THE OHIO STATE UNIVERSITY

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

RADIOACTIVE WASTE MANAGEMENT

AT

THE OHIO STATE UNIVERSITY

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

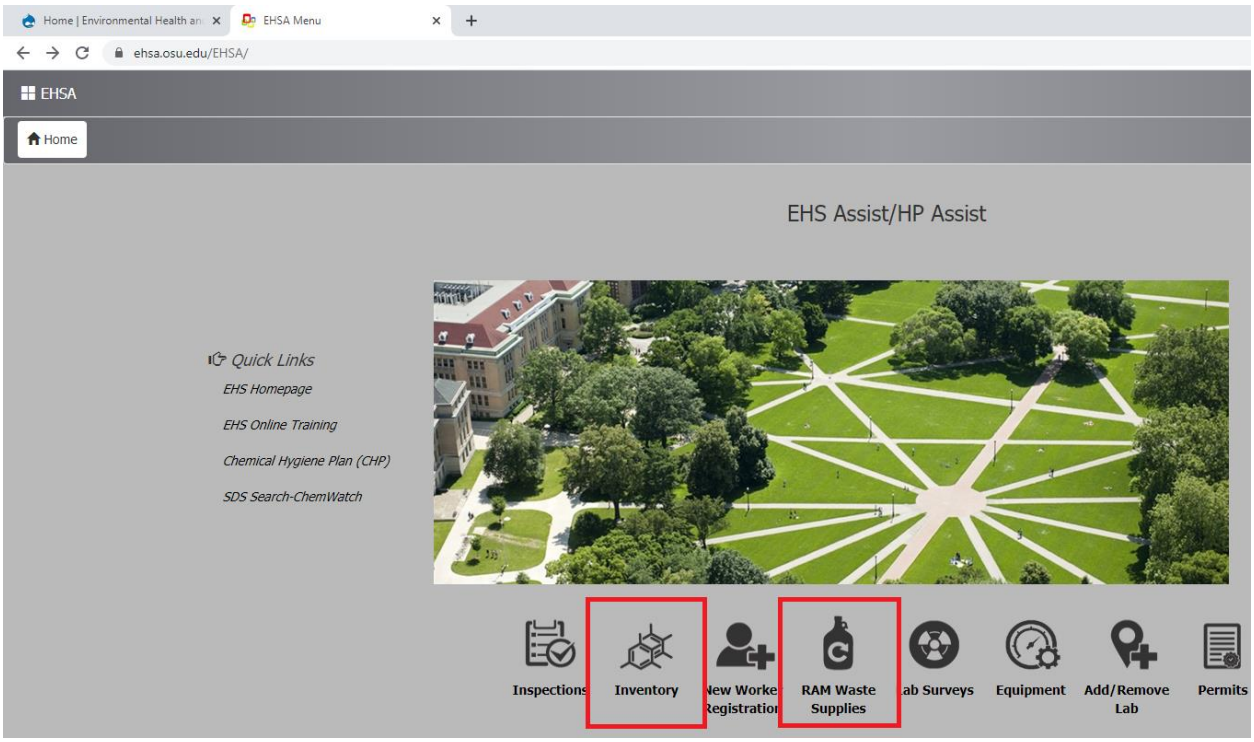
Contents

THE OHIO STATE UNIVERSITY

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

Getting Started

The home page for your EHS Assist account will look like this.

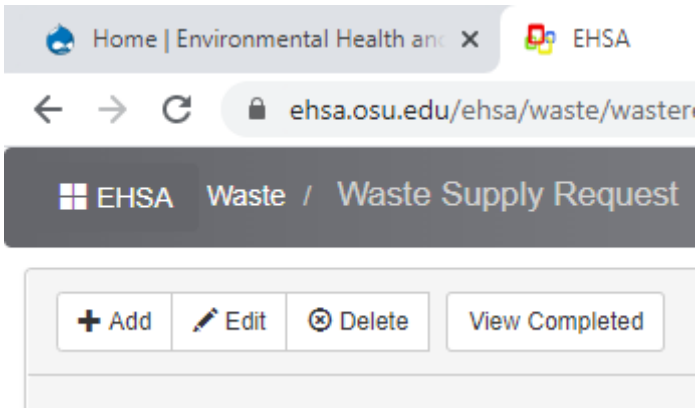


The “Inventory” and “RAM Waste Supplies” links at the bottom are the two links you will be using for radioactive waste purposes.

First you need a container. EHS provides 2 cubic-foot boxes and liners for solid waste, 2 gallon jugs for liquid waste and replacement liners for labs that do in-lab decay and storage of waste.

Clicking “RAM Waste Supplies on the home page will take you to a list of all incomplete waste supply requests that your lab has submitted.

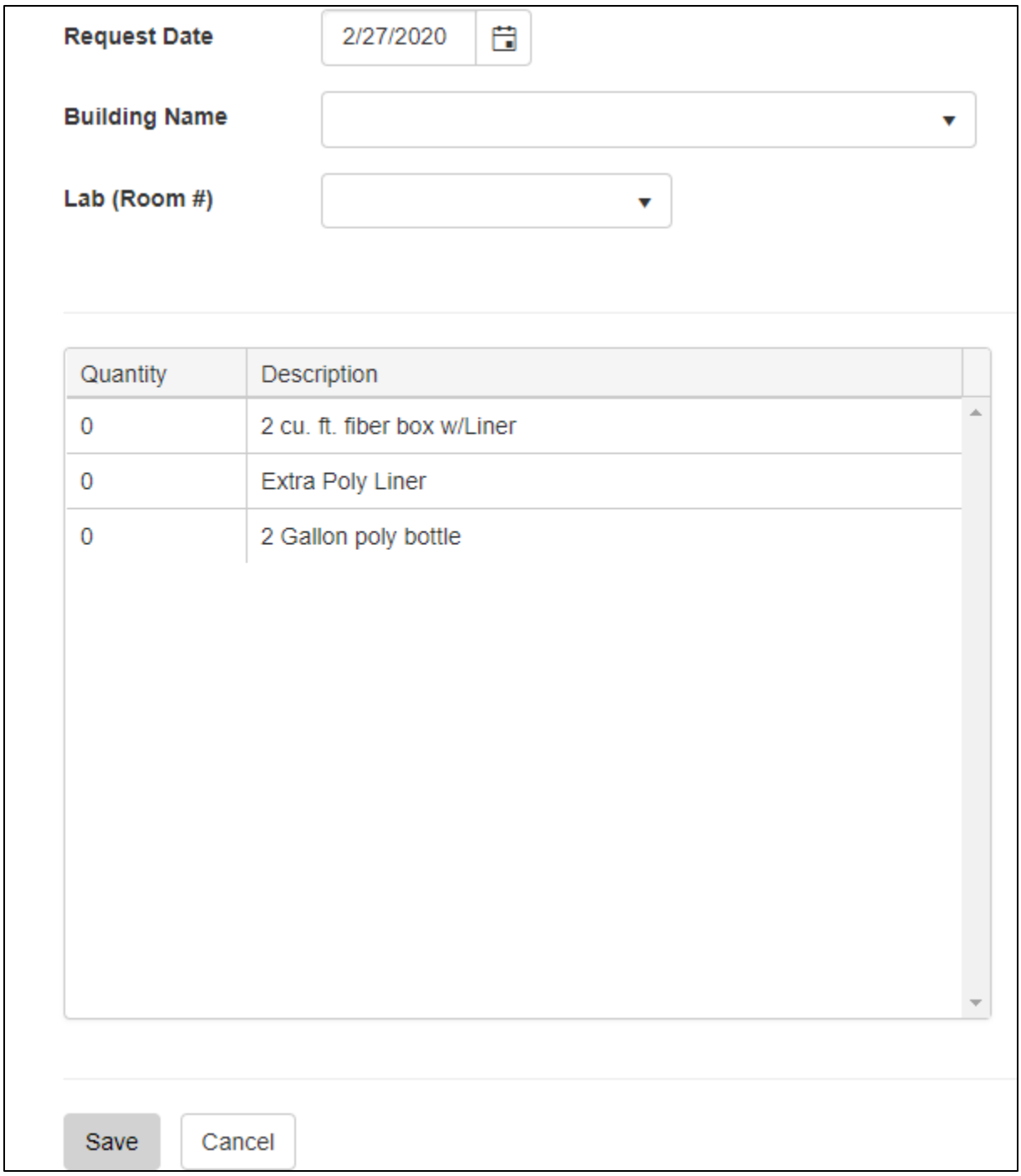
You can add a new request to the list or you can edit or delete an existing request. You can also view past requests.



