

RADIOACTIVE				
Finding	Inspection Form Question	Best Practices	Regulatory Citation	Corrective Action(s):
Area is not registered for the use of lasers	If a laser is being used, is it currently registered with the Radiation Safety Office?	Area is not registered for the use of lasers: Lasers may only be stored and used in areas registered with the Radiation Safety Office.		Contact the Radiation Safety Officer to register this area or cease the use of lasers in this area.
Authorization for use of radioactive materials is not current	Is the authorization for use current?	Authorization for use of radioactive materials is not current: Radioactive materials may not be stored or used without proper authorization by the Radiation Safety Committee.	UMB Radiation Safety Program 1.5.1 & 1.5.5	Contact the Radiation Safety Office as soon as possible to renew your authorization.
Efficiency sheets are not provided with wipe test results	Are efficiency sheets provided with wipe test results when not automatically calculated by the equipment?	Efficiency sheets are not provided with wipe test results: When efficiency is not automatically calculated by the liquid scintillation or gamma counter, a manual calculation of efficiency must be provided with each wipe test.		Complete the Contamination Wipe Survey Result form located on the UMB EHS website to document efficiency with each wipe test.
Improper disposal of lead storage containers, or "lead pigs"	Are lead storage containers returned to EHS for disposal?	Improper disposal of lead storage containers, or "lead pigs": Lead storage containers should be returned to UMB EHS for disposal and not placed in radioactive waste containers.		Submit a radioactive waste pick-up request for all lead storage containers listed.
Improper disposal of nuclides down sanitary sewer	Are only authorized nuclides below the permitted levels disposed of in the sanitary sewer?	Improper disposal of nuclides down sanitary sewer: Only nuclides authorized for disposal down the sanitary sewer may be disposed of at this location. Activity of nuclides disposed must be within authorized limits.	COMAR D. 1003; UMB Radiation Safety Program 9.2.3 & 9.4	Radioactive liquid disposal to the sanitary sewer is only permitted for those nuclides listed in the sewer disposal permit and may not exceed the permitted level. Revisions to the limits can be requested by contacting the Radiation Safety Officer.
Improper disposal of radioactively contaminated waste	Are the biohazardous, chemical, regular trash, and glass recycling free of radioactive waste?	Improper disposal of radioactively contaminated waste: Radioactive waste should not be disposed via other waste streams. Dispose radioactive waste only in appropriately labeled radioactive waste containers.	COMAR D.9.04; UMB Radiation Safety Program 9.1 & 9.4	Items contaminated with radioactivity must be collected in appropriately labeled radioactive waste containers for disposal through UMB EHS.
Inadequate or inappropriate signage at sewer disposal locations	Is the current sewer disposal permit and contamination signage posted prominently at each authorized sewer disposal location?	Inadequate or inappropriate signage at sewer disposal locations: A current Sewer Disposal Permit must be posted at all authorized sanitary sewer locations. A sign stating "Assume This Site is Contaminated" must also be prominently displayed.	COMAR D.1003 & D.1109; UMB Radiation Safety Program 9.2.3 & 9.4	Post the current Sewer Disposal Permit and "Assume This Site is Contaminated" sign at the correct sink location.
