



BASEF

The Bay Area Science & Engineering Fair Project Safety Inspection Guide

You are reading this Project Safety Inspection Guide because either you have volunteered as a Safety Inspector or you have accessed this handout out of personal interest. If you are a Safety Inspector, thank you for your interest and commitment to the youth participating at this fair. If you picked up this guide out of interest, we encourage you to visit the BASEF web site at <http://www.basef.ca>.

Contents

- BASEF Safety Inspection..... 3
 - Safety Inspector Benefits 3
 - Student Benefits..... 3
 - School Benefits 3
 - Community Benefits 3
 - Business Benefits 3
 - Science Fair Benefits 3
- The Roles of the Safety Inspection Team..... 4
 - Evaluator 4
 - Facilitator 4
 - Counselor 4
 - Motivator 4
 - Role Model 4
- Provide a good experience for the Competitors 4
- Conduct of Volunteers 5
 - Communications with Students 5
 - Suggested Wording 5

Safety Inspector's Behaviour with Students	5
BASEF Safety Team Responsibilities	5
What to Expect on Safety Inspection Day	6
Safety Inspection Station	6
Tool Loan Section	6
Inspection Tips & Tricks	7
General Rules	7
Using the Safety Checklist	8
Display	8
Backboards	8
Table Surface	8
Under the Table	9
Apparatus	9
Human Projects	9
Animal Projects	9
Chemical Safety	9
Acceptable Substitutes	10
Electrical	10
Fire Safety	11
Light Emitting Devices	11
X-Ray/Radiation Producing Equipment	11
Microorganism & Biohazards	11
Pressure Systems & Explosives	12
Structural / Mechanical	12
Final Comments	13

BASEF Safety Inspection

Safety Inspector Benefits

As a BASEF Safety Inspector, you will be provided with a number of opportunities during the small amount of time that you will invest. You will also gain personal rewards from the experience and the interaction with students.

- Excellent Opportunity to Network
- Develop Communication Skills
- Develop Analytical and Evaluation skills (translates into leadership and management skill base)
Sharpen your Investigative Skills
- Build Self Confidence
- Share Knowledge with Today's Youth
- Have Fun while Helping Others

Safety Inspectors are an integral part of a science fair. As a Safety Inspector, you are part of the science fair infrastructure. Your time as a Safety Inspector has an impact that goes far beyond the evening of safety checks. Your time reaches out and influences students, schools, the community, businesses and science fairs.

Student Benefits

- Learn more about Science and Engineering
- Learn to deal with challenges
- Earn recognition and win acceptance
- Gain pleasure from achievement
- Build self esteem and self confidence
- Meet members of the business community
- Meet members of the Scientific and Engineering communities

School Benefits

Science fairs create an event for schools to use to raise interest in education. Schools also gain in having better students through their experience of science fair competition and interaction with the Safety Inspectors.

Community Benefits

The community gets the long-term benefits of the leadership development of the students who participate in science fairs.

Business Benefits

Science fairs are a medium that can be used to promote businesses through raising community awareness of the businesses that support science fairs. Businesses also reap rewards from the communication and leadership skills that their volunteer Safety Inspectors gain through participating in the science fairs.

Science Fair Benefits

The Science Fair gains exposure to businesses and schools. Science Fairs, a network of volunteer organizations, are sponsored by community and business donations. Well run Science Fairs build credibility and solidarity for all of the fair supporters.

The Roles of the Safety Inspection Team

To help students display their projects during the Fair in a safe manner for all involved.
Explain the reasoning behind the rules to first-time students and their parents.
To ensure the rules are followed in as accommodating a manner as possible.

Evaluator

The main role of a Safety Inspector is to assist students in preparing their projects for safe exhibition at the Fair. You will be evaluating the project based on your observation of the exhibit in comparison to the Fair's safety regulations.

Facilitator

As a Safety Inspector, you will also be a Facilitator, creating an open and positive atmosphere to allow the student and parents to complete the safety check process comfortably. This role is important because the quality of your facilitation will set the stage for the competitor's on-site experience.

Counselor

When a student asks you, "How does my project look?" you have stepped into the role of a counselor. Respond by pointing out some positive aspect that you observe on the exhibit as compared to the items on the safety checklist. If the student does not ask how the project looks, be sure to congratulate them on passing the safety check and wish them good luck in the fair.

