

**PUERTO RICO  
WATER RESOURCES AND ENVIRONMENTAL  
RESEARCH INSTITUTE  
REQUEST FOR PROPOSAL  
FY 2023**

**U.S. Geological Survey  
STATE WATER RESOURCES RESEARCH INSTITUTE  
PROGRAM**

**under Section 104B of the  
Water Resources Research Act of 1984, as Amended**



**APPLICATION PACKAGE  
CLOSING DATE: APRIL 15, 2023, 11:59 PM**

## INTRODUCTION

This ***Request for Proposals*** (RFP) is issued under the provisions of section 104 of the Water Resources Research Act of 1984 (Public Law 98-242), as amended by Public Laws 101-397, 104-147, 106-374, and 109-471. Section 104 of the Water Resources Research Act directs the Secretary of the Interior to administer program grants to Institutes and Centers, established under the provisions of section 104(a) of the Act, for research, education, and training that will assist the Nation in augmenting its water-resources science and technology. Responsibility for administration of this program has been delegated to the U.S. Geological Survey (USGS).

Research proposals submitted under this RFP are intended to address water resources problems of state and regional significance. The research priority areas for Puerto Rico are listed below. Proposals will not be considered in the following cases:

1. Proposals submitted by an applicant that has not met reporting requirements on a previous award by the US Geological Survey (USGS) or PR Water Resources and Environmental Research Institute (PRWRERI).
2. Applications for research on health effects involving human subjects.
3. Applications for research involving oceanography (estuarine research applications are acceptable).

This document provides guidance to the academic community for the preparation of proposals for the Institute's annual research program with the US Geological Survey. The procedure this year will be: (1) to request proposals, (2) to solicit evaluations by the Institute's External Advisory Committee (EAC) for relevance to the stated research priorities and technical contents, (3) to request a numerical rating of the proposals meeting the requirements of priority needs, and (4) selection of best proposals (number of proposals will depend on fund availability).

## I. PROGRAM OBJECTIVES

Section 104(b) of the Water Resources Research Act of 1984 requires the Institutes or Centers to:

- (1) “plan, conduct, or otherwise arrange for competent applied and peer reviewed research that fosters – (A) improvements in water supply reliability; (B) the exploration of new ideas that address water problems or expand understanding of water and water-related phenomena; (C) the entry of new research scientists, engineers, and technicians into water resources fields; and (D) the dissemination of research results to water managers and the public.”
- (2) “cooperate closely with other colleges and universities in the State that have demonstrated capabilities for research, information dissemination, and graduate training in order to develop a statewide program designed to resolve State and regional water and related land problems.”
- (3) The Act also requires each institute to “cooperate closely with other institutes and other organizations in the region to increase the effectiveness of the institutes and for the purpose of promoting regional coordination.”

Applications submitted under this Announcement are to be in furtherance of these objectives and promote the national mission and objectives of the U.S. Geological Survey, which are focused on providing water quality and quantity information, understanding water availability, addressing the influence of climate on water resources, and responding to water-related emerging needs. Specific areas of emphasis are at the discretion of the individual Institute or Center Directors.

## II. PUERTO RICO WATER RESOURCES RESEARCH PRIORITIES

Research and technology transfer will be concentrated on the following areas:

