

Science & Engineering Fair Research Plan

Potentially Hazardous Biological Agents (PHBA)

Name
School
Category
Research Teacher:

Question or Problem being addressed - Title

Rationale

Brief synopsis of the background that supports your research problem and explain why this research is important scientifically and if applicable, explain any societal impact of your research.

Research Question/Hypothesis/Engineering Goals/Expected Outcomes

Materials List

List of all items used in research. Make sure to include concentrations of all chemicals, source and amount of all living organisms, and all equipment used.

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Procedures

Detail all procedures and experimental design to be used for data collection (see Research Plan/Project Summary Instructions, ISEF Rules and Guidelines, page 31). See pages 7-23 of the ISEF Rules and Guidelines for specific inclusions involving Human subjects, vertebrate animal, potentially hazardous biological agents, and/or hazardous chemicals, activities or devices. **Make sure to clarify which procedures were completed by the researcher and which were completed by others.**

Human participant research: Procedure must include the following items!

- Describe **who will participate** in your study (age range, gender, racial/ethnic composition).
- Identify any **vulnerable populations** (minors, pregnant women, prisoners, mentally disabled or economically disadvantaged).
- **Where will you find your participants?**
- **How will they be invited to participate?**
- What will participants be **asked to do?**
- Will you use any surveys, questionnaires or tests?

- What is the **frequency and length of time** involved for each subject?
- What are the **risks or potential discomforts** (physical, psychological, time involved, social, legal, etc.) to participants?
- **How will you minimize the risks?**
- List any **benefits to society or each participant**.
- **Will any identifiable information (e.g., names, telephone numbers, birth dates, email addresses) be collected?**
- Will data be confidential or anonymous? If anonymous, **describe how the data will be collected anonymously**. If not anonymous, **what procedures are in place for safeguarding confidentiality?**
- **Where will the data be stored?**
- **Who will have access to the data?**
- **What will you do with the data at the end of the study?**
- **Describe how you will inform participants about the purpose of the study, what they will be asked to do, that their participation is voluntary and they have the right to stop at any time.**

Vertebrate animal research: Procedure must include the following items!

- **Describe potential ALTERNATIVES to vertebrate animal use and present a detailed justification for use of vertebrate animals.**
- Explain potential impact or contribution this research may have to science.
- Include **methods used to minimize potential discomfort**, distress, pain and injury to the animals during the course of experimentation.
- Detail chemical concentrations and drug dosages (if applicable).
- **Animal species (common and scientific name)**
- **Detail animal numbers, strain, sex, age, source, etc.**
- Describe housing and oversight of daily care and **disposition of animals at the termination of the study**.
- Complete a **Mortality Form** after experimentation has ended.

Potentially Hazardous Biological Agents: Procedure must include the following items!

- Describe **Biosafety Level Assessment process and resultant BSL determination**.
- Complete appropriate Biosafety Form. **Include source of agent, source of specific cell line, etc.**
- **Detail** safety precautions and specify methods of disposal.

Hazardous Chemicals, Activities & Devices: Procedure must include the following items!

- Describe **Risk Assessment process**.
- Detail chemical concentrations and drug dosages.
- Describe safety precautions and procedures to minimize risk.
- Specify methods of disposal.

Procedures (Research Methods)

Description in detail of method/procedures, risk and safety, and proper disposal if needed. See statements above for more information.

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Risk Assessment

Analyze all activities and determine any risk associated with them.

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Risk Mitigation

Analyze all activities and determine appropriate procedures to reduce risk, like wearing PPE including goggle, gloves, etc.

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Describe the Biosafety Level Process

1. Determine the BSL level of the organism.
2. Consult the ISEF Rules and SSEF Rules to determine the mandated BSL level of the experiment
3. Review with mentor.
4. Determine any additional training necessary and complete.
5. Send all information to SRC for review and approval

One of the following forms must be included with your paperwork

[Biosafety Level 1 Form](#)

[Biosafety Level 2 Form](#)

Detail Safety Precautions

All PHBAprojects MUST include detailed, step-by-step procedures that clearly describe:

- a. personal protective equipment (PPE) items used to reduce risks to the researcher;
- b. aseptic technique (standard microbiological procedures that prevent cross contamination);
- c. sterilization of work surfaces and reusable equipment before and after use (Ex: 10% bleach or 70% ethanol)

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Specify Methods of Disposal.

Please note that your lab supervisor must dispose of all cultures with 70% ethanol solution, 1:10 Bleach Solution (30 minutes), or Autoclaving @121 °C for 20 minutes. (I usually bleach equipment, autoclave cultures in Petri dishes, and use ethanol to clean surfaces)

Data Analysis

Describe the procedures you will use to **analyze the data** that answer research question, hypothesis, or engineering goals.

Bibliography

List at least five (5) major references (e.g. science journal articles, books, internet sites) from your literature review. Please use a **variety of sources**, five sources from the internet will not suffice.

- If you plan to use **vertebrate animals**, one of these references must be an animal care reference.
- If you plan on using **human subjects**, one of these references must be from the listing of human subject reference in the ISEF Rules and Guidelines.
- Include MSDS/SDS citation for all **hazardous chemicals** used in experimentation.
- If you plan on using **PHBAs**, one of the references must include aseptic technique.