CHAPTER II. GETTING STARTED

People often ask, *"How do successful grant writers get started?"* First and foremost, those that are successful do good research. Secondly, most successful grant writers have often served on competitive grants review panels, and in the process gained valuable understanding and insights into how the system operates.

If you want to get experience as a competitive grants panelist, start as an *ad hoc* reviewer. This may require that you be nominated by your dean, department head, or State Agricultural Experiment Station director as a potential reviewer. Once you are requested to be an *ad hoc* reviewer, you need to take the responsibility seriously and do an excellent job to qualify for consideration as a panelist. Most federal grant-giving agencies have databases of potential *ad hoc* reviewers and qualified competitive grants panel members. Your strategy should be to get listed on that database to gain the necessary experience.

It is well recognized that reviewing grant proposals is a lot of work for the benefits. Serving on a competitive grants panel is very demanding work, with the effort justified as a service for the scientific community.

The most successful grant writers establish and maintain constant communication with their funding sources before submitting a proposal, during the review process, and after the awarding of funds. But, they do so in a way that they are not seen as overbearing by the competitive grants office.

The most common mistake made in preparing a proposal is to start too late. Quality proposals often can and do take many months to prepare. The most successful applicants take as many as four to six months to complete a grant proposal, while three months is the average for preparation of successful grants. This long period allows you to obtain input and review from your colleagues, along with time for multiple revisions. However, when you begin a proposal many months prior to submission, be sure to include updated revisions for all relevant publications up to the date of submission. A missing, yet critically relevant publication, can be viewed as a serious flaw by the review panel.

Lastly and most importantly, do not assume that your institution's grants administration office can sign off on the proposal within a day or two. Increasingly institutions are requesting up to a week to review and process your proposal.

Learning the Art of Being Appealing

As noted earlier the appearance of a proposal can affect the acceptance of an excellent idea. We would never propose that fluff be substituted for substance, but are only noting that an excellent idea poorly packaged is often not well received. Part of that packaging deals with format, layout, and organization. These are generally outlined in the RFA, and

require that you follow the directions for preparation of the proposal, some of which we will cover as you read this manual. There is, however, no substitute for reading the full RFA and understanding the application process as outlined by the agency. Another aspect of proposal appeal has to do with "turning on" the reviewers to a positive reception of what you are proposing.

Most successful grant proposals contain persuasive preliminary data. This information should "whet the appetite" of the review panel, and build a degree of appeal and acceptance.

The approach of the successful grant proposal writer is to be both positive and encouraging. The experienced grant writer realizes that it is a small world. Your justified criticism of published work may seem fair to you, but others may read it as an insult. And an insult, unintended or otherwise, might considerably disadvantage an otherwise excellent grant proposal.

To deal with this reality, anyone considering the preparation of a competitive grant proposal should give considerable thought to the work previously done in that research area and by whom. Failure to discuss a past study is often deadly—especially if that author is an *ad hoc* reviewer, or is serving on the review panel. You should fairly and honestly review all previous efforts and present them positively. Don't play favorites with scientific schools of thought. You should actively seek advice from scientists knowledgeable in that special area of investigation. You must fairly review the relevant contributions of investigations done by past panel members and by past recipients of grants from that office. You should play it safe and play it smart. Just understand and realize that scientists who have received grants in the past are often asked to serve on peer panels, and past panel members are often re-appointed. We hope you get the connection.

Individual panel members differ in the harshness with which they judge specific grant proposals. We would hope that, on average, scores of panel members would be similar. Often they are not. In a study of one panel, grant proposals were rated on a scale of 1 (excellent) to 5 (poor). One panel member was averaging, after three days of scoring, 3.6 on all of his proposals, versus 2.2 for another panel member. For that particular panel any score of less than 1.5 stood virtually no chance of being funded. That's the luck of the draw and it can really hurt! To deal with these human factors, remember that much more than logic, scientific integrity, and "sex appeal" is required to get a grant proposal funded. Obviously, some psychology is needed.

Remember also that during a panel review, the scientists are reviewing a large number of proposals. Those proposals that are easy to read and understand tend to put the reviewer in a good frame of mind. These reviewers may be more favorably disposed to highlight the strengths of a proposal. Proposals that are difficult to read (small font, typos, etc.) irritate the reviewers. These reviewers may be more prone to highlight the weaknesses of

a proposal. Put yourself in the place of a scientist who has been working for three straight 12-hour days. It does not take much to irritate this group!