1. **Research on Natural Disasters:** Effects of hurricanes, extreme rainfalls, earthquakes, or other natural hazards on natural resources, watershed hydrology, river morphology, the water and wastewater treatment, water distribution infrastructure, landslides, and floods.
2. **Drinking Water Quality Research:** Fluoride as a health agent, control of Trihalomethanes and other disinfections byproducts, TMDL procedures and development, epidemiological studies of water borne illness, effectiveness of water treatment processes.
3. **Climatologic Effects on Water Resources:** Climate changes and their effects on water resources, local and regional effects (the Antilles), modeling.
4. **Definition, Effects and Prediction of Droughts:** Optimization of water reservoirs and dams' operation during extreme dry periods, modeling of droughts, public perception, economic effects, prevention and preparedness.
5. **Surface Water, Erosion and Sediment Transport Studies:** Morphological studies on gravel and sand extraction and canalizations, Characterization of urban runoff, river restoration. Causes, characterization, control, and management of sedimentation in dams and water reservoirs. Innovative design of water intakes with sedimentation problems, control of sediment transport in construction projects, riverbanks and channel erosion, and local scour in bridges
6. **Water supply and Distribution Systems:** Implications of the new regulations for disinfections on well in Puerto Rico, impact of withdrawals on nearby water bodies, head water protection, operation and management by communities. Water losses in hydraulic networks, hydraulic modeling of water quality and quantity in distribution systems, pressure distribution, and water demand determination.
7. **Design of water treatment processes for private systems in small communities:** Design and construction of simple, economic and easy to operate systems, disposition of treated water and its effects on effluents.
8. **Groundwater Research:** Availability of water, development of strategies for the north coast unconfined and artesian aquifers, optimization of water withdrawal from aquifers, quantitative management plan for aquifers, saltwater intrusion, safe yield, pollutant transport and flow modeling, development of new methodologies for groundwater treatment with high contents of iron and manganese.
9. **Recycling and Reuse of Used Water:** The use of wastewater for irrigation and artificial recharge, recycling of used water for human consumption, characterization of wash flows from water treatment plant filters, and vulnerability of water bodies to assimilate used waters.
10. **Storm and Wastewater Infrastructure for Tropical Areas:** Design criteria for storm water and wastewater drainage systems, energy losses, manhole hydraulics.
11. **Watershed and Water Sources Management:** Includes conservation strategies, source protection, optimization of water sources, deforestation and reforestation, and riverine zones among others.
12. **Aquatic Ecosystems:** Flow conditions (quantity, quality, etc.) for aquatic ecosystems support, use of aquatic communities as river quality indicators, ecosystem values and health, and others.
13. **Development of Education Programs:** Water conservation, water resources and environment protection.
14. **Programs and Strategies for Reforestation and Their Effects on Low Flows:** Changes in land management and their effects on low flows.
15. **Estuaries and Associated Wetlands:** Modeling of estuaries and associated wetlands, strip and mixing zones, hydrology and hydraulics, water quality.
16. **Use of sinkholes in the north coast as drainage systems:** Disposal of street and highway runoff and water from other anthropogenic sources, hydraulics, intake capacity, protection structures.
17. **Economic solutions to water problems:** implications on water quality, water scarcity, cost of water, human adaptation and the environment.

### III. APPLICANT ELIGIBILITY

Awards are available only to faculty members or affiliates at institutions of higher education in Puerto Rico pursuant to the provisions of Section 104 of the Water Resources Research Act of 1984, as amended.

### IV. CONFLICT OF INTEREST

An applicant may not permit any federal employee to use his or her position for a purpose that is or gives the appearance of being in conflict of interest, either by giving the applicant an unfair advantage or by a desire for private financial gain.

### V. APPLICATION DUE DATE

The applicant shall submit its application to the PR Water Resources and Environmental Research Institute no later than **April 15, 2023, 11:59 pm**.

### VI. PROPOSAL DELIVERY INSTRUCTIONS

**Proposals must be delivered by e-mail at [prwreri@uprm.edu](mailto:prwreri@uprm.edu). Each application shall be prepared and submitted in accordance with the specific instructions provided in this RFP. Proposal must be submitted in MS Word Format using 12-point font and single spaced. Specific format and content instructions can be found in section XII. APPLICATION INSTRUCTION.**

Please note that the due date for proposals submission is **April 15, 2023, 11:59 pm**. (Atlantic Standard time). You may write the Institute for clarification of these instructions at [prwreri@uprm.edu](mailto:prwreri@uprm.edu) or call 787-832-4040 ext. 5901.