Clicking the +Add button on this screen will allow you to create a new container request.

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

The left of the screen that appears will look like this:



Choose the building and room number you want the supplies delivered to.

Clicking in the “Quantity” column will allow you to specify how many of each container you want delivered.

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

On the same screen, to the right of the fields shown, will be a field in which comments can be entered related to the supply request. This field will also be used for radioactive waste related requests that cannot be initiated from EHS Assist; these will be discussed later.

Extra poly liners are only provided as replacements for labs who reuse boxes after waste they have been holding has decayed and been approved for disposal as non-radioactive by EHS. If safe lab practices are being followed there should be no reason to double-line a solid waste container.

Supplies are usually delivered within three working days of the request.

Containers not supplied by EHS.

The containers supplied by EHS are for dry solid waste and for bulk liquid waste. A researcher with a smaller lab may want to use smaller boxes for storage purposes. Many labs regularly generate scintillation vials, others generate animal carcasses both of which are better packaged in other containers. Specifics of packaging these types of waste will be discussed later, but container numbers should be assigned to them.

A sharps container may be used if applicable so long as it is properly labeled.

The infectious waste burn boxes provided by EHS should NOT be used to package radioactive waste.

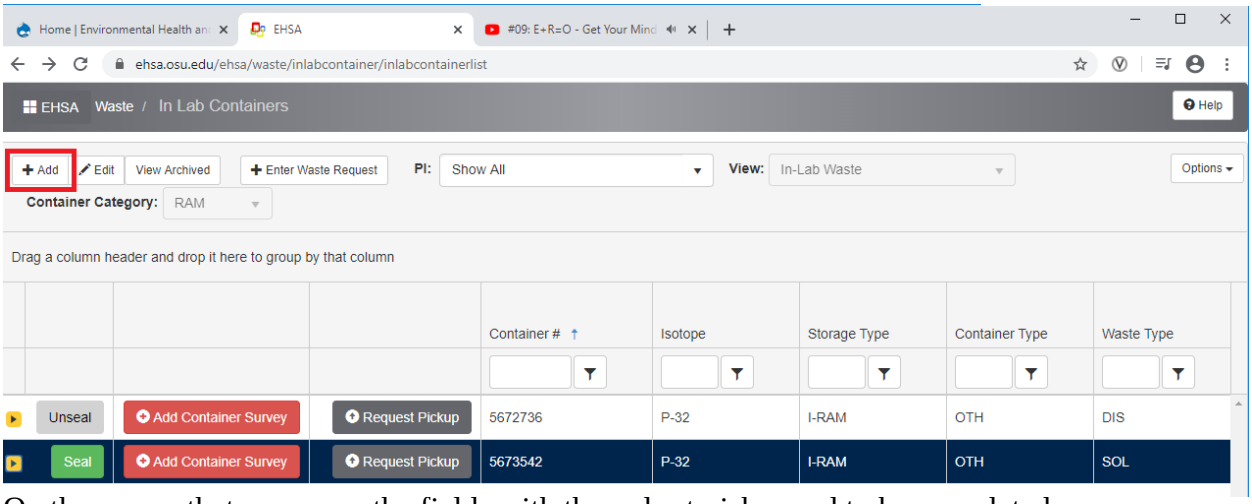
Generating Container Numbers

To get EHS Assist to assign a container number, you will want to go to click on the “Inventory” link at the bottom of the home page.

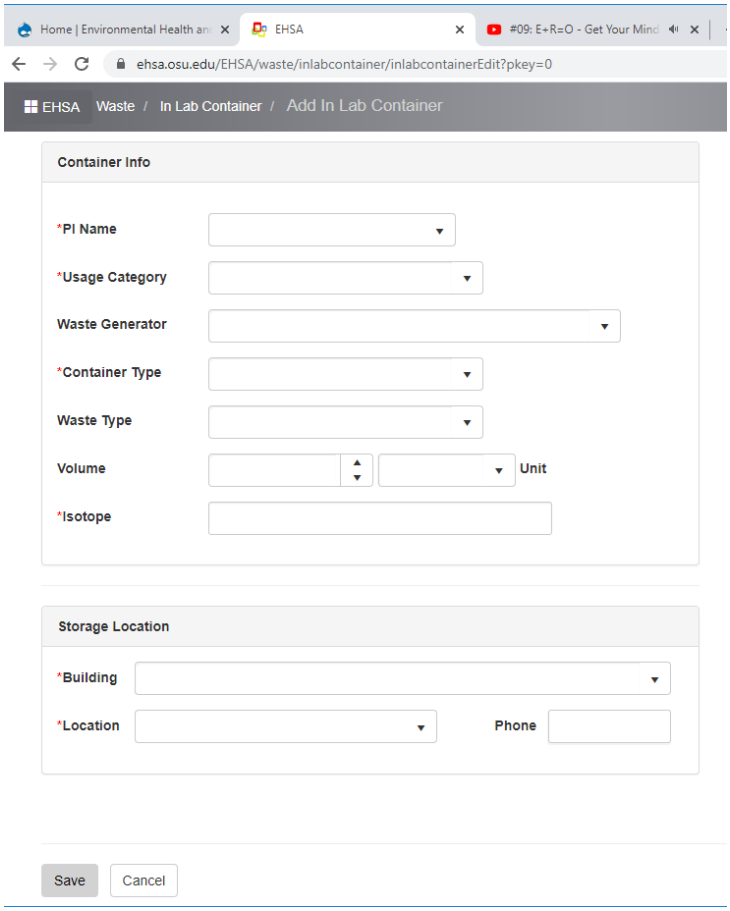
Use the “In-Lab Waste Containers” link to go to a list of your existing waste containers.

