioactive Material Control

Written Material Displayed on Display Boards:

Station Title

Info. Sheets:

- a) Radioactive Waste Minimization
- b) Scenario with Steps for Spills Management
- c) Low Level Radioactive Waste Record
(enlargement tag)

Pictures Displayed on Display Boards:

5 Photos of Radioactive Waste Receptacles, Solidifying Stations and Materials

Table-top Items (equipment, manuals, etc.):

Plaster of Paris
Dixie Cups
Stir Sticks
Tape
Paper Towels (decon wipes)
Low Level Waste Record Tags
"Contaminated" Respirator Filters
Vials of H₂O for "contamination spills"



PHOTO SHOOT



At *Photo Shoot*, participants first face an empty lab counter top with a jumble of work station set-up equipment (shields, etc.) off to one side. The objective of photo shoot is to set up an ideal workstation according to the pictures and instructions on the display board and take a Polaroid snapshot of the station when completed.

Participants evidently enjoy helping each other with this station and seeing their finished photos posted next to the progress chart with their name on the picture. Typically they will also "explain" to the proctor the ALARA principals they have used in creating their workstation.

Materials

Written/Reproduced Handouts Available to Students:

4 Pages on Application of ALARA Fundamentals in the Workplace and Use of Equipment and Materials

Written Material Displayed on Display Boards:

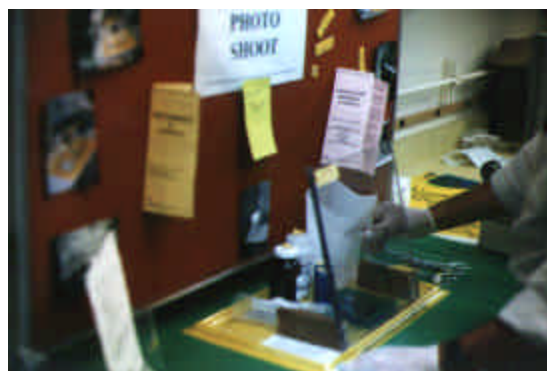
Station Title
Items to Use in Workplace Setup

Pictures Displayed on Display Boards:

12 of Exemplary Laboratory Work Station Set-ups

Table-top Items (equipment, manuals, etc.):

Plastic Shield and Splash Tray
Geiger Muller Counter
Safety Glasses
Bottles and Pigs with Velcro-backed Labels to Apply
Waste Bin Collector
Labels - rolls
Tongs, Gloves,
Tweezers
Absorbent Wipes
Polaroid Camera



BLACK BOX



The *Black Box* contains different types of instrumentation and function checks used for source identification, evaluation and monitoring. Dosimeters, ion chambers, new technology digital radiation meters, "antique" meters, types of probes, are displayed and available for "play." Pictures display the instruments in laboratory use. Students are expected to turn on all of the instruments and range them to obtain stated values associated with identified and labeled sources. This is a very noisy, very popular station that transitions directly to other stations using surveying and monitoring equipment.

Materials

Written/Reproduced Handouts Available to Students:

Brochure: Instruments and Surveys

Written Material Displayed on Display Boards:

Station Title
Table of Radioactive Detection Instruments
Instrument Function Tests
Determining Radiation Type
Estimating Total Radioactivity



Pictures Displayed on Display Boards:

7 Types of Monitors including Floor (mounted) Monitors in Use

Table-top Items (equipment, manuals, etc.):

Antique Geiger-Muller
Ion Chamber
New Geiger-Muller
Gamma and X-ray and Fast Neutron and
Gamma Pocket Ion Chambers
Electronic Dosimeters
Radon Detectors
Probe Types and Source Types (α, β, γ)

CODE BREAKER



Code Breaker is a very busy, intense station. It immediately follows *Black Box* and is designed so that the students use the skills they just practiced there. *Code Breaker* addresses direct survey techniques for the different common source types of radiation. A passage is to be decoded by the students using an alpha meter and a Geiger-Muller meter.

To characterize alpha from beta from gamma radiation sources, differing shielding materials are present for experimentation. Students try to decode the passage by finding words that correspond to their source types on a chart of possibilities. Proper identifications give the participants clues for solving the coded passage. Different shielding is provided to aid in the characterizing of items. This is a popular exercise that the students evidently relish. Because they inevitably enjoy sharing results with each other and will frequently team-up to help each other, we provide two and sometimes three chairs at this station.



Materials

Written/Reproduced Handouts Available to Students:

Code Breaker Passage - completion exercise
Table: Summary of Contamination Values

Written Material Displayed on Display Boards:

Station title
7 Information Sheets:
Types and Selection of Radiation Detection
Instruments, Survey Techniques and Hints for
Detecting
Source Types.