Inappropriate radioactive waste management	Is radioactive waste properly segregated/stored and disposed of in a timely fashion?	Inappropriate radioactive waste management: Radioactive waste must be segregated by isotope and disposed of in proper receptacles with appropriate shielding. All radioactive waste must be promptly disposed of and not held for radioactive decay in the lab.	COMAR D.9.04; COMAR D.1001; UMB Radiation Safety Program 9.1 & 9.4	Segregate radioactive waste by isotope

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Incomplete wipe survey records	Is all required information present for wipe surveys?	Incomplete wipe survey records: Wipe survey records must include action levels, diagram and/or list of points surveyed, date of the survey, model and serial number of the instrument used and the initials of the surveyor.		Ensure that each wipe survey includes action levels, diagram and/or list of points surveyed, date of the survey, model and serial number of the instrument used and the initials of the surveyor
Laboratory contamination tests unavailable or improperly recorded	Are laboratory contamination tests available and completed in full?	Laboratory contamination tests unavailable or improperly recorded: All areas where radioactive materials are used and/or stored must be checked for contamination on the pre-determined intervals determined by UMB EHS. Complete documentation should include a lab map with swipe locations, LSC/gamma counter result print outs with date of survey. Test results should be reported in units of activity (dpm or uCi). Areas determined to be above permissible contamination levels should be cleaned and rechecked promptly. If the date of survey does not appear on the counter result printout, this record will not count as completed for the intended period.	COMAR D.501.1.ii & D.1103, UMB Radiation Safety Program 7.4	Laboratory contamination tests should be completed every 30 days, regardless of whether radioactivity was used, and kept in the lab's radiation safety notebook for inspection. Areas where a result was over 200 dpm must be decontaminated and a new wipe test performed in this area. Further decontamination and wipe tests must be performed until the result is below 200 dpm. Records of decontamination to be kept in the radiation safety notebook for inspection with the relevant month.
Laboratory exceeds possession limit	Does the laboratory exceed any of the established possession limits?	Laboratory exceeds possession limit: Laboratories must not exceed approved possession limits. If the lab is in danger of exceeding the possession limits set forth by the Radiation Safety Department, it is the responsibility of the lab to contact the Radiation Safety Department and request an increase in possession limit.	COMAR 26.12.01.01 Part C section C.27(a)	Contact the Radiation Safety Office to discuss.
LSC or gamma counter non-operational	Is the LSC/gamma counter working?	LSC or gamma counter non-operational: Liquid scintillation counter and/or gamma counters are needed to process laboratory swipe tests. Portable detection equipment is not an adequate substitute. Repairs should be promptly addressed and temporary alternate plans made for swipe tests.	COMAR D.501; UMB Radiation Safety Program 7.3	Counting equipment not properly functioning should be repaired before continuing work with radioactive materials.
Notice to Employees signage not posted	Is notice to employee signage conspicuously posted?	Notice to Employees not posted: All areas that use and/or store radioactive materials must conspicuously post "Notice to Employees" signage, informing them of their rights when working in radiation areas.		Conspicuously post Notice to Employees in radiation use areas
Radiation dosimetry badge records were not available at time of inspection	Were dosimetry records available at the time of inspection?	Radiation dosimetry badge records were not available at time of inspection: Dosimetry records must be kept on file for at least two years	COMAR D.502 & D.1107; UMB Radiation Safety Program 5.1	Contact UMB EHS for guidance on past dosimetry records and ensure future records are maintained.

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Radiation dosimetry badges missing, expired, or inappropriately worn	Are radiation badges current and worn appropriately?	Radiation badges missing, expired, or inappropriately worn: Radiation monitoring is required when working with select radioactive materials. Radiation badges should be worn on the outside of the lab coat or glove in the area most likely to receive exposure. Badges must be stored away from sources of radiation when not in use. Badges are exchanged on a predetermined schedule and must be returned within 15 days of receipt. Never wear someone else's badge. If a badge is lost or damaged, contact UMB EHS for a replacement.	COMAR D.502 & D.1107; UMB Radiation Safety Program 5.1	Missing, damaged, or expired badges should be replaced. Contact UMB EHS if a replacement is required. Return dosimetry badges within 15 days of receipt.
Radiation meter calibration past due	Is the radiation meter calibration current?	Radiation meter calibration past due: Detection equipment such as Geiger Mueller instruments must be calibrated annually. Calibrations should include electrical and source calibration. Contact UMB EHS for assistance.	COMAR D.501; UMB Radiation Safety Program 7.3	Complete annual calibration of portable detection equipment in lab before continuing work with radioactive materials or x-ray producing devices.
Radiation meter not functioning properly	Is the radiation meter functioning properly?	Radiation meter not functioning properly: All detection equipment must be in good working order and easily accessible for use. Check the batteries prior to each use. Any deficiencies noted with equipment must be corrected before the next use.	COMAR D.501; UMB Radiation Safety Program 7.3	Check the portable detection meter before each use and arrange repairs if the meter is not properly functioning.
