Proposal for the Formation of the

CENTER FOR ENVIRONMENTAL RADIATION STUDIES

At

Texas Tech University

SUBMITTED TO THE OFFICE OF THE VICE PRESIDENT FOR RESEARCH AND GRADUATE STUDIES

On

5 March 2003

Attachment A
Request for Establishing, Modifying, Dissolving, or Reviewing a Center or Institute

Name of Center/Institute: Center for Environmental Radiation Studies
Director: Dr. Ronald K. Chesser, Professor Biological Sciences
Responsible university official: Vice President for Research and Graduate Studies
Date Submitted: 3 March 2003

Request: This request is to establish a Center for Environmental Radiation Studies at Texas Tech University. This center will promote and focus research on the fate and effects of ionizing radiation released via natural and man-made causes. Research will be conducted to reduce risk to human health and environmental contamination. The Center will form a partnership with the International Radioecology Laboratory, in Slavutych, Ukraine, to foster long-term radiation research into the dispersion and impacts of fallout from the Chernobyl accident. It is anticipated that the Center will have contributing faculty from Texas Tech University and partnering universities, institutes, and governmental agencies.

Recommendations:

Approvals:

_____
Vice President for RGSTT Date

_____
President Date

a) STRATEGIC PLAN

Mission Statement

The mission of the Center for Environmental Radiation Studies is to promote research on the dispersion and biological/ecological effects of ionizing radiation, to advise local, state, national, and international agencies on means to reduce risks to human health and environmental contamination, to refine models for the dispersion of radionuclides released by natural and man-made events, and to serve as an educational resource.

Vision

The Center for Environmental Radiation Studies will strive to develop databases and expertise important to strategic planning for the state of Texas, U.S. national homeland security and international nuclear safety.

Critical Success Factors

Critical measures of success shall include, but not be limited to, the following:

- Scientific publications in national and international journals detailing fates, effects, and processes important to the dispersion of ionizing radiation
- Creation of databases valuable for detailing empirical patterns of contamination and/or movements of radionuclides in contaminated environments
- Creation and/or refinement of predictive models used to project dispersion of radionuclides, resultant doses, and potential biological effects
- Creation and/or refinement of countermeasures and protective actions to reduce human risks in the advent of releases of significant amounts of radioactive materials
- Service on local, regional, state, national and international advisory/strategic panels regarding nuclear research, nuclear safety, biological effects, and homeland security
- Training of graduate students and post-doctorates in the areas of molecular genetic responses, radiation dosimetry, and radioecology
- Securing funding to extend and diversify the research programs associated with the center
- Document the genetic and physiological responses to chronic exposure to various levels and types of radiation

Goals

The goals of the Center for Environmental Radiation Studies at Texas Tech University are:

- To build a team of internationally renowned scientists whose joint works will lead to a better understanding of the fate and effects of radioactive elements that are released into urban and rural settings
- To integrate the knowledge of scientists with the practical needs of politicians, health service personnel, first-responders, and regulators in order to build realistic emergency plans, strategic prevention methods, and cost-effective statutes for regulation
- To become the primary scientific establishment responsible for the acquisition and use of databases detailing spatial and temporal patterns of radiation in urban and rural environments worldwide
- To better understand the molecular mechanisms of mitigating the effects of ionizing radiation
- To train scientists and technicians in the methods of investigating and documenting dispersion, dosimetry, and health effects of radioactivity in environmental settings
- To understand the health, social, political and economic risks to life forms due to various levels of exposure to environmental radiation

Objectives

- Produce information necessary for the development of realistic risk assessment information for widespread release of radiation
- Refine model development for movement of radiation through environmental pathways to regions that may incur significant health risks to the populace
- Evaluate the effectiveness of cleanup technologies in reducing availability and uptake of environmental radiation
- Establish robust methods for calculation of radiation dose to human and non-human species and to establish guidelines for determining compliance/noncompliance to regulatory requirements
- Document dose-response assessments for a variety of environmental endpoints such as genetic mutations, reproductive risks, cancer, and population viability
- Document beneficial responses (hormesis) to exposure to radiation
- Produce characterizations of radiation distributions, mobility and chronic biological effects, necessary for development of strategic plans in the event of future accidents involving release of radionuclides into environmental settings
- Provide information on radionuclide distributions and characterizations necessary to assist other agencies in their efforts to