Pictures Displayed on Display Boards:

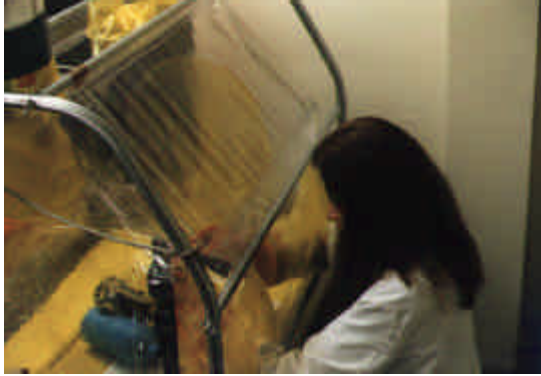
None

Table-top Items (equipment, manuals, etc.):

α meter
Geiger Muller meter
Sources:
Luminescent Panel
Gage
Pu-239 Source
Sr-90 Source
Smoke Detector
Fiestaware Plate
Lantern Mantles
3" x 3" Shielding Pieces:
Aluminum
Steel
Stainless Steel
Brass
Lead
Plastic
Wood
Rubber
Plexiglas



SWIPER



Swiping surveys are commonly performed in laboratories where removable contamination may have occurred. Low energy beta and some alpha contamination situations demand the use of glass fiber filters, along with good swiping techniques and a liquid scintillation counter for detection. This station simulates a swiping situation.

The students perform their swiping in a portable glove box on four items in a tray. They load their swipes in LSC bottles and remove them from the glove box. With the room lights off, they then shine a black light on the (fluorescein) contaminated swipes and note on their sketches (radiological survey forms) where they found contamination. This is a popular station because the student gets to turn off the lights and watch things glow in the dark.

Materials

Written/Reproduced Handouts Available to Students:

Radiation Survey Forms

Written Material Displayed on Display Boards:

Station Title

Information Sheets:

What Makes A Good Swiper

Radiation Swiping Techniques

Radiation Surveys Table

What to do - Checklist

Chart for Fluorescein Contamination



Pictures Displayed on Display Boards:

3 - of Liquid Scintillation Counter (LSC)

2 - of Radiation Wrist and Ring Badges in Use During Surveying

Table-top Items (equipment, manuals, etc.):

Portable Glove Box

Black Ray - μ V Portable Lantern

Boxes of Swipes (Type A/E Glass Fiber Work Best)

Boxes of LSC Bottles

Tweezers/Tongs

LSC Display Racks

Fluorescein And Liquid Palmolive Dish Soap (Lemon-Lime)

"Contaminated" Items:

Pressure Bottle

Magnehelic Gage

Gate Valve

Lever/Ball Valve



PAPERWORK PLACE



Do the paperwork to check out a "radioactive" apple or banana (isotope request form). Do the paperwork to dispose of your banana peel or apple core (closure card). Survey and document radiation as direct or indirect on the radiation survey form. Fill out a radiation dosimeter request and (be prepared to) input to a radiological work permit form.

The *Paperwork Place* station gives participants a chance to practice their paperwork for accountability for radioactive materials used in laboratories. Do it right - get a banana!

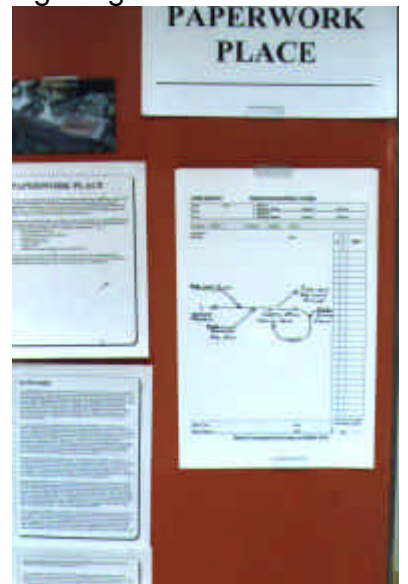
Materials

Written/Reproduced Handouts Available to Students:

Station Title
Paperwork Place Evaluation

Written Material Displayed on Display Boards:

Information sheets:
Low Level Radiation Waste Record
Isotope Request Form
Closure Card
Radiation Work Permit
Radiation Dosimeter Request Form
Radiation Survey Form



Pictures Displayed on Display Boards:

1 Closure Card on a Lab Counter

Table-top Items (equipment, manuals, etc.):

Apples and Bananas in a Small Refrigerator



GO FRISK



Frisk the tyvek clad mannequin. Participants find the contamination hot spots, identify the radiation type and fill out a survey form (report to ES&H).

Methods for frisking, dose limits and types of exposure are reviewed at the *Go Frisk* station. One each α , β , and γ source are strategically placed on the mannequin to result in "through the body" and hard-to-pin-down locations. This station is surprisingly challenging to even old-hand radiation workers and evidently great fun to do. Generally, participants are impressed by how difficult and effective frisking can be and by how much time good frisking requires.



Materials



Written/Reproduced Handouts Available to Students:

- Radiation Survey Form (human form outline)
- Worker Dosimetry
- Frisking Methods

Written Material Displayed Nearby:

- Station Title
- Types of Exposure
- Table: Dose Limits
- Outline: Dosimetry Process Sheet
- Pregnant Worker Considerations
- Frisking Methods

- Dose Related Definitions
- Self Monitoring (Frisking) Procedures

Pictures Displayed on Display Boards:

- Poster: Frisk With Your Friends

Table-top Items (equipment, manuals, etc.):

- Next to Mannequin:
 - Portable Lead Shield
 - Geiger Muller Counter

