

NATIONAL SCIENCE FOUNDATION

Responsible Conduct of Research

AGENCY: National Science Foundation (NSF).

ACTION: NSF's Implementation of Section 7009 of the America COMPETES Act.

SUMMARY: The National Science Foundation (NSF) is announcing its implementation of Section 7009 of the America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (COMPETES) Act (42 U.S.C. 1862o-1). This section of the Act requires that "each institution that applies for financial assistance from the Foundation for science and engineering research or education describe in its grant proposal a plan to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduate students, graduate students, and postdoctoral researchers participating in the proposed research project."

SUPPLEMENTARY INFORMATION: The responsible and ethical conduct of research (RCR) is critical for excellence, as well as public trust, in science and engineering. Consequently, education in RCR is considered essential in the preparation of future scientists and engineers. The COMPETES Act focuses public attention on the importance of the national research community's enduring commitment and broader efforts to provide RCR training as an integral part of the preparation and long-term professional development of current and future generations of scientists and engineers. A wide array of information exists to help inform RCR training. For example, many professional societies as well as governmental licensing authorities for professional scientists and engineers have adopted policies or best practices that might be usefully considered. In addition, research is illuminating existing practices surrounding ethical issues, and providing an evaluation of pedagogical innovations in ethics education. A recent NSF-funded workshop entitled "Ethics Education: What's Been Learned? What Should be Done?" was held by the National Academies of Science & Engineering (NAE). Information about the workshop, as well as additional resources, are available at: <http://www.nae.edu/nae/engethicscen.nsf/weblinks/NKAL-7LHM86?OpenDocument>. The workshop report is available at the NAE's Center for Engineering, Ethics and Society Web site: <http://>

www.nae.edu/?ID=14646. NSF is committed to continue its funding of research in this important area through programs such as Ethics Education in Science and Engineering: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13338&org=SES&from=home and to promote the development and implementation of effective practices through its education and training programs. The Foundation also will continue to explore other mechanisms to support the academic community's efforts in providing RCR training.

Implementation Plan: Effective January 4, 2010, NSF will require that, at the time of proposal submission to NSF, a proposing institution's Authorized Organizational Representative certify that the institution has a plan to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduates, graduate students, and postdoctoral researchers who will be supported by NSF to conduct research. While training plans are not required to be included in proposals submitted to NSF, institutions are advised that they are subject to review upon request. NSF will formally implement the new RCR requirement via an update to the NSF Proposal and Award Policies and Procedures Guide (PAPPG). It is anticipated that the revisions to the PAPPG will be issued on October 1, 2009. NSF also will modify its standard award conditions to clearly stipulate that institutions are responsible for verifying that undergraduate students, graduate students, and postdoctoral researchers supported by NSF to conduct research have received RCR training. In addition, NSF will support the development of an on-line RCR resource containing research findings, pedagogical materials, and promising practices regarding RCR in science and engineering. The development and evolution of the ongoing online RCR resource will be informed by the research communities that NSF supports, and it will serve as a living resource of multimedia materials that may be used to train current and future generations of scientists and engineers in RCR.

Discussion of Comments: One hundred eighty-eight (188) comments were received in response to the February 26, 2009 **Federal Register** notice (74 FR 8818) requesting comments on NSF's proposed plan. The comment request included a series of questions to help guide the comments:

- What challenges do institutions face in meeting the new RCR requirement?

- What role should Principal Investigators play in meeting NSF's RCR requirement?

- There are likely to be differences in the RCR plans that institutions develop to respond to this new requirement. What are the pros and cons of exploring a diversity of approaches?

- How might online resources be most effective in assisting with training students and postdocs in the responsible and ethical conduct of research?

- Discuss possible approaches to verifying that the requisite RCR training has been provided.

Following the close of the comment period, NSF reviewed and responded to the comments. A summary of the comments and NSF's responses are below:

Comment 1: 22 comments were received noting general challenges that institutions will face in providing education and training that meet the needs of a diverse community.

