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Question: How do you safely receive a shipment of radioactive materials?

Here is the process, step-by-step:

- 1) Wear Gloves and radiation monitoring badge
- 2) Inspect package for visual signs of damage or leak
 - a) If package appears damaged notify your radiation safety officer
- 3) Check for external radiation first at 1 meter (with ion chamber detector) and then at surface (wipe test)
 - a) Radiation level at 1 meter must fall below that of the transportation index indicated in the small rectangular box towards the bottom of the diamond label
 - i) If radiation level is much different than the transportation index you must notify your radiation safety officer and await instructions
 - ii) Ion chamber better than Geiger-Mueller counter as GM counter may over-respond
 - b) Wipe 300 cm² of surface of package and assay within a well counter
 - i) See institutional policies but generally 220 dpm/cm² is a common limit to stop and notify your radiation safety officer. If under this amount you may be able to decontaminate and proceed, although still notifying the RSO. If under 22 dpm/cm² you are good to go without decontamination or notifying RSO.
- 4) Remove packing slip if above is ok
 - a) Ensure that the correct material went to the correct recipient
- 5) Open outer and inner packaging and confirm the contents match that on the packing slip
- 6) Visually inspect shielded container for damage
 - a) If appears damaged wipe the container and assay in well counter
- 7) If all ok, don't forget to remove the radioactive labels and discard
 - a) You cannot discard the container with the radioactive label in place
- 8) Record the receipt of your package
 - a) Nuclear Regulatory Commission requires records be kept 3 years, agreement states may be 3-5 years
- 9) Return empty re-usable shipping box(es) to the vendor
 - a) Ensure no contamination on the package and de-contaminate if necessary.
 - b) Make sure to remove the radiation label

Question: What is an agreement state?

Each state can form an agreement with the NRC that they will provide primary oversight of radioactive materials in their own state and thus become an agreement state. Agreement states cannot have rules that are less strict than that of the NRC but they are allowed to have rules that are more strict, for example a requirement to maintain records for longer than the NRC requires.

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In a non-agreement state: NRC automatically oversees all reactor byproduct materials (such as Tc-99m or I131). Individual states automatically oversee all cyclotron (such as F18 or I123), x-ray sources such as mammo units, and naturally occurring radioactive materials. For agreement state: state will oversee all radioactive materials but must be at least as strict as the NRC.

Question: What should I know about radiation safety labels?

- 1) Colors: These are either white or yellow. There is 1 white label (so called White-1) and 2 Yellow labels (called Yellow II and Yellow III).
 - a) In order from lowest shipped activity to highest shipped activity is White I, Yellow II and Yellow III.
- 2) Transportation index is either 0 (white I), <1 mrem/hr (yellow II), 1-10 mrem/hr (yellow III), >10 mrem/hr (also yellow III but with special permission, so called "exclusive use provisions")
 - a) The transportation index is the activity detected at 1 meter by an ion chamber detector
- 3) By virtue of the label type you need to know what the maximum radiation level at the surface is as well. Note that wipe test is for removable radiation. This, on the other hand, is the measurement you would get with a survey meter like an ion chamber detector.
 - a) White I: <.005 mSv/hr (.5 mrem/hr)
 - b) Yellow II: above White 1 levels but <.5 mSv/hr (50 mrem/hr)
 - c) Yellow III: above Yellow II but <2 mSv/hr (200 mrem/hr)
 - d) Yellow III with exclusive use provisions: above standard Yellow II but <10 mSv/hr (1000 mrem/hr)

Label	Transportation Index (activity at 1 meter)	Activity at surface
White I	No detectable radiation	<.5 mrem/hr
Yellow II	<1 mrem/hr	<50 mrem/hr
Yellow III	1-10 mrem/hr	<200 mrem/hr
Yellow III with exclusive use provisions	>10 mrem/hr	<1000 mrem/hr

Question: How quickly must I complete the package check-in process?

You have 3 hours to survey at 1 meter and complete the wipe test when facility is open. If delivered after hours you have 3 hours from start of the next business day to complete these initial surveys.

Question: I know how to receive radioactive materials, but what do I do with the waste?

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- 1) "Decay in Storage"
 - a) Store waste until associated radiation decays to background levels as measured by Geiger-Mueller counter
 - i) Typically store for 10 half-lives to reach background
 - ii) For Tc-99m usually store for 1 week for convenience (for example empty trash every Friday). Other isotopes require longer storage times to reach background.
 - b) While in storage, needs to be secured, isolated, and shielded
 - i) Lead waste bins in secure area commonly used