Radiation safety training required	Is initial radiation safety training current?	Radiation safety training required: Researchers using radioactive material at UMB must complete Radiation Safety training. This must be completed PRIOR to any radioactive material use or ordering.		Radiation safety training is required for all personnel working with radioactive materials or x-ray producing devices. Contact UMB EHS to schedule training.
Radiation use area not posted	Are radiation use areas demarcated clearly?	Radiation use area not posted: Designated areas for the use of radioactivity must be well demarcated with appropriate door signs and labels. Benchtop use areas should be covered with disposable (diaper) paper and posted with caution tape or signage. These areas should be checked for contamination regularly.		Radiation use areas should be conspicuously posted with warning signs.
Radiation warning labels missing	Are radiation warning labels posted?	Radiation warning labels missing: Warning labels (radioactive trifoil) must be posted on the door to the lab and conspicuously on equipment where radioactivity is used or stored. All radioactive waste containers must be labelled with a "Caution - Radioactive Material" Label.	COMAR D.9.04; UMB Radiation Safety Program 9.1 & 9.4	Replace any missing or worn radiation warning labels.
Radioactive material is stored or used in an unregistered area	Are all areas where radioactive material is used or stored registered with UMB EHS?	Radioactive material is stored or used in an unregistered area: Radioactive material may only be stored and used in areas designated for such use by the Radiation Safety Office.		Contact the Radiation Safety Office to register this area or cease the use of radioactive materials in this area. Ensure area is completely decontaminated from previous use.
Radioactive material security inadequate	Is radioactive material adequately secured?	Radioactive material security inadequate: All radioactive use labs must be locked when no one is present in the lab. Storage units for stock vials must be locked in a freezer/refrigerator or within a lock box inside the freezer/refrigerator, which is secured to the interior. If this level of security is not attainable, alternate measures may be pursued with UMB EHS assistance.		Ensure proper security procedures are in place and followed when radioactive materials are present in the laboratory.

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Radioactive materials work was observed at the time of the inspection	Was radioactive materials work observed during the time of the inspection?	All proper and approved practices and procedures should be followed when working with radioactive materials.		No corrective actions are necessary.
Radioactive waste containers leaking or overflowing	Are all waste containers in good condition and below the fill line?	Radioactive waste containers leaking or overflowing: Containers used to collect radioactive waste must be in good condition and not filled above 90% capacity before being turned into UMB EHS for disposal.		Submit a radioactive waste pick-up request for all containers listed and request additional waste storage containers for future use.
Radioactive waste log completed inappropriately	Are all waste logs completed in full?	Radioactive waste log completed inappropriately: The waste log must be filled out completely including the; nuclide, activity, assay date, chemical identification and percentages if a liquid, and the name of the person disposing of radioactive waste. This information must be filled out every time a contaminated item, source vial, or potentially contaminated item is disposed of in the radioactive waste container.		Retrain lab members on proper completion of waste logs.
Radioactive waste must be separated by nuclide, and solids separated from liquids	Is radioactive waste separated by nuclide, and solid separated from liquid?	Radioactive waste must be separated by nuclide, and solids separated from liquids: Only C-14 and H-3 may be mixed in the same waste container. All other isotopes must be separated. Solid and liquid waste be separated.	COMAR D.1001; UMB Radiation Safety Program 9.4	Contact UMB EHS to obtain separate containers for solid and liquid wastes, as well as for individual nuclides.
Radioactive waste tag incomplete or missing	Are radioactive waste tags complete and present?	Radioactive waste tag incomplete or missing: Radioactive waste containers must be labeled with a completed yellow UMB EHS radioactive waste tag before the waste can be removed from the lab.	COMAR D.9.04; UMB Radiation Safety Program 9.1 & 9.4	Complete any missing radioactive waste tag information. Label all radioactive waste containers.