Motivator

An important role of a Safety Inspector is to compliment the student in ways that will make them feel good about their work and motivate them to compete in the future. The students have put in a lot of work to compete in the Fair and should be complimented on that as well as the work they have done. The simplest compliment given to a student can spur them on to future successes in life.

Role Model

Remember that, when communicating with the students, you are in the role of a Safety Inspector, a Leader in the community, from business or academia. Your actions portray to the students what the Science Fair is all about. Take care in what you do and say in the presence of the students.

Provide a good experience for the Competitors

As a Safety Inspector, you can provide a good experience for the student competitors by doing the following:

- Be Genuine
- Smile
- Show you are interested
- Show a commitment to Safety
- Show a commitment to having the students pass the safety check

Conduct of Volunteers

As an adult volunteer BASEF Safety Inspector, you are in a position of trust with the children you will be interviewing. All Safety Inspectors are to behave in a responsible manner. If you observe any problem, unsafe or inappropriate behaviour, promptly report it to any member of the BASEF Organizing Committee.

Communications with Students

All conversations are to be Science Fair related. Steer away from personal discussions. Your role is as a Safety Inspector, not a student counselor. If conversations become personal, encourage the student to discuss the matter with parents, school counselors, etc. Quickly end the conversation. Avoid one-on-one conversations with students outside of the exhibition area, especially in isolated circumstances. Should a student be interested in further discussions of their project after the Science Fair (i.e. mentoring), do not agree to such arrangements without the full knowledge and consent of their parents or guardians.

Suggested Wording

Personalize your language:

- To pass the safety check, the following needs to be done...
- What we require to do here is to...
- The safety regulations state that this must be done...
- To make this safe to display the following must be done...
- Good job, Item 3 passed...

Safety Inspector's Behaviour with Students

When with the students, there are things that you can do to make the experience a learning opportunity for the students and an enjoyable experience for you:

- *Work to put students and parents at ease. Explain the reasons for a safety check. Review the checklist items verbally with the students.*
- *Give positive reinforcement to nourish self-esteem.*
- *Give positive comments for items as they pass the check. Congratulate the student on passing the safety check.*
- *If an exhibit does not pass the check, be firm about the rules while being positive about the student's ability to fix the display.*
- *End the meeting on a positive note. Wish the student good luck in the Fair.*
- ***Remember when you were this age.***

BASEF Safety Team Responsibilities

- Safety of students, volunteers, and the public.
- Adherence to Fair, hosting institution and municipal safety codes.
- To make projects safe and eligible for display and competition.
- To make the best decisions you can.

BASEF committee members and category content experts are available to assist you with making decisions during the inspection period.

What to Expect on Safety Inspection Day

- 3:30p.m. Meet in Exhibit Room at Safety Station
- 4:00p.m. Exhibitors arrive and start setting up
- 5:00p.m. First rush of project inspections expected
- 7:00p.m. Second rush of project inspections expected
- 8:00p.m. Exhibit setup officially ends
- 9:00p.m. Majority of checks should be complete

A few inspectors may be asked to stay beyond 9:00 p.m.

Please allot time in your personal schedule for extra time that may be required.

Safety Inspection Station

The Safety Inspection Team assembles near an area designated as the Safety Inspection Station. We divide the station into a registration section and a tool loan section, each staffed by volunteers.

When a student has assembled their exhibit, they must be register for inspection at the Station. A pre-printed Safety Checklist will be available with the student's name and project title.

A Safety Registration volunteer will assign the student's Checklist to an Inspector who will execute the inspection.

If one or more items require correction, the Safety Inspector (not the student) returns the partially complete Checklist to the Safety Inspection Station.

When the student has made their corrections, they must inform the Safety Inspection Station and the same or another Safety Inspector can complete the Checklist.

Upon successful completion of the Safety Checklist, the Safety Inspector must sign both the Checklist and the exhibit placard then returns the Checklist to the Inspection Station.

Tool Loan Section

The BASEF Safety Team provides tool loan section of the Safety Inspection Station free of charge to students with basic tools and repair material should they need to modify their exhibit to pass the safety inspection.

