environment
National Science Foundation
Washington, D.C. 20550

Recent Awards: January-March 1978

REORGANIZATION OF RANN AND ESTABLISHMENT OF ASRA

On January 5, 1978, Dr. Richard Atkinson, Director of the National Science Foundation (NSF) announced the establishment of a Directorate for Applied Science and Research Applications (ASRA) to strengthen the links between applied and problem-oriented research and the Foundation's basic research activities. The new directorate, which became effective February 6, 1978, replaces the Directorate for Research Applications (RA) which contained the Research Applied to National Needs (RANN) program and the Division of Advanced Environmental Research and Technology (AENV). Most of the functions of RA will be taken over by ASRA, and most of the functions of AENV will be taken over by ASRA's Division of Problem-Focused Research Applications (see below). Besides strengthening links between applied and basic research, ASRA was established to improve the ties between research applications activities and user groups in State and local governments, private industry, and other Federal mission agencies; to focus problem-oriented research applications on fewer national issues to increase the impact of the NSF programs; and to provide a funding source for high quality applied research.

The New Directorate will consist of six units: the Office of the Assistant Director (AD/ASRA), the Office of Problem Analysis (OPA), the Division of Integrated Basic Research (IBR), the Division of Applied Research (AR), the Division of Problem-Focused Research Applications (PFRA), and the Division of Intergovernmental Science and Public Technology (ISPT).

The Office of the Assistant Director will carry out the policy-making, management, review and coordination functions of ASRA.

The Office of Problem Analysis will work with internal NSF and external groups and organizations in assessing problems for strategic and problemmatic planning by the Assistant Director/ASRA.

The Division of Integrated Basic Research will provide a direct link between ASRA and the basic research directorates of NSF by jointly identifying basic research related to significant national problems.

The Division of Applied Research will be organized into two sections, an Applied Social and Behavioral Sciences Section and an Applied Physical, Mathematical and Biological Sciences Section. The objectives of this division will be to support applied research proposals which will benefit social, economic, and technical problems and policy issues. It also will identify and stimulate the growth of new technologies and processes based on discoveries in various fields of science.

The Division of Intergovernmental Science and Public Technology will be transferred from the Research Applications Directorate to the New ASRA with its functions and organizations unchanged.

The Division of Problem-Focused Research Applications (PFRA) will consist of four major program elements: Earthquake Hazards Mitigation; Chemical Threats to Man and the Environment; Alternative Biological Sources of Materials (formerly contained in RANN's Division of Advanced Energy and Resources Research and Technology (AERRT)); and Community Water Management. The objective of PFRA is to focus scientific and technological capabilities on selected societal problems where NSF can make a unique contribution to the science and technology base needed for their timely, practical solution. The common objectives of the programs within PFRA are to concentrate research and proof-of-concept experiments on selected problem areas in order to facilitate the incorporation of science as a working tool for problem resolution in the public and private sectors; to provide support for problem-focused research that bridges from basic research discoveries to application; and to enhance the capability and capacity of nontraditional research users to employ research results and methods.

PFRA PROGRAMS

Earthquake Hazards Mitigation

The objectives of the Earthquake Hazards Mitigation program are to develop methods and techniques that can provide effective protection for man, his works and institutions from life loss, personal injury, property damage, social dislocations, and economic

and ecological disruption associated with potential or realized earthquake hazards.

SITING: The Siting category of the Earthquake Hazards Mitigation program provides research support for the elucidation of the physical basis of earthquake energy generation and the transmission and propagation of the generated shock waves through various geologic and soil conditions; with the impact of earthquake ground motion on structures; and with development of criteria and guidelines for the mitigation of potential impacts on the built environment. The specific objectives of the Siting program are to:

- Develop a comprehensive data base on the nature of earthquake motion at typical construction sites and for representative structures;
- Establish the physical basis for characterizing the nature of earthquake motions and the dynamic forces generated by such motions and other natural hazards;
- Develop capabilities for prediction of the magnitude and frequencies of ground motion;
- Develop a methodology for qualitative and quantitative estimates of local or regional risk associated with earthquakes and other types of hazards and combined hazards;
- Develop a comprehensive and unified program to improve geotechnical engineering practices applicable to soil dynamics, foundation design, failure and instability, and other aspects of earthquake ground motion; and
- Identify procedures for integrating information on natural hazards into land use planning, urban and coastal zone planning, offshore engineering and siting procedures.

