SECTION 2: INTRODUCTION

This handbook is for teachers using the NJAS rules and regulations to guide students doing open-ended, inquiry-based research. It was written with safety for students and research organisms as a major concern. It consists of three sections: Section 1: FACILITATING JUNIOR HIGH/MIDDLE SCHOOL STUDENTS; Section 2: FACILITATING SENIOR HIGH STUDENTS; and Section 3: USEFUL INFORMATION FOR ADULT SPONSORS AND STUDENTS INVOLVED IN NJAS SCIENCE FAIRS. Each section is meant to stand "alone"; if the teacher has only senior high students, Section 1 of the guide would not be used. The complete handbook (and required forms) can be read and/or downloaded from the NAS/NJAS website at <**www.neacadsci.org**>.

Highlights from the handbook include the following information:

- Two forms are required for *all* junior high NJAS projects and three forms for senior high. (Senior high requires three because one form was divided into two separate forms.)

- On the Student Research Plan Form, the student identifies a particular problem and plans what experimental approach he/she will use to solve the problem. The completed form is submitted to the teacher who reviews it for compliance with local, state, and federal regulations and the NJAS guidelines.

- The other form(s) must be signed by the student and the student's parent or guardian, and then by the teacher after he/she has reviewed it to make sure necessary signatures have been obtained by the adults involved in approving or supervising any part of the experiment.

- Student experimentation begins after forms are on file with the teacher.

- Additional forms and/or signatures are required only if the project requires special supervision by *qualified* adults because the research poses potential risk to the student and/or to the research organisms. These projects include almost all that involve the use of nonhuman vertebrate animals, human subjects, potentially pathogenic agents (all micro-organisms isolated and/or cultured from any environment are considered pathogenic, including bacteria and fungi but excluding protists), recombinant DNA, controlled substances, human/vertebrate animal tissue, and hazardous substances or devices.

- The rules and regulations for conducting experimentation with each of these "special supervision" subjects are outlined in Chapters 2-7 of Section 1 and Chapters 2-8 in Section 2 of the handbook. It is important that the teacher reads these rules and regulations *before* allowing students to do experimentation.

- Special supervision *must be* provided by a Qualified Scientist and/or a Designated Supervisor.

- Roles and Responsibilities of a Qualified Scientist: Must be thoroughly familiar with the local, state, and federal regulations that govern the student's area of research. The Qualified Scientist and the teacher may be the same person, if that person is qualified. A student may work with a Qualified Scientist in another city or state. In this case, the student must work

locally with a Designated Supervisor (see below) who has been trained in the techniques the student will use.

- Roles and Responsibilities of Designated Supervisor: The Designated Supervisor is an adult who supervises a student's experiment. The Designated Supervisor need not have an advanced degree, but should be thoroughly familiar with the student's project, and must be trained in the student's area of research. The teacher may act as the Designated Supervisor.

- The teacher must evaluate projects requiring special supervision and make sure criteria for the Qualified Scientist and the Designated Supervisor adhere to those set forth in the NJAS Guidelines.

- The teacher needs to either select the Qualified Scientist and/or the Designated Supervisor for the student or provide substantial input if the student is doing the selecting.

- It is important to be aware that the guidelines are not the same for the two different age groups when the research requires special supervision due to the potential risk to students and/or the research organisms.

SECTION 2

Facilitating SENIOR HIGH SCHOOL Students

Table of Contents

SECTION 2
Facilitating SENIOR HIGH SCHOOL Students

Introduction

Section 2 includes information for guiding senior high students doing open-ended "science as inquiry" research following the NJAS Rules and Regulations. Each chapter is divided into parts for easy reference. For most projects the only chapters that will apply are Ch. 1 "Instructions for Facilitating Senior High Students", Ch. 10 "NJAS Science Fair Display and Safety Regulations", and Ch. 12 "Copies of Forms Required for Senior High Projects". The remaining chapters are pertinent to projects requiring special instructions because the research poses potential risk to the student and/or to the research organisms and requires the special supervision of a Qualified

Scientist and/or a Designated Supervisor. These projects include almost all that involve the use of nonhuman vertebrate animals, human subjects, potentially pathogenic agents (all micro-organisms isolated and/or cultured from any environment are considered pathogenic, including bacteria and fungi but excluding protists), controlled substances, human/vertebrate animal tissue, recombinant DNA, and hazardous substances or devices.

It is important to be aware that the guidelines for doing research requiring special supervision are not the same for this age group of students as for junior high/middle school students. Senior high students are required to complete special forms and obtain signatures from qualified scientists and/or designated supervisors who have approved the student's Student Research Plan Form. Junior high/middle school students do not need to complete the special forms but they are required to obtain the signatures. Another difference is that NJAS guidelines allow senior high students to do research on recombinant DNA if the research is done at a federally registered research institution.

The NJAS Guidelines for high school students were written to align with the Intel ISEF Science Fair Rules and Regulations. Almost all of the Rules and Regulations are the same; however, there are some differences in that Intel ISEF requires more forms be completed and more signatures be obtained from ISEF *before* experimentation may begin. It is permissible for senior high students entering the NJAS Regional Science Fair to use the ISEF forms in place of the NJAS forms. In this case, ISEF forms would be completed following *all* the ISEF Rules and Regulations and would have the required signatures needed from the ISEF Scientific Review Committee.

It is strongly recommended that all of Section 2 and Section 3 "Useful Information for Adult Sponsors and Students Involved in NJAS Science Fairs" be read and reviewed before facilitating students in their experimental research. Section 3 is subdivided by the following titles: Why Have Students Do Scientific Research?, NJAS Science Project Categories With Descriptions, Steps to Doing Scientific Research, NJAS Guidelines for Field Research Projects, Constructing A Visual Display of the Science Research Project, Writing A Science Research Abstract, Writing A Science Research Paper, Oral Presentation of the Science Research Project, Judging Criteria for NJAS Science Fairs, Nebraska Junior Academy of Sciences Judge's Score Sheet, and Book Reference List for Inquiry-Based Investigations.

Chapter 1: Instructions for Facilitating Senior High Research Students

The purpose of this chapter is to help the Adult Sponsor gain a better understanding of the general guidelines involved in facilitating and/or supervising high school students doing research projects for a Nebraska Junior Academy of Sciences (NJAS) Regional Science Fair.

Part A: Roles and Responsibilities of the Adult Sponsor

- Adult Sponsor may be a teacher, parent, university professor, or scientist in whose lab the student is working. This individual must have a solid background in science and should have close contact with the student during the course of the project.

- Adult Sponsor is ultimately responsible not only for the health and safety of the student conducting the research, but also for the humans or animals used as subjects.

- Adult Sponsor must be familiar with the regulations that govern potentially dangerous research as they apply to a specific student project. These may include chemical and equipment usage, experimental techniques, research involving human or nonhuman animals, cell cultures, microorganisms, or animal tissues. The issues must be discussed with the student when completing the **Student Research Plan (Form 1)**.

- Adult Sponsor is responsible for establishing the Institutional Review Board at the local school level to review and approve all high school projects involving the use of human subjects.

- Some experiments involve procedures or materials that are regulated by state and federal laws. If not thoroughly familiar with the regulations, the Adult Sponsor needs to enlist the aid of a Qualified Scientist and/or a Designated Supervisor.

- Adult Sponsor is responsible for ensuring the student's research is eligible for entry in the Nebraska Junior Academy Science Fairs held in regions across the state.

Part B: General Rules for ALL Senior High School Research Projects

- All projects must adhere to the Ethics Statement below.
  Scientific fraud and misconduct is not condoned at any level of research or competition. Plagiarism, use or presentation of other researcher's work as one's own and fabrication or falsification of data will not be tolerated. Fraudulent projects will fail to qualify for competition in NJAS science fairs.

- All projects must adhere to all Federal, State and local laws and regulations.

- The use of photographs of persons requires the **Informed Consent Form (Form 7)** and must conform to school policy.

- Exhibits must adhere to NJAS safety and size requirements (see Chapter 11).

Part C: Field Research Projects

- Many times important research is done outside the confines of the traditional setting. This type of research is often referred to as "field work" or "field research."

- Field research involves making careful observations in a given locale, and sometimes, comparing this survey to known data from other locales. It may involve the making of a detailed inventory of the living and non-living objects, or their characteristics, in a given geographic location, or the interaction among the objects.

- It always involves looking for the patterns in a well-defined area and the keeping of detailed field notes.

- The "controls" in this type of study are in the observational techniques that are used.
- Refer to Section 3: "NJAS Guidelines for Field Research Projects" for facilitating students doing this type of research.

Part D: Special Supervision REQUIRED for Certain Research Projects

- It is important that the Adult Sponsor be aware that certain projects require special supervision by *qualified* adults. These projects include any involving human subjects, nonhuman vertebrate animals, pathogenic agents (all micro-organisms isolated and/or cultured from any environment are considered pathogenic, including bacteria and fungi but excluding protists), recombinant DNA, controlled substances, human/animal tissue, and hazardous substances or devices.

- The rules and regulations for conducting experimentation with each of these "special supervision" subjects are outlined in Chapters 2-8. It is important that the Adult Sponsor read these rules and regulations BEFORE allowing students to do experimentation that requires special supervision.

- Special supervision *must be* provided by a Qualified Scientist and/or Designated Supervisor.

- Roles and Responsibilities of the Qualified Scientist
  - Qualified Scientist should possess an earned doctoral/professional degree in the biomedical sciences. However, a master's degree with equivalent experience and/or expertise in the student's area of research is acceptable.
  - Qualified Scientist must be thoroughly familiar with the local, state, and federal regulations that govern the student's area of research.
  - Qualified Scientist and the Adult Sponsor may be the same person, if that person is qualified as outlined above.
  - A student may work with a Qualified Scientist in another city or state. In this case, the student must work locally with a Designated Supervisor (see below) who has been trained in the techniques that the student will use.

- Roles and Responsibilities of the Designated Supervisor
  - Designated Supervisor is an adult who supervises a student's experiment.
  - Designated Supervisor need not have an advanced degree, but should be thoroughly familiar with the student's project, and must be trained in the student's area of research.
  - Adult Sponsor may act as the Designated Supervisor.

- Roles and Responsibilities of the Adult Sponsor
  - Adult Sponsor must evaluate projects requiring special supervision and make sure criteria for the Qualified Scientist and Designated Supervisor adhere to those set forth in the NJAS Guidelines.
  - Adult Sponsor needs to either select the Qualified Scientist and Designated Supervisor for the student or provide a lot of input if the student is doing the selecting.

