

Ask the Expert:

# Standard Operating Procedures for Biosafety Cabinet Use



Authored By:

**Julianne L. Baron**

Ph.D., CPH, RBP

President of Science and Safety Consulting. She has a background in infectious diseases, biosafety, and public health and consults on laboratory safety and design, pandemic preparedness, and scientific communication.

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Your laboratory may have many standard operating procedures (SOPs) for its technical procedures, but have you considered drafting them for safely and consistently using your biosafety cabinet (BSC)? BSCs are primary containment devices used to contain biological aerosols. However, they must be properly set up, used, and maintained to ensure they provide their required types of protection. SOPs help to ensure that important laboratory processes are done repeatably and consistently and can serve as valuable training tools for your laboratory staff. In this article, we will discuss why you should write SOPs for your BSC use, which procedures should have SOPs, how to effectively write SOPs, who should be involved in their development, and how often SOPs should be reviewed and revised.



Standard Class II Type A2 Biosafety Cabinet

## Why Should You Write Standard Operating Procedures for Work in Your Biosafety Cabinet?

Creating standard operating procedures for scientific processes and technical laboratory procedures is important to ensure quality, consistency, accuracy, and reproducibility of data.<sup>1,2</sup> Although they may seem unnecessary and time consuming to write, SOPs can help reduce technical and user errors, serve as training tools, and facilitate regular review of processes.<sup>1,2</sup> In certain industries, laboratories may be required to document all of their procedures in written SOPs as part of a quality management system.<sup>1</sup> From a laboratory safety perspective, documenting practices and procedures is a critical part of the risk mitigation process (fitting under the administrative/work practice controls) and the use of good/standard microbiological practices.<sup>3,4</sup> Adherence to these best practices is a critical part of a strong biosafety program since deviation from approved procedures can result in the exposure of laboratory staff or the release of biohazardous agents into the community or environment.<sup>3</sup> The procedures developed to reduce personnel's health and safety risks must be effectively communicated to all laboratory users,<sup>3,5</sup> and having them written in a standard fashion can facilitate this information sharing. Properly maintained biosafety cabinets are essential components of many laboratory biosafety programs but they must be used in conjunction with adequate safety practices, procedures, and training.<sup>3</sup>

## Which BSC Use Procedures Should Have Written SOPs?

When working in the BSC, there are three general categories of procedures that would benefit from formal, written SOP development. These include how to set up and use the cabinet, how to clean and decontaminate the BSC, and how to respond to an emergency situation (spill, loss of power, alarm, etc.). It may also be prudent for technical SOPs to include which steps or which procedures should be completed in a BSC to avoid confusion by lab staff who are new to learning the procedure or who have not performed that process in a while.

### 1. How to Set-Up and Use a BSC

Organizations should create written SOPs describing the correct and safe use of BSCs.<sup>6</sup> These SOPs should contain an introduction, a description of how the class and type of BSC to be used in the laboratory was selected, what staff training requirements exist, and detailed steps on how to use the cabinet.<sup>6</sup> These steps should include BSC use best practices such as how to: verify proper BSC certification and airflow, turn on and purge the BSC, disinfect and add supplies and equipment to the work surface, work without disrupting the BSC's airflow, work from "clean" to "dirty", collect waste within the BSC, limit contamination of materials inside the BSC, and avoid the use of equipment that generates flames or explosion potential.<sup>3,6,7</sup> For more information about biosafety cabinet set up and ergonomic considerations for working in a cabinet, consider reviewing: [Using Ergonomic and Workflow Analyses to Configure a Biosafety Cabinet](#) for more details that could be used in your SOPs.

### 2. How to Clean and Decontaminate a BSC

In addition to procedures for how to set up the BSC, organizations should consider documenting the schedule and processes for how the laboratory staff will routinely clean, decontaminate, and maintain their BSC outside of the need for a third-party contractor.<sup>8</sup> This should include how to clean the BSC with the appropriate disinfectant and contact time before and after regular use and both how and when to remove the cabinet's work surface and decontaminate the drain pan underneath it.<sup>3,6,7</sup> For more information about surface decontamination of BSCs, consider reviewing: [Biosafety Cabinet Surface Decontamination Considerations](#) for additional detail for your SOPs.