DESIGN: The specific objectives of the Design program are to:

- Improve the characterization of earthquake and natural hazard loadings necessary for the economical design of structures subject to dynamic loading;
- Develop new methods of analysis and design of buildings and structures of all types which will take into account nonlinear and inelastic behavior of materials;
- Develop methods to assess the hazard potential and risk assessments applicable to existing structures and facilities, and devise innovative methods for improving performance within economically acceptable bounds;
- Obtain information for engineering analysis and design by observing the damage of facilities following actual earthquakes, and incorporate this information into standard design practice;
- Develop improved computational capability for dynamic analysis of structures and facilities and improve user access to any computer software which is developed;
- Develop model standards and design criteria for design of structures and facilities subjected to earthquake and natural hazard loadings; and
- Conduct detailed studies of the behavior of smaller nonengineered structures and secondary components of buildings to improve recommended minimum analysis and design guidelines.

POLICY: The specific objectives of the Policy program are to:

- Expand the base of knowledge on alternative social adjustments to earthquakes;
- Identify the social, economic, political, legal, and related factors which facilitate or hinder the adoption of both social and technological solutions to earthquake hazards;
- Facilitate the beneficial use of earthquake hazards mitigation measures by devising effective techniques for disseminating information to the public and to decision-makers at the local, State, and national levels; and
- Investigate measures which will reduce possible negative social, economic, and political consequences of earthquake predictions and warnings.

Chemical Threats to Man and the Environment

The Chemical Threats to Man and the Environment program supports research to increase our scientific knowledge of man-made contaminents and naturally occurring toxicants on human health and the quality of the environment, and to make this knowledge available to appropriate users. The objectives of the Chemical Threats to Man and the Environment program are to:

- Define the exposure of ecosystems and human populations to chemicals and their conversion products by determining chemical pathways and transformations in the environment;
- Accelerate the application of recent discoveries in the basic sciences to the identification and measurement of environmental contaminents;
- Develop methods to enable us to predict the toxicological effects of chemicals on humans based on animal tests and other laboratory data; and
- Identify contaminent effects on living forms critical for the functioning of whole ecosystems.

Alternative Biological Sources of Materials

The Alternative Biological Sources of Materials program deals with selected aspects of the problem of meeting the Nation's future needs for raw materials. This program is directed toward alleviating national dependence on selected scarce resources by making alternative biological sources of materials available in the United States. Three particular topics have been selected for investigation: biological conversion of lignocellulosic materials to useful chemicals; biological nitrogen fixation; and production of rubber from the guayule plant.

Community Water Management

The Community Water Management program addresses the Nations capability and capacity to efficiently and effectively manage the use and reuse of water in the built environment, and to reduce risks to public health, safety, and the environment that arise from or are otherwise associated with the use and reuse of water. The objectives of the Community Water Management program are to:

- Identify threats to community water and assess their effects on public health, safety and welfare;
- Evaluate existing and new concepts for management of the community water cycle in terms of costs, impacts, effectiveness, and acceptability of risk;
- Synthesize approaches to management of the integrety of community water supplies with emphasis on conservation, reclamation, and reuse; and
- Improve the process by which knowledge relating to management of threats to community waters is translated into action and public policies.

INTRODUCTION

This brochure presents brief descriptions of awards given by PFRA during the period January 1, 1978 through March 31, 1978. The data collected and contained herein was derived from PFRA program records and at the time of printing had not been reconciled with the National Science Foundation's Management Information System reports.

Readers wishing information on PFRA, ASRA, NSF, or any of the individual projects listed in this brochure are encouraged to complete and return the post card on page 00. Information regarding proposal guidelines and proposal submission is available upon request.

