f a c t s h e e t

Environmental Compliance for Laboratories

Air Emissions, Industrial Wastewater & Hazardous Waste

Laboratories may conduct experiments involving chemical reactions or use chemical reactions and other techniques to analyze various products or substances (e.g., chemicals, drugs, and environmental media). These activities can generate chemical wastes or air pollutants that may be subject to Massachusetts Department of Environmental Protection (MassDEP) regulations and/or permitting requirements governing air emissions and the management of hazardous waste and wastewater.

Laboratory operations must be conducted in accordance with applicable federal, state and local environmental laws, regulations and permits. Many laboratory operators have found that pollution prevention and waste minimization are the best ways to reduce environmental impacts and regulatory requirements, and should always be given priority.

The regulatory requirements described in this fact sheet apply to many types of laboratories, including but not limited to analytical, research and development, educational and institutional, product development and testing, and medical. If you have questions about whether the requirements described below apply at your laboratory facility, contact your MassDEP Regional Office (see contact information at the end of this fact sheet).

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Air Emissions

Air emissions from laboratories may be subject to MassDEP's air pollution control regulations (http://www.mass.gov/eea/agencies/massdep/air/regulations/310-cmr-7-00-air-pollution-control-regulation.html). A critical starting point for every laboratory operator is to determine and document the type and quantity of air contaminants emitted to the air from their laboratory activities. This can be done by tracking the quantity of chemicals used and the quantity of these chemicals that becomes waste. Using a mass-balance approach, calculations can be conducted to determine air emissions from the laboratory. These emissions calculations should be performed for all emission points in the laboratory.

Air contaminants that should be assessed include volatile organic compounds (VOCs) and hazardous air pollutants (HAPs), such as methylene chloride and benzene.[1] The actual amount emitted and potential amount that theoretically could be emitted determine which air pollution control regulations apply to the laboratory. Therefore, good records of chemical use and air emissions calculations are essential for showing compliance or justifying any exemptions that may apply to the laboratory.

In general, MassDEP's air quality regulations establish exemptions or performance standards for smaller emissions sources, and permit requirements for larger emissions sources, including pre-construction Plan Approvals, and for the largest emissions sources, major source Operating Permits. For laboratories, the regulations contain specific exemptions and requirements for certain laboratory activities.

[1] A list of HAPs is available at www.epa.gov/ttn/atw/orig189.html.

Plan Approvals

MassDEP implements a pre-construction permitting program for newly constructed facilities and modifications of existing facilities with air emissions, through its 310 CMR 7.02 Plan Approval regulations. A Plan Approval is required "prior to any construction, substantial reconstruction, alteration, or subsequent operation of a facility that may emit contaminants to the ambient air." A Plan Approval establishes Best Available Control Technology (BACT) to minimize air emissions of a proposed project. However, there are a number of exemptions to Plan Approval requirements relevant to laboratory activities described below, including exemptions for laboratory ventilation and exhaust systems, biotechnology laboratories, and *de minimis* emissions.

Plan Approval Exemptions

Laboratory Ventilation and Exhaust Systems

Many laboratories use hoods and ventilation systems that exhaust vapors to the outside air. MassDEP's regulation specifically exempts certain "insignificant activities" from Plan Approval, including ventilation and exhaust systems for laboratory hoods used by:

- Academic institutions for academic purposes,
- Hospitals and medical care facilities used for medical care purposes and medical research only,
- Laboratories which perform laboratory scale activities as defined by OSHA[2], and
- Facilities conducting quality assurance and quality control testing and sampling activities.

[See 310 CMR 7.02(2)(b)(16), which references 310 CMR 7.00 Appendix C(5)(i)]

This exemption is limited to emissions from ventilation and exhaust systems for laboratory hoods and does not cover other potential air emissions from lab facilities, such as emissions from combustion sources (i.e., boilers) or other emissions not directed into a laboratory hood. This exemption applies to the lab hood exhaust system even if potential emissions exceed one ton per year for a particular air contaminant.