Part E: Instructions for Completing the Forms Required for ALL Projects

- Only three forms are required for ***all*** NJAS projects. These are the **Student Research Plan (Form 1)** that is completed by the student, the **Checklist for Adult Sponsor/Safety Assessment Form (Form 2)** that is a checklist completed by the Adult Sponsor, and the **Approval Form** (**Form 3)** that is signed by the appropriate responsible people. The three completed forms should be kept on file with the Adult Sponsor for liability purposes.

- The first form that needs to be completed is the **Student Research Plan (Form 1)**. This form is completed by the student after he/she has picked and researched his/her topic. On this form the student identifies a particular problem and plans what experimental approach he/she will use to solve the problem. The completed form is submitted to the Adult Sponsor for review, and after approval a copy is returned to the student.

- The second form is the **Checklist for Adult Sponsor/Safety Assessment Form (Form 2)**. The sections of the form are filled out by the Adult Sponsor (usually the teacher) in several stages prior to experimentation. Section 1 is completed after the **Student Research Plan (Form 1)** has been reviewed. Section 2 needs only to be completed if the project requires any SPECIAL forms (as outlined in Section 1 of the form). This section is done after the SPECIAL forms have been completed and submitted to the Adult Sponsor. Section 3 is done after the **Approval Form (Form 3)** has been completed and submitted to the Adult Sponsor. When all sections have been completed the form should be signed and dated by the Adult Sponsor and kept on file for liability purposes.

- The third form is the **Approval Form (Form 3)**. For ALL projects this form must be signed by the Adult Sponsor, the student, and the student's parent or guardian. If the project required the completion of any SPECIAL forms, this form will need to be submitted to and approved by the NJAS Regional Director (see Part F "Completing Special Forms Required for Certain NJAS Projects" below). The **Approval Form (Form 3)** with appropriate signatures should be kept on file with the Adult Sponsor for liability purposes.

- Certain projects require additional SPECIAL forms. These projects include any involving human subjects, nonhuman vertebrate animals, pathogenic agents (all micro-organisms isolated and/or cultured from any environment are considered potentially pathogenic, including bacteria and fungi but excluding protists), recombinant DNA, controlled substances, human/animal tissue, and hazardous substances or devices.

- If the project does not require completion of any SPECIAL forms, then the student may begin the experimentation. Information on projects requiring SPECIAL forms is included in Part F.

Part F: Completing SPECIAL Forms Required for Certain NJAS Projects

- Experiments that involve human subjects, nonhuman vertebrate animals, pathogenic agents, controlled substances, recombinant DNA, human/animal tissue, and hazardous substances or devices *require* the completion of SPECIAL forms and the approval from the NJAS Regional Director ***before*** experimentation begins.

- SPECIAL forms need to be completed if any of the boxes were checked on question two of the **Checklist for Adult Sponsor/Safety Assessment Form (Form 2)**. Special guidelines for these projects are included in Chapters 2-8.

Chapter 2: Projects Involving Human Subjects (SPECIAL Forms Required)

Part A: Background Information

The NJAS Rules, which follow federal regulations, exist to safeguard the rights and welfare of individuals who participate as research subjects and to protect the student researcher. When students conduct biomedical or behavioral research, they are directly responsible for protecting the rights and welfare of the participating human subjects. The psychological and physical risks must be carefully evaluated at the local level by both the student and the Institutional Review Board (IRB) prior to experimentation.

Part B: Roles and Responsibilities of the Adults

1) **Adult Sponsor:**

- Adult Sponsor may be a teacher, parent, university professor, or scientist in whose lab the student is working. This individual must have a solid background in science and should have close contact with the student during the course of the project.

- Adult Sponsor is ultimately responsible not only for the health and safety of the student conducting the research, but also for the humans used as subjects.

- Adult Sponsor must be familiar with the regulations that govern potentially dangerous research as they apply to research involving humans. The issues must be discussed with the student when completing the required forms for ALL projects and the special forms required for research involving human subjects.

- Adult Sponsor needs to read and be familiar with the information provided in this chapter *before* allowing any students to design/conduct experimental research involving human subjects.

2) **Qualified Scientist**:

- Qualified Scientist should possess an earned doctoral/professional degree in the biomedical sciences. However, a master's degree with equivalent experience and/or expertise in the student's area of research is acceptable. Qualified Scientists include: medical doctors, psychologists or psychiatrists.

- Qualified Scientist must be thoroughly familiar with the local, state, and federal regulations that govern the student's area of research.

- Qualified Scientist and the Adult Sponsor may be the same person, if that person is qualified as outlined above.

- A student may work with a Qualified Scientist in another city or state. In this case, the student must work locally with a Designated Supervisor who has been trained in the techniques the student will use.

3) **Designated Supervisor:**
- Designated Supervisor is an adult who supervises a student's experiment.

- Designated Supervisor need not have an advanced degree, but should be thoroughly familiar with the student's project, and must be trained in the student's area of research.

- Adult Sponsor may act as the Designated Supervisor.

Part C: Instructions for Completing SPECIAL Forms Involving Human Subjects
- It is the responsibility of the Adult Sponsor to set up a local Institutional Review Board (IRB) to review all proposed projects involving human subjects. The IRB consists of a science teacher, school administrator, and an appropriate medical professional (registered nurse, medical doctor, psychologist or psychiatrist). When the project concerns behavioral research, the IRB must include a psychologist or psychiatrist.

- All projects involving human subjects require completion of the **Human Subjects Form (Form 6**. Section 1 of this form is filled out by the student with the Adult Sponsor's guidance. (Refer to Part F for information on "Assessing Risk and Choosing a Study Group".) A sample **Informed Consent Form (Form 7)** must also be filled out by the student and attached to the **Student Research Plan (Form 1)**.

- If the research uses tests (standardized or student-prepared), surveys, questionnaires, etc. then samples of these must be attached to the **Student Research Plan (Form 1)**.

- The Adult Sponsor submits a packet containing the **Human Subjects Form (Form 6)** and the three forms required for ALL projects--**Forms 1(with attachments), 2, and 3**-- for review and approval by the local IRB *prior* to experimentation.

- The IRB reviews the forms to determine the level of risk to the human subjects ("minimal", "more than minimal", or "unacceptable risks involved") and completes Section 2 of the **Human Subjects Form (Form 6).** The **Human Subjects Form (Form 6)** is returned along with the sample **Informed Consent Form (Form 7)** and the three required forms to the Adult Sponsor.

- If the local IRB returns a determination of "unacceptable risks involved", then the student must redesign the **Student Research Plan (Form 1)** and revise the other forms (as determined by the IRB) with the guidance of the Adult Sponsor. All forms must then be resubmitted to the IRB for approval before experimentation may begin.

- If the IRB determines that "only minimal risk is involved" then *no additional forms* are required by NJAS. However school policy may require that the human subjects complete the **Informed Consent Form (Form 7)**.

- If the IRB determines that "more than minimal risk is involved" then the **Qualified Scientist Form (Form 4)** and the **Informed Consent Form (Form 7)** are REQUIRED for all subjects and the **Designated Supervisor Form (Form 5)** MAY be required. The student *must* enlist (with Adult Sponsor guidance) a Qualified Scientist (role and responsibilities defined in Part B) to oversee the project and complete the **Qualified Scientist Form (Form 4)**. If the Qualified Scientist *cannot* be present during the experimentation, a Designated Supervisor (role and responsibilities defined in Part B) must supervise and complete the **Designated Supervisor Form (Form 5)**. The student *must* obtain the **Informed Consent Form (Form 7)** for each test subject.

- The Adult Sponsor sends a packet containing ***copies*** of the three required forms **(Forms 1 with attachments, 2, and 3)** and ***copies* of all SPECIAL forms** to the NJAS Regional Director for final approval. Unless the research was done at a registered research institution, this approval must be obtained *before* experimentation begins.

- If the research work was conducted in an institutional or industrial setting prior to NJAS or ISEF review and approval, then the **Registered Research Institutional /Industrial Setting Form (Form 10)** must be completed *following the end of experimentation* by the scientist who supervised the student research. The Adult Sponsor needs to send a packet containing ***copies*** of the three forms required for ALL projects (**Forms 1, 2, and 3**) along with a ***copy*** of the **Registered Research Institutional/Industrial Setting Form (Form 10)** to the NJAS Regional Director. *Research done at an institution must still be reviewed and approved before competing at the NJAS Regional Science Fair*.

- The Adult Sponsor should keep all the returned forms on file for liability purposes. *Copies* of all completed forms must be available for review by the NJAS Regional Director (or his/her representative) and the judges at the Regional Science Fair competition. It is recommended these be kept in a notebook or folder.

Part D: Summary of SPECIAL Forms Involving Human Subjects

- All projects *require* the **Human Subjects Form (Form 6)**.

- If the local IRB determines *only minimal risk*--no additional special forms are required.

- If the local IRB determines *more than minimal risk* --the **Qualified Scientist Form (Form 4)** and the **Informed Consent Form (Form 7)** are *required* and the **Designated Supervisor Form (Form 5)** is *required if the Qualified Scientist cannot be present during the experimentation.*

- Research done at a registered research institution prior to NJAS or ISEF approval requires the **Registered Research Institutional/Industrial Setting Form (Form 10)**.

Part E: Rules and Regulations Involving Human Subjects

Rule 1: Student researchers must assess the risks to their human subjects when developing the **Student Research Plan (Form 1).** Any possible risks must be described in the **Human Subjects Form (Form 6)** and **copies** of the **Human Subjects Form (Form 6)** and the **Informed Consent Form (Form 7)** must be submitted for review and approval by an Institutional Review Board (IRB) at the local level before experimentation begins. Upon assessment of risks by the IRB, changes in the Student Research Plan may be required. If the IRB requires changes in the project, the student must incorporate those changes into the forms *before* the IRB signs for approval.

Rule 2: Any proposed changes in the **Student Research Plan (Form 1)** by the student after initial IRB approval must have subsequent IRB approval before such changes are made and before experimentation begins/resumes.

Rule 3: Observational studies and related data collection are exempt from use of the **Informed Consent Form (Form 7)**, but the **Human Subjects Form (Form 6)**, the IRB review and review by the NJAS Regional Director is still required.

Rule 4: Research on students under the age of 18 does not need the **Qualified Scientist Form (Form 4)** or the **Informed Consent Form (Form 7)** for the following:

a) Research conducted in established settings:
   (1) involving normal educational practices
   (2) on individual or group behavior or characteristics of individuals, such as studies of perception, cognition, game theory, or test development, where the investigator does not manipulate subjects' behavior and the research will not involve stress to subjects. (see point 2 of *Possible Risk Activities* for clarification)

b) Research involving observation of legal public behavior.

c) Research involving collection or study of existing publicly available data.