### VII. FUNDS

**As of the date of this Announcement, federal funds have not yet been allocated for this program for FY 2022. The Government's obligation under this program is contingent upon the availability of appropriated funds. The Puerto Rico Water Resources and Environmental Research Institute reserves the right to adjust in any way necessary these requirements to meet those of the U.S. Department of Interior and/or of the U.S. Geological Survey. Use the following numbers for this year's proposal:**

- A. The maximum amount to be awarded in FY 2023 is **\$22,000** annually per project.
- B. Proposals should be for research and information transfer projects 12 to 36 months in duration and shall not request federal funding exceeding \$66,000 (\$22,000 per year).
- C. **Multiyear projects will be funded a year at a time.** Funding in subsequent years will be contingent upon availability of funds and satisfactory performance. **No guarantee is made upon fund availability and continuation of a project. A new proposal must be submitted for each subsequent year.**
- D. Projects begun with prior year funds may be continued provided that each year is based on a revised proposal that incorporates a report of progress to the date of revision. A concise statement including data and analysis of research progress in the previously funded period, which demonstrate acceptable progress on the research project (not to exceed 10 pages single spaced), should be submitted within 30 days preceding the close of each 12-month budget period.
- E. Matching Funds – **No matching funds are required.** If you have questions, please contact the PRWRERI at 787 832-4040 Ext. 5901 or [prwreri@upr.edu](mailto:prwreri@upr.edu).

- F. The applicant's negotiated indirect cost rate (NICR) will be applied to federal costs. The NICR shall not be applied to tuition and equipment costs.
- G. The portion of benefits paid to individuals cannot exceed the proportion of their salaries paid from the grant.
- H. Federal funds shall not be used to pay indirect costs. The Geological Survey will accept indirect cost rates approved by the cognizant agency in accordance with 2 CFR 200: Uniform Guidance – Uniform Administrative Requirements, Cost Principles, and Audit Requirements.
- I. A copy of the approved rate agreement or other approving documentation must be attached to proposals from universities or colleges other than the University of Puerto Rico.

## VIII. PROJECT DURATION

Projects may be from one to three-year duration. Those with duration greater than one year will be approved for continuation of funding contingent upon: (1) the continued availability of funds to the Institute and (2) a revised proposal that demonstrates satisfactory progress for the previous year toward meeting the project's stated objectives. It is very important, therefore, that each year of multiyear projects stands by itself.

All projects will have a start date of **September 1, 2023**. Projects may be designed to run beyond September 2024 (multiyear projects), if they contain a reportable element with conclusive findings to be included in the FY 2023 program report. Funding in subsequent years will be contingent upon availability of funds and satisfactory performance.

The period of performance for the projects will be **September 1, 2023, through October 31, 2024**. A short (2-4 pages) semi-annual reports is required, and PIs will submit draft copies of completion reports to PRWRERI no later than **December 1, 2024**, for Institute review.

## IX. PROPOSAL REVIEW AND SELECTION PROCESS

1. Proposals will be received and sent for evaluation to the Institute's External Advisory Committee. Results of this evaluation will be forwarded to the director of the Institute. A copy of the evaluation standard form is enclosed (Exhibit 1). The External Advisory Committee uses this form in its evaluation and ranking process.
2. Advised by these evaluations, the director will select the top proposals.
3. The following criteria will be used:

Technical merit (quality)	40%
Applicability (importance)	30%
Novelty (new approaches)	10%
Competence of PIs	10%
Educational and training opportunities	10%

4. Tentative timeline will be as follows:

March 22, 2023	The Institute issues the Request for Proposals.
April 15, 2023	Proposals due at the Institute Office (email submitted).
April 17, 2023	Proposals evaluated by the Advisory Committee.
April 26, 2023	Local selection process completed.