Response: NSF recognizes that many issues must be considered in developing effective content and training mechanisms and that universities and research institutions will need flexibility to develop and deliver effective training that is tailored to their student/postdoc needs.

Comment 2: 19 respondents commented on the resource burden the RCR training requirement will place on institutions. It was specifically suggested that the 26 percent cap on Facilities and Administration costs currently contained in OMB Circular A-21, Cost Principles for Educational Institutions (2 CFR Part 220), be lifted. (See http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=c8bb5a0992df470805b85610c02e77ec&tpl=/ecfrbrowse/Title02/2cfr220_main_02.tpl.)

Response: The 26 percent cap is specified in OMB Circular A-21, and NSF, therefore, does not have the authority or independent discretion to change it.

NSF, however, has supported, and will continue to support, research on RCR training to help inform the development of training programs through programs such as Ethics Education in Science and Engineering. NSF will also continue to promote the development and implementation of effective practices through its education and training programs such as the Integrative Graduate Research and Education Traineeship Program. NSF has also funded two beta sites (NSF Award 0936857, <http://www.umass.edu/sts/digitallibrary/>, and NSF Award 0936865, <http://www.onlineethics.org/>

[CMS/about/UserGuide/18848.aspx](#)) to begin to provide an interactive community online resource on ethics education in science and engineering. These beta sites will provide a foundation for an ongoing on-line RCR resource in ethics education in science and engineering that NSF plans to award through open competition. NSF will also continue to explore other potential methods to support the academic community's efforts in providing RCR training.

Comment 3: Three respondents inquired whether the institution was permitted to include the costs associated with RCR training as direct costs on NSF awards.

Response: Most institutions have included training expenses in their Facilities and Administrative (F&A) rate pool and they therefore cannot charge the costs directly to proposals/awards per OMB Circular A-21, Section F, Identification and Assignment of F&A costs. This is not a decision that program officials and principal investigator(s) can make on a proposal-by-proposal basis. Rather, the cognizant agency and institution must determine the treatment of these costs during the process of negotiating the institution's indirect cost rate. These costs effect the development and oversight of the Facilities and Administrative (F&A) rate and must be in compliance with the OMB cost principles. Accordingly, the institution must involve its cognizant agency along with NSF in this decision and provide information of their current policies and procedures along with its disclosed practices per its Disclosure Statement.

Comment 4: 35 respondents requested clarity or provided input on whether or not NSF should provide guidance on content for training in responsible and ethical research conduct.

Response: NSF understands that some institutions would like NSF guidance regarding appropriate content for training in RCR. However, NSF does not intend to issue NSF-specified standards and recognizes that training needs may vary depending on specific circumstances of research or the needs of students intending to pursue careers in a variety of science and engineering settings after completing their education. Therefore, it is the responsibility of each institution to determine both the content and the delivery method for the training that will meet the institution's particular needs for RCR training in all areas at that institution for which NSF provides support. Furthermore, each institution must decide if development of content or pedagogical method is required, or if

appropriate content and training can be provided from some existing sources or capabilities, and take appropriate action to implement its decisions.

NSF does support the development of resources and forums for the research community to discuss the most appropriate content in ethical research training and to develop shared guidelines. For example, NSF funded a workshop held at the National Academies of Science and Engineering in August 2008 entitled, "Ethics Education: What Have We Learned? What Should be Done?" The workshop report is available at the NAE's Center for Engineering, Ethics and Society Web site: <http://www.nae.edu/?ID=14646>. NSF has also funded two beta sites (NSF Award 0936857, <http://www.umass.edu/sts/digitallibrary/>, and NSF Award 0936865, <http://www.onlineethics.org/CMS/about/UserGuide/18848.aspx>) to begin to provide an interactive community location and searchable clearinghouse of resources on ethics education in science and engineering. These beta sites will provide a foundation for an ongoing on-line RCR resource in ethics education in science and engineering that NSF plans to award through open competition. These kinds of resources give institutions places to find materials and standard approaches to ethics education that research communities have already developed.