Rule 5: Copies of standardized tests and student-prepared tests, surveys, etc. must be attached to the **Student Research Plan (Form 1)** for both reviews (IRB and the NJAS Regional Director).

Rule 6: Completion of the **Qualified Scientist Form (Form 4)** by a Qualified Scientist is *required* if the IRB determines that there is "more than minimal risk". If the Qualified Scientist is unable to supervise the experiment, a trained Designated Supervisor is *required* (and *requires* signature on the **Designated Supervisor Form (Form 5)**.

Rule 7: All research forms approved by the IRB must then be reviewed and approved by the NJAS Regional Director *before* experimentation begins.

Rule 8: Any proposed changes in the **Student Research Plan (Form 1)** by the student *after* initial approval by the NJAS Regional Director must have subsequent approval *before* experimentation begins/resumes.

Rule 9: Research conducted by a precollege student at federally registered research institutions (*e.g.*, university labs, medical centers, NIH, etc.) prior to NJAS or ISEF approval requires completion of the **Registered Research Institutional/Industrial Setting Form (Form 10).** A letter from the mentor attesting to this approval is not sufficient to replace **Form 10**. Note: this research must still obtain NJAS approval prior to NJAS Regional Science Fair competition (see **Form 3)**.

Rule 10: A student may observe and collect data for analysis of new procedures and medications only under the direct supervision of a licensed professional. Students are prohibited from administering medications to human subjects. The local IRB must ascertain that the student is not violating the medical practice act of that particular state.

Rule 11: It is illegal to publish or display information in a report that identifies the human subjects directly or through identifiers linked to the subjects, including photographs without written informed consent. (Public Health Service Act, 42 U.S.C., 241(d). Use the **Informed Consent Form (Form 7)**.

Rule 12: All completed forms must be available for review by the NJAS Regional Director (or his/her representative) and the judges at the Regional Science Fair competition. It is recommended these be kept in a notebook or folder.

Part F: Assessing Risks and Choosing a Study Group

- When choosing a study group, the criteria for selecting the subjects should be clearly defined. In other words, students should ask questions that will define the exact study population. For example, if students want to study nondiabetic males, they should make sure to ask the appropriate questions that would eliminate diabetic individuals. Similarly, in studies where exercise is involved in the project, the student researcher should determine that the research subject is not at risk by exercising, e.g., the subject has no cardiac or respiratory disease/disorder.

- Once a population is chosen, the NJAS Rules *require* students to assess any potential risks when developing the **Student Research Plan (Form 1)**. Any possible risks must be explained on the **Human Subjects Form (Form 6)** and a sample **Informed Consent Form (Form 7**). The student must submit the **Human Subjects Form (Form 6)** and a sample **Informed Consent Form (Form 7)** with the three forms required for all projects--**Forms 1(with attachments), 2, and 3**--to a local Institutional Review Board (IRB) for review and approval *before* the beginning of experimentation.

- Parents have the right to deny participation in any study, including those involving tests (standardized or student-prepared), surveys, or questionnaires. The local IRB may judge certain tests, surveys, or questionnaires to involve "more than minimal risks" and the **Informed Consent Form (Form 7)** *will be required* for all subjects. Such tests, surveys, or questionnaires *must be* provided to parents with the **Informed Consent Form (Form 7)**.

- The **Informed Consent Form (Form 7)** is a) required for subjects under 18 years of age (except for Observational research studies and related data collection), b) required for all subjects when "more than minimal risk" is determined by the IRB, and c) is strongly recommended for all projects involving human subjects. A sample of the **Informed Consent Form (Form 7)** must be submitted to the IRB *before* experimentation begins.

Part G: Evaluating Risk

In evaluating risk, the following federal definition of minimal risk should be used as a guide: *No more than minimal risk exists when the probability and magnitude of harm or discomfort anticipated in the research are not greater (in and of themselves) than those ordinarily encountered in DAILY LIFE or during performance of routine physical or psychological examinations or tests.*

The following are examples of activities or groups that contain more than minimal risks:

- Possible Risk Activities:
  - **Exercise**
  - **Emotional stress** resulting from invasion of privacy (See Privacy Act of 1974 45CFR5B). Questions on sexual activities or preferences, AIDS testing and results, suicide attitudes, divorce and its effects on psychological well-being all should be considered overtly invasive or high-risk and thus require the **Informed Consent Form (Form 7)**. Student researchers should always carefully evaluate controversial questions for compliance with federal regulations.
  - **Ingestion or physical contact** with any potentially hazardous materials. This rule applies to the student researcher as well as the human subject(s).

- Risk Groups:
  1) Any member of a group that is naturally at-risk (*e.g.*, pregnant women, individuals with diseases such as cancer, asthma, diabetes, cardiac disorders, psychiatric disorders, dyslexia, AIDS, etc.).

  2) Special vulnerable groups covered by federal regulations (*e.g.*, children, prisoners, pregnant women, handicapped or mentally disabled persons, economically or educationally disadvantaged persons). Additional safeguards are applied to these subjects because they have been judged as vulnerable to coercion or undue influence.

Part H: Sources of Information

1) CFR, Title 45 (Public Welfare), Part 46-Protection of Human Subjects (45CFR46)
2) Penslar, R. L., Institutional Review Board (IRB) Guidebook, (1993). Washington, DC: ORRP-NIH
3) Bellmont Report, April 18, 1979
Above documents available from:
Office for Protection From Research Risks (OPRR)
National Institutes of Health
6100 Executive Blvd., Suite 3B01, MSC 7507
Rockville, MD 20892-7507
phone: 301-496-7041, fax: 301-402-0527

email: ohrp@osophs.dhhs.gov website: http://ohrp.osophs.dhhs.gov/polasur.htm
Division of Human Subject Protections
phone: 301-402-0527 and to have documents faxed call: 301-594-0464

American Psychological Association
750 First Street, NE
Washington, DC 20002
phone: 202-336-5500 website: http://www.apa.org
Information for students: http://www.apa.org/science/infostu.html
Information regarding publications: http://www.apa.org/science/pubs.html

Educational and Psychological Testing
Standards for educational and psychological testing. (1999). Washington, DC: AERA, APA, NCME.
To order call: (800) 628-4094. website: http://www.apa.org/science/standards.html

Chapter 3: Projects Involving Non-Human Vertebrate Animals (SPECIAL Forms Required)

Part A: Position Statement on Use of Animals in Pre-College Science Research

This position statement has been substantially borrowed from the Science Service and the Intel ISEF position statement on the use of animals, and has been modified to conform with the NJAS Rules and Regulations.

Science Service affirms its conviction that the humane use of animals by students under qualified adult supervision is necessary and important for learning about the life sciences. As science educators, one of our major roles is to establish guidelines for the appropriate use of animals in precollege research projects and in classrooms. We are committed to the promulgation and strict enforcement of existing rules that were designed to ensure the humane and proper treatment of any animal used in our science competitions.

NJAS follows the majority of the International Rules and Guidelines that were written to teach students about the humane treatment of animals as well as respect for all living things. Alternatives are encouraged and must be explored during the pre-approval process. The requirement for prior project review and approval as well as the direct supervision of student research has raised the quality of scientific research in the pre-collegiate arena and protected the welfare of animals. Science Service, the International Science and Engineering Fair Scientific Review Committee, and the Nebraska Junior Academy of Sciences promote and enforce these guidelines and have processes in place to ensure those competing are in compliance.

Science Service has taken the responsibility of establishing the comprehensive guidelines for student science research. They are widely accepted and are becoming the standard for pre-college science research. These guidelines are reviewed annually and are appropriately more

strict and comprehensive than those of the federal government. We believe prohibition of animal based research projects at the NJAS and the Intel ISEF affiliated fairs will eliminate these established guidelines governing animal use. If animal research projects at NJAS and Intel ISEF are eliminated, unregulated and unsupervised animal research at the secondary and lower level will increase. Students will proceed with experimentation without rules or guidelines undoubtedly resulting in the proliferation of inhumane science projects and classroom activities. National and state mandated educational standards that require scientific inquiry will be seriously compromised. This action would be detrimental to science education and animals, and would not serve the public interest.

Part B: Background Information

- Students proposing research on non-human vertebrate animals should explore all possible alternatives. If vertebrates are used for research and testing, the student researchers and Adult Sponsors are responsible for granting the animals every humane consideration for their comfort and well being before, during, and after the research.

- Studies involving animals in their natural environment as well as animals in zoological parks with no interaction between the experimenter and the subject animal(s) do not require the **Qualified Scientist Form (Form 4)** or the **Non-Human Vertebrate Animal Form (Form 8**). *These projects do not require completion of any SPECIAL forms.*

- The **Student Research Plan (Form 1)** must include specific information and requires special instructions in order to comply with NJAS Rules and Regulations (see Part F for instructions).

- Certain research that is permissible for professionals in research institutions may not be appropriate for high school students.

Part C: Roles and Responsibilities of the Adults

1) **Adult Sponsor:**

- Adult Sponsor may be a teacher, parent, university professor, or scientist in whose lab the student is working. This individual must have a solid background in science and should have close contact with the student during the course of the project.

- Adult Sponsor is ultimately responsible not only for the health and safety of the student conducting the research, but also for the nonhuman vertebrates used as subjects.

- Adult Sponsor must be familiar with the regulations that govern potentially dangerous research as they apply to research involving nonhuman vertebrates. The issues must be discussed with the student when completing the required forms for ALL projects and the special forms required for research involving nonhuman vertebrate subjects.

- Adult Sponsor needs to read and be familiar with the information provided in this chapter *before* allowing any students to design/conduct experimental research involving nonhuman vertebrate subjects

2) **Qualified Scientist**:

- Qualified Scientist should possess an earned doctoral/ professional degree in the biomedical sciences. However, a master's degree with equivalent experience and/or expertise in the student's area of research is acceptable. Qualified Scientists include veterinarians.

- Qualified Scientist must be thoroughly familiar with the local, state, and federal regulations that govern the student's area of research.

- Qualified Scientist and the Adult Sponsor may be the same person, if that person is qualified as outlined above.

- A student may work with a Qualified Scientist in another city or state. In this case, the student must work locally with a Designated Supervisor who has been trained in the techniques the student will use.

3) **Designated Supervisor:**
- Designated Supervisor is an adult who supervises a student's experiment.

- Designated Supervisor need not have an advanced degree, but should be thoroughly familiar with the student's project, and must be trained in the student's area of research.