There will be a “+Add” button on the screen with this list.

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu



On the screen that comes up the fields with the red asterisks need to be completed.



"Usage Category" is the physical form of the waste to be put in this container.

Clicking in the isotope field will bring up a list of isotopes that your PI is approved for. You may click in this field multiple times to allow multiple isotopes to go into the same container but remember that you will want to keep your waste segregated by half-life.

When you go to record a transaction later on, EHS Assist will only call up the waste containers for the isotope of the stock vial that you are working with and the usage category that you choose to do a transaction for. If you have reason to put an isotope not previously selected into a container then you can come back to this screen and add the new isotope to the container.

THE OHIO STATE UNIVERSITY

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

Packaging Waste

In this section, reference will be made to packaging being labeled as containing radioactive material; it is required by law that the outer container be labeled if the package contains radioactive material. De Minimis waste (covered in the next section) is not considered to be radioactive and does not need to be labeled once it has been confirmed that the material in the package is de minimis. Other than labeling requirements, packaging of de minimis waste should be done the same as packaging of radioactive waste.

Solid Waste

As stated previously, EHS provides 2 cubic-foot boxes with liners on request. If alternate containers are used then the guidelines below should be followed for choosing a container to pack solid radioactive waste in.

- It shall be durable and in good condition.
- It shall have a liner (liners should be transparent or semi-transparent).
- It shall be sealable. It does not have to be kept sealed if it is still being actively used.
- It shall be labeled as containing radioactive material.

Restrictions

- Do not use containers larger than 2 cubic feet in volume without consulting EHS first.
- Containers should not have labels for any hazard other than radioactive material unless the other hazards are present. EHS should be consulted before the lab starts filling these boxes.
- Only small amounts of liquid are allowed to go into solid waste containers. You do not have to empty every microcentrifuge tube and partially full stock vials but larger volumes of liquid should not go into solid waste containers. For any single liquid containing item put into the waste container there should not be so much liquid that if that item were to come open a noticeable amount of liquid would pool in the bottom of the container.
- Do not put any volume of scintillation cocktail into solid waste.

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

- Lead should never be put in with radioactive waste. If you have cont
  EHS for instructions before packaging it.
- Sharps should be boxed in a separate container (sealable and sturdy enough to keep the sharps contained) which is labeled as containing sharps. There can be an entire box dedicated solely for packaging sharps or a smaller box that is later put inside a larger waste box.

What are sharps?

There is no official regulatory definition for what a sharp is so far as radioactive waste goes; the main concern is that if the waste needs to be sorted or repackaged we want to reduce the chances of a contaminated object breaking the skin. For medical research and animal husbandry there are more specific definitions sharps and guidelines on how they are to be packaged as waste. Some general guidelines for determining if something is a sharp are:

- If you were to stumble and place your hand on the object as you catch yourself, is it likely to puncture the skin?
- Does it come to a point or have a jagged edge?
- Was its original purpose for cutting?
- Is it made of glass and is it easily breakable?

Sharps	Non-Sharps*
Glass Pasteur pipettes	Plastic pipette tips
Razor blades	Micro-centrifuge tubes
Broken glass	
Easily breakable glass (glass plates or thin tubes)	
Contaminated equipment (scissors, lancets, etc.)	
Sharp pieces of wood	

*The more generalized definition of sharps used for non-radioactive waste would include some items on the non-sharp list and is used to describe items that might tear a regular trash bag (e.g. a plastic pipette tip). For the purpose of this manual only objects that are likely to be a radiological hazard (i.e. puncture skin and cause internal exposure) are being referred to as sharps. If properly packaged, the requirements for more generalized sharps will also be met.

Biologically contaminated sharps must go in a red bio-sharp container. This is any waste generated on an IBC protocol.

If the sharps were used on an IACUC protocol but not on an IBC protocol then they should be in a rigid plastic container.

Sharps not associatied with an IACUC or IBC protocol can be packed in cardboard so long as the container can be sealed without waste protruding (e.g. no points coming out of box corners).

THE OHIO STATE UNIVERSITY

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

Scintillation Vials

There are three acceptable ways to pack vials. For all three, it is required that the outer box be labeled as containing radioactive material unless the vials qualify as de minimis waste. The three methods are listed from the most preferred to the least preferred:

1) Save the same packaging (trays and box) that the empty, unused vials came in and use them to package the vials.
2) If the vial trays have been saved but not the outer box then put the trays in another box. If the box used is large enough that the trays might slide around then put some packing material (newspaper, folded up cardboard, etc.) to keep them from doing so. **DO NOT** slide a tray in sideways even if there is enough room to fit one. Do not use a box so big that it will be too heavy to lift; five or six trays is the maximum amount that should be put in a box.

☆**NOTE:** There are two reasons why using vial trays is preferred – to keep the vials upright so that they do not leak in storage and to keep the vials from spilling when the waste is processed.

3) If there are no vial trays available, double line a box with plastic bags and put the vials in it. Make sure that the liners are strong enough to hold the weight of the vials if they were to be removed from the box. If the vials are being held for decay-in-storage then this is **not** a good method to use – you will have to recount some of the vials and if they have not been stored right-side up then there is a good chance that cocktail will have leaked out while they were in storage.

EHS has done contamination checks on some of the vial trays that we have picked up in the past and set them aside in case labs need them. We do not have a large supply, so please keep requests down to 10 trays or less.

Most brands of scintillation vials do not seal well enough to prevent cocktail from leaking out, so we emphasize to keep them right-side up as much as possible. Also, most cocktails will readily soak through a plastic bag so double or triple line your boxes if you have no vial trays.

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

Bulk Liquid

As stated previously, EHS provides 2-gallon jugs on request (the jug in the picture is not labeled, we provide those too). Other containers can be used as long as they match the following requirements.

- They will have a properly fitting lid so that they can be sealed.
- They should be plastic. If there is a chemical present that cannot be stored in plastic contact EHS before you start to fill the container.
- Containers should not be larger than the 2-gallon jugs that we provide. For transportation of liquid radioactive waste EHS will bring a 5-gallon bucket to double contain the waste; anything larger than the jugs we provide will not fit in one of our buckets.