### 3. How to Respond to Emergencies in a BSC

Organizations must develop emergency procedures that describe what should be done in the event of an accident or emergency scenario that can result in the exposure of laboratory staff or the release of biological materials.<sup>4,5</sup> Everyone in the lab must be familiar with and competent in the performance of these emergency procedures.<sup>4,5</sup> Since the BSC is a device where these biohazardous materials are often handled, it is no surprise that certain emergency situations can occur during the use of a cabinet. These incidents may include spills inside the BSC, loss of power to the BSC or building, alarms in the BSC or building, and laboratory staff experiencing medical emergencies while using the BSC or in the immediate area of the cabinet.<sup>9</sup> The appropriate response to these situations should be detailed in a written SOP.

## How Do You Write Effective SOPs?

Your organization may have a standardized SOP format that is used for all SOPs that it generates due to regulatory/compliance requirements or internal policy. Regardless of the format of the SOP, it is important to ensure that the procedure is written in a way that it can be understood by those who are meant to use it day in and day out.<sup>1</sup> Depending on the reference, the process for writing an SOP can vary, but generally it can be grouped into a few distinct steps that are described in further detail below.

### 1. Drafting the SOPs

Once you have determined that a formal, written SOP is needed for your cabinet use, you should request your organization's standard SOP template before getting started. SOPs should be written by individuals who know the procedures and those will be asked to follow them.<sup>1</sup> Often the biosafety officer or other health and safety experts will be enlisted to help develop these types of documents.<sup>3</sup> If you need help getting started, consider searching online for relevant SOPs that may be available as a starting point. SOPs are typically divided into specific headings including title, version number, author, creation and approval dates, purpose, scope, supplies/materials/equipment needed, definitions, procedural steps, references, and attachments.<sup>1,2</sup> Your organization's template may include these and/or other headings. The procedural steps should be written step-by-step in order with enough detail that someone who is not familiar with the procedure can perform it correctly just from following the SOP.<sup>1,2</sup> It may be beneficial to have several untrained individuals do exactly that before the SOP is finalized to correct any confusing steps or missing details before it is formally reviewed.<sup>1</sup>

### 2. Approving and Distributing the SOPs

Once an SOP has been drafted and tested, it should be reviewed by individuals who were not a part of writing it.<sup>1,2</sup> Ultimately, the laboratory director or principal investigator is responsible for ensuring that their laboratory's staff are properly applying and adhering to safety procedures,<sup>3</sup> so it is important to have them review and approve of your safety SOPs, including BSC use SOPs. All laboratory staff that will perform the procedures should be trained on the new SOPs that have been developed for

the laboratory.<sup>1,3</sup> This can include group training and discussion, hands-on individualized training, and/or competency checks and performance demonstrations.<sup>1,3</sup> For more information about the benefits of creating BSC use training and resources to make your own training program, consider reviewing: [Creating a Biosafety Cabinet Training Program](#). After the SOPs are finalized, they should be readily accessible by all laboratory staff and it should be easy to distinguish what version is the current version of the SOP that should be used.<sup>1,2</sup>

### 3. Reviewing and Revising the SOPs

While still in use, SOPs should be regularly reviewed, generally on an annual or biannual basis<sup>1,3</sup> or as dictated by your regulatory or compliance requirements. However, revision may be needed outside of this regular review period if there have been changes to procedures and/or equipment or if laboratory incidents or drills/exercises have occurred that identify gaps in the SOP.<sup>3</sup> Regular SOP review may trigger updates to the SOPs due to changes that have occurred since the last review or lack of clarity in the steps outlined in the document.<sup>1,3</sup>



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## Conclusion

Written standard operating procedures are an important part of a good biosafety program because they describe risk mitigation measures and standard microbiological practices that are expected from laboratory staff. When working in a BSC, there are three types of procedures that most often call for formal SOPs:

1. **How to set up and use the BSC:** including how to verify functionality, how to work safely from “clean” to “dirty”, how to collect waste, etc.
2. **How and when to clean and decontaminate the cabinet:** including during regular use and when deep cleaning and maintenance are needed by the laboratory staff.
3. **How to respond to BSC-related emergencies:** including spills, power loss, alarms in the BSC or building, and medical emergencies.

SOPs should be written by individuals who are knowledgeable about the procedures and by those who will perform them. Your organization may have specific formatting for the SOP, but typically they are divided into headings which contain administrative information, the actual procedures, and references and attachments. SOPs are most useful when they are written in a way that they can be followed easily by laboratory staff that are unfamiliar with the techniques. It can help to have someone test out the SOP for clarity and accuracy before it is reviewed and approved by the laboratory director or principal investigator. All laboratory staff who will use new or revised SOPs should be trained how to perform them, and all laboratory SOPs should be regularly reviewed and revised as laboratory procedures change.



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