manage, remediate, or decommission contaminated structures and resources

Strategies

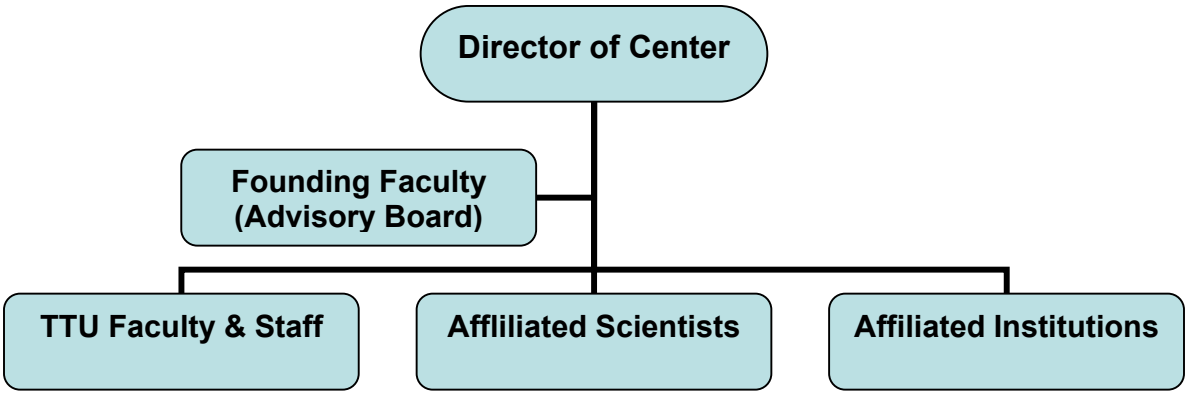
The Center for Environmental Radiation Studies will assemble teams of skilled people whose collective and individual works will synthesize and integrate radiological, genetic, biological, and dosimetry information relevant to urban and rural settings contaminated with radiation. Unique combinations of expertise and experiences in the Center will ensure that the programs are relevant and timely to public, political and scientific communities.

Assessments

The Center will be reviewed annually by the Vice President for Research and Graduate Studies or his/her designee.

STRUCTURE/ORGANIZATION

The director of the center will be a tenured faculty member at Texas Tech University. Together with the founding faculty members (RK Chesser, CJ Phillips, RJ Baker), the director will invite experts from Texas Tech University and other universities and institutions to become Affiliated Scientists in the Center. Some agencies may serve as Affiliated Institutions with or without Affiliated Scientists (e.g., U.S. Departments of Energy and State).



INTERDISCIPLINARY and/or MULTIDISCIPLINARY ACTIVITIES

In order to achieve the diverse goals and objectives set forth in the strategic plan for the center, it will be necessary to assemble a team comprising a wide array of interests and skills. Within TTU, the Center will draw upon faculty with a wide variety of expertise and will cross traditional academic departments and school/college boundaries. Understanding the nature of radionuclides in the environment and the biological and health risks of radiation doses will require the expertise of scientists, health professionals, administrators, and politicians. Building and refining dynamic models will require active participation by experts in computer science, mathematics, geosciences, and engineering. Scientists in the Center will work closely with the Center for Dispersive Processes on the Texas Tech University campus to model and visualize particulate fallout patterns. Physicians and technicians will be required to integrate scientific results with potential health risks. Clearly, success of the Center will hinge upon the active participation of members from different departments and colleges within Texas Tech University and the Texas Tech University Health Sciences Center.