Prior to submitting your proposal, give yourself sufficient time to forward your newly completed proposal to a friend or colleague who is a recognized expert in the area. While there is always the danger of giving away a good idea to an unscrupulous individual, most scientists will protect the integrity of your ideas. Requesting a review of your proposal may even flatter the scientist. Who knows, she or he may be on the review panel. Having an advocate for your work on a panel is one of the greatest strengths you can have.

While you're learning to be appealing, we thought that the following points paraphrased from the popular book *In Search of Excellence*, by T.J. Peters and R.H. Waterman Jr., Warner Books, NY, 1984, might hold some insights.

- "Does it feel right?" counts more than "Can I prove it?," said Nobel Laureate James Watson. An idea must hang together more than simply being logical.

- We're all suckers for a bit of praise.

- Hold your facts to a minimum when preparing a proposal. Most of us can only hold a dozen or fewer facts in our mind at one time.

- KISS (or Keep It Simple, Stupid). Avoid technical detail that will turn off or confuse reviewers. Particularly avoid complex mathematics unless the complexity is absolutely essential.

- We all respond to external rewards—even crusty old competitive grants review panel members. Be kind in your comments, and not harshly critical.

- Actions speak louder than words. Your pattern of productivity (a.k.a. publications) is important. It turns out that for competitive grants, one cannot fool any of the people any of the time.

Play to your strong points when preparing your grant proposal. Watch out for insults of any kind, especially the unintended insult. Anyone's grant proposal can be torn to shreds, and if given a reason, an irritated scientist serving as a peer panel member can be provoked to do a masterful job. So don't provoke. Be friendly!

Get Some Institutional Support

Those institutions that excel in obtaining competitive grants generally have a strong record of support for faculty activities in the grants application process, in the management of grants, and in the reporting of results obtained from grants. Some institutions offer workshops for early career faculty (often those who have yet to be successful), assistance in preparing budgets, editorial help in preparing proposals, and some institutions even overnight mail proposals for you before the deadline at the institutions' expense (this, however, is becoming less common with the increasing insistence by the major federal agencies and foundations that proposals be submitted electronically).

Grant-successful departments mentor junior faculty and share their departmental resources to strengthen an individual's relative competitive position. Many institutions require junior faculty to have their proposals reviewed by successful senior faculty prior to submission. Senior faculty often share funded grant proposals with junior faculty so that they may be used as models. Others allow junior faculty to gain experience as co-Principle Investigators (PIs) on already established research programs. Successful departments typically do not overload junior faculty with teaching and administrative assignments, thus allowing time for initial grant preparation.

Selecting a Topic

To improve the chances for your grant proposal, here's what to avoid when selecting a topic:

- **Stay away from minor or insignificant problems,** unless it is an exquisite model. If you propose to do research in an area that no one else cares about, you have weakened your argument for obtaining a share of the limited funding portfolio that most agencies manage. Topics dealing with minor crops in agriculture, trivial items in behavioral science, or oddities of chemistry, etc., should be avoided.

- **Avoid overemphasizing the potential of commercial applications** of your discoveries, unless you include a statement of your intention to obtain a public patent on your discoveries. Granting agencies tend to avoid funding individual scientists who propose that success might lead to riches. If there are opportunities for licensure of intellectual properties that might result, state such, but don't overplay the potential for income, either to the institution or to yourself personally. We know that this is contrary to what is preached, but ask others about their experiences, if you don't believe us.

- **Stay away from old topics.** It is very easy for a critical panel member to say, "This was studied in the 1930s and it didn't go anywhere," and

you will not have a chance to reply to that criticism. You're simply out of the competition, unless there is a strong advocate on the panel who can overcome such criticism.

- **Don't try to compete with the big research laboratories** or your ex-graduate advisor. Big laboratories by definition have a reputation, and that makes it difficult to compete against them. They have too many advantages over an individual scientist. (If you represent a big lab, you will not likely be reading this publication, because big labs already have big grants—and they know how to get them!) Graduate advisors may also have established reputations, and it's too easy to criticize a proposal as "merely an extension of work already being conducted at his/her advisor's lab."