Receipt-Use-Disposal (RUD) forms did not match physical inventory	Does physical inventory match RUD forms?	Receipt-Use-Disposal (RUD) forms did not match physical inventory: RUD forms must be kept for all material in inventory and updated as the material is used. RUD forms may only be returned to the Radiation Safety Office when the material has all been accounted for.		RUDs must be kept up to date as material is removed or disposed of. When all material is accounted for, RUDs should be turned into UMB EHS. RUDs should not be turned into EHS if material from the corresponding inventory number on the RUD is still in the possession of the laboratory.
Receipt-Use-Disposal (RUD) forms not found for all items in inventory	Are RUD forms available for inspection?	Receipt-Use-Disposal (RUD) forms not found for all items in inventory: RUD forms must be kept for all material in inventory and updated as the material is used. RUD forms may only be returned to the Radiation Safety Office when the material has all been accounted for.		If RUD forms are not found, contact the Radiation Safety Office at UMB EHS for a replacement.
Removable Contamination Found	Are all laboratory areas free of removable contamination?	UMB has established within its restricted areas a removable contamination action level of 200 dpm/100 cm ² for beta/gamma-emitting radionuclides. Areas having removable contamination in excess of the UMB action level will be decontaminated as soon as practicable and resurveyed until removable contamination levels are below the action level. The individual performing the survey shall notify the Radiation Safety Office/EHS immediately upon discovery of contamination levels exceeding 1000 dpm/100 cm ² .		Decontaminate the area as soon as practicable and resurvey until removable contamination levels are below the action level.

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Sewer disposal log maintained improperly	Is the sewer disposal log maintained properly?	Sewer disposal log maintained improperly: Each sewer disposal needs to be recorded on the log sheet. If there was no radioactive material disposed during a month, an entry still needs to be logged showing there was no material disposed of in the sewer.	COMAR D.1003 & D.1109; UMB Radiation Safety Program 9.2.3 & 9.4	Ensure all personnel are trained on proper recording and disposal down the sanitary sewer. All future logs must be logged properly
Shielding required	If required, is shielding used?	Shielding required: Proper shielding is required to minimize exposure from select radioactive materials in the lab. Shielding materials may include such materials as Lucite, lead or a lead/Lucite combination. Please refer to the Radiation Safety Handbook for more information or contact UMB EHS.		Proper shielding is necessary to reduce personnel exposure from radioactive materials.

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Aisle, egress, fire alarm pull stations, fire extinguishers, or sprinklers obstructed	Are the aisle, egress, fire alarm pull stations, fire extinguishers, and sprinklers unobstructed?	Aisle, egress, fire alarm pull stations, fire extinguishers, or sprinklers obstructed: Laboratory occupants must always have an unobstructed pathway to allow rapid egress in the event of an emergency. 44" of clearance must be maintained in all hallways. Remove any obstructions that do not meet this requirement. Emergency equipment such as fire extinguishers, fire alarm pull stations and fire suppression sprinkler heads must always be unobstructed to permit access and allow proper operation.	Please see UMB EHS website for more information.	Remove obstructions.
Contaminated waste in regular trash or glass recycling box	Is contaminated waste in proper receptacles?	Contaminated waste in regular trash or glass recycling box: Biological, chemical or radioactive contaminated waste is not allowed in the regular trash. This includes labware associated with hazardous chemicals, radioisotopes or biohazards.	RCRA Subtitle C; 40 CFR 262	Remove contamination waste from regular trash and glass recycling
Cosmetics used in the lab	Are lab personnel refraining from using cosmetics in the lab?	Cosmetics used in the lab: Like food and drink, cosmetic items that are applied to the face or eyes are prohibited in research labs.	29 CFR 1910.1450	Do not apply cosmetics in the lab.