Liquid waste guidelines

- Do not mix aqueous and organic liquids.
- When you submit a waste request for liquid waste to be picked up, we will want to know all of the chemicals that are in the container. Even if just water was used as a solvent, we still want to know that that there is water in the container.

Mixed liquid waste

If there are hazards other than radioactivity present in liquid waste (flammable, corrosive, toxic, etc.) it may be more expensive to dispose of. If we ship waste off campus without knowing what is in it and the receiver determines that it is mixed waste, it becomes more expensive. We need to know what chemicals are present before EHS will take liquid waste from a lab.

Carcasses

Individual carcasses shall be individually triple wrapped in clear plastic (no aluminum foil) and sealed in cardboard boxes (1 cubic foot or smaller) which are labeled as containing radioactive material (unless de minimis). Carcasses should be kept frozen until the time of pick up.

☆ For storage purposes, you may want to put the empty box in your freezer ahead of time so that you know you will have space to store it when it is full and waiting to be picked up.

THE OHIO STATE UNIVERSITY

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

De Minimis Waste

For waste to be classified as de minimis there are three qualifications it must meet:

- The only isotopes that can be de minimis are H-3 and C-14.
- The waste can only be scintillation cocktail or animal carcasses (or tissue).
- The activity concentration must be equal to or less than 0.05 μCi/mL of scintillation cocktail or 0.05 μCi/g of animal tissue.

The three forms that de minimis waste will take are scintillation vials, bulk scintillation cocktail, and animal carcasses or tissue. On rare occasions scintillation cocktail may be counted in well plates; these can be treated as vials.

A De Minimis Verification Form needs to be completed for each container to be picked up; these can be found on the EHS website using the resource search function (keyword "de minimis" will find them). The form used will differ depending on the waste – RS-16 for scintillation vials, RS-17 for bulk liquid, and RS-18 for carcasses.

Vials

Using the definition of de minimis for scintillation cocktail, $\leq$ 0.05 μCi/mL, we can calculate that $\leq$ 111,000 dpm/mL qualifies as de minimis. This makes it possible to sort out the hot vials from the de minimis vials in advance. For example, if you use 5 mL of cocktail per vial then any vial that counts as 555,000 dpm or less is de minimis. This is dpm, not cpm, so if your scintillation counter does not do a cpm to dpm conversion then you will have to remember to do one before assuming that a vial is de minimis.

To fill out the RS-16 you will need the dpm of the hottest vial in the box. Knowing the threshold between de minimis and hot for the work that you do and keeping a record of the highest dpm that goes into a box will make it easier to fill out the form. If you do not keep track of the highest dpm going into a box then you will have to rerun a representative sample of the vials (at least 10%) and use the highest count you get to complete the RS-16 form.

A tray of vials is not considered to be a box.

Individual trays do not get their own waste container number and you do not need to fill out a separate RS-16 for each tray of vials.

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

Bulk Liquid

To fill out the RS-17 form you will need to count a 1 mL sample of the cocktail.

Carcasses

Collecting the data needed to fill out the RS-18 form is going to rely primarily on the procedures used for the animals. If the entire animal is being disposed of then its entire mass may be used when calculating the activity concentration even if isotope used is expected to be localized in only a portion of the carcass.

Damaged Containers

Boxes - Cardboard boxes are the containers that are most likely to become damaged. There are a few reasons why this may happen:

- Age – The integrity of a box can weaken over time. Labs that do less work may have an open container for longer and it can degrade.
- Water Damage – Getting cardboard wet and letting it dry out will weaken it. Plumbing leaks, being stored in damp and musty areas, and being frequently brushed against with a mop have all caused boxes to become damaged in the past.
- Wax – There have been occasions where labs have had their floors waxed and waste containers were put back in the lab before the wax had properly dried and gotten stuck to the floor. The boxes couldn't be removed without damaging them.
- Vermin – Even when there is nothing in a waste container that would be considered food, there have been times when labs have found that something has chewed on their waste box.
- Rough Handling – Normal lab activities shouldn't lead to boxes being crushed or punctured, but there is the possibility that an accident will lead to something falling on or against a box and damaging it.

If a cardboard waste container is found to be damaged it should be replaced. If the box has a liner as it should then it is simply a matter of transferring the liner to a new box.

Liquid – It is unlikely that a plastic jug will get damaged, but age and dry rot can cause them to degrade. If the damage is above the level of the liquid then it may be possible to transfer it to another container. Otherwise the waste will be leaking and should be reported as a spill.

Vials – If a vial is dropped and it breaks it should be treated as a spill. If vials are not stored right-side up then cocktail can leak out and the container they are stored in should be surveyed for contamination and replaced.

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

Storing Waste

This section deals with storing waste both while the container is still in active use and after it has been sealed. Due to the number of labs on campus and the varying resources available to each, it isn't possible to come up with a standard policy to cover all circumstances. The four most prevalent issues are going to be looked at here.

1 – ALARA

Keeping exposures As Low As Reasonably Achievable is always going to be a goal. There are four principles involved with the ALARA philosophy: time, distance, shielding, and containment.

Time and Distance – Most labs don't have the luxury of space. Being able to designate a part of the lab for waste storage can cut down on the amount of time workers have to spend around it as well as put distance between workers and waste. Open waste containers are more likely going to be kept in or near the area where RAM is handled in the lab; do not rush procedures to cut down on time. Some departments have shared storage rooms for waste; using these are probably the best way to utilize time and shielding in practicing ALARA; some guidelines for shared spaces are given later.

Shielding – One thing to consider about shielding is whether or not it is really needed. For weak beta emitters the waste container itself is sometimes enough to shield the material it contains. Stronger beta emitters and gamma emitters may not need to be shielded if only low activities are used. The best way to determine if a container needs shielding is to check it with a survey meter. Take readings at the surface of the package and a reading about one foot away from the highest surface reading and see how much the readings drop. Also consider the amount of time people will be spending in the area. If in doubt, call Radiation Safety for help evaluating shielding needs. Wood is a reasonably good shield against beta emitters; sometimes putting a container in a cabinet is all the shielding that is required. The problem with wood is that it is also porous and can easily absorb contaminants that gets on it. An eighth to a quarter inch of plexiglass works for P-32. This won't necessarily stop all of the radiation coming off of it but should block the majority. Lead works best for gamma emitters. Lead should not be used to shield P-32 or other high energy beta emitters.

Containment – Containment, for ALARA purposes, is either containing yourself to keep contamination off of you (using personal protective equipment) or containing the material to keep contamination from spreading. For waste storage we are looking at the latter. A secondary storage container for liquid is an example of containment. For solid waste make sure that the waste goes into the liner and not between the liner and the box. Make sure that the liner is sealed properly when the box is sealed.