- **Minimize the direct applications of potential research results.** Panels often find that this type of research lacks the "appeal" often described as "sexy." A proposal to breed a new cultivar of a crop, or synthesize a new growth-regulating or promoting product, or design a new plant disease scoring system does not appeal to competitive grants panel members. Although you may think that the information is critical to your job appointment, it will make a poor grant proposal. Panel members are not likely to sympathize with an individual's employment needs. Panel members will typically focus on the need to advance the body of scientific knowledge in a given field. As unfortunate and as unfair as this may seem, we are not trying to describe how the system should be, but how it really functions.

- **Avoid proposals to develop new research methods or descriptive work.** Funds to support development of an analytical procedure, a new classification system for a group of organisms, or a more precise measurement of an already well understood mechanism are simply not fundable in the competitive grant environment. This type of work is not exciting to peer panels, and it is not necessarily going to directly advance the frontiers of science. It is critical to remember that a grants review panel will review an extraordinary number of good and truly fundable proposals, and your proposal must catch the "eye" of a reviewer who will serve as your advocate.

- **Avoid working on problems that are not germane to your region.** A proposal to study some phenomena in rice in a region where rice is not grown commercially, or to do research on a plant disease that does not occur in your region, will work against you, unless you are using the species as or in a model system.

- **Avoid excessive foreign travel.** Just be careful here, especially if the foreign travel would seem enjoyable. Studying for a summer in southern France (even when critical to the research) can bring out the jealousies of some panel members, and can provoke some negative attitudes. (Yes, we have witnessed such reactions!)

- **Keep the budget realistic and reasonable.** Theoretically the size of a proposed research budget and the proportion of indirect costs will not affect the panel's recommendations. Practically they do, as no one wants to be seen as recommending a wasteful or irresponsible proposal with a "fat" budget. Additionally, panel members are often drawn to the self-imposed objective of trying to fund as many research grant proposals as possible, which results in finding fault with proposed budgets. An extravagant or what is perceived as a "fat" budget works against the proposal being selected for funding.

Here are some suggestions for selecting a topic:

- **Focus on a hot topic.** Find a topic and develop your proposal around issues that are high on the national or regional priorities list. Food safety, genetic engineering, international competitiveness, environmental quality, homeland security, nutrition, obesity, water quality (and we could go on) are all hot topics. Know and understand the national priorities from the Executive branch of government.

- **Seek out "big picture" problems.** The "big picture" becomes an advantage in that a significant discovery from your research can have large impacts. Increasing acreage of a crop, large crop losses caused by a pest, significant human suffering, etc., all add to factors in the plus column of a grant proposal review.

- **Find a topic(s) that is of general interest to science.** Ask yourself, "Who really cares?" You and perhaps a few colleagues? A lot of people? Better yet, the general public? The more the better! Find a way to make your arguments compelling to the reader.

- **Try to work in an area where you can publish with some frequency.** Any good peer panel scientist can spot a potentially productive area of investigation, one that is likely to yield results and publications. Pick the topic that seems research-fertile to others.

- **Find an early career co-PI.** Believe it or not, panel members will gravitate toward proposals submitted by early career faculty who are trying to establish themselves, and in many cases have overlooked minor

flaws to reward potential. The generosity shown by panels to young scientists trying to establish their careers is remarkable. Productive scientists who have been around for a while and have a good reputation do well, but young scientists are frequently given the benefit of the doubt along with a measure of latitude in the review process, if the idea is bold and imaginative. That's just the way it seems to work.

- **Find ways to cooperate and collaborate.** Even though your best collaborator may be submitting a grant proposal to the same agency, ask to put your colleague(s) on your proposal as collaborator(s), or at least as advisor(s). Panel members are likely to ask, "Why aren't these two people working together? Is there a personality problem?" As a general rule of thumb, the more cooperation exhibited in the proposal, the better the panel members like it. There seems to be a general feeling by most panel members that too much individualism hurts science, and that we would all be better off working together. So, get some collaborators, and clearly spell out in the proposal the role of each collaborator in the proposed project. As an aside, we are clearly witnessing a change toward more integrated proposals, where the issues are more complex and the need to address stakeholder needs are identified and addressed.