Electrical safety issues identified	Is all equipment plugged in safely, and are wires/plugs in good condition?	Electrical safety issues identified: The use of extension cords as permanent wiring is prohibited, as is overloading outlets and chaining power strips together. Wires, cords and plugs must be in good condition; frayed cords or cracked insulation near plugs must be repaired or taken out of service immediately. Some older equipment may not be suitable for use in wet labs, particularly if it does not have a polarized or grounded (three-prong) plug. Power strips and surge protectors should only be used for computers and their peripherals. Heavy equipment, such as freezers or incubators, may not be plugged into a power strip. You may not daisy chain, which is the action of plugging power strips into one another. Flexible cords are not permitted to be run through ceiling tiles or through walls.	29 CFR 1910.304(f)(5)(v); 334(a)(3), A(2)i, 1926, 416 (e)(i)	Visually inspect all cords on a frequent basis and remove /replace all worn and damaged extension cords. Ensure that power strips are not used for heavy load equipment. Remove any daisy chained power strips and find alternate means of power. If additional outlets are needed, contact your department and/or Facilities Management for installation or rewiring.
Evidence of eating and drinking	Is the lab free of food and drink?	Evidence of eating and drinking: Food and drink are strictly prohibited from labs. Disposal of food items and wrappers in lab trashcans is prohibited.	29 CFR 1910.1450; 29 CFR 1910.1200	Remove all food and drink from the laboratory. Do not put food items or wrappers in lab trash cans.
Eye wash concerns identified	Are the eye wash stations in compliance?	Eye wash concerns identified: Eye wash stations must be clearly labeled and these areas clear from obstruction. Always keep eye wash caps in place to prevent contamination from entering the unit. Eye wash stations must be tested weekly, with testing logged.	29 CFR 1910.151, 1200, 150; EPA WPS	All material that impedes access to the eyewash station must be removed. Label eye washes and safety showers. Test eye washes weekly and record dates of testing. To have the eyewash station repaired, contact Facilities Management
Fire extinguishers have not been tested annually	Are fire extinguishers kept in lab tested annually?	Fire extinguishers have not been tested annually: Fire extinguishers, if allowed in the lab space, must be tested annually or discarded.	29 CFR 1910.157(e)(3)	Several vendors offer testing and recharge services. To discard a fire extinguisher, contact Facilities Management at (410) 706-7570.

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General laboratory housekeeping unsatisfactory	Is the laboratory housekeeping satisfactory?	General laboratory housekeeping unsatisfactory: An organized work environment is vital when working with hazardous materials. Clutter can lead to falls, chemical spills, exposures and can block emergency exits. Dirty floors and counter tops can hide contamination and contribute to overall exposure. Keep all work areas clear and support custodial staff by managing trash properly.	29 CFR 1910.22	General housekeeping should be actively maintained, including disposal of garbage and unnecessary equipment.
Glass waste bottle are stored improperly.	Are glass waste bottles placed in secondary containment?	Glass waste bottle are stored improperly: No glass waste bottles are to be stored directly on the floor, where they may present a spill hazard. All glass waste bottles, for example as vacuum traps for liquid waste, must be stored secondary containment, such as in a plastic bin, to prevent accidental spills.		Place the glass vacuum waste bottle within a secondary container i.e. plastic bin.
Items stored less than 18 inches from ceiling or sprinkler head	Are all items stored at least 18 inches from the ceiling or sprinkler head?	Excess Storage: Storage of combustible materials (papers, books, etc.) and/or miscellaneous objects within 18 inches of the ceiling is not permitted. Fire sprinkler heads must not be obstructed.	NFPA 13 Section 8.6.6	Remove unnecessary materials from the lab. Reorganize storage to prevent sprinkler obstruction.
Laboratory walkways have obstructions	Are the laboratory walkways free of obstructions?	Laboratory walkways have obstructions: Routine maintenance in the laboratory must be improved. Chemicals and equipment that are not in use must be properly stored or disposed of. Walkways, benches and active work spaces must free from obstructions. Ongoing experiments must be organized, labeled and contained, leaving ample workspace for safe work practices.	29 CFR 1910.22(a)	Remove all materials and equipment obstructing laboratory walkways.