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

2 - Containers within Containers

Occasionally people will ask a question like, “Can we keep a small box in our fume hood to put pipette tips in and then, when it is full, put that into our waste container?” The answer is, yes. In fact, that is a good way to incorporate the time and distance principles of ALARA in your work area. There are a few things to remember if you do something like this:

- The box in the fume hood has to be labeled as containing radioactive material.
- In your on-line records you will be using the container number for the larger box to do transactions. Make sure that the smaller box is put in the larger box before it is sealed.
- Similarly, make sure that you leave enough room in the larger box to include the smaller box.

3 – Shared Storage Spaces

As mentioned earlier, some departments may designate a room where radioactive material can be stored. Some guidelines for using these spaces are:

- Make sure that each container is clearly labeled with the principle investigator who generated it. This will be the person who submitted the protocol to use radioactive material to the URSC, not the lab manager or person who handled the radioactive material.
- The building coordinator is not responsible for waste stored in shared storage rooms and should not be expected to schedule waste pickups or decay checks.
- If the space is used to store non-radioactive items then the labs storing waste there are responsible for doing so in such a way that it is not a hazard to other researchers.
- These rooms generally don’t need to be surveyed because they are storage only. As such, containers should be sealed prior to being moved into them. If it becomes necessary to reopen a container it should be taken back to the PI’s lab to do so.
- If a violation is found in a shared storage room and 1) the inspector cannot determine who is responsible and 2) nobody steps forward claiming responsibility for it then the violation may be assigned to every supervisor who uses the room for storage.

4 - Container Integrity

This has been discussed above under “Damaged Containers.” If there is a shared storage space then the building coordinator should let the individual labs know if there were any flooding issues, but it is still the labs’ responsibility to repackage their own waste.

If the waste is in a container provided by EHS then we can provide replacements.

THE OHIO STATE UNIVERSITY

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

Decay-in-Storage

Under certain circumstances, Ohio State University is allowed to dispose of waste as non-radioactive after letting it decay. The qualifications for this are:

- The longest half-life present is 120 days or less.
- The container is sealed and the date it was sealed is on the outside of the container. Even though the sealed date can be entered on-line it should still be marked on the container.
- The container has been surveyed, Radiation Safety has reviewed the results to confirm that there are no discernable counts above background, and Radiation Safety has approved the waste for disposal as non-radioactive.

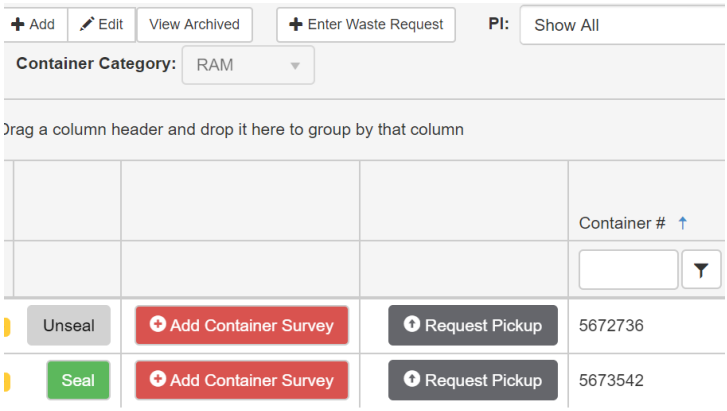
It typically takes about 10 half-lives before waste has decayed so that it is no longer discernable from background.

Storing Material

All containers being held for decay-in-storage are required to be labeled as containing radioactive material until they have been checked and approved as non-radioactive. When the material is disposed of there can be no "radiation" markings, "radioactive material" markings or radiation symbols on it. These markings should be defaced before putting them in the waste container (if the outer container is properly labeled then the contents don't have to be) otherwise the lab will have to go through and deface them after the material has been released.

To seal the container on-line go to your waste inventory and click on the "Seal" button for that container. When a container has been sealed for 10 half-lives it will be highlighted in blue on this list.

The date the container was sealed should be marked on the outside of the container.

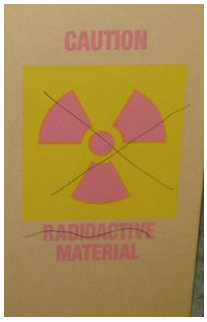


Solid Waste and Carcasses

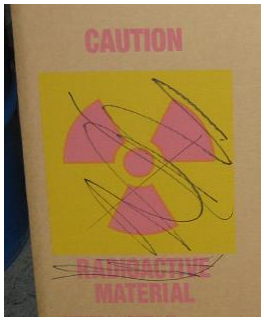
Once solid waste or carcasses have been cleared by EHS as non-radioactive they may be disposed of as they would for their contents. Carcasses and some solid waste will have to be repackaged as biohazardous. Any radioactive markings on the container will need to be defaced.

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

Defacing Waste Containers

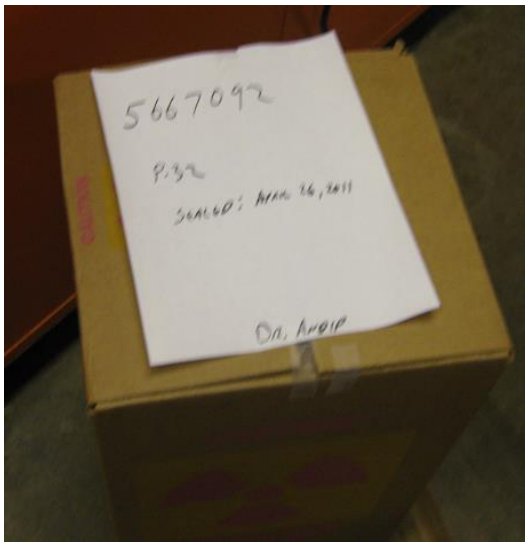


No



No

Yes



Boxes used to store decay-in-storage waste may be reused but you will have to request a replacement liner when you put in a request to have the material decay checked.

If you are going to reuse a box then any information written on the box from its previous use – container number, seal date, etc. – should be crossed out first. Alternatively, keeping this information on a separate sheet of paper taped to the box will reduce future confusion.

Consider the physical condition that a box is in before reusing it.

Liquid Waste

A sample of the waste should be recounted and the results sent to EHS before liquid waste is checked for decay; 1 mL of waste to 5 mL or 10 mL of cocktail (depending on the size vial available) is recommended.

As with solid waste, once approved as non-radioactive liquid waste should be disposed of as is appropriate for the contents present. In most cases this will be as a solvent pick up.

Scintillation Vials

A representative sample (at least 10%) of scintillation vials will need to be recounted and the results sent to EHS before they can be checked for decay. If approved for disposal as non-radioactive EHS will arrange for them to be picked up.

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

Waste Not Released from Decay-In-Storage

After 10 half-lives waste should have decayed to about 0.1% of its original activity. Depending on the activity at the time the waste was sealed some waste may need to sit for a few more half-lives after being checked and have a second decay check scheduled for later.