DEFINITIONS AND EXPLANATION OF FORMAT

Strip Mining and Its Effect on Environmental Health;[1] Walter G. Lewis;[2] Lewis & Day, Inc., 6822 Westcott Drive, Richmond, Virginia 22325;[3] **Award #77-00017**[4]

1. **Title of the Specific Grant**
2. **Principal Investigator:** the chief scientist or administrator who is responsible for the research plan and fiscal expenditures as an NSF-sponsored awardee.
3. **Institution Conducting the Research:** any college, university, laboratory, industry, or other organization, whether operating on a profit or non-profit basis, as well as State governments and Federal organizations.
4. **Award Number.**

Alternative Biological Sources of Materials

Alleviate national dependence on selected scarce resources by making alternative biological sources of materials available in the United States. Three particular topics have been selected for investigation in Fiscal Year 1978: biological conversion of lignocellulosic materials to useful chemicals; biological nitrogen fixation; and production of rubber from the guayule plant.

1. Fusion, Regeneration and Development of Algal Protoplasts; Martha D. Berliner; Simmons College; 300, The Fenway, Boston, MA 02115; **Award #77-12720**

   Develop a methodology to regenerate protoplasts into whole plants, using algae as a model, to facilitate the translation of modern cellular genetics into a practical system of plant breeding.

2. Enhancing Plant Productivity with Nitrogen-Fixing Bacteria; Winston J. Brill; University of Wisconsin; Madison, WI 53706; **Award #78-12705**

   Enhance plant productivity by coating the seeds of legumes with specific protein (lectin) that binds nitrogen-fixing bacteria to the roots of the plants; construct superior strains of appropriate free-living and symbiotic bacteria for use with legumes and cereals.

3. Breeding Improvement of Rubber Yield in Guayule; George P. Hanson; California Arboretum Foundation; 301 North Baldwin Avenue, Arcadia, CA 91006; **Award #76-24472 A01**

   Develop improved varieties of guayule to be cultivated as a domestic source of natural rubber; conduct hybridization, selection, and horticultural studies on cross-bred test stock.

4. The Conversion of Agricultural By-Products to Sugars; Peter J. Reilly, Iowa State University; Ames, IA 50010; **Award #78-10174**

   Provide incremental funding to assess the feasibility of converting xylan, the predominent hemicellulose in grasses, cereal grains, and hardwoods, into xylose and other sugars.

5. Chemical Stimulation of Rubber Synthesis in Guayule; Henry Yokoyama and George P. Hanson; California Arboretum Foundation; 301 N. Baldwin Avenue; Arcadia, CA 91006; **Award #78-09567**

   Stimulate rubber synthesis in the young guayule plant with 2-(3-4 dichlorephenoxy)-triethylamine to determine whether chemical stimulation in combination with breeding improvement will bring the productivity of guayule to a level suitable for commercial exploration.

Chemical Threats to Man and Environment

Identify, understand, and reduce contamination and environmental hazard arising from the manufacture, use and disposal of man-made and naturally occurring chemical products.

1. Field Measurements of Biogenic Sulfur Emissions; David Chang; Environmental Research Technology, Inc.; 696 Virginia Rd.; Concord, MA 01742; **Award #77-20663**

   Test the hypothesis that biogenic emissions of volatile sulfur compounds from natural sources contribute significantly to the production of airborne sulfate particulates in regions impacted by anthropogenic sources of sulfur dioxide.

2. Twelfth Annual Conference on Trace Substances in Environmental Health; Delbert D. Hemphill; University of Missouri; Columbia, MO 65201; **Award #78-05696**

   Conduct the Twelfth Annual Conference on Trace Substances in Environmental Health at the University of Missouri to explore the biological, ecological and health significance of both organic and inorganic chemical substances present in "trace" amounts in the environment.

3. Quantitative Structure Activity Relationships in Toxic Substances; Anton J. Hopfinger; Case Western Reserve University; Cleveland, OH 44106; **Award #77-24061**

   Develop and test a methodology for applying quantitative structure activity relationships based on molecular mechanics to the prediction of the likehood of toxicity of chemical substances in product development, chemical regulation, and industrial hygene.