Repair materials include:

- *Large rolls of duct tape (our most popular fixer-upper!)*
- *Glue sticks*
- *Scissors, pliers, wire cutters and screwdrivers*
- *Tape measure*

Inspection Tips & Tricks

In past in-person fairs, about 10% to 15% of the exhibits required some modifications to be made safe for viewing. As the 2024 fair is only the second in-person fair in four years, expect up to 25% of the exhibits to require some modifications to be made safe for viewing. Some of these can be done while you wait (very, very quick ones) while others may require the student to make the modifications then request a re-inspection.

The Safety Inspection Team should be able to inspect approximately 100 projects per hour, which should keep the waiting period for students and their parents reasonable.

- Get there early
- Supper will be provided during the early part of the evening
- A Safety Inspector's T-shirt and ID tag will be provided to wear (and keep!)
- Review the Safety & Regulations Checklist and a copy of this Guide
- Set a time limit of about 5 minutes per project
- Projects are checked as many times as needed to pass the inspection
- The goal is that every exhibit must pass the safety inspection to be exhibited at the Fair
- If stuck on a project, ask the Safety Coordinator or the category expert on-site for advice.
- Within the Safety Inspection Team, there are category experts to address situations that may arise.
- If you are in doubt when inspecting a project, contact the Safety Coordinator to arrange for a second person to look at it.
- The rules in some areas are quite strict and will be enforced. We have a responsibility to ensure the safety of everyone who may see these exhibits. If in doubt, we will err on the side of safety.

General Rules

Safety of the exhibitors, judges, volunteers and the public is a prime consideration. Suitable precautions must be taken to prevent the possibility of personal injury, property damage and the legal action that could result from a lack of concern for safety.

The Safety Inspector must confirm a display using water as safe both before and after using the water. The exhibitor must have arrangements for removing and disposing of the water safely and without spillage.

Aisles and exits must not be obstructed.

Packing material must be removed from the Exhibit Hall after setup.

No gas or water outlets, cable or telephone circuits will be available in the display area.

BASEF Safety Inspectors and Volunteers can recommend corrective actions to pass the Safety Inspection but are NOT permitted to modify students' exhibits.

Using the Safety Checklist

To perform your duties as a Safety Inspector, the main tools that you will require are a pen or pencil, a clipboard, and the BASEF Safety & Regulations Checklist for the project being inspected.

To use the Checklist effectively, follow the following instructions:

- A Safety Inspector enters a checkmark when an item passes the safety check criteria. Enter a checkmark for items that are not applicable.
- If any Safety Checklist criteria are not met, document the reason why on the back of the form. For exhibits that are being re-inspected, the next inspector will refer to reason(s) when they arrive at the exhibit for re-inspection.
- The Safety Inspector returns partially completed Checklists to the Safety Station. The initial Checklist is used for re-inspections of the exhibit.
- The Checklist and exhibit placard must be signed only when all safety requirements are met.
- Completed Safety Checklists are to be returned to Safety Station for BASEF records.

The following clarifications are to assist you with the definitions and parameters of the safety regulations at BASEF:

Display

- All materials must fit within the display area.
- A project that does not fit in the space allotment must be modified.
- Consider a photograph as a substitute.
- Project demonstration can be performed outside of the display area with permission. The exhibit must be self-standing and stable.

Backboards

- Must be made of approved materials.
- Exhibits must be sturdy and self-supporting; adjacent projects or walls may not be used for support.
- Secure light or unstable displays to the table with tape. Have no loose items that can fall.
- Paper materials that are attached to backboards must be secured and without air pockets.
- Glue all paper flat to the backboard.
- Do not hang overlapping sheets on the backboard; put them in a binder.



Table Surface

- Check all apparatus, computers, notebooks etc.
- Electrical and liquid items must not be placed in close proximity.
- Liquid samples are to be simulated using colored water or other non-designated substances.
- Glass items are to be kept safe from falling.
- Acceptable materials are to be stored in sealed, break-resistant containers.

Under the Table

- All packing boxes and bags must be removed from the Exhibit Hall and taken home. No packing materials are to be stored under the table.
- Cardboard boxes, etc. cannot be left at the project after setup.
- Any tools that the student leaves in the display area are left at their own risk.

Apparatus

- The exhibitor must supply all equipment except display tables.
- Apparatus can be run only if approved and its operation cannot injure anyone. The apparatus as displayed must be self-supporting and not subject to falling.
- Moving exhibits (e.g. radio-controlled vehicles, robots) are to fit within the display space.
- Consider a photograph as a substitute.
- Powered aircraft may not be activated and must be disabled to prevent accidental operation.