IMPORTANT NOTE: While certain laboratory hood emissions may be exempt from Plan Approval, these emissions must be included in calculating total facility-wide emissions for determining whether a facility triggers major source permitting thresholds (see Operating Permits below). In addition, MassDEP's regulation at 310 CMR 7.01 prohibits emissions that will cause a condition of air pollution, regardless of any Plan Approval exemptions. MassDEP may require emissions reductions through a Plan Approval where laboratory emissions are creating a condition of air pollution. Thus, even if exempt from Plan Approval, laboratories should seek to limit air emissions to the extent feasible and should be cognizant of the impact their emissions may have on near-by receptors.

[2] OSHA's Laboratory Standard regulations (29 CFR 1910.1450) states that "Laboratory scale means work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person." 'Laboratory scale' excludes those workplaces whose function is to produce commercial quantities of materials." See OSHA's fact sheet on the Laboratory Standard at www.osha.gov/Publications/laboratory/OSHAfactsheet-laboratory-safety-osha-lab-standard.pdf, which contains a link to OSHA interpretations of what activities qualify as "laboratory scale."

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Biotechnology Labs

MassDEP's regulation found at 310 CMR 7.02 exempts "biotechnology laboratories" from Plan Approval. By definition, such laboratories are used solely for research, development or support for medical devices, drugs, or biologic products derived from biotechnology, where such products are going through preclinical research in preparation for, or are subject to, certain Food and Drug Administration approvals. [See 310 CMR 7.02(2)(b)(34).] This exemption applies even if potential emissions from the biotechnology laboratory exceed one ton per year for a particular air contaminant. Similar to the lab hood exemption, facilities with biotechnology labs are not exempt from major source permitting thresholds. Lab emissions must be included in calculating total facility-wide emissions, and MassDEP always retains authority under 310 CMR 7.01 to require a Plan Approval to address a condition of air pollution.

De Minimis Emissions

MassDEP's 310 CMR 7.02 regulation exempts "construction, substantial reconstruction or alteration" (i.e., a "project") that results in a "*de minimis*" increase in emissions from Plan Approval. "*De minimis*" refers to an increase in potential emissions of less than one ton during any consecutive 12-month period. This exemption applies to any type of project, including construction or modification of a laboratory. Therefore, if a laboratory-related project is not otherwise exempt from Plan Approval (under the lab hood exhaust or biotechnology lab exemptions described above), the project may still be exempt from Plan Approval if the increase in potential emissions is less than one ton per year for any air contaminant. For projects that result in *de minimis* increases in potential emissions, potential emissions can be documented to be below one ton by maintaining records at the facility showing that actual emissions are below one ton on an ongoing rolling 12-month basis (see definition of Potential Emissions in 310 CMR 7.00). Please note that there is a limit to how many *de minimis* projects can occur at a facility in any 12-month period. If several *de minimis* projects cumulatively total 10 tons, a Plan Approval may be required. [see 310 CMR 7.02(6)]

IMPORTANT NOTE: If your laboratory or generator meets any of the exemptions from Plan Approval described above, you should maintain documentation of your laboratory activities/status. If relying on the *de minimis* exemption for a lab-related project, maintain records of materials used in the lab (e.g., chemical purchases, chemical use, chemical waste) to show that emissions for that project are less than one ton of any air contaminant in each consecutive 12-month period. Also, maintain records of your calculations or analyses to show that facility potential emissions, including lab operations, do not exceed major source thresholds and thereby trigger Operating Permit requirements (see below). "Potential to emit" calculations should be updated each time a facility adds equipment that could increase potential air emissions, and the updated potential emissions should be compared to the major source applicability thresholds. EPA has published guidance for determining potential to emit available at www.epa.gov/ttnatw01/1998sbapptebroc.pdf. The Oklahoma Department of Environmental Quality also has a fact sheet on calculating potential to emit for batch processes that may be useful for laboratories at https://www.deq.state.ok.us/factsheets/air/batchPTE.pdf.

Operating Permits

MassDEP implements the federal Clean Air Act's Operating Permit program for major sources (often referred to as a "Title V Operating Permit"). An Operating Permit is a compilation of all air emission standards and control requirements that apply to a facility, but it does not impose any additional requirements to control or reduce emissions. MassDEP's Title V Operating Permit regulations are at 310 CMR 7.00: Appendix C.