- **Develop a proposal that will create extendable information.** Describe how the discoveries from your investigation will be extendable to other problems or other topics. Discuss how the granting agency gets more bang-for-the-buck for the resources invested. Model systems are particularly well suited to meeting this need for the broad application of research results. When possible and where appropriate, include in your proposal extension faculty who can extend your findings to stakeholders. This is particularly true and is a requirement for the integrated programs that are increasing in frequency with some agencies. If you are including extension faculty that can reach out to the community, it is important that they be involved with the work from its inception, and not be an add-on at the last minute. Reviewers who are increasingly familiar with these integrated proposals are well attuned to the need to identify extension faculty up front and to see that they are playing an active role in both the proposal preparation and conduct of the work.

- **Focus on basic science.** Even though the application of knowledge to problem solving is almost always commendable, most traditional competitive grants programs are really looking to fund basic research. You may choose to argue otherwise, but you should have a clear understanding

from the funding agency of what they want before you spend your time preparing an applied research proposal that has virtually no chance of receiving funding. And, although granting agencies most often support basic research, there still needs to be a connection to a "real world" problem.

- **Focus on a problem that will provide answers to an important question.** It is important to remember that system science has yet to be fully accepted by a majority of review panel members. Systems research, computer simulation, and model development have not worn well as competitive research grant areas, however this is changing with the inclusion of the USDA integrated programs, which can constitute up to 20 percent of the USDA-NRI (National Research Initiative) portfolio. If you do propose a systems study, be sure to include methods for model verification and validation, and other appropriate tests. If not, the reductionists on the peer panel will likely give your proposal big trouble.

- **Budget for a post-doc.** Even though competitive grants panels look favorably on the support of graduate students, most funding agencies generally feel that post-docs funded by a research grant give more productivity for the investment than graduate students. Graduate students, it is feared, might spend the first year or more on a grant preparing to initiate their research, or they may become deeply involved in their academic activities before being able to devote time and effort to the proposed research. On a three-year grant, that is a significant portion of the project's time spent without the development of any research results.

- **Seek matching funds.** Demonstrate your institution's commitment to the project (either directly or indirectly) through a commitment to matching funds. But be careful here because matching funds on a federal grant are an auditable item. You could end up with a full audit of your grant and the matching funds.

- **Prepare a realistic budget**. Under-funded proposals often result in the panel raising the question, "Can the proposed work be completed with the funds requested?" Of course "fat" budgets receive just as much scrutiny. Be realistic and clearly justify each budget item to convince reviewers of your knowledge of the "real" costs of the project.

Get Some Preliminary Data

Getting adequate preliminary data is perhaps the most important aspect of a competitive grant proposal that will make your submission truly competitive. Many review panels are

insistent on having data that supports an application contained within the proposal. This often means having a significant portion of the study under way, prior to the submission of the grant proposal. As ridiculous as this may seem, that is the way it works.

Many institutions offer internal research initiation grants to scientists to get some projects started. These initiation grants are usually for small amounts (typically up to $20,000 per year) to allow a scientist to gather preliminary information that can be used to initiate a research or scholarly effort (hence the name of the grant). State Agricultural Experiment Station funding (Hatch formula funding and the matching state project support) is often available from your department or from the State Agricultural Experiment Station Director's office. They can provide an excellent means of obtaining "preliminary" data. Ask and seek out initial support. If you have a good idea that is not sufficiently developed to allow you to be competitive in your search for external funding, your department chair or experiment station director may be able to provide funds to allow for the collection of preliminary data. Do not hesitate to request support!

An initiation grant lets one find out what no one else knows. Once you have obtained some preliminary data, it is much easier to "sell" your idea to a competitive grants review panel, as the best possible proposal to get the answers to the big questions.

Taking Care with Procedures

Under most circumstances, procedures and methods themselves are not considered "researchable." It is highly unlikely that you will be successful in obtaining funding to work out methods or procedures. It is critical that you have all the methods and procedures worked out in considerable detail at the time of proposal submission. Do not say that the procedures for the work you are proposing "will be worked out later." Do not refer the panel members to research methods or procedures that are "in press." Any essential "in press" information should be appended to the proposal. Appended information is not typically included in the count toward the page limit and there is no requirement that it be read by panel members or *ad hoc* reviewers. Above all, if the "in press" information is critical to the understanding and presentation of your proposal, you have to find a way to include it in your grant application.