Human Projects

- The project display may include pictures of participants if prior permission has been obtained.
- Projects dealing with forensic science topics must preserve the anonymity of any human victims.
- Project displays must avoid sensational, gratuitous or macabre images.

Animal Projects

- Live animals are not to be displayed.
- Pictures that could be interpreted as harm or distress to animals may not be displayed. Displayed materials must comply with all safety, animal care and ethical regulations.

Chemical Safety

- Chemicals that are (in nature) hazardous, flammable, explosive, toxic, carcinogenic, mutagens and all pesticides cannot be displayed. They are to be simulated.
- Prescription drugs, over-the-counter medication and many kitchen and laundry supplies cannot be displayed
- Chemicals that come with hazard warning labels or have a MSDS sheet indicating any hazard are not to be brought to the Fair.
- Substitutes for toxic and corrosive chemicals must be used. Cigarettes contain poisonous chemicals that are to be simulated. Candy cigarettes are an effective display substitute.
- Any apparatus that has been in contact with cigarette tars, smoke or by-products must be cleaned or removed from display.
- Exposed insulation is a fibrous material that can be inhaled and result in lung damage. Fibrous material must be sealed in airtight containers.



Acceptable Substitutes

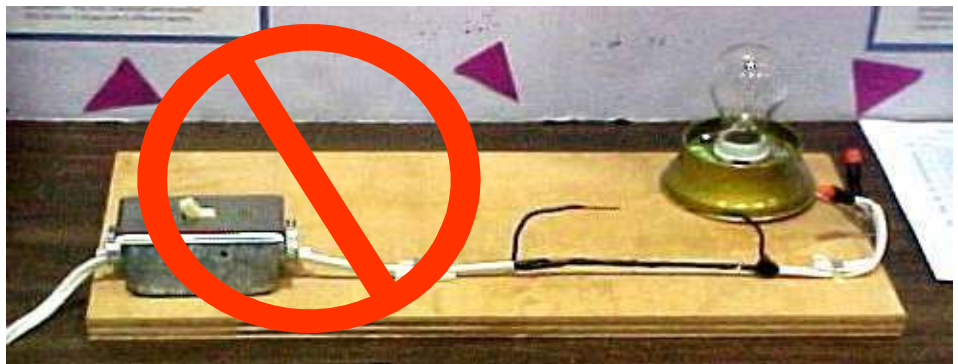
- Water may be used instead of alcohol, ether, and other highly flammable liquids. Colored water can simulate other chemicals.
- Molasses can be used to represent petroleum products. When chemicals are simulated, they should be labeled with the names of the
- substance they represent preceded by the word “simulated”
- Common salt, for example, can be used to simulate chemicals such as ammonium nitrate.

No project will be penalized because the key (but potentially dangerous) components are not on display.

If you are in doubt about any material, contact the category content expert or Safety Coordinator.

Electrical

- One AC electrical outlet supplying 110 Volts, 60 cycles can be supplied if requested. Each 15 Amp circuit will be shared by several projects.
- Exhibit power is to be distributed to the apparatus using switched power bars or multi-outlet extension cords.
- Only CSA-approved extension cords in good condition shall be used.
- Constructed electrical distribution boxes may be deemed unacceptable. All CSA appliances must be in good working order and not modified.
- Electrical cords are to be set up in such a manner that they do not create tripping hazards.
- High voltage electrical projects such as Van de Graff Generators, spark gaps, etc. must be disabled so that they are non-operational.
- An insulating grommet is required at the point where the service enters any enclosure.
- Switches and cords must be the approved variety. Cell or battery-fed circuits are to be safe in design and operation.
- No exposed live parts over 36 Volts are allowed.
- Current (amperage) must be at a low enough level so as not to cause damage to the apparatus or surroundings if a short circuit occurs.
- All exposed, non-current carrying metal parts in systems utilizing more than 36 Volts are to be connected to the ground lead.
- Non-sealed batteries shall not be used because of the hazardous chemicals involved.
- At the end of the day or the viewing period, all electrical exhibits must be disconnected and power bars switched off.



Fire Safety

- The BASEF Organizing Committee will work with the Safety Officer of the host site to meet all requirements for safety and security.
- Fire extinguishers of proper size are available in the exhibition area.
- No flames or heat sources are to be used in the display.
- Packing material must not be stored in the exhibit hall.
- Review the hosting site's emergency evacuation plan with the student.