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The need for an Operating Permit is based on a facility's federal potential emissions.[3] Specific thresholds include 10 tons per year for an individual HAP and 25 tons per year for a combination of HAPs; 50 tons per year for VOCs and NOx; and 100 tons per year for all other regulated pollutants. If a facility's federal potential emissions exceed any of these thresholds but its actual emissions can be kept below the thresholds, a facility can obtain an enforceable cap on its emissions (or "restricted emissions status") from MassDEP and avoid the need for an Operating Permit.

Since laboratories use various chemicals, HAPs and VOCs likely are the air pollutants to be most concerned about.[4] If a laboratory facility has the potential to emit a single HAP at or above 10 tons per year (tpy) or a combination of HAPs at or above 25 tpy, or the potential to emit VOCs above 50 tpy, it would be considered a "major source" that must obtain an Operating Permit, unless its emissions can be capped below the thresholds.

When calculating whether your laboratory facility's potential emissions are greater than major source thresholds, you must include emissions from the facility's "insignificant activities," even though emissions from insignificant activities are exempt from Plan Approval. In other words, emissions from the ventilation and exhaust systems for the laboratory's hoods must be included in the facility-wide federal potential to emit calculation. If your facility's potential emissions meet or exceed major source levels, you can apply to MassDEP to restrict (i.e., cap) your emissions below major source thresholds to avoid the need to obtain an Operating Permit. If your facility cannot restrict emissions below major source levels, you must apply for an Operating Permit (to learn more see: www.mass.gov/eea/agencies/massdep/air/approvals/about-the-massachusetts-operating-permit-program.html)

Source Registration

MassDEP's regulations at 310 CMR 7.12 require facilities to report emissions to MassDEP if their federal potential air emissions exceed specific thresholds. Source Registration is based on facility-wide emissions and there are different thresholds for combustion equipment and non-combustion equipment and processes. The reporting thresholds for non-combustion emissions are listed below:

Contaminant	*Threshold*
Particulate Matter	2 tons per year
Oxides of Sulfur	2.5 tons per year
Organic Material	10 tons per year
Nitrogen Dioxide	4.4 tons per year
Lead	5 tons per year
Hazardous Air Pollutants (HAPS)	10 tons of any individual HAP, 25 tons of total combined HAPs

Even if your laboratory facility does not trigger Source Registration reporting, you should keep records of your actual emissions from chemical purchase, usage, and waste disposal quantities, and an analysis that shows your potential emissions are below the Source Registration thresholds.

[3] "Federal Potential to Emit" has a separate definition and does not include the de minimis provisions in MassDEP's definition of "Potential to Emit" for the Plan Approval regulations.
[4] In addition to laboratory hoods and ventilation systems, laboratory facilities may include boilers, emergency generators, and other equipment that emits air contaminants to the air. Emissions from all of these activities must be considered when comparing to major source Operating Permit thresholds.

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Please note that even if a laboratory does not exceed Source Registration reporting thresholds, if the laboratory applies for a Plan Approval or a Restricted Emissions Status, MassDEP may require the laboratory to file Source Registration as a condition of either of these approvals [see 310 CMR 7.02(9) and (10)]. Additional information about MassDEP's Source Registration program is available at: www.mass.gov/eea/agencies/massdep/service/online/source-registration.html

Industrial Wastewater Requirements

Wastewater from washing of equipment and/or glassware in the laboratories, and process wastewater are considered to be "industrial wastewater," and must be properly managed in accordance with all applicable state and local rules. MassDEP industrial wastewater regulations can be found at: http://www.mass.gov/eea/agencies/massdep/water/wastewater/industrial-wastewater.html

- **Laboratories that discharge wastewater to a river, stream or other waterbody** may need to obtain a National Pollution Discharge Elimination System permit (NPDES), which would allow them to discharge to a water body near their facility. Learn more: http://www.mass.gov/eea/agencies/massdep/water/wastewater/surface-water-discharge-permitting-npdes.html#2