Comment 5: Three comments noted the challenge with identifying and tracking postdocs and students to receive RCR training and suggested that for tracking purposes it would be easier to extend the training requirement to all students.

Response: NSF is requiring RCR training and tracking only for those postdocs and students who receive support to conduct research on NSF grants. However, NSF recognizes that all student and postdocs would benefit from RCR training and that institutions may decide to extend the training beyond NSF-supported students and postdocs at their discretion.

Comment 6: 24 respondents provided input in response to NSF's question on the role of the Principal Investigators in meeting NSF's RCR requirement.

Response: The institution is responsible for certification that the RCR training plan is in place and verification that the students and postdocs have completed the RCR training. The role of a PI in meeting these institution responsibilities is determined by the institution.

Comment 7: One respondent noted that NSF should encourage PIs to

include RCR training in annual and final reports.

Response: NSF will not require PIs to report on RCR training in annual and final reports because the requirement for verifying training will be part of the standard award conditions and institutions will decide how they will track completion of training.

Comment 8: 15 respondents noted that an NSF-supported online RCR resource will be an invaluable resource for materials, research and innovative teaching and delivery methods.

Response: NSF is supporting two beta sites that provide resources on ethics education in science and engineering. These sites will serve as a foundation for an open competition for an ongoing on-line RCR resource on ethics education in science and engineering. This resource has the potential to provide a centralized location for information that can be used to help institutions and PIs meet their own particular needs. The resource will contain information the community develops including research findings, pedagogical materials, and promising practices regarding the ethical and responsible conduct of research in science and engineering. The development and evolution of the ongoing on-line RCR resource will be informed by the research communities that NSF supports, and will serve as a living resource of multimedia materials that may be used to train current and future generations of scientists and engineers.

Comment 9: 11 respondents noted that although online training modules may teach rules, policies and guidelines, they should be complemented by more interactive, mentored-discussion of ethical principles and evaluation of case studies.

Response: It will be up to each institution to determine how best to ensure effective and appropriate education in responsible research practices.

NSF funds innovative research and education projects in ethics education in science and engineering including the development of resources and forums for the research community to discuss the most appropriate content in ethical research training and to develop shared guidelines. For example, NSF funded a workshop held at the national Academies of Science and Engineering in August 2008 entitled, "Ethics Education: What Have We Learned? What Should be Done?" The workshop report is available at the NAE's Center for Engineering, Ethics and Society's

Web site: <http://www.nae.edu/?ID=14646>.

Institutions are encouraged to visit the two beta sites NSF is supporting that provide resources on ethics education in science and engineering. These sites will serve as a foundation for an open competition for an ongoing on-line RCR resource on ethics education in science and engineering. This resource has the potential to provide a centralized location for information that can be used to help institutions and PIs meet their own particular needs. The resource will contain whatever information resources the community chooses to develop and share including research findings, pedagogical materials, and best practices. It will be up to each institution and discipline to determine how best to ensure effective and appropriate education in responsible research practices.

Comment 10: Six respondents noted current online resources that might be used with the online resource.

Response: NSF will forward the recommended resources to the on-line resource beta-site for consideration.

Comment 11: 20 respondents either suggested that NSF allow institutions to develop their own systems to track and verify the delivery of the required training or provided potential approaches to accomplish this.

Response: NSF recognizes that there are many ways to achieve the training objectives of RCR, each with strengths and potential pitfalls. NSF intends to allow institutions to meet the verification requirement using appropriate systems of their choosing.

Comment 12: One commenter suggested that NSF's proposed implementation plan will not be effective because it does not include systems to mitigate against unethical behavior.