Light Emitting Devices

- Only manufacturer-labeled ANSI 'Class 1' unmodified Lasers or laser diodes can be operated at the Fair.
- Lasers are to be affixed to the apparatus. (Not removable.)
- Lasers are not to point upward or into the viewing arena.
- Lenses, mirrors, etc. are to be securely mounted to maintain a fixed orientation.
- A fixed beam stop is present, to prevent the beam from escaping into the viewing arena.
- Pre-manufactured lasers in completely enclosed apparatus such that the beam cannot be seen by an observer under any condition may be operated.
- Focused laser diodes may not be operated at the Fair.
- L.E.D. (non-focused Light Emitting Diodes) is not a laser and acceptable for operation. Any lights used as a heat source must be thermally guarded.
- Display lighting must conform to all safety rules.
- If display lighting is hot to the touch, the lighting must be out of reach to the public.

X-Ray/Radiation Producing Equipment

This section is not a formal part of the Checklist but needs to be considered for safety like the other sections on the checklist.

- Radioactive materials cannot be displayed.
 - Smoke detectors with the radiation chamber intact and unmodified may be displayed.
- X-ray or radiation-producing equipment, microwave, ultraviolet, infrared devices may not be operated.
- Substitute materials and/or equipment with pictures

Microorganism & Biohazards

The following may not be displayed:

- Biological toxins, Microorganisms, Moulds, or Spores.
- Mixed cultures obtained from the environment; e.g. soils, mouth swabs
- Non-living, decomposing plant tissue, soil or materials.
- Non-living, decomposing animal tissue, or materials.
- Bones, teeth, cartilage.

Acceptable methods of display are pictures or complete encasement in solid Acrylic.

Pressure Systems & Explosives

- All air and hydraulic systems that employ pressure pumps and/or holding tanks must be non-operational, depressurized, open to the atmosphere and free of compressed gas or fluids.
- Pressurized vessels should have a safety valve.
- Pressurized canisters or compressed gas cylinders are not allowed. Firearms and explosive material must not be displayed.
- Pictures may be used













Structural / Mechanical

- Exhibits must be of a safe design with adequate stability to keep from tipping.
- All sharp edges or corners on prisms, mirrors, enclosures, glass, metal plates and the like must be removed or otherwise protected.
- The length of hoses or extension cords is to be kept to a minimum and out of the way to eliminate tripping hazards. Use tape for securing.
- Dangerous moving parts such as belts, gears, pulleys, propeller blades and pinch-points must be suitably guarded and firmly attached.
- If guarding is not possible, the items must be disabled so they are rendered inoperable.

Final Comments

- Err toward Safety
- If not sure, get a second opinion.
- Always suggest to the student a way to fix the project so that it will fit within the safety guidelines.
- If a project is deemed non-eligible for safety reasons, immediately contact the Safety Coordinator to assess the project and handle the situation.
- If you find one of the following symbols on something at the exhibit, review the appropriate area of the checklist and this guide.

	Explosion hazard (for explosion or reactivity hazards)		Flame (for fire hazards)		Flame over circle (for oxidizing hazards)
	Gas cylinder (for gases under pressure)		Corrosion (for corrosive damage to metals, as well as skin, eyes)		Skull and Crossbones (can cause death or toxicity with short exposure to small amounts)
	Health hazard (may cause or suspected of causing serious health effects)		Exclamation mark (may cause less serious health effects or damage the ozone layer*)		Environment* (may cause damage to the aquatic environment)
	Biohazardous Infectious Materials (for organisms or toxins that can cause diseases in people or animals)				

* The GHS system also defines an Environmental hazards group. This group (and its classes) was not adopted in WHMIS 2015. However, you may see the environmental classes listed on labels and Safety Data Sheets (SDSs). Including information about environmental hazards is allowed by WHMIS 2015.

The objective of the Safety Inspection is to prepare projects for display in the Fair. The goal of the Safety Inspector is to assist the student in making their project safe for viewing at the Science Fair. Make every effort on-site to assist the student in achieving this goal.

Once again, thank you for taking the time to help with the Science Fair. For many students, this will be a significant event in their growing awareness of the opportunities that Science and Engineering may hold for them. Our goal is to make the experience as positive and rewarding as possible, while making it as safe as possible.