4. Chemical Structure, Reactivity, and Carcinogenicity of Halohydrocarbons; Benjamin Van Duuren; Institute of Environmental Medicine; New York University; New York, NY 10016; **Award #78-07176**

   Study delected halogenated hydrocarbons to determine the relationships between chemical structure, reactivity with a variety of reagents, stereochemistry, *in vivo* and *in vitro* metabolism, and carcinogenic activity; determine the nature of the activiated carcinogenic intermediates of those carcinogenic halohydrocarbons which need to be metabolically activated.

Community Water Management

Reduce risks to public health, safety, and the environment that arise from or are otherwise associated with the use and reuse of water.

1. The Thames/Potomac Seminars: A Comparative Study of River Basin Management; Anne Blackburn; Interstate Commission on the Potomac River Basin; 814 East West Towers, 4350 East West Highway; Bethesda, MD 20014; **Award #78-09532**

   Conduct an intensive comparative study of the approaches to management of water in the Thames and Potomac River basins to determine the technical, management, and institutional practices that would be useful and transferable to the U.S.

2. Synthesis of a Municipal Wastewater Sludge Management System; Charles Finance; Media Four Productions; 6519 Fountain Ave.; Hollywood, CA 90028; **Award #78-10274**

   Provide supplemental support for production of a film on residual sludge processing and management concepts based upon disinfection with high energy electrons and injection into topsoil.

3. Efficacy and Impact of Intensive Plant Harvesting for Lake Management; Orie L. Loucks; University of Wisconsin; Madison, WI 53706; **Award #77-10188**

   Evaluate the efficacy of intensive harvesting of aquatic vegetation in the management of nutrients flowing into a lake ecosystem from diffuse, non-point sources (a workshop to discuss findings is planned for September, 1978).

4. Water Quality and Health Significance of Bacterial Indicators of Pollution; Wesley O. Pipes; Drexel University; Philadelphia, PA 19104; **Award #77-12114**

   Conduct a workshop that will critically review current knowledge regarding the water quality and environmental risk significance of bacterial indicators of pollution, identify research needed, and prioritize this research to improve the basis for quantitative evaluation of risk to public health indicated by these parameters.

5. Great Plains Drought Strategies - A Workshop; Norman J. Rosenberg; University of Nebraska-Lincoln; Lincoln, NE 68583; **Award #77-21289**

   Conduct a workshop to prepare a multidisciplinary research plan for the production of alternative water management strategies for the agricultural and industrial sectors in the Great Plains Region, taking into account the high probability of drought occurrence; identify users of this plan.

6. Utilization of Volunteer Wetlands for Management of Pond-Stabilized and Domestic Wastewater; Jeffrey C. Sutherland; William & Works, Inc.; 611 Cascade West Parkway, S.E.; Grand Rapids, MI 49506; **Award #77-20273**

   Assess the feasibility of utilizing freshwater wetlands in combination with pond-stabilization for treatment of community wastewater; determine the wetland's water and nutrient budgets, effects of effluent application on natural wetland vegetation, cost of operation and maintenance and the consumption of energy in comparison with alternative, equivalent, systems.

7. Onshore Impact of Offshore Oil and Gas: Methodology Development and Test; Dr. Ben Tencer; Roy F. Weston, Inc.; Weston Way; West Chester, PA 19380; **Award #78-15050**

   Develop methods for assessment of economic, demographic, fiscal, and environmental impacts of onshore activities resulting from U.S. Outer

Continental Shelf (OCS) oil and gas developments; apply these improved methods to estimation of the potential onshore impacts of Baltimore Canyon oil and gas development; and document the results in a form useful to the public sector.

8. Mobility and Survival Characteristics for Viruses in Cypress Dome Wetlands; Flora Mae Wellings; State of Florida, Dept. of Health and Rehabilitative Services, Epidemiology Research Center; 4000 West Buffalo Avenue; Tampa, FL 33614; **Award #77-26849**

   Evaluate the virological safety of cypress domes used in management of effluents from municipal wastewater treatment plants.