Survey meters used to detect gamma emitters can be overly sensitive and there may be times when it is hard to tell if readings are above background or just fluctuations. It may be deemed safer to hold the material longer rather than approving it as non-radioactive.

There are occasions when radioactive material is contaminated with an isotope with a longer half-life when manufactured. This usually does not happen with the commonly used isotopes (H-3, C-14, S-35, P-32, I-125, Cr-51) but it does happen sometimes with less frequently used isotopes. It may be necessary to dispose of some waste as long-lived due to these contaminants.

Other Waste

There is some non-radioactive waste that will still be scheduled for pickup with radioactive waste. These requests will be made using the “Comments” field of the container request page.

Lead

Lead pigs will need to be surveyed and confirmed to be not contaminated before they can be disposed. They will not be picked up until survey results have been sent to EHS. If lead is found to be contaminated contact EHS to evaluate the situation.

Stock vials should be put in your solid waste and not left in the lead pigs.

If we cannot lift a box of lead or it looks as if the weight may compromise the integrity of the box we will not take it – a dozen pigs per box is usually a safe maximum. Larger pieces of lead like sheet lead or lead bricks may have to have a special pickup scheduled.

Clean Survey Vials

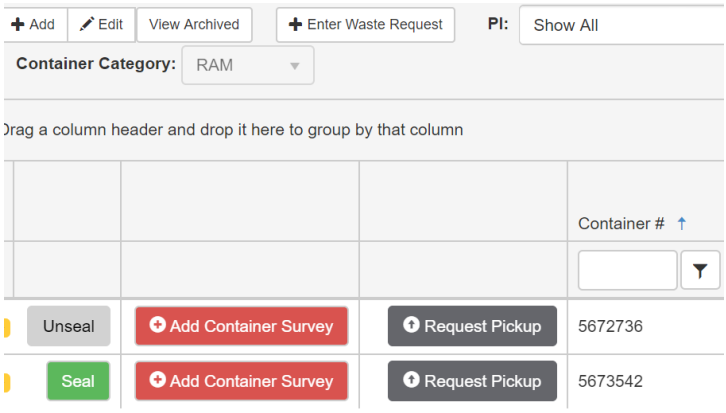
More often than not weekly contamination surveys will not find contamination. The clean scintillation vials should still be packaged as scintillation vials and picked up by EHS. If the lab generated de minimis H-3 or C-14 they can put these clean vials in with their de minimis waste, otherwise they will not have a container number for these vials. When scheduling these as “clean survey vials,” remember to indicate the number of boxes you have to pick up.

THE OHIO STATE UNIVERSITY

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

Scheduling a Waste Pickup

To request a container be picked up it must be sealed in your on-line waste inventory (green button) and a contamination survey must be entered for it (red button).



The contamination survey must cover at least 300 cm^2 of the container surface and is entered in dpm/cm^2 (divide the swipe result by 300). The survey should be less than 240 dpm/cm^2 for beta and gamma emitters or 24 dpm/cm^2 for alpha emitters.

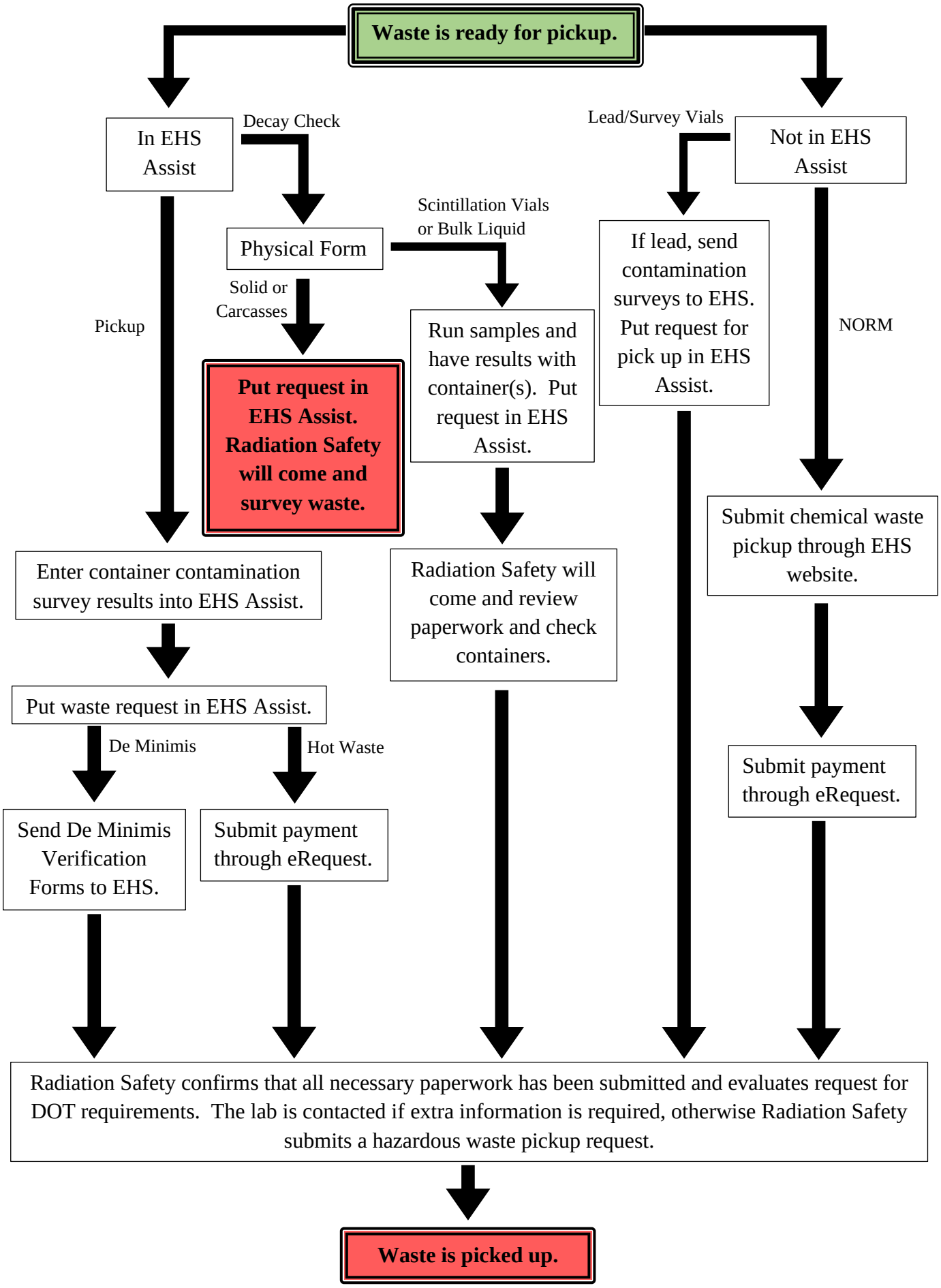
Clicking the black button will bring a pop-up box asking if you want this to be a decay check or not. If it is a decay check then you will not need a smear wipe survey of the container, if it is a pick up then you will need one.