You must communicate your mastery of the methods and procedures, with an economy of words that leaves no question as to your skills in conducting the proposed research. You must be able to cite the research methods in the literature (when they exist) and show that you have fully mastered all the needed procedures before submitting your proposal, or show how you or a co-PI will attain the needed skills. If the methods and procedures are not cited in the literature, then you must provide the proof that the research can be

done as proposed. It is unlikely that your proposal will be funded if there are methods and procedures still to be worked out.

You will need to include just enough detail on your experimental methods and procedures description to let the reviewers know that you know how to do the proposed research. You must not provide so much detail as to be boring. But, too little detail will suggest that you do not fully know what you are proposing to do. You need to find just the right balance. To gauge this balance, study some proposals by others and ask colleagues to comment on your draft methods and procedures section. There is perhaps nothing more critical in the preparation of your proposal than honest review and critique by established colleagues.

Reviewers want to be assured that you can perform the research proposed. If the methods you propose are new to you, you can alleviate panel fears by collecting data using the techniques, perhaps in a colleague's laboratory. In other cases, it is helpful to append to your proposal a letter of support from an experienced colleague who has agreed to provide technical guidance to you for any new techniques.

And please note the comment of one former peer panel member who stated, *"Sophisticated methods are not substitutes for a sterile idea."* Another said, *"You cannot bluff your way into a competitive research grant with fluff and smoke!"*

Provide a Progress Report

A grant proposal provides you with an important opportunity to summarize your findings in considerable detail and to present the current status of the topic that you wish to investigate. This is especially important if you are applying for a renewal, or even when you are applying for a new grant from the same agency. The grant proposal provides you with an opportunity to "sell" your proposed project to the review panel members, and to establish your credibility in relation to others doing research in that particular area of science. Take some care to get all relevant computerized information retrieval system data for your proposal's section on research progress (to at least demonstrate that you are aware of what's going on). The U.S. Department of Agriculture's Current Research Information System (called CRIS) is far too frequently ignored in this regard. This is upsetting to administrators who spend a lot of dollars to keep the system current, and it is frustrating when another scientist's work goes unnoticed. A reviewer knowing that a similar research project is under way at another location is often fatal to a proposal during the review process.

Packaging Your Proposal

Hold the "body" of your proposal to the number of pages allowed. If the RFA says 15 pages, stick to it and don't go beyond the designated number of pages. We are aware, moreover, of

grants program managers who will not even consider any proposal that is not in accordance with the page limits. They view it as a way to reduce the work load. Need we say more? The reviewers are required to read only to the page limit. If you've submitted 50 pages, more than 2/3 of your proposal may not get read, or, if it is read, may be done so grudgingly. Don't try to squeeze the margins or pack in the text by single spacing or selecting a very small font size. This doesn't fool the reviewers and, in fact, most agencies now set limits or standards for font, type size, and margins to eliminate this approach. Nothing is more frustrating than to try to read a proposal with a magnifying glass! Remember that most of the reviewers have taken on this task as a service to their field of science and attempting to "fool" the reviewers in most cases only aggravates reviewers—potentially to the point where they may not fairly evaluate a good idea. Reviewers are very busy rushing to read a stack of papers usually under immense time pressure. Work the page limit to your advantage. Ask yourself, ***"Is this information really needed in this proposal—or is it necessary in the body of the proposal?"*** Use an appendix for the material if it's truly needed but just won't fit, but understand that there is usually no obligation on the part of the panel members to read the appendix. And think of the bonus effect felt by the reviewer who finds you have made a strikingly good argument in say 12 pages. Reviewers love it!

Forget wasting valuable page space arguing the need for your research on the merits of "the world food crisis," "thermonuclear threat," or "environmental pollution" in a false attempt to make your proposed project more worldly. These word-wasting arguments generally fail to convince reviewers, and they cost you valuable page space. Be careful with dollar losses for particular agricultural production problems, unless you can substantially back them up with facts and they truly do help build your argument. Remember, most dollar losses for agricultural commodities are someone's best guess and they are usually well understood by the reviewers. At the very least, you should provide up-to-date references for your claims.

Number all of your pages. Better yet, put a running footer on each page with your name and page number. Staples do tend to pull apart, and then the pages will fly. And, sometimes panel members may wish to direct other reviewers to a specific statement in your proposal. This is always helped by providing the reviewers with page numbers. (Yes, we have seen proposals with no pagination!)