- **Laboratories that discharge any amount of industrial wastewater to the ground surface** must obtain a groundwater discharge permit from MassDEP. For more details on the different types of groundwater discharges, please see the Groundwater Discharge Program regulations (314 CMR 5.03 and 5.04), see: http://www.mass.gov/eea/docs/dep/service/regulations/314cmr05.pdf
  Learn more about groundwater discharge permits: http://www.mass.gov/eea/agencies/massdep/water/wastewater/groundwater-discharge-permitting.html

- **Laboratories that discharge wastewater to a sewer** must obtain municipal or district sewer system operator approval for this wastewater prior to discharging it into the sewer system. These laboratories may also be required by the municipal or district sewer system to pre-treat their wastewater before discharging to the sewer. Depending on the discharge volume from the laboratories and the type of treatment plant receiving the wastewater, laboratories might also need a MassDEP permit. For additional information, see: http://www.mass.gov/eea/agencies/massdep/water/wastewater/industrial-wastewater.html

- **Laboratories that discharge wastewater to a septic system** (i.e., are located in an area without access to sewers) *may not discharge wastewater* – except for sanitary wastewater from bathrooms and kitchens – to the septic system. Non-sanitary wastewater must be stored in an industrial wastewater holding tank. The tank must be installed and operated according to the requirements found at 314 CMR 18.00.
  Learn more about septic systems: http://www.mass.gov/dep/water/wastewater/septicsy.htm
  Learn more about industrial wastewater holding tanks: http://www.mass.gov/eea/agencies/massdep/service/approvals/holding-tanks-forms.html

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Hazardous Waste Requirements

Laboratories commonly generate several types of hazardous wastes (e.g., used solvents, dyes/pigments, pharmaceuticals). In addition, many cleaners and detergents used in labs may be classified as hazardous waste. Check the Safety Data Sheet (SDS) for each product your laboratory uses to see if it contains chemicals listed or defined as hazardous by MassDEP regulations. Learn more: http://www.mass.gov/eea/agencies/massdep/recycle/regulations/310-cmr-30-000.html

Generator Status & Storage Limits

Any facility that generates hazardous wastes must register its status with MassDEP, obtain a site-specific identification (ID) number, store and label wastes appropriately, and arrange for timely shipment of accumulated wastes to a facility that is permitted by the state in which it is located to treat, store or dispose of these types of wastes. Very Small Quantity Generators (VSQGs) can store and then self transport their own hazardous waste, (up to 55 gallons at a time) to another registered generator that is permitted. Both parties need to maintain a receipt for the delivery.

A laboratory's "generator status" determines how much waste may be accumulated over what period of time before it must be shipped off-site for recycling or disposal. The following table provides an overview of generator status requirements.

	Very Small Quantity (VSQG)	**Small Quantity (SQG)**	**Large Quantity (LQG)**
Total Waste Generated **Monthly**	Less than 100 kg	More than 100 kg and less than 1000 kg	Greater than 1000 kg
Acute Waste	None allowed	Less than 1 Kg. (2.2 lbs)	More than 1 Kg.
Accumulation Limit	Up to1000 kg	Up to 6000 kg	No limit
Storage Time Limit	No time limit	Up to 180 days	Up to 90 days

NOTE: 100 Kg = 220 pounds= 25 to 27 gallons (the actual weight and volume depends on the type of material)

To maintain a laboratory's generator status, a facility may not accumulate a larger volume of waste on-site or store it for longer than allowed. Learn more about hazardous waste generator status and storage limits: http://www.mass.gov/eea/agencies/massdep/recycle/hazardous/hazardous-waste-generator-status-and-storage-limits.html

MassDEP Hazardous Waste Registration

Any business or institution that ships hazardous waste off-site for recycling or disposal must register their generator status with MassDEP. In order to register a generator status, or make changes in generator status, MassDEP must be notified using the appropriate form listed below.