- Adult Sponsor may act as the Designated Supervisor.

4) **Animal Care Supervisor:**
- Animal Care Supervisor is required for all nonhuman vertebrate animal projects.

- Animal Care Supervisor must be familiar with the proper care and handling of research animals used in the project.

- Qualified Scientist or Designated Supervisor usually serves as the Animal Care Supervisor.

- Adult Sponsor if familiar with proper care and handling can serve as the Animal Care Supervisor.

Part D: Rules and Regulations Involving Vertebrate Animals
Rule 1: Alternatives
- Alternatives to the use of nonhuman vertebrate animals for research **MUST BE** explored and discussed in the **Student Research Plan (Form 1)**. Alternatives may include replacement, reduction or refinement.

- The three Rs of animal experimentation:
  Replace vertebrate animals with invertebrates or lower life forms whenever possible.
  Reduce the number of animals whenever possible. (Do not reduce numbers beyond statistical validity.)
  Refine experimental protocols to lessen pain or distress to the animals.

- NJAS Rules and the International Rules encourage any non-invasive and non-intrusive studies (i.e., observational, behavioral, and natural history studies) that do not affect an animal's health or well-being by causing stress, discomfort, pain or death. The NJAS Rules follow the International Rules that allow intrusive studies on vertebrate animals and invertebrate animals that have advanced nervous systems ONLY when lower vertebrates or other alternatives are not suitable.

- Examples of possible alternatives are listed below:
  a) Cells and tissue cultures
  b) Plants, yeast and fungi
  c) Mathematical or computer models
  d) Invertebrates with more primitive nervous systems (i.e., protozoa, planaria, insects)
  e) Primary tissue or cell explants from humanely euthanized animals
  f) Chicken embryos prior to three days (72 hours) before hatching

Rule 2: The NJAS Rules and the International Rules define an animal as any live, nonhuman vertebrate, mammalian embryo or fetus, bird eggs within three days (72 hours) of hatching, and all other vertebrates at hatching or birth.

Rule 3: Students performing animal research must follow local, state, and federal regulations. Research conducted at registered research institutions (e.g., university lab, medical center, NIH, etc.) must be reviewed and approved by that institution's Animal Care and Use Committee. Invasive studies which duplicate previous research by others should be avoided.

Rule 4: Procurement
- All animals must be legally acquired.

- Animals should be healthy and free of diseases that can be transmitted to humans or other animals.

- Animals may not be captured from or released into the wild without approval of authorized wildlife and public health officials.

- All animals are classified as laboratory animals on the first day of study. Proper forms, including the **Student Research Plan (Form 1)**, must be completed and submitted for review and approval by a NJAS Regional Director *before* experimentation begins.

Rule 5: Housing
- Animals must be housed in clean, ventilated, comfortable environments compatible with the standards and requirements appropriate for the species used. Animals must have adequate lighting, humidity and controlled temperature (with as little variation as possible), and have sanitized cages of adequate sizes for the typical activities and social interactions of the species (unless individual housing is dictated by experimental protocol).

- The conditions above are especially critical with experiments involving small, common laboratory animals (*e.g.*, mice, rats, hamsters, guinea pigs, gerbils, rabbits). The health and

well-being of the animals should always be the highest consideration. Because the school setting is not always suitable, the student's home environment setting needs to be compared to the school setting by the student AND Adult Sponsor when deciding where to house the animals and conduct the experiment. Which setting is the best for maintaining the environment, housing and husbandry standards?

Rule 6: Husbandry

- Animals must be treated kindly and cared for properly.

- Animals must be given a continuous, clean (uncontaminated) water and food supply. Food should meet the nutritional requirements of the particular species. Watering and feeding devices should be cleaned frequently.

- Proper care must be provided at all times including weekends, holidays, and vacation periods. Animals must be observed DAILY to assess their health and well-being.

- Cages, pens, and fish tanks must be cleaned frequently. A highly absorbent bedding should be used in cages and pens. Hardwood chips are recommended (do not use cedar) and can be obtained from local pet or feed stores. Do not use newspaper or paper towels because inks may be carcinogens and adversely affect liver enzyme function.

- If an unexpected illness or emergency occurs, animals must have proper veterinary medical and nursing care under the direction of a veterinarian.

Rule 7: Experimental Conditions

- **Experiments designed to kill vertebrate animals are not permitted.** However, experimental designs incorporating humane euthanasia are permitted.

- Experimental procedures that cause unnecessary pain or unnecessary discomfort or unnecessary death to any vertebrate animals, including operant conditioning with aversive stimuli and predator/prey experiments, **are prohibited** (*e.g.*, mammals, birds, reptiles, amphibians, fish).

- Research on animals involving anesthetics, drugs, thermal procedures, physical stress, organisms pathogenic for humans or other vertebrates, ionizing radiation, carcinogens, mutagens, tumors, or surgical procedures **must be directly supervised** by a Qualified Scientist or Designated Supervisor within a hospital, school, or clinical/research institution.

- The use of alcohol, acid rain, insecticide, herbicide and heavy metal in toxicity or behavioral studies on live vertebrates **is prohibited**.

- Research in nutritional deficiency, ingestion, inoculation or exposure to hazardous or reputedly toxic materials or drugs is permitted to proceed only to the point where signs or lesions of the deficiency or toxicity first appear. Appropriate measures must then be taken to correct the deficiency, toxicity or drug effect, if such action is feasible. If not, the animal(s) must be euthanized.

- Food or water deprivation should be appropriate to the species, but may not exceed 24 hours.

- Weight loss is one significant sign of stress or toxicity. **Maximum permissible weight loss or growth retardation** (compared to controls) of any experimental or control animal(s) **is 15 percent**.

- **LD50**: LD means lethal dose or death rate. **A death rate of 50 percent or greater** in any group or subgroup, by design or as an unexpected result of experimental procedure **is not permitted** and the project will fail to qualify for competition.

Rule 8: Euthanasia

- Proper euthanasia at the end of experimentation for tissue removal and/or pathological analysis is permitted.

- Only the Animal Care Supervisor, Qualified Scientist, or the Designated Supervisor may perform euthanasia. **Student researchers may perform euthanasia only in an emergency.**

- Methods of Euthanasia
    - **Acceptable** Methods of Euthanasia: administration of barbituric acid derivatives in conformance with applicable laws; inhalation of gas anesthetic in a well ventilated area; induced narcosis with carbon dioxide or nitrogen for common laboratory animals; use of MS-222 and hypothermia with subsequent cervical dislocation for cold-blooded aquatic species.

    - **Unacceptable** Methods of Euthanasia: injection of air, or any product containing strychnine, curare, succinylcholine or other neuromuscular blocking agents; guillotine, decapitation and cervical dislocation without prior anesthesia; exhaust fumes; chloroform or ether; stunning blows to the head; microwaves. These methods are unacceptable for student research projects regardless of who conducts the procedure.

Rule 9: Any proposed changes in the Student Research Plan (Form 1) and/or the SPECIAL forms by the student after initial approval by the NJAS Regional Director must have subsequent approval before such changes are made and before experimentation begins/resumes.

Rule 10: All signed forms must be available for review by a NJAS Regional Director (or his/her representative) and the judges at the Regional Science Fair competition. It is recommended these be kept in a notebook or folder.

Part E: BRIEF Summary of Rules & Regulations Involving Vertebrate Animals

- Must adhere to the Position Statement on Use of Animals in Pre-College Science Research.

- Alternatives to the use of vertebrate animals for research must be explored.

- All studies involving nonhuman vertebrate animals must have a Qualified Scientist.

- Proper animal care must be provided daily including weekends, holidays and vacations.

- Experiments designed to kill vertebrate animals are not permitted.

- Experimental procedures that cause unnecessary pain or unnecessary discomfort or death of any vertebrate animals, including operant conditioning with aversive stimuli and predator/prey experiments, are prohibited (e.g., mammals, birds, reptiles, amphibians, fish.)

- LD(50) or higher in any group or subgroup is not permitted.

- Students may not perform euthanasia, except in emergency situations.

- Use of alcohol, acid rain, insecticide, herbicide, and heavy metal in toxicity or behavioral studies on live vertebrates is prohibited.

- Proposed research *must be reviewed and approved* by the NJAS Regional Director before experimentation begins.

- If work was conducted in an institutional or industrial setting prior to NJAS approval, the **Registered Research Institutional/Industrial Setting Form (Form 10)** must be completed by the scientist who supervised the student research.

- *Copies* of all signed forms must be available for review at a NJAS Science Fair competition.

Part F: Special Instructions for Completing Student Research Plan (Form 1)

- The **Student Research Plan (Form 1)** asks for a description of methods and procedures. Projects that involve vertebrate animals require an extremely detailed description. Although most of the following information is requested on the **Non-Human Vertebrate Animal Form (Form 8)**, the comprehensive **Student Research Plan (Form 1)** is required detailing the specifics listed below:
    - Describe in detail how the animals will be used. Include methods and procedures, such as experimental design and data analysis. Identify the kind of animal, number of animals proposed for use, where they will be obtained, their weight and sex (if known).

    - Describe the procedures that will minimize the potential for discomfort, distress, pain and injury to the animals during the course of experimentation. Invasive studies which duplicate previous research by others should be avoided. Any procedure that will cause discomfort to animals is *strongly discouraged*.

Part G: Instructions for Completing SPECIAL FORMS Involving Vertebrate Animals

- Studies involving animals in their natural environment as well as animals in zoological parks with no interaction between the experimenter and the subject animal(s) do **NOT** require the **Qualified Scientist Form (Form 4)** or the **Non-Human Vertebrate Animal Form (Form 8**).

- All other projects involving nonhuman vertebrate animal subjects *require* completion of the **Non-Human Vertebrate Animal Form (Form 8)** and the **Qualified Scientist Form (Form 4).** If the Qualified Scientist is unable to supervise the experiment **the Designated Supervisor Form (Form 5)** is also required**.**

- To conduct research with vertebrate animals the student and Adult Sponsor MUST enlist the help of a qualified Animal Care Supervisor and a Qualified Scientist.

- The Qualified Scientist must sign the **Qualified Scientist Form (Form 4)**. If the Qualified Scientist cannot be present during the experimentation a Designated Supervisor must agree to supervise the experimentation and sign the **Designated Supervisor Form (Form 5)**.

- The student (with a lot of guidance/support from the Adult Sponsor) completes Section 1 of the **Non-Human Vertebrate Animal Form (Form 8)**. (Note that in this section the student must provide the name of the veterinarian who will provide veterinary medical and nursing care in case of illness or emergency.) Section 2 of the form is completed by the Animal Care Supervisor.