Earthquake Hazards Mitigation

Reduce the casualties, damage, and social and economic disruption from earthquakes by developing our technological capabilities through research and developing an increased understanding of the adjustments that units of society can make to earthquake hazards.

1. Earthquake Response and Aseismic Design of Underground Piping Systems; Teoman Ariman; University of Notre Dame; Notre Dame, IN 46556; **Award #77-23236**

   Investigate the earthquake response and earthquake-resistant design of underground piping systems utilized in energy transport, particularly buried gas pipelines; study the failure of pipes by fracture and other failure mechanisms, and develop design guides for piping systems subject to seismic hazard.

2. Underground Lifelines in a Seismic Environment; M. L. Baron; Weidlinger Associates; 110 East 59th Street; New York, NY 10022; **Award #76-09838 A02**

   Study the behavior of underground lifeline structures such as pipelines, conduits, channels, etc., in seismic environments, and apply the technical knowledge gained in conjunction with cost-benefit and optimization studies to the planning, design and construction of such structures.

3. Conference on Stability Problems of Mixed Steel-Concrete Structures, Boston, Massachusetts, May 1978; Lynn S. Beedle; Lehigh University; Bethlehem, PA 18015; **Award #78-08818**

   Bring together information on the static and dynamic stability problems and performance characteristics of mixed steel-concrete composite construction and publish this information for distribution.

4. Seismic Investigation and Design Criteria for Industrial Storage Racks; John A. Blume; URS/John A. Blume & Associates; 130 Jessie Street; San Francisco, CA 94105; **Award #77-06505**

   Analyze and test stacker-type industrial racks including standard pallet racks and their subassemblies, drive-in and cantilever racks to determine their behavior under seismic forces.

5. Seismological Analysis of Strong Motion Records; Brue Bolt; University of California, Berkeley; Berkeley, CA 94720; **Award #78-02650**

   Examine the consequences of using effective peak acceleration as a scaling parameter for response spectra rather than the dislocation pulse; conduct wave analysis of strong motion records; and search for common physical features in terms of source mechanisms, fault rupture, and so forth.

6. Numerical and Experimental Study of Earthquake Strong Motion; James N. Brune; University of California, San Diego; La Jolla, CA 92037; **Award #77-23829**

   Investigate earthquake ground motion characterization in terms of fault proximity, fault type, models and laboratory experiments; calibrate the computer methods for modeling earthquakes, simulate ground motion under a variety of conditions, and produce rules for characterizing ground motion which are suited to the needs of design engineers.

7. Seismic Response of Three-Dimensional Dam-Reservoir Systems; Allen T. Chwang; California Institute of Technology; Pasadena, CA 91125; **Award #77-16085**

   Evaluate the seismic response of a dynamically coupled, three-dimensional dam reservoir system including hydrodynamic interaction effect, flexibility effect, effect of phase variation and spatial attenuation of seismic waves, and the effect of the side confinement of the dam.

8. Earthquake Engineering Research Facility Support; Ray W. Clough; University of California, Berkeley; Berkeley, CA 94720; **Award #77-21787**

   Provide continuing support for the essential maintenance and operation of inelastic seismic performance experimental facilities required at the University of California, Berkeley, including the Earthquake Simulator Laboratory, dynamic controlled test systems, high speed digital data aquisition systems, and field vibration test systems.

9. Formulation and Expression of Seismic Design Provisions; Steven J. Fenves; Carnegie-Mellon University; Pittsburgh, PA 15213; **Award #78-11300**

   Facilitate the development, use and implementation of the seismic design provisions that are currently being developed by the National Bureau of Standards and the Applied Technology Council.

10. Progressive Collapse of Transmission Line Structures Due to Dynamic Loads; John F. Fleming;

University of Pittsburgh; Pittsburgh, PA 15213; **Award #77-23519**

Investigate the effect of partial failures induced by earthquake or other dynamic loads in transmission line structures, with particular emphasis on predicting progressive collapse conditions, and develop design criteria which would prevent progressive collapse.