PARTICIPANTS

A. Faculty participants (Founding members are listed. Additional faculty within Texas Tech University will be enlisted.)

Founding Faculty

- Dr. Ronald K. Chesser, Biological Sciences, Arts and Sciences
- Dr. Robert J. Baker, Biological Sciences, Arts and Sciences
- Dr. Carleton J. Phillips, Biological Sciences, Arts and Sciences

TTU Faculty and Affiliated Scientists

- Dr. Michael D. Allen, Office of Research, Graduate Studies, and Technology Transfer
- Dr. Brenda E. Rodgers, Life, Earth and Environmental Sciences, West Texas A&M University
- Dr. Alan Graham, Department of Chemical Engineering, School of Engineering
- Dr. Jeremy Leggoe, Department of Chemical Engineering, School of Engineering
- Dr. Dan Cooke, Computer Science Department, School of Engineering
- Dr. Glen Hill, Architecture, School of Architecture
- Dr. Laura Baker, University Medical Center, TTHSC
- Dr. Michail Bondarkov, International Radioecology Laboratory

Affiliated Institutions

The scientists affiliated with the center have developed close working relationships with personnel from different universities, in national agencies, and in international institutes and ministries. These institutions will be pivotal in helping the Center for Environmental Radiation Studies at Texas Tech University to achieve its scientific, service, and

educational goals. The anticipated Affiliated Institutions outside of Texas Tech University include:

- United States Department of Energy
- United States Department of State
- United States Department of Defense
- United States Department of Homeland Security
- International Atomic Energy Agency (Austria)
- International Chernobyl Center (Ukraine)
- International Radioecology Laboratory (Ukraine)
- Ministry of Emergency Situations and Protection of the Population from the Impacts of the Chernobyl Nuclear Accident (Ukraine)
- Ministry of Health (Ukraine)
- Louis Stokes Department of Veterans Affairs (Cleveland, Ohio)
- West Texas A&M University

b) POTENTIAL SOURCES OF FUNDING

- United States Department of Energy
- United States Department of Health and Human Services
- United States Department of Homeland Security
- National Institutes of Health
- International Atomic Energy Agency
- National Science Foundation

c) SIMILAR CENTERS AND INSTITUTES

Texas universities: None, the following have similar structure and function
Center for Dispersive Processes (TTU)
Center for Biotechnology and Genomics (TTU)
The Institute of Environmental and Human Health (TTU)
Center for Law, Policy and Biodefense (TTU)
Center for the Management of Information Systems (Texas A&M)

Other universities: (very little overlap)
Governmental Information Research Centers

d) RESOURCES REQUESTED FROM THE UNIVERSITY

We request that the Center for Environmental Radiation Studies be housed in the Experimental Sciences Building, scheduled for completion in 2004.

We request that overhead return from extramural grants generated by the Center for Environmental Radiation Studies be returned to the Center.

e) MILESTONES

Three-year milestones:

- We will measure the patterns of movement of plumes of radiation that moved through the abandoned city of Pripyat, Ukraine, near Chernobyl.
- We will assist federal agencies to improve strategic models predicting movements of radiation plumes in urban and rural environments in the event of an incident at a nuclear complex or deployment of a "dirty bomb."
- Understand the genetic responses associated with chronic and acute exposures to low-dose ionizing radiation
- Secure long-term funding for research programs associated with the Center.
- Increase the number of participating TTU faculty in the Center
- Have at least three PhD students conducting research associated with center projects
- Have at least one faculty member serving on a national/international advisory panel regarding strategic planning for nuclear emergencies

Five-year milestones:

- Development of accurate risk models for predicting human health and environmental risks from long and short term exposures at various dose rates
- Develop maps of radiation distributions and movements in abandoned cities and villages contaminated by Chernobyl
- Development of remediation models to minimize risk – Which plans would have been effective at Chernobyl?
- Measure the effectiveness of buildings and geographic features on shielding the dispersion of radiation
- Long-term biological, environmental and health effects of chronic radiation doses
- Long-term management plans for productive use of ecosystems contaminated by radiation
- Center is sustained by funding from three or more agencies
- Faculty representation in the center is increased to seven
- Have at least seven PhD/MS students conducting research associated with center projects
- Establish the Center databases and models as a recognized national resource for strategic defense and homeland security planning
- Develop environmental radiation training centers for modeling radiation fallout patterns, radiation assessment in rural and urban environments, and for molecular characterization of radiation effects
- Explore extending models to other radioactively contaminated regions, such as Chelyabinsk, Russia
- Develop virtual-reality models for quick response to radiation emergencies