- After completion, the SPECIAL forms--**Non-Human Vertebrate Animal Form (Form 8)**, **Qualified Scientist Form (Form 4)**, and, if needed, the **Designated Supervisor Form (Form 5)**--are submitted to the Adult Sponsor.

- The Adult Sponsor sends a packet containing ***copies*** of the three forms required for ALL projects (**Forms 1,2, and 3**) **and all special forms** to a NJAS Regional Director for review. This individual MUST give final approval before any experimentation begins.

- If the research work was conducted in an institutional or industrial setting prior to NJAS review and approval, then the **Registered Research Institutional/Industrial Setting Form (Form 10)** must be completed *following the end of experimentation* by the scientist who supervised the student research. The Adult Sponsor needs to send a packet containing ***copies*** of the three forms required for ALL projects (**Forms 1, 2, and 3**) along with a ***copy*** of the **Registered Research Institutional/Industrial Setting Form (Form 10)** to the NJAS Regional Director. *Research done at an institution must still be reviewed and approved before competing at the NJAS Regional Science Fair*.

- The Adult Sponsor should keep all the returned forms on file for liability purposes. ***Copies*** of all signed forms must be available for review by a NJAS Regional Director (or his/her representative) and the judges at the Regional Science Fair competition. It is recommended these be kept in a notebook or folder.

Part H: Sources of Information for Animal Care and Use

1) *Guide for the Care and Use of Laboratory Animals, Institute of Laboratory Animal Resources (IlAR)*, National Research Council, 1996. http://www4.nas.edu/cls/ilarhome.nsf

2) *Principles and Guidelines for the Use of Animals in Precollege Education* (a free pamphlet from ILAR)
To order contact:
National Academy Press
2101 Constitution Avenue, NW
Lockbox 285
Washington, DC 20055
phone: 888-624-8373 or 202-334-2590 website: http://www.nap.edu

3) Federal Animal Welfare Act (AWA)
7 U.S.C. 2131-2157
Subchapter A - Animal Welfare (Parts I, II, III)
Above document is available from:
Animal Care
Animal and Plant Health Inspection Service (APHIS)
U.S. Department of Agriculture
12th & Independence Avenue, SW
Washington, DC 20250 website: http://www.aphis.usda.gov/ac/info.html

4) *Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching (Agri-Guide)*
American Dairy Science Association
1111 N. Dunlap Avenue
Savoy, IL 61874
(217) 356-3182 website: http://www.adsa.uiuc.edu

Part I: Sources of Information for Alternative Research and Animal Welfare
1) The National Library of Medicine provides computer searches through MEDLINE under the key phrase "Animal Welfare".
Reference Librarian, National Library of Medicine
8600 Rockville Pike
Bethesda, MD 20894
1-888-FIND-NLM or 1-888-346-3656 website: http://www.nlm.nih.gov

2) National Agriculture Library (NAL) provides reference service for materials that document a) Alternative Procedures to Animal Use and b) Animal Welfare.
Animal Welfare Information Center
National Agriculture Library
5th Floor, 10301 Baltimore Blvd.
Beltsville, MD 20705-2351
phone: (301) 504-6212, fax: (301) 504-7125 website: http://www.nal.udsa.gov/awic

3) Institute of Laboratory Animal Resources (ILAR) provides a variety of information on animal sources, housing and handling standards, and alternatives to animal use through annotated bibliographies published quarterly in ILAR Journal.
Institute for Laboratory Animal Research (ILAR), NAS 347

2101 Constitution Avenue, NW
Washington, DC 20418
phone: (202) 334-2590, fax: 202-334-1687
email: ILAR@nas.edu
http://www4.nas.edu/cls/ilarhome.nsf

Quarterly bibliographies of Alternatives to the Use of Live Vertebrates in Biomedical Research and Testing may be obtained from:
National Library of Medicine
Special Information Services
8600 Rockville Pike
Bethesda, MD 20894
1-888-FIND-NLM or 1-888-346-3656 website: http://www.sis.nlm.nih.gov

4) Euthanasia Guidelines
1993 Report of the AVMA Panel on Euthanasia published in the Journal of the American Veterinary Medical Association (JAVMA), Vol. 203, No. 2: 229-249, 1993.

Part J: Sources of Information for Other Federal Laws That May Apply
1) Endangered Species Acts (16 U.S.C. 1531)
U.S. Fish & Wildlife Service, Division of Endangered Species
Department of the Interior
1849 C Street, NW
Washington, DC 20240 website: http://endangered.fws.gov/whatwedo.html

Chapter 4: Projects Involving Pathogenic Agents (SPECIAL Forms Required)

Part A: Background Information
- For purposes of NJAS Rules and Regulations ALL micro-organisms isolated from the environment are considered pathogenic with the exception of protists.

- Projects involving protists isolated from the environment are exempt and *do **NOT** require completion of any SPECIAL forms as outlined in this chapter.*

- Projects using agricultural use of animal waste as fertilizer are exempt and *do **NOT** require completion of any SPECIAL forms as outlined in this chapter*.

- Projects using micro-organisms purchased through a biological supply company and known to be non-pathogenic are exempt and *do **NOT** require completion of any SPECIAL forms as outlined in this chapter.*

- Projects using E. coli strain K12, baker's yeast, or brewer's yeasts are **not** considered to be pathogens and *do NOT require completion of any SPECIAL forms as outlined in this chapter*.

Part B: Roles and Responsibilities of the Adults

1) **Adult Sponsor:**

- Adult Sponsor may be a teacher, parent, university professor, or scientist in whose lab the student is working. This individual must have a solid background in science and should have close contact with the student during the course of the project.

- Adult Sponsor is ultimately responsible for the health and safety of the student conducting the research.

- Adult Sponsor must be familiar with the regulations that govern potentially dangerous research as they apply to research involving pathogenic agents. The issues must be discussed with the student when completing the required forms for ALL projects and the special forms required for research involving pathogenic agents.

- Adult Sponsor needs to read and be familiar with the information provided in this chapter *before* allowing any students to design/conduct experimental research involving human subjects.

2) **Qualified Scientist**:

- Qualified Scientist should possess an earned doctoral/ professional degree in the biomedical sciences. However, a master's degree with equivalent experience and/or expertise in the student's area of research is acceptable. Qualified Scientists include: medical doctors and medical technologists.

- Qualified Scientist must be thoroughly familiar with the local, state, and federal regulations that govern the student's area of research.

- Qualified Scientist and the Adult Sponsor may be the same person, if that person is qualified as outlined above.

- A student may work with a Qualified Scientist in another city or state. In this case, the student must work locally with a Designated Supervisor who has been trained in the techniques the student will use.

3) **Designated Supervisor:**

- Designated Supervisor is an adult who supervises a student's experiment.

- Designated Supervisor need not have an advanced degree, but should be thoroughly familiar with the student's project, and must be trained in the student's area of research.

- Adult Sponsor may act as the Designated Supervisor.

Part C: Rules and Regulations Involving Pathogenic Agents

Rule 1: Students are allowed to experiment with pathogenic agents as long as the students adhere to federal regulations and guidelines, which are designed to protect the safety of researchers. Carelessness and improper techniques in working with pathogenic and non-pathogenic agents can lead to laboratory- and/or field-contracted infections.

Rule 2: Research involving pathogenic agents must be approved by a Qualified Scientist *before* experimentation begins.

Rule 3: Pathogenic agents are disease-causing agents such as bacteria, viruses, viroids, prions, rickettsia, fungi, or parasites. For purposes of these rules, the term "Pathogenic Agent" applies to ALL pathogenic agents whether they infect humans, vertebrates, invertebrates or plants.

Rule 4: When using pathogenic agents, student researchers and their Adult Sponsors are required to follow standard microbiological practices, as defined in *Biosafety in Microbiological and Biomedical Laboratories* (see reference listing in Part E "Sources of Information").

Rule 5: All organisms collected, isolated, and/or cultured from any environment during student research projects should be considered pathogenic with the exception of protists. Raw or partially-processed human or animal waste is considered to contain pathogenic agents.

Rule 6: Student research with pathogenic agents may be performed only under the direct supervision of an experienced Qualified Scientist or Designated Supervisor in an institutional laboratory, including a school if facilities are adequate and appropriate.

Rule 7: Studies involving pathogenic agents are prohibited in a home environment, but specimens may be collected at home.

Rule 9: Studies on microorganisms with multiple antibiotic resistance must be conducted at a Registered Research Institution.

Rule 10: Any proposed changes in the **Student Research Plan (Form 1)** by the student after initial approval by the NJAS Regional Director must have subsequent approval *before* such changes are made and *before* experimentation begins/resumes.

Part D: Instructions for Completing SPECIAL FORMS Involving Pathogenic Agents

- All projects involving pathogenic agents (as defined in this chapter) *require* completion of the **Qualified Scientist Form (Form 4).** If the Qualified Scientist is unable to supervise the experiment the **Designated Supervisor Form (Form 5)** is also required**.**

- To conduct research with pathogenic agents the student and Adult Sponsor must enlist the expertise of a Qualified Scientist (see Part B for role and responsibilities) with microbiology specialty to oversee the project.

- The Qualified Scientist must sign the **Qualified Scientist Form (Form 4)**. If the Qualified Scientist cannot be present during the experimentation a Designated Supervisor (see Part B for

role and responsibilities) must agree to supervise the experimentation and sign the **Designated Supervisor Form (Form 5**).

- The completed SPECIAL form(s)--**Qualified Scientist Form (Form 4)**, and, if needed, the **Designated Supervisor Form (Form 5)**--are submitted to the Adult Sponsor.

- The Adult Sponsor sends a packet containing ***copies*** of the three forms required for ALL projects (**Forms 1,2, and 3**) and a ***copy*** of the **SPECIAL form(s)** to the NJAS Regional Director for review. This individual MUST give final approval *before* any experimentation begins.

- If the research work was conducted in an institutional or industrial setting prior to NJAS review and approval, then the **Registered Research Institutional/Industrial Setting Form (Form 10)** must be completed *following the end of experimentation* by the scientist who supervised the student research. The Adult Sponsor needs to send a packet containing ***copies*** of the three forms required for ALL projects (**Forms 1, 2, and 3**) along with a ***copy*** of the **Registered Research Institutional/Industrial Setting Form (Form 10)** to the NJAS Regional Director. *Research done at an institution must still be reviewed and approved before competing at the NJAS Regional Science Fair*.