11. Scale Modeling and Testing of Structures for Reproducting Response to Earthquake Excitation; James M. Gere; Stanford University; Stanford, CA 94305

Investigate the direct replica modeling of elastic and inelastic behavior of civil engineering structures to achieve a routine capability for reproducing, on existing small-scale test facilities, the dynamic response of large structures subjected to prescribed earthquake motions. **Award #77-14444**

12. Behavior of Buildings to Wind and Seismic Forces; Gary C. Hart; University of California - Los Angeles; Los Angeles, CA 90024; **Award #77-24062**

Study the behavior and response of full scale buildings in Century City/Los Angeles when subjected to strong winds and seismic forces; compare such responses with the soil structure interaction due to these forces.

13. Sesimic Response of Structures and Strong-Motion Instrumentation; George W. Housner; California Institute of Technology; Pasadena, CA 91125;**Award #77-23687**

This project includes the analysis of earthquake records, operation and upgrading of instruments and portable instrument networks, analysis of buildings in the nonlinear range, and behavior of materials and structures.

14. Behavior of Reinforced Concrete Frame Elements Under Biaxial Lateral Loadings; James O. Jirsa; University of Texas at Austin; Austin, TX 78712; **Award #77-20816**

Evaluate the importance of the path of lateral deformation on sequence of application of bi-directional lateral loads on the shear strength and response of columns and beam-column joints; evaluate the influence of axial load variations on the behavior of columns and beam-column joints; develop design recommendations for such members; and develop behavioral models to be used in analysis of structures to predict behavior for members subjected to large shear forces.

15. Seismic Safety Design for Police and Fire Stations; Earle W. Kennett; American Institute of Architects Research Corporation (AIA/RC); 1735 New York Avenue, N.W.; Washington, D. C. 20006; **Award #77-28413**

Explore, define, and record seismic design considerations to be used by the architectural and public safety professions in the design, construction, and operation of police and fire stations, including recommendations for specific prototypical architectural design alternatives.

16. Statistical Investigation of Engineering Seismology; Leon Knopoff; University of California-Los Angeles; Institutue of Geophysical and Planetary Physics; Los Angeles, CA 90024; **Award #77-24742**

Introduce physics into the stochastic models of earthquake occurrence, source, and faults, and develop basic scientific procedures for the seismic risk estimation of a given region.

17. Community Response to Natural Hazard Warnings; Robert K. Leik; University of Minnesota; Minneapolis, MN 55455; **Award #78-10634**

Provide policy level officials with information on communities response to floods, hurricanes, tornadoes and earthquakes; clarify how warning responses are related to content and timing of messages, interorganizational relations, predisaster planning, and individual decisions.

18. Extension and Utilization of Community Flood Model; Louis W. Miller; University of Pennsylvania; Philadelphia, PA 19104; **Award #77-26363**

Determine how the physical and economic characteristics of communities influence the decision-making process for hazard mitigation and recovery; determine the financial impact of natural disasters on individual households; assess the role of financial institutions in disaster mitigation; and study the impact of a natural disaster on regional economies.

19. Unified Approach to the Design of Window Glass Subjected to Dynamic Loads; Joseph E. Minor; Texas Tech University; Lubbock, TX 79409; **Award #77-24063**

Review the process in which glass panels are selected for use in engineered structures to provide the practitioner with safe, economical designs for glass windows which utilize current knowledge of wind engineering, glass material propoerties, and structural response of thin rectangular panels.

20. Social and Psychological Factors in Evacuation in Natural Hazards; Ronald W. Perry; Batelle Human Affairs Research Center; 4000 N.E. 41st Street; P.O. Box 5359; Seattle,WA 98105; **Award #77-23697**

Produce a theoretically and empirically grounded model of the factors affecting evacuation which will help isolate key issues in the design and implementation of evacuation plans.