Each container selected will be sent to EHS as a separate waste pick up request.

Any paperwork required - de minimis forms, samples for decayed liquid or scintillation vials, or contamination surveys of lead - should be sent to EHS at:

radiation.safety@osu.edu

If billing is required for the waste pickup then an e-request needs to be made for it.


Waste is ready for pickup.
In EHS Assist
Decay Check
Lead/Survey Vials
Not in EHS Assist
Physical Form
Scintillation Vials or Bulk Liquid
If lead, send contamination surveys to EHS. Put request for pick up in EHS Assist.
Pickup
Solid or Carcasses
NORM
Run samples and have results with container(s). Put request in EHS Assist.
Put request in EHS Assist. Radiation Safety will come and survey waste.
Submit chemical waste pickup through EHS website.
Enter container contamination survey results into EHS Assist.
Radiation Safety will come and review paperwork and check containers.
Put waste request in EHS Assist.
De Minimis
Hot Waste
Submit payment through eRequest.
Send De Minimis Verification Forms to EHS.
Submit payment through eRequest.
Radiation Safety confirms that all necessary paperwork has been submitted and evaluates request for DOT requirements. The lab is contacted if extra information is required, otherwise Radiation Safety submits a hazardous waste pickup request.
Waste is picked up.

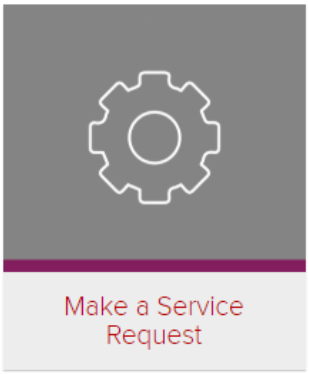
THE OHIO STATE UNIVERSITY

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

NORM

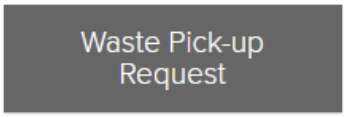
Naturally Occurring Radioactive Material

Naturally occurring uranium and thorium may be purchased without a state or federal permit and does not require a protocol with EHS to obtain. When it comes time to dispose of it, even if it is an unopened bottle, it is considered to have been processed material and is regulated.



A lab will enter NORM into their chemical inventory after is it purchased; they will not be able to put it into a radioactive waste container and there will be no container number assigned to it.

They will request that it be picked up by submitting a chemical waste request from the EHS website. From the home page select



"Make a Service Request" then select "Waste Pick-Up Request" on the page that comes up.

When submitting a request remember to include all chemicals present.

An eRequest to pay for the disposal of NORM must be submitted before it is picked up. Solid NORM is billed by weight, so if you are using a plastic bucket as a waste container then you should put a liner in it or you may be paying for an extra two pounds if the bucket gets contaminated. Some forms of NORM (e.g. uranyl nitrate) are naturally considered to be mixed hazard waste and will be more expensive.

Sealed Sources

Arrangements to dispose of sealed sources will be made through the EHS inspector for your lab.

Some devices contain sources that may not appear on your RAM inventory. In most cases the PI should have a sealed source permit for the source, but not always. Many gas chromatographs and electron capture devices contain sources that will be on a sealed source permit, sources in liquid scintillation counters usually are not. Removal of a source from a device should be done by a representative of the device manufacturer, somebody certified by the manufacturer, or an EHS representative.

THE OHIO STATE UNIVERSITY

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

Billing Rates

The following are the billing rates for radioactive waste for the fiscal year July 2020 through June 2021. Rates may increase; the usual rate of increase is 2% per year.

Lab Waste – non-NORM – radioactive only (no other hazards present)

Short Lived Waste (half-life less than or equal to 120 days)		
	Cost	**Unit**
solid, carcasses, scintillation vials	$140.76	cubic foot
bulk liquid	$70.38	gallon
Long Lived Waste (half-life greater than 120 days)		
	Cost	**Unit**
solid, "hot" carcasses	$332.20	cubic foot
bulk liquid (hot sinkable)	$40	gallon
bulk liquid (not hot sinkable)	$166.10	gallon

NORM – radioactive only (no other hazards present)

	Cost	**Unit**
Solid	$42.75	pound
Liquid	$42.75	gallon

Mixed Waste – Waste that contains hazards other than radioactivity are more expensive to dispose of. EHS gets a quote from the broker who disposes our waste and charges that and labor for the disposal. Labor is time that EHS must spend to prepare the material for shipment; usually this is only a few minutes and not charge is made.

The cost for mixed liquid waste is tiered per volume. Up to 5 gallons is one price; the price to dispose of 1 gallon is the same as the price to dispose 5 gallons. Between 5 and 30 gallons is another price. Coordinating disposals with other labs to split the price will save money, but make sure that EHS knows this is happening before requesting a billing estimate.

The hazard present will also affect the cost. Corrosive liquids cost about twice as much as flammable liquids to dispose of.

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

Long Lived "Hot" Scintillation Vials – Scintillation vials that cannot be held and are not de minimis are also expensive to dispose of and are billed like mixed waste (since most scintillation cocktails are flammable they are actually a specific form of mixed waste).

Sealed Sources – Sources removed from electron capture devices and liquid scintillation counters are $600.00 apiece. Otherwise we need to get an estimate from our broker for sealed sources.

Contaminated Lead – Lead that is found to be contaminated and cannot be cleaned will be billed according to a price supplied by our broker.

Free Items

There is no charge for the following items. They should still be properly packaged if applicable.