- The Adult Sponsor should keep all the returned forms on file for liability purposes. ***Copies*** of all signed forms must be available for review by the NJAS Regional Director (or his/her representative) and the judges at the Regional Science Fair competition. It is recommended these be kept in a notebook or folder.

Part E: Sources of Information

Biosafety in Microbiological and Biomedical Laboratories
(BMBL) - 4th Edition. Published by CDC-NIH, To order contact:
Office of Health and Safety
Centers for Disease Control and Prevention
1600 Clifton Road, NE Mailstop F05
Atlanta, GA 30333
website: http://www.cdc.gov/od/ohs/biosfty/biosfty.htm

Bergey's Manual of Systematic Bacteriology (four volumes).
(1984, 1986, 1989), Baltimore: Williams and Wilkens.
To order contact:
Lippincott Williams and Wilkins
P.O. Box 1600, Hagerstown, MD 21741
phone: (301) 223-2403 or (800) 638-3030
website: http://www.low.corn

American Type Culture Collection
1(800) 638-6597 (US, Canada, & Puerto Rico)
website: http://www.atcc.org

Chapter 5: Projects Involving Controlled Substances (SPECIAL Forms Required)

Part A: Background Information
Controlled substances include Drug Enforcement Administration (DEA) classed substances, prescription drugs, alcohol, and tobacco. These substances must be acquired and used according to existing local, state, and federal laws.

Part B: Roles and Responsibilities of the Adults
1) **Adult Sponsor:**
- Adult Sponsor may be a teacher, parent, university professor, or scientist in whose lab the student is working. This individual must have a solid background in science and should have close contact with the student during the course of the project.

- Adult Sponsor is ultimately responsible for the health and safety of the student conducting the research.

- Adult Sponsor must be familiar with the regulations that govern potentially dangerous research as they apply to research involving controlled substances. The issues must be discussed with the student when completing the required forms for ALL projects and the special forms required for research involving controlled substances.

- Adult Sponsor needs to read and be familiar with the information provided in this chapter *before* allowing any students to design/conduct experimental research involving controlled substances.

2) **Qualified Scientist**:
- Qualified Scientist should possess an earned doctoral/ professional degree in the biomedical sciences. However, a master's degree with equivalent experience and/or expertise in the student's area of research is acceptable. Qualified Scientists include medical doctors.

- Qualified Scientist must be thoroughly familiar with the local, state, and federal regulations that govern the student's area of research.

- Qualified Scientist and the Adult Sponsor may be the same person, if that person is qualified as outlined above.

- A student may work with a Qualified Scientist in another city or state. In this case, the student must work locally with a Designated Supervisor who has been trained in the techniques the student will use.

3) **Designated Supervisor:**
- Designated Supervisor is an adult who supervises a student's experiment.

- Designated Supervisor need not have an advanced degree, but should be thoroughly familiar with the student's project, and must be trained in the student's area of research.

- Adult Sponsor may act as the Designated Supervisor.

Part C: Rules and Regulations Involving Controlled substances

Rule 1: Research involving controlled substances must be approved by the NJAS Regional Director *before* experimentation begins.

Rule 2: Student researchers must adhere to all federal regulations governing controlled substances. For further information, contact the regulatory agencies listed in Part E "Sources of Information".

Rule 3: Production of alcohol is federally regulated and students must contact the Bureau of Alcohol, Tobacco and Firearms for regulations (see Part E "Sources of Information" for contact information).

Rule 4: Only under the *direct supervision* of a Qualified Scientist or Designated Supervisor may a student use any federally-controlled or experimental substances for therapy or experimentation.

Rule 5: Any proposed changes in the **Student Research Plan (Form 1)** by the student after approval by the NJAS Regional Director must have subsequent approval *before* such changes are made and *before* experimentation begins/resumes.

Rule 6: *Copies* of all signed forms must be available for review by the NJAS Regional Director (or his/her representative) and/or the judges at the Regional Science Fair competition. It is recommended these be kept in a notebook or folder.

Part D: Instructions for Completing SPECIAL Forms Involving Controlled Substances

- All projects involving controlled substances *require* completion of the **Qualified Scientist Form (Form 4).** If the Qualified Scientist is unable to supervise the experiment the **Designated Supervisor Form (Form 5)** is also required**.**

- To conduct research with controlled substances the student and Adult Sponsor *must* enlist the expertise of a Qualified Scientist (see Part B for role and responsibilities) with thorough knowledge of the student's area of research to oversee the project.

- The Qualified Scientist must sign the **Qualified Scientist Form (Form 4)**. If the Qualified Scientist cannot be present during the experimentation a Designated Supervisor (see Part B for role and responsibilities) *must* agree to supervise the experimentation and sign the **Designated Supervisor Form (Form 5**).

- The completed SPECIAL form(s)--**Qualified Scientist Form (Form 4)**, and, if needed, the **Designated Supervisor Form (Form 5)**--are submitted to the Adult Sponsor.

- The Adult Sponsor sends a packet containing **copies** of the three forms required for ALL projects (**Forms 1,2, and 3**) and the **special form(s)** to the NJAS Regional Director for review. This individual MUST give final approval *before* any experimentation begins.

- If the research work was conducted in an institutional or industrial setting prior to NJAS or ISEF review and approval, then the **Registered Research Institutional /Industrial Setting Form (Form 10)** must be completed *following the end of experimentation* by the scientist who supervised the student research. The Adult Sponsor needs to send a packet containing **copies** of the three forms required for ALL projects (**Forms 1, 2, and 3**) along with a **copy** of the **Registered Research Institutional/Industrial Setting Form (Form 10)** to the NJAS Regional Director. *Research done at an institution must still be reviewed and approved before competing at the NJAS Regional Science Fair*.

- The Adult Sponsor should keep all the returned forms on file for liability purposes. All signed forms must be available for review by the NJAS Regional Director (or his/her representative) and the judges at the Regional Science Fair competition. It is recommended these be kept in a notebook or folder.

Part E: Sources of Information

Prescription Drugs
Superintendent of Documents
U.S. GPO
Washington, DC 20402
(202) 512-1800
http://www.access.gpo.gov/su docs

Alcohol. Tobacco and Firearms
The Bureau of Alcohol, Tobacco and Firearms
650 Massachusetts Ave., N.W.
Washington, DC 20226
http://www.atf.treas.gov
Distilled Spirits and Tobacco Branch - (202) 927-5000
Firearms & Explosives Division - (202) 927-8300

Narcotics and Addictive Drugs
The Drug Enforcement Administration*
Information Services Section
2401 Jefferson Davis Hwy., Alexandria, VA 22301
Washington, DC 20537
phone: (202) 307-7255; website: http://www.usdoj.gov/dea
*Contact appropriate state agencies concerning additional regulations.

Chapter 6: Projects Involving Recombinant DNA (SPECIAL Forms Required)

Part A: Background Information

*ALL projects involving Recombinant DNA (rDNA)**must be performed** in a federally registered research institution and the all research done by the student must be done under the supervision of a Qualified Scientist.*

Part B: Roles and Responsibilities of the Adults

1) **Adult Sponsor:**

- Adult Sponsor needs to read and be familiar with the information provided in this chapter *before* allowing any students to design/conduct experimental research involving Recombinant DNA.

2) **Qualified Scientist**:

- Qualified Scientist should possess an earned doctoral/professional degree in the biomedical sciences. However, a master's degree with equivalent experience and/or expertise in the student's area of research is acceptable.

- Qualified Scientist must be thoroughly familiar with the local, state, and federal regulations that govern the student's area of research.

Part C: Rules and Regulations Involving Recombinant DNA

- ALL projects involving Recombinant DNA (rDNA) **must be performed** in a federally registered research institution (e.g. university lab, medical center, NIH, etc.) and all of the research done by the student must be done under the supervision of a Qualified Scientist.

- *Copies* of all signed forms must be available for review by the NJAS Regional Director (or his/her representative) and the judges at the Regional Science Fair competition. It is recommended these be kept in a notebook or folder.

Part D: Completing SPECIAL Forms Involving Use of Recombinant DNA

- All projects involving Recombinant DNA must be performed in a federally registered research institution under the supervision of a Qualified Scientist.

- To conduct research with R-DNA the student and Adult Sponsor *must* enlist the expertise of a Qualified Scientist (see Part B for role and responsibilities) with thorough knowledge of the student's area of research to oversee the project a federally registered research institution.

- The Qualified Scientist must sign the **Qualified Scientist Form (Form 4)**.

- The completed SPECIAL form is submitted to the Adult Sponsor.

- The Adult Sponsor sends a packet containing ***copies*** of the three forms required for ALL projects (**Forms 1,2, and 3**) and a ***copy*** of the **special form (Form 4)** to the NJAS Regional

Director for review. This individual MUST give final approval *before* any experimentation begins.

- If the research work was conducted in an institutional or industrial setting **prior** to NJAS review and approval, then the **Registered Research Institutional/Industrial Setting Form (Form 10)** must be completed *following the end of experimentation* by the scientist who supervised the student research. The Adult Sponsor needs to send a packet containing ***copies*** of the three forms required for ALL projects (**Forms 1, 2, and 3**) along with a ***copy*** of the **Registered Research Institutional/Industrial Setting Form (Form 10)** to the NJAS Regional Director. *Research done at an institution must still be reviewed and approved before competing at the NJAS Regional Science Fair*.

- The Adult Sponsor should keep the returned forms on file for liability purposes. *Copies* of all signed forms, certifications, and permits must be available for review by a NJAS Regional Director (or his/her representative) and the judges at the Regional Science Fair competition. It is recommended these be kept in a notebook or folder on the display table.

Part E: Sources of Information

NIH Guidelines for Research Involving Recombinant DNA Molecules
Published by National Institutes of Health
To order contact:
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Chapter 7: Projects Involving Human and Nonhuman Vertebrate Animal Tissue (SPECIAL Forms Required)

Part A: Background Information

- Several types of tissue are exempt, and do ***NOT*** require the **Human and Non-Human Vertebrate Animal Tissue Form (Form 9)** or prior approval by the NJAS Regional Director. These tissues include:
    - Plant tissue

- Established cell and tissue cultures (e.g., those obtained from the American Type Culture Collection). Identify culture source and catalog number in the Student Research Plan Attachment.
- Meat or meat by-products obtained from food stores, restaurants, or packing houses
- Hair

- *Projects using tissues that are exempt do **NOT** require completion of any SPECIAL forms as outlined in this chapter.*

- All body fluids, including saliva and urine, are to be considered tissues for the purposes of student research and *are not* "exempted" tissues.