Never bind your proposal, but preferably staple it together with a high quality stapler. Fancy-bound proposals are very difficult for the grants program office to handle and file. These difficulties outweigh any benefits obtained from the distinction of such bindings. Think of the grants office trying to file them, stack them, ship them, and all of the other handling procedures that are necessary during the review process.

While we recommend use of an extra-high-quality photocopier and paper so that every copy looks good, we clearly understand that agencies are increasingly requesting that

proposals be submitted electronically. Within the next few years, many if not all federal agencies and many foundations are planning to forgo all paper submissions, so it is important that you use a commonly available software program and that any attachments (pictures, tables, etc.) open easily, so they can be attached to the proposal on the receiving end. If for some reason you are submitting paper copies of your proposal, clean, legible copies are vital. Be careful when using figures and drawings and use them only when necessary. Make sure all your artwork is always of first class quality. Second-rate drawings and figures will reflect poorly on your proposal. A neat, clearly formatted proposal will enable reviewers to focus on your ideas. A messy, poorly reproduced proposal will only interfere with the communication of your ideas. Appearances do count.

Alternatively, if you are seeking a renewal, you need to remind the reviewers of the start and end dates of the current award. Most importantly you must establish your credibility with the review panel such that they will be impressed by the continued high quality of your research. It will be critical for you to summarize your previous hypothesis, the long-term objectives and specific aims and give a succinct description of the progress of your work. In particular it will be critical that you place emphasis on the most important and relevant findings from your previously funded work. It is also appropriate to describe how the specific goals and aims of the work may have changed as your work has progressed.

In addition, and in the most subtle of ways, you need to convince the reviewers that your recent contributions were outstanding and of great importance. You will also need to address and speak to the topic of "How your work has significantly advanced knowledge in your field and how the continued support of the renewal will continue this record of accomplishment, achievement, and excellence." Two final points on renewals: don't complain about previously low and/or inadequate funding, as it will not get you any points and is, in fact, self-defeating. Secondly, be sure to incorporate all publications, manuscripts submitted and accepted, and abstracts of the work conducted during the term of the grant award.

Signature Page

Your institution will require you to gather a number of signatures to indicate concurrence on submitting your proposal. Make sure that the names of the signatories are typed as well as signed because most signatures are illegible. Follow instructions on the requirements for an original signature. Make sure you include the phone number of all the principal investigators (and be sure to spell it principal, not principle!), as questions might arise that can be answered over the phone. Many proposals now include FAX numbers and e-mail addresses as well.

The signature page makes a good cover page (see next section).

Title Page and Covers

Title pages and covers are a waste of paper. Most commonly, the signatures and sign-off page is expected to be used as a cover. Title pages are just more pages to be photocopied, and stiff covers become cumbersome and difficult to handle and store (see above). Again, if you are making a formal paper submission, do not bind your proposal! Just put one good staple in the upper left corner. That is all it takes.

Table of Contents

The table of contents seems to help some proposals, but it doesn't seem necessary for all proposals as long as you follow the format and sequence of the RFA. If you're preparing a particularly complex proposal that you feel would be assisted with a table of contents, you might want to consider including it. Otherwise, it's probably best left out unless required by the granting agency.

A Few Points to Consider Before Preparing a Proposal

Considerable preparation is necessary before beginning to write a competitive grants proposal. The first and foremost ingredient is an excellent "researchable idea." This is the "KEY" around which any good proposal will be built.

Once the excellent "researchable idea" has been identified, the content of the proposal needs to be considered, especially in view of any page length constraints. All relevant literature must be cited in your proposal to avoid sending a message to the panel of reviewers that you are unaware of significant findings in a research-related area. All of your methods need to be accurately described (but not thoroughly) so that there is no question that the activity proposed can be accomplished and that your scientific approach is acceptable.

The resources available to conduct the project need to be adequately described and, as appropriate, highlighted, justified, and explained if they are unique or unusual.

Finally the importance of your proposed research needs to be clearly communicated in your proposal and discussed in terms of expected outcomes, benefits, and impacts. If there are some anticipated potential problems or concerns, or even some possible unintended consequences, these too should be discussed in your proposal. Examples of anticipated potential problems include: answering biosafety questions; obtaining necessary regulatory permits; supplying required environmental impact statements (under the National Environmental Policy Act); and compliance with human subjects guidelines, radiation safety rules, and animal welfare regulations.