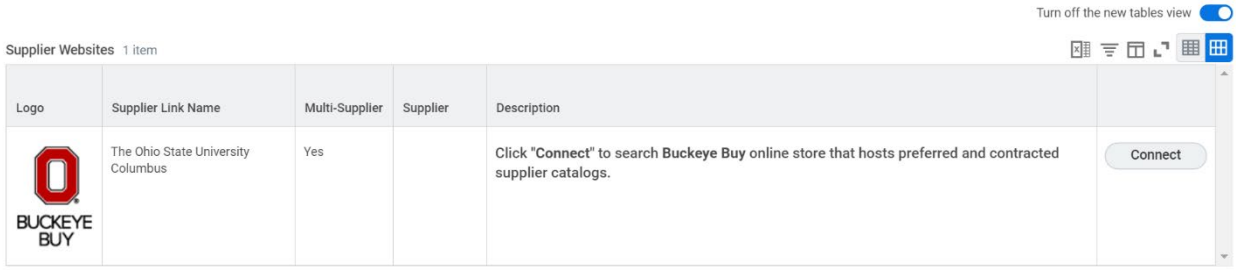
- De minimis waste
- Non-contaminated weekly survey vials
- Decayed scintillation vials
- Uncontaminated lead
- Empty, unused waste containers
- In-lab decay checks

THE OHIO STATE UNIVERSITY

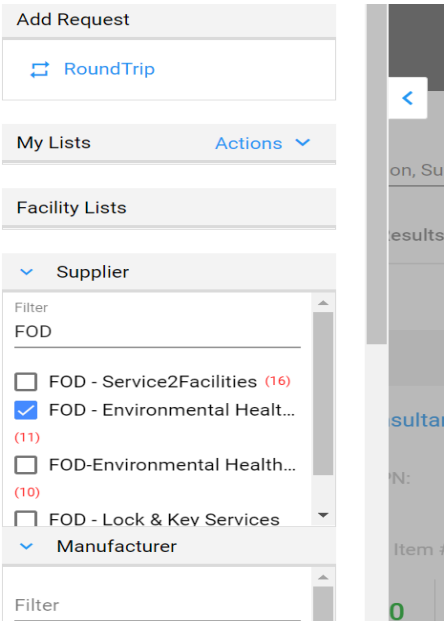
Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

Workday Rad Waste Request Procedure

- Login to Workday
- Select: **Request Travel or Purchase**
- Select: **Request to procure goods and/or services**
- Requisition Type: **Buckeye Buy** (complete required fields per requestor's worktags)
- Press**: OK**
- Select Option: **Connect to Supplier Website and click "Connect" to Buckeye Buy**



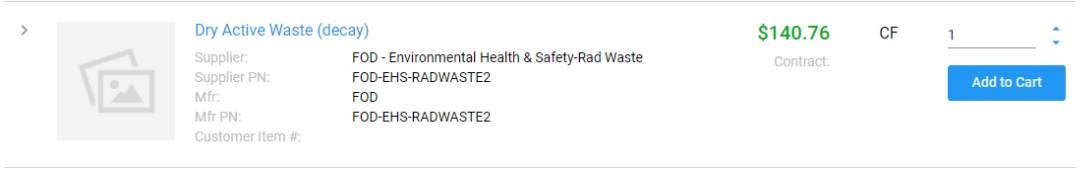
- Under **Supplier**, in the **Filter** line: type **FOD-Environmental Health & Safety-Rad Waste** and click box. (Use < to remove side bar)



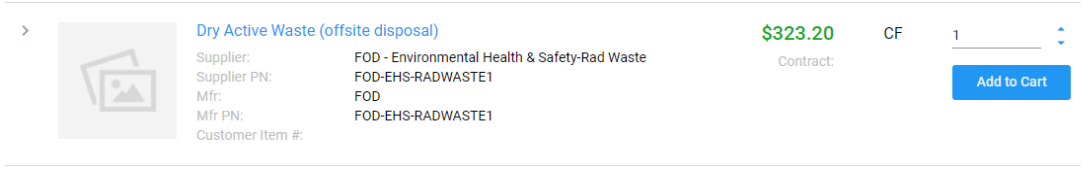
Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

- **Choose the correct items to add to cart (of the four applicable to rad waste):**

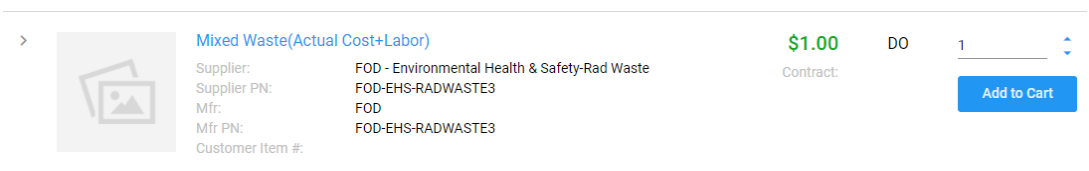
  - **Dry Active Waste (decay) @ $140.76 per cubic foot**
    Dry Active Waste (decay) is short-lived waste (half-life of 120 days or less)



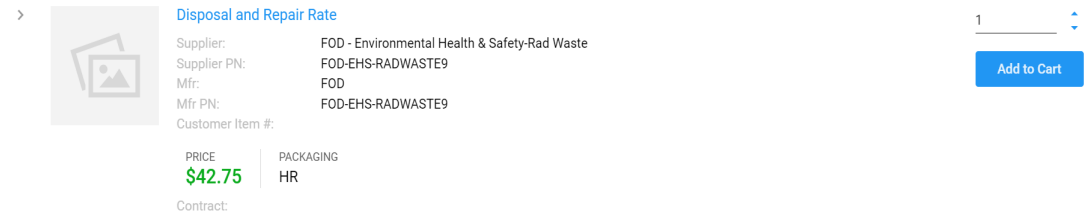
  - **Dry Active Waste (offsite disposal) @ $323.20 per cubic foot**
    Dry Active Waste (offsite disposal) is long-lived waste (half-life greater than 120 days).



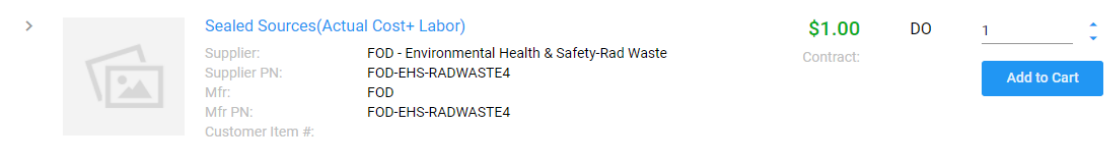
  - **Mixed Waste (Actual Cost + Labor) @ quote required before a Workday Request is submitted you will need to contact radiation.safety@osu.edu to get a quote. This includes NORM Mixed Waste (Natural Uranium and Thorium).**



  - **For NORM Uranium and Thorium (Not Mixed Waste) choose Disposal and Repairs @ $42.75 per pound or gallon.**



  - **Sealed Sources (Actual Cost + Labor) @ quote required before a Workday Request is submitted you will need to contact radiation.safety@osu.edu to get a quote.**



Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
614-292-2874 Fax
ehs.osu.edu

- After all items have been selected, click on **cart** in the upper right corner.
- Review cart for accuracy and click **"Submit"** and follow prompts to complete request.

- Once the Workday request has been forwarded to EHS and items/quantities have been confirmed by the staff, EHS will put the request on the waste pickup schedule.
  NOTE: The default packaging for solid waste is cubic feet (CF). The quantity may need to be adjusted to reflect the actual amount present and billed to the department accordingly.

The purchase orders that come to EHS do not always have the information that we need to match them up to a waste pickup request. Entering the PI and location in the comment section will help to facilitate the process.