Part B: Roles and Responsibilities of the Adults

1) **Adult Sponsor:**

- Adult Sponsor may be a teacher, parent, university professor, or scientist in whose lab the student is working. This individual must have a solid background in science and should have close contact with the student during the course of the project.

- Adult Sponsor is ultimately responsible for the health and safety of the student conducting the research.

- Adult Sponsor must be familiar with the regulations that govern potentially dangerous research as they apply to research involving human and nonhuman vertebrate animal tissue. The issues must be discussed with the student when completing the required forms for ALL projects and the special forms required for research involving human and nonhuman vertebrate animal tissue.

- Adult Sponsor needs to read and be familiar with the information provided in this chapter *before* allowing any students to design/conduct experimental research involving human and nonhuman vertebrate animal tissue.

2) **Qualified Scientist**:

- Qualified Scientist should possess an earned doctoral/ professional degree in the biomedical sciences. However, a master's degree with equivalent experience and/or expertise in the student's area of research is acceptable. Depending on the type of tissue being used in the project, qualified individuals might include: medical doctors, veterinarians, biologists, or biochemists.

- Qualified Scientist must be thoroughly familiar with the local, state, and federal regulations that govern the student's area of research.

- Qualified Scientist and the Adult Sponsor may be the same person, if that person is qualified as outlined above.

Part C: Rules and Regulations Involving Human and Nonhuman Vertebrate Animal Tissue

Rule 1: Research involving human or nonhuman vertebrate animal tissue must be approved by the NJAS Regional Director *before* experimentation begins.

Rule 2: Using viable fresh tissue, organs, human or animal parts, including blood, blood products, teeth, primary cell cultures, and body fluids require the completion of the **Human and Non-Human Vertebrate Tissue Form (Form 9)** *except* when using the "exempted" tissues listed in Part A: "Background Information"**.**

Rule 3: A Qualified Scientist is *required* to supervise the experimentation (except when using the "exempted" tissues) and complete the **Qualified Scientist Form (Form 4).**

Rule 4: Students must conduct research on human blood, blood products or other body fluids under either one of the following conditions: a) tissue fluids are documented free of HIV and hepatitis B and C before the student receives them; b) tissues are handled in accordance with standards and guidelines set forth in Occupational Safety and Health Act, 29CFR, Subpart Z, 1910.1030 – *Blood Borne Pathogens*.

Rule 5: Students who use teeth in a research project must use those which are not capable of causing disease, regardless of the source (human, primate, shark, etc.) i.e. they must be sterilized. The method of decontamination should be determined by the mentor, but autoclaving is recommended (121 degrees Celsius for 30 minutes.)

Rule 6: Any proposed changes in the **Student Research Plan (Form 1)** by the student after initial approval by the NJAS Regional Director must have subsequent approval *before* such changes are made and *before* experimentation begins/resumes.

Rule 7: *Copies* of all signed forms, certifications, and permits must be available for review by the NJAS Regional Director (or his/her representative) and the judges at the Regional Science Fair competition. It is recommended these be kept in a notebook or folder on the display table.

Part D: Instructions for SPECIAL Forms Involving Human and Nonhuman Vertebrate Animal Tissue

- All projects involving human and non-human vertebrate animal tissue *require* completion of the **Human and Non-Human Vertebrate Animal Tissue Form (Form 9)** *except* for those projects using "exempted" tissue as outlined in Part A: "Background Information".

- The student and Adult Sponsor must enlist the expertise of a Qualified Scientist (see Part B for role and responsibilities) who has thorough knowledge of the student's area of research. The Qualified Scientist must complete the **Qualified Scientist Form (Form 4)**.

- The completed SPECIAL form(s)--**Human and Non-Human Vertebrate Animal Tissue Form (Form 9)** and the **Qualified Scientist Form (Form 4)**--are submitted to the Adult Sponsor.

- The Adult Sponsor sends a packet containing ***copies*** of the three forms required for ALL projects (**Forms 1,2, and 3**) and ***copies*** of the **special forms (Forms 9 and 4)** to the NJAS

Regional Director for review. This individual MUST give final approval *before* any experimentation begins.

- If the research work was conducted in an institutional or industrial setting prior to NJAS or ISEF review and approval, then the **Registered Research Institutional /Industrial Setting Form (Form 10)** must be completed *following the end of experimentation* by the scientist who supervised the student research. The Adult Sponsor needs to send a packet containing ***copies*** of the three forms required for ALL projects (**Forms 1, 2, and 3**) along with a ***copy*** of the **Registered Research Institutional/Industrial Setting Form (Form 10)** to the NJAS Regional Director. *Research done at an institution must still be reviewed and approved before competing at the NJAS Regional Science Fair*.

- The Adult Sponsor should keep all the returned forms on file for liability purposes. *Copies* of all signed forms and certifications must be available for review by the NJAS Regional Director (or his/her representative) and the judges at the Regional Science Fair competition. It is recommended these be kept in a notebook or folder on the display table.

Part E: Sources of Cultures

American Type Culture Collection
1081 University Boulevard
Manassas, VA 20110-2209
(800) 638-6597 (US, Canada, and Puerto Rico)
http://www.atcc.org

Carolina Biological Supply Company
Main Office and Laboratories
2700 York Rd.
Burlington, NC 27215
(336) 584-0381
(800) 334-5551 (US, Canada, and Puerto Rico)
http://www.carolina.com

Chapter 8: Projects Involving Hazardous Substances or Devices (SPECIAL Forms Required)

Part A: Background Information

Students conducting research involving hazardous substances or devices must adhere to federal and state regulations governing hazardous substances or devices which are designed to protect the safety of the researchers.

Part B: Roles and Responsibilities of the Adults

1) **Adult Sponsor:**

- Adult Sponsor may be a teacher, parent, university professor, or scientist in whose lab the student is working. This individual must have a solid background in science and should have close contact with the student during the course of the project.

- Adult Sponsor is ultimately responsible for the health and safety of the student conducting the research.

- Adult Sponsor must be familiar with the regulations that govern potentially dangerous research as they apply to research involving hazardous substances and devices. The issues must be discussed with the student when completing the required forms for ALL projects and the special forms required for research involving hazardous substances and devices.

2) **Designated Supervisor:**

- Designated Supervisor is an adult who supervises a student's experiment. Appropriate individuals might include: chemistry teachers (for research involving flammable or explosive compounds), physic teachers (for research involving lasers or radiation), or police (for research involving firearms).

- Designated Supervisor need not have an advanced degree, but should be thoroughly familiar with the student's project, and must be trained in the student's area of research.

- The Adult Sponsor may act as the Designated Supervisor.

Part C: Rules and Regulations Involving Hazardous Substances or Devices

Rule 1: Research involving hazardous substances or devices must be approved by the NJAS Regional Director *before* experimentation begins.

Rule 2: The use of hazardous chemicals and equipment, firearms, radioactive substances and radiation require proper supervision by a Designated Supervisor. The Designated Supervisor must be directly responsible for overseeing the student experimentation.

Rule 3: Student researchers working with hazardous substances or devices must follow proper safety procedures for each chemical or device used in the research. Flammable, explosive or highly toxic chemicals are of particular concern. Also included are mutagens and carcinogens as well as chemical mixtures found in pesticides.

Rule 4: For all research requiring a Federal and/or State Permit, the student/designated supervisor will be expected to have the permit prior to the onset of experimentation.

Rule 5: Use of radiation and radioactive substances are tightly regulated. Students should strictly adhere to safety standards of the authorized institution where such substances/devices are used in the research.

Rule 6: Students under 21 are prohibited by federal and most state laws from purchasing and/or handling smokeless powder or black powder for science projects. (For further regulations,

contact the Firearms & Explosives Division of the Bureau of Alcohol, Tobacco, and Firearms listed in Part E "Sources of Information".)

Rule 7: Differentiation between hazardous and non-hazardous chemicals can best be determined by utilizing the Materials Safety Data Sheets (MSDS).

Rule 8: If work was conducted in an institutional or industrial setting, **Registered Research Institutional/Industrial Setting Form** (Form 10) must be completed by the scientist who supervised the student research.

Rule 9: *Copies* of all signed forms, certifications, and permits must be available for review by the NJAS Regional Director (or his/her representative) at the Regional Science Fair competition. It is recommend these be kept in a notebook or folder on display table.

Part D: Instructions for SPECIAL Forms Involving Hazardous Substances or Devices

- The student and Adult Sponsor must enlist the expertise of a Designated Supervisor (see Part B for role and responsibilities) who has thorough knowledge of the student's area of research and who agrees to be directly responsible for overseeing the student's experimentation. The Designated Supervisor must complete the **Designated Supervisor Form (Form 5)**.

- The completed **Designated Supervisor Form (Form 5)** is submitted to the Adult Sponsor.

- The Adult Sponsor sends a packet containing ***copies*** of the three forms required for ALL projects (**Forms 1, 2, and 3**) and a ***copy*** of the **Designated Supervisor Form (Form 5)** to the NJAS Regional Director for review. This individual MUST give final approval before any experimentation begins.

- If the research work was conducted in an institutional or industrial setting prior to NJAS review and approval, then the **Registered Research Institutional/Industrial Setting Form (Form 10)** must be completed *following the end of experimentation* by the scientist who supervised the student research. The Adult Sponsor needs to send a packet containing ***copies*** of the three forms required for ALL projects (**Forms 1, 2, and 3**) along with a ***copy*** of the **Registered Research Institutional/Industrial Setting Form (Form 10)** to the NJAS Regional Director. *Research done at an institution must still be reviewed and approved before competing at the NJAS Regional Science Fair*.

- The Adult Sponsor should keep all the returned forms on file for liability purposes. *Copies* of all signed forms, certifications, and permits must be available for review by the NJAS Regional Director (or his/her representative) and the judges at the Regional Science Fair competition. It is recommended these be kept in a notebook or folder on the display table.