21. An Evaluation of the Earthquake Rehabilitation Building Ordinance in the City of Long Beach, California; William J. Petak; J. H. Wiggins Com-

pany; 1650 South Pacific Coast Highway; Redondo Beach, CA 90277; **Award #77-22621**

Review, assess and evaluate the Earthquake Hazard Regulations for Rehabilitation of existing structures adopted by the City of Long Beach in 1971; determine the effectiveness of the ordinance, the effectiveness of the City Government in implementing the Ordinance, the costs and consequences of implementation, and the transferability of this approach to other natural hazard areas.

22. Fire Resistance of Epoxy Repaired Concrete Structures; Joseph M. Plecnik; California State University - Long Beach; Long Beach, CA 90840; **Award #77-22946**

Investigate the behavior of epoxy repaired concrete structural walls during fire exposure; determine the nature and extent of residual strength of epoxy repaired structural components after fire exposure; and prepare a Computerized Catalog of repaired structures to study their behavior during future fires and/or earthquakes.

23. Dynamic Soil Structure Interaction; Jose M. Roesset; Massachusetts Institute of Technology; Cambridge, MA 02139; **Award #77-14174**

Determine the dynamic stiffness of rectangular foundations, study the dynamic behavior of pile foundations; investigate plasticity of nonlinear soil models; and study the effects of uncertainties on soil-structure interaction.

24. Feasibility of Force-Pulse Generators for Earthquake Simulators; F. B. Safford; Agbabian Associates; 250 N. Nash Street; El Segundo, CA 90245; **Award #77-15010**

Design, construct and evaluate prototype pulse systems to simulate earthquake wave forms in full scale structures.

25. Improving Earthquake Resistance of Elevators; Anshel J. Schiff; Purdue University; Lafayette, IN 47907; **Award #77-21268**

Investigate three specific problem areas for improvement of the earthquake provisions of the national elevator code: counterweight and guide rail design, the determination of seismic on elevator systems, and the analysis of cable dynamics.

26. Earthquake Engineering of Large Underground Structures; Roger Scholl; John A. Blume and Associates; 130 Jessie Street; San Francisco, CA 94105; **Award #77-06505**

Evaluate the current state-of-the-art in underground earthquake engineering practice, determine areas in which additional research is needed, and produce a report summarizing worldwide experience concerning underground earthquake engineering design and construction practices (Persons wishing to obtain the report of this project should contract the P.I. for guidance).

27. Induced Seismicity at Nurek Reservoir, Tadjikistan, USSR; David W. Simpson; Columbia University; Palisades, NY 10027; **Award #77-01092 A01**

Study the induced seismicity near the Nurek reservoir; investigate spatial and temporal variations in seismicity and their relationship to water level; perform studies on the frequency characteristics of earthquakes and various geological and geophysical effects of the induced seismic motion; study the earthquake spectra using digital recorders.

28. Strong Motion Accelerograph Network in the Los Angeles Basin; Ta-Liang Teng; University of Southern California; Los Angeles, CA 90007; **Award #77-16983**

Install 100 accelerographs in a well-planned grid-shaped array in the Los Angeles Basin to record future earthquake data; use the data to study the distribution of strong shaking, the attenuation patterns, the shear velocity structure, and the effect of geological structure and local conditions.

29. "A Methodology for Optimal Strong-Motion Instrument Locations in Building Structures"; F. E. Udwadia; University of Southern California; Los Angeles, CA 90007; **Award #77-07903**

Develop a scientific methodology for the location of strong-motion instruments in buildings for maximum possible information about the structure's dynamic characteristics; study both the number and position of instruments in relation to the amount of information obtained.

30. Prediction of Earthquake Resistance of Structures; P.C. Wang; Polytechnic Institute of New York; 333 Jay Street; Brooklyn, NY 11201; **Award #78-09990**

Continue development of a minimum method to generate design earthquakes, including development of critical response spectra; establish procedures for choice of design variables, and design computer programs in forms that can be directly used by practicing engineers.

31. Earthquake Design Criteria for Water Supply and Wastewater Systems; Leon Weinberger; Environmental Quality Systems, Inc.; 1160 Rockville Pike; Rockville, MD 20852; **Award #77-22617**

Develop criteria for the design of water supply and wastewater pollution control systems to reduce damage during earthquake events and promote rapid post-quake recovery.