Response: We note that the National Science and Technology Council has developed a Federal policy on research misconduct, which authorizes agencies to impose administrative actions on those who engage in research misconduct. See NSF's implementation at 45 CFR Part 689. The NSF Office of the Inspector General investigates reports of research misconduct and refers the results of their findings to NSF management for appropriate action.

Institutions involved in international collaborations might find materials provided by the Organisation for Economic Co-operation and Development (OECD) "Research Integrity: preventing misconduct and dealing with allegations" useful. See: <http://tinyurl.com/176p3b>.

Comment 13: Six comments suggested that reviewers of proposals and other faculty members should be required to take RCR training. These comments appear to be aimed at the issue of plagiarism when reviewing proposals. Another commenter suggested that only Ph.D. students should be required to take such training.

Response: Section 7009 of the COMPETES Act mandates that institutions applying for financial assistance from the Foundation provide such training for undergraduate students, graduate students, and postdoctoral researchers participating in the proposed research project. Thus, reviewers and other faculty members are not required to take such training, although undergraduate and graduate students are subject to such a requirement. As to faculty members, institutions, at their discretion, may expand the scope of such training to include other categories of individuals not covered by Section 7009 of the COMPETES Act. As to reviewers, NSF has a longstanding policy of providing guidance and instructions to our reviewer community on the confidentiality of information, which includes plagiarism, contained in proposals and the treatment of conflicts-of-interest.

Comment 14: Two respondents suggested alternate mechanisms for an institution to inform NSF that it has an appropriate training plan. One commenter suggested that NSF require investigators to include a short summary of their institutions' training plans in the body of the proposal. Another commenter suggested that, in lieu of an institution providing a certification with each proposal, an institution should only have to submit such a certification once and, NSF should simply compile a list of institutions that have provided the requisite certification.

Response: Although these alternative mechanisms have merit, NSF has chosen the implementation approach that is consistent with how NSF has had institutions certify their compliance with statutory requirements such as Non-discrimination, Conflict of Interest, Drug Free Workplace, etc.

Comment 15: One respondent recommended that NSF make the development of conceptual models and practical assessment of the effects of RCR education a research priority.

Response: Although not an explicit research priority, NSF may support proposals that address these topics. For example, proposals for the development of conceptual models and assessment methods for RCR may be appropriate for

submission to programs in the Directorate for Education and Human Resources. Innovative research on ethics and values in science and engineering may be appropriate for submission to programs in the Social, Behavioral and Economic Sciences Directorate. NSF expects that such proposals would compete for resources along with other important educational and research activities.

Comment 16: NSF received 19 general comments. These include: (a) comments expressing support for the requirement or support for the value of RCR training in general; and (b) comments not related to the RCR requirement.

Response: These comments provide valuable perspectives on RCR training. However, no NSF responses are needed for purposes of this **Federal Register** Notice.

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NUCLEAR REGULATORY COMMISSION

[NRC-2009-0276; NRC-2009-0275; NRC-2009-0274; NRC-2009-0277]

Draft Regulatory Guides: Granting Extension of Comment Period

AGENCY: Nuclear Regulatory Commission.

ACTION: Notice of Granting of Request to Extend the Comment Period of Draft Regulatory Guide (DG)-1221, "Control of Stainless Steel Weld Cladding of Low-Alloy Steel Components;" DG-1222, "Control of Preheat Temperature for Welding of Low-Alloy Steel;" DG-1223, "Control of Electroslag Weld Properties;" and DG-1224, "Control of the Processing and Use of Stainless Steel."

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SUPPLEMENTARY INFORMATION:

I. Introduction

The U.S. Nuclear Regulatory Commission (NRC) issued for public comment DG-1221, DG-1222, DG-1223, and DG-1224, which were published in the **Federal Register**, 74 FR 31991, 74 FR 31993, 74 FR 31993, and 74 FR 31992, respectively, on July 6, 2009. This series was developed to describe