Part E: Sources of Chemical Information

Safety in Academic Chemistry Laboratories, 1995.
Washington, DC: American Chemical Society.
Order from (first copy free of charge):
American Chemical Society

Office of Society Services
1155 16th Street, NW
Washington, DC 20036
phone: (202) 872-4615 or 1-800-227-5558

Material Safety Data Sheets (MSDS)
MSDS should be collected by your laboratory or available from the manufacturer. The internet also has a range of free resources: http://www.ilpi.com/msds/index.html

Part F: Sources of Lasers and Radiation/Radioactive Substances Information
U.S. Department of Labor
Occupational Safety and Health Administration (OSHA)
Publications Office
200 Constitution Avenue, N.W.
Washington, DC 20210
phone: (202) 693-1999
http://www.osha.gov

PUB 8-1.7 - Guidelines for Laser Safety and Hazard Assessment

STD 1-4.1 - OSHA Coverage of Ionizing Radiation Sources Not Covered by Atomic Energy Act of 1954

Part G: Sources of Radioisotopes and Radioactive Substances Information
John Hickey
U.S. Nuclear Regulatory Commission
Material Safety and Inspection Branch
11555 Rockville Pike
Rockville, MD 20852
phone: (301) 415-7000
http://www.nrc.gov

Part H: Sources of Firearms Information
Local Police Department or State Police
The Bureau of Alcohol, Tobacco and Firearms
650 Massachusetts Ave., NW
Washington, DC 20226
Firearms & Explosives Division:
phone: (202) 927-8300
website: http://www.atf.treas.gov

Chapter 9: Adults Involved in a Science Project-Their Roles and Responsibilities

The purpose of this section is to explain the roles and responsibilities of different adults that may be involved in a student's research project. ALL projects require an Adult Sponsor. Projects requiring special forms almost always involve other adults.

Part A: The Adult Sponsor

- Adult Sponsor may be a teacher, parent, university professor, or scientist in whose lab the student is working. This individual must have a solid background in science and should have close contact with the student during the course of the project.

- Adult Sponsor is ultimately responsible not only for the health and safety of the student conducting the research, but also for the humans or animals used as subjects.

- Adult Sponsor must review the student's Student Research Plan Form (Form 1) to make sure that: a) experimentation is done within local, state, and federal laws and the NJAS Rules; b) that forms are completed by other adults involved in approving or supervising any part of the experiment; and c) that criteria for the qualified scientist adhere to those set forth in the NJAS Guidelines.

- Adult Sponsor must be familiar with the regulations that govern potentially dangerous research as they apply to a specific student project. These may include chemical and equipment usage, experimental techniques, research involving human or nonhuman animals, and cell cultures, microorganisms, or animal tissues. The issues must be discussed with the student when completing the Student Research Plan Form (Form 1). Some experiments involve procedures or materials that are regulated by state and federal laws. If not thoroughly familiar with the regulations, the Adult Sponsor should help the student enlist the aid of a Qualified Scientist and/or Designated Supervisor.

- Adult Sponsor is responsible for ensuring the student's research is eligible for entry in the Nebraska Junior Academy Science Fair.

Part B: The Qualified Scientist

- Qualified Scientist should possess an earned doctoral/ professional degree in the biomedical sciences. However, a master's degree with equivalent experience and/or expertise in the student's area of research is acceptable when approved by a NJAS Regional Director or an ISEF Scientific Review Committee.

- Qualified Scientist must be thoroughly familiar with the local, state, and federal regulations that govern the student's area of research.

- Qualified Scientist and the Adult Sponsor may be the same person, if that person is qualified as outlined above.

- A student may work with a Qualified Scientist in another city or state. In this case, the student must work locally with a Designated Supervisor (see below) who has been trained in the techniques the student will use.

Part C: The Designated Supervisor

- Designated Supervisor is an adult who supervises a student's experiment.

- In the case of hazardous substances or devices, a Designated Supervisor is directly responsible for overseeing student experimentation. A Qualified Scientist may or may not be necessary.

- Designated Supervisor need not have an advanced degree, but should be thoroughly familiar with the student's project, and must be trained in the student's area of research.
- Adult Sponsor may act as the Designated Supervisor.

- If a student is experimenting with live vertebrates and the animals are in a situation where their behavior or habitat is influenced by humans, the Designated Supervisor must be knowledgeable about the humane care and handling of the animals. If the Designated Supervisor is not knowledgeable, the Adult Sponsor must ensure that the student enlists the help of an Animal Care Supervisor.

- If a student is using hazardous substances or devices, the Designated Supervisor must be thoroughly knowledgeable about the project and must be directly responsible for overseeing the student experimentation.

Part D: The Animal Care Supervisor

- Animal Care Supervisor is required for all nonhuman vertebrate animal projects and must be familiar with the proper care and handling of research animals used in the project.

- Qualified Scientist or Designated Supervisor or animal care professional usually serves as the Animal Care Supervisor.

- Adult Sponsor may serve as the Animal Care Supervisor if familiar with the proper care and handling of the research animals used in the project.

Part E: The Institutional Review Board (IRB)

- Institutional Review Board (IRB) is a committee that, according to federal law, must evaluate the potential physical or psychological risk of research involving human subjects. All proposed human research must be reviewed and approved by an IRB before experimentation begins. This includes any surveys or questionnaires to be used in a project.

- IRB at the school must consist of a minimum of three members. Additional members are recommended to avoid conflict of interest. The IRB should include:
  a) a science teacher
  b) a school administrator
  c) and one of the following: a psychologist, psychiatrist, medical doctor, physician's assistant, or registered nurse

- Due to the federal regulations requiring local community involvement, an IRB should be established at the school level to deal with human research projects. If it is impossible to

establish an IRB at each school, the teacher/school should contact the NJAS Regional Director or ISEF-Affiliated Fair Director for assistance in evaluating human research prior to experimentation.

Part F: The NJAS Regional Director--Roles and Responsibilities
The role of the NJAS Regional Director is to review and approve 1) any research projects requiring prior approval of SPECIAL Forms before experimentation (the areas mentioned in question 2 of the **Checklist for Adult Sponsor/Safety Assessment Form**) or 2) any research done at a registered research institution/industrial setting and involving any of the areas mentioned in question 2 of the **Checklist for Adult Sponsor/Safety Assessment Form (Form 2)** and not approved prior to experimentation.

Chapter 10: NJAS Science Fair Display and Safety Regulations

Part A: Display/Exhibit Size
Exhibit size for a display sitting on a table is limited to 76 cm (30 in.) deep, front to back; 122 cm (48 in.) wide, side to side; and 198 cm (78 in.) high. If the display is on the floor it is limited to 274 cm (108 in.) high from floor to top with the same depth and width as the table display. Any exhibit/display board exceeding these dimensions will be disqualified at the Regional Science Fair.

Part B: Not Allowed at Project or in Booth
- Living organisms, including plants, animals and microbes
- Taxidermy specimens or parts
- Preserved vertebrate or invertebrate animals
- Human or animal food
- Human/animal parts or body fluids (for example, blood, urine)
- Plant materials (living, dead or preserved) usually which were part of the scientific experimentation and which are in their raw, unprocessed, or non-manufactured state (Exception: manufactured construction materials used in building the project or display)
- Laboratory/household chemicals including water
- Poisons, drugs, controlled substances, hazardous substances or devices (for example, firearms, weapons, ammunition, reloading devices)
- Dry ice or other sublimating solids
- Sharp items (for example, syringes, needles, pipettes, knives)
- Flames or highly flammable materials
- Batteries with open-top cells
- Photographs or other visual presentations depicting vertebrate animals in surgical techniques, dissections, necropsies, other lab procedures, etc.
- Lasers, except for the use of laser pointers during presentations

Part C: Allowed at Project, BUT with the Restrictions Indicated

- Any apparatus with unshielded belts, pulleys, chains, or moving parts with tension or pinch points may not be operated.

- Any scientific apparatus or invention may be displayed, but not operated. Apparatus must conform to the other display safety rules, such as no water or flames.

Part D: Additional Electrical Regulations at the NJAS Science Fairs

- See the "Display and Safety Regulations" for other electrical rules.

- All electrical work must conform to the National Electrical Code or exhibit hall regulations. The guidelines presented here are general ones, and other rules may apply to specific configurations. The on-site electrician may be requested to review electrical work.

- All electrical connectors, wiring, switches, extension cords, fuses, etc. must be UL-listed and must be appropriate for the load and equipment. Connections must be soldered or made with UL-listed connectors. Wiring, switches, and metal parts must have adequate insulation and overcurrent safety devices (such as fuses) and must be inaccessible to anyone but the student with the display. Exposed electrical equipment or metal that is liable to be energized must be grounded or shielded with a nonconducting material or with a grounded metal box or cage to prevent accidental contact.

- There must be an accessible, clearly visible on/off switch or other means of disconnect from the 120 or 220 Volt power source.

- Wiring which is not part of a commercially available UL-listed appliance or piece of equipment must have a fuse or circuit breaker on the supply side of the power source and prior to any project equipment.

Ch. 11: Flow Charts for High School Projects Requiring SPECIAL Forms

- The flow charts are used to summarize each of the projects that require special supervision and, therefore, the completion of special forms.

- Set of flow charts is located on the website where they can be viewed or downloaded.

- **Students participating in NJAS Regional Science Fairs need to adhere to the rules for completing ALL of the form requirements as outlined in specific detail in chapters 2-8.**

- Chapter 12 includes all forms that are or may be required for NJAS projects. These forms are on the website where they can be viewed and/or downloaded. All forms may be duplicated as needed.

- A convention is followed throughout this section on flow charts which indicates that specific forms are either **Required** or **May Be Required**. To graphically differentiate between these

conditions the symbols shown below are used. Note that the forms shown in a rectangular box (*)are **Required** while the forms shown in a rounded corner rectangular box (*) **May Be Required**. Always refer to the complete Rules in Chapters 2-8 in Section 2 for full details of specific requirements.

• Flow charts are for:

- Human Subject Projects (Ch. 2)
- Non-Human Vertebrate Animal Projects (Ch. 3)
- Pathogenic Agents Projects (CH. 4)
- Controlled Substances Projects (Ch. 5)
- Recombinant DNA Projects (Ch. 6)
- Human and Non-Human Vertebrate Animal Tissue Projects (Ch. 7)
- Projects Involving Hazardous Substances or Devices (Ch. 8)

Chapter 12: Forms Required For Senior High School Projects

NJAS forms required for senior high projects are on the website where they may be viewed and/or downloaded. The forms may be duplicated as needed. Forms 1, 2, and 3 are required for ***all*** projects. The other forms are for projects requiring special supervision. Refer to Chapters 2-8 for detailed information on projects that require special forms and to Ch. 11 to view flow charts of required forms for projects requiring special supervision. Forms included are:

- **Student Research Plan (Form 1)**
- **Checklist for Adult Sponsor/Safety Assessment Form (Form 2)**
- **Approval Form (Form 3)**
- **Qualified Scientist Form (Form 4)**
- **Designated Supervisor Form (Form 5)**
- **Human Subjects Form (Form 6)**
- **Informed Consent Form (Form 7)**
- **Non-Human Vertebrate Animals Form (Form 8)**
- **Human and Non-Human Vertebrate Animal Tissue Form (Form 9)**
- **Registered Research Institutional/Industrial Setting Form (Form 10)**