32. Natural Hazards Research and Applications Information Center; Gilbert F. White; University of Colorado; Boulder, CO 80309; **Award #77-05164**

Accelerate natural hazards research and the application of findings through an information center service which disseminates information on research findings, programs, and conferences; and conduct annual and special natural hazards workshops.

33. Analysis of Cape Ann Earthquake from Building Damage; Robert V. Whitman; Massachusetts Institute of Technology; Cambridge, MA 02139; **Award #77-15331**

    Determine the strength of ground shaking caused by the earthquake of 1755 at Cape Ann, Massachusetts.

34. Summer Institute on Design for Protection Against Natural and Manmade Hazards; Bernard Wobbeking; American Society for Engineering Education; 1 Dupont Circle; Washington, D.C. 20036; **Award #77-01090 A02**

    Conduct a Summer Institute to train selected participants in methods of structural design to mitigate losses as a result of natural hazards such as earthquakes, tsunamis, fire, landslides, extreme winds, and others. Participants will be requested to teach similar courses in their universities and local areas. The courses for engineers and architects are on a local basis to reach the practicing professionals who can apply the results of the course immediately.

HOW TO OBTAIN PFRA RESEARCH FINDINGS AND RESULTS

One of the most important objectives of PFRA is the timely and widespread dissemination of the results of PFRA- supported research to potential users. The name and mailing address of the Principal Investigator and Grantee Institution is contained in each project description in this brochure. Persons wishing to obtain information on project findings including project reports, monographs, journal articles, technical reports, and other such relevant materials should write to the Principal Investigator at the Grantee Institution to determine what information is available and at what, if any, cost it may be obtained. The Grantee Institution may charge a nominal amount for the duplication and mailing of such materials to cover costs. The Principal Investigator may furnish information on how interested persons may acquire reports and other materials as appropriate from the National Technical Information Service (NTIS) of the Department of Commerce in lieu of furnishing the report or other material directly. NTIS is the central point in the United States for the public sale of Government-funded research and development reports and other analyses prepared by Federal agencies, their contractors, and grantees. The Principal Investigator may also cite journals or other publications where project information may be looked up instead of furnishing a copy of the article.

REPORT DOCUMENTATION PAGE	1. REPORT NO. NSF/RA-780188	2.	PB 287477

4. Title and Subtitle
Environment, Recent Awards, January-March 1978

5. Report Date
January-March 1978

6.

7. Author(s)

8. Performing Organization Rept. No.
NSF 78-25

9. Performing Organization Name and Address

National Science Foundation
1800 G Street, N.W.
Washington, D.C. 20550

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C)
(G)

12. Sponsoring Organization Name and Address
Applied Science and Research applications (ASRA)
National Science Foundation
1800 G Street, N.W.
Washington, DC 20550

13. Type of Report & Period Covered

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

This brochure presents brief descriptions of awards given by Problem-Focused Research Applications (PFRA) during the period January 1, 1978 through March 31, 1978. The data collected are derived from PFRA program records. Four major categories are covered: (1) Alternative Biological Sources of Materials - focuses on alleviating national dependence on selected scarce resources by making alternative biological sources of materials available in the United States; (2) Chemical Threats to Man and Environment - focuses on identifying, understanding and reducing contamination and environmental hazard arising from the manufacture, use and disposal of man-made and naturally occurring chemical products; (3) Community Water Management - focuses on reducing risks to public health, safety, and the environment that arise from or are otherwise associated with the use and reuse of water; and (4) Earthquake Hazards Mitigation - focuses on reducing the casualties, damage, and social and economic disruption from earthquakes by developing our technological capabilities through research and developing an increased understanding of the adjustments that units of society can make to earthquake hazards.

17. Document Analysis a. Descriptors

Research
Earthquakes
Contaminants
Pollution
Resources
Water pollution
Hazards
Environmental impacts
Awards

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
NTIS		10
	20. Security Class (This Page)	22. Price