Laboratory was inaccessible	Was the laboratory space accessible for the audit?	Laboratory was inaccessible: UMB EHS must be able to access all lab spaces for auditing.		Contact UMB EHS to reschedule the inspection
Mold growth is present	Is the area clear of mold?	Mold growth is present: A clean and mold-free environment should be maintained.		Small areas of growth can be cleaned and treated. Remove or repair sources of moisture. For a large area, greater than 1 sq.ft., UMB EHS may be contacted to obtain a quote for mold removal.
Needles are being recapped	Is there evidence of needles being recapped?	Except in certain, pre-approved circumstances, needles should not be recapped. Do not recap needles prior to disposal. Capping needles presents an unnecessary risk.	See the UMB Bloodborne Pathogen Control Plan for more information.	Do not recap needles.
No Food/Drink postings required	Are "No Food/Drink" signs conspicuously posted?	No Food/Drink postings required: Food and beverages should not stored in the laboratory areas, refrigerators or in glassware that is also used for laboratory operations. Microwave ovens in the lab cannot be used for food or drink.	29 CFR 1910.1450	Post appropriate 'No Food or Drink' signage in laboratory.
PPE - Proper PPE not worn and/or available	Is appropriate PPE available and worn?	PPE - Proper gloves not worn and/or available: At a minimum, eye protection, protective gloves and a laboratory coat must be made available for all personnel conducting laboratory experiments. Proper gloves should be worn while working with hazardous materials. Researchers should be educated on proper PPE and chemical compatibility. Never wear PPE out of the laboratory and change often.	29 CFR 1910.132-139 (SUBPART I)	Wear the appropriate PPE while working with hazardous materials in the lab.

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Safety shower access obstructed	Are safety showers accessible?	Safety shower access obstructed: All material that impedes access to the safety shower must be removed.	ANSI Z358.1 Section 4.5.2; B5	All material that impedes access to the safety shower must be removed.
Sharps container too full	Is the sharps container no more than 3/4 full?	Sharps container too full: Do not add waste beyond the fill line. Where no fill line is present, do not fill the container more than 3/4 full. Tape shut or seal according to directions.	CDC/NIH BMBL 5th ed.	Do not overfill sharps containers. Replace the container when necessary to prevent over-filling.
Sharps found in regular trash	Is the regular trash clear of sharps?	Sharps found in regular trash: Sharps including needles, syringes, glass, razor blades, etc. must never be placed in the regular trash or autoclave waste that eventually goes into the normal trash.		Never place sharps in the regular trash. All sharps should be disposed of via appropriate containers (heavy duty plastic, leak-resistant, able to be sealed, upright and stable during use, properly labeled on the outside).
Unprotected sharps are in the laboratory:	Is the laboratory free of unprotected sharps (unprotected safety razors, needles, scalpels)?	Unprotected sharps are in the laboratory: Unprotected sharps, which may include razorblades, scalpels, or needles, were found in the lab space. All sharps should be protected when not in use and disposed of in an appropriate sharps container when no longer in use.	CDC/NIH BMBL 5th ed.	When not in use, razor blades and other sharps must be stored in a protective device, or disposed of in a disposable sharps container. Manual recapping of needles is prohibited.
Unsafe cryogen use	Are proper safety controls in place while using cryogens?	Unsafe cryogen use: Cryogens (i.e., liquid nitrogen, dry ice, etc.) must be used with proper safety controls. Only use liquid nitrogen and dry ice in well-ventilated spaces. Use gloves approved for cryogen use. Use approved tongs to retrieve samples from liquid nitrogen to prevent burns. Lab apron and splash-resistant goggles may be required.	Please see UMB CHP for more information.	Follow cryogen use guidelines on UMB EHS website. Make sure appropriate PPE is stocked in lab.
Updated door sign not posted	Is there a door sign/are hazards and emergency contact information current at the time of inspection?	Updated door sign not posted: Updated door signs must be posted at all entrances leading into a laboratory. A door sign must include the current Principal Investigator, emergency contact information (with non-campus phone numbers), and all laboratory hazards.	CHP 2.1 NFPA 704 CDC/NIH BMBL 5th ed.: Section IV.A.9	Request a new or update door sign through the MyEHS Door Sign Request portal.