- **Lab Facilities that are Very Small Quantity Generators of hazardous wastes, including waste oil, or are Small Quantity Generators of waste oil** should submit a Generator Registration Form to MassDEP, which is available at: http://www.mass.gov/eea/agencies/massdep/recycle/approvals/hazardous-waste-forms.html#5

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- **Small Quantity Generators and Large Quantity Generators of hazardous wastes** should submit a **Notification of Hazardous Waste Activity Form,** found at**:** http://www.mass.gov/eea/docs/dep/recycle/approvals/hwactvty.pdf
  Additional information on hazardous waste activity notification can be found at: http://www.mass.gov/eea/agencies/massdep/recycle/approvals/hazardous-waste-forms.html#5

- **If a laboratory's generator status changes,** the owner or operator must notify MassDEP of this change, using the hazardous waste activity notification form: http://www.mass.gov/eea/docs/dep/recycle/approvals/hwactvty.pdf

Properly Storing & Labeling Wastes

Regardless of the laboratory's generator status, its hazardous waste storage area must be secured against unauthorized access and it must be posted with *Hazardous Waste* signs. Storage containers must be kept in good condition and labeled with the names of the wastes inside them, as well as the associated hazards (i.e., corrosive, ignitable, reactive or toxic). If the laboratory is a Small or Large Quantity Generator of hazardous waste, other requirements also apply.
Learn more:
http://www.mass.gov/eea/docs/dep/recycle/laws/sqgsum.pdf and
http://www.mass.gov/eea/agencies/massdep/recycle/hazardous/the-very-small-quantity-generator-of-hazardous-waste.html

Arranging for Timely Hazardous Waste Shipments

Each shipment of hazardous waste must be transported by a MassDEP-licensed hazardous waste transporter and must be accompanied by a manifest form. Manifest forms are available from transporters. VSQGs can self transport their own hazardous waste (up to 55 gallons at a time) to another registered generator who is permitted and both parties need to maintain a receipt for the delivery. For a list of licensed transporters, see: http://www.mass.gov/eea/docs/dep/recycle/hazardous/hwtran.pdf

Please Note: Generators of hazardous waste **must not treat** the waste without obtaining a permit from MassDEP. Hazardous wastes that are ***only*** hazardous because of their corrosivity (pH of less than or equal to 2 or greater than or equal to 12.5), may be neutralized on-site and rendered non-hazardous before disposal.

Mercury-Containing Materials

Many items that are commonly used by laboratories contain mercury, including measuring devices such as thermometers, thermostats, switches and relays, as well as mercury-containing lamps such as fluorescent bulbs. Massachusetts hazardous waste regulations for Universal Waste and the Massachusetts Mercury Management Act of 2006, require the collection, management, storage and recycling of mercury-containing devices and materials when these products reach the end of their useful lives. The applicable regulations can be found at:
http://www.mass.gov/eea/docs/dep/service/regulations/310cmr30.pdf

If a mercury-containing product is still offered for sale in Massachusetts, the manufacturer should be providing customers with information about how to ensure that the mercury in their product is recycled (rather than disposed of) when the product reaches the end of its useful life. See:
http://www.mass.gov/eea/docs/dep/toxics/stypes/hgprdfax.pdf

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Other Requirements

Medical & Biological Labs

Medical and biological laboratories must manage medical and biological wastes, including sharps, without exposing workers or the public to unnecessary risks. Medical, biological and pharmaceutical wastes must be separated from other wastes and transported by a medical waste transporter to a facility specifically licensed to destroy these wastes or render them "non-hazardous." Learn more at: http://www.mass.gov/eea/agencies/massdep/recycle/hazardous/infectious-waste-disposal-and-transport.html

Radiological Wastes

Some laboratories may generate radiological wastes (e.g., from X-rays, medical treatment, biological research and development, pharmaceutical and medicinal production, etc.). The Massachusetts Department of Public Health (DPH) regulates the management of these wastes. Learn more at the "Radiation Control" link at: http://www.mass.gov/eohhs/gov/departments/dph/

For More Information

- Call the MassDEP Business Compliance Division at 617-292-5898.
- Call or visit the MassDEP regional office that covers your municipality. Find your region: http://www.mass.gov/eea/agencies/massdep/about/contacts/
- Follow the "Health Topics Index" link on the DPH web site: http://www.mass.gov/dph/

Please note that this fact sheet is a general guide to a variety of MassDEP regulations and requirements that may apply to your Lab. Other federal, state, and local rules, including those adopted by DPH and the U.S. Occupational Safety & Health Agency (OSHA), also may apply.

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