May 2, 2023	PRWERRI send Institute's proposal to USGS.
September 1, 2023	Projects begin (contingent to USGS approval).
February 28, 2024	Semi-annual report due in the Institute office.
October 31, 2024	Projects end.
December 1, 2024	Draft project completion reports due for Institute review.
December 8, 2024	Final version of completion report due in the Institute office.
December 31, 2024	Annual program report submission to the USGS.

## **X. APPLICATION REQUIREMENTS**

- A. The length of the project period shall not exceed 3 years, with discrete 12-month budget periods.
- B. The Institute will consider research proposals only from faculty members or affiliates at institution of higher education in Puerto Rico.
- C. The Institute shall not accept proposals from any applicant who has not met reporting requirements for projects funded by a prior formula grant administered by the Department of the Interior.
- D. INDICATE WHETHER THE APPLICATION IS FOR A NEW OR CONTINUING PROJECT.

## XI. APPLICATION CONTENTS

Each application shall consist of the

1) Project Proposal, including a Budget Breakdown (Exhibit 5) and Budget Justification (Exhibit 6).

Exhibit 5 (Budget Breakdown) and Exhibit 6 (Budget Justification) should be considered worksheets.

2) A **supplementary document of no more than four pages labeled "Data Management Plan" (DMP)**. This supplementary document should describe how the proposal will conform to USGS policy on the dissemination and sharing of research results and associated data. A valid DMP may include only the statement that no detailed plan is needed (e.g., "No data are expected to be produced from this project"), if the statement is accompanied by a clear justification. This supplementary document may include:

- the types of data, samples, physical collections, software, curriculum materials, and other materials to be produced during the project.
- the standards to be used for data and metadata format and content (where existing standards are absent or deemed inadequate, this should be documented along with any proposed solutions or remedies);
- policies for access and sharing including provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements.
- provisions for re-use, re-distribution, and the production of derivatives; and
- plans for archiving data, samples, and other research products, and for preservation of free public access to them.

Additional guidance on data management plans is available from the USGS Data Management web site here:

<https://www.usgs.gov/products/data-and-tools/data-management/data-management-plans>

## XII. APPLICATION INSTRUCTION

The contents of the application shall be prepared in accordance with the following instructions.

A. **Research Proposals.** (Includes research, education, information transfer, and information management system proposals.

Each proposal shall consist of the following 20 elements (see example at Exhibit 2).

1. Title. Concise but descriptive.
2. Project Type. Choose from the following: Research, Information Transfer, Information Management System, Education, or Other (please specify).
3. Focus Categories. Choose a maximum of three focus categories from the list provided (see Exhibit 3), with the most preferred focus category first.
4. Research Category. Choose from the following the one category that most closely applies: Social Sciences, Ground-water Flow and Transport, Water Quality, Biological Sciences, Engineering, or Climate and Hydrologic Processes.
5. Keywords. Enter keywords of your choice descriptive of the work (see Exhibit 4).
6. Start Date. Enter the actual beginning date for the project.
7. End Date. Enter the estimated end date for the project.
8. Principal investigator(s). Provide full name, academic rank, university, email address and phone number of the principal investigators.
9. Congressional District of the university where the work is to be conducted (see Exhibit 2).

10. Abstract. Provide a brief (one-page) description of the problem, methods, and objectives.
11. Budget Breakdown, as requested by Exhibit 5.
12. Budget Justification, as requested by Exhibit 6. Please, provide enough details as to demonstrate who your numbers were arrived at (see **Budget Explanation** section below).

Item 13 must start a new page. Items 13 through 20 shall not exceed 10 single-spaced pages - 12-point font, exclusive of curriculum vitae (CVs) (item 20). Before submission of your application, please, verify compliance with the 10-page limit.

13. Title. Please use the same title as was entered in item 1, above.
  14. Statement of regional or State water problem. Include an explanation of the need for the project, who wants it, and why.
  15. Statement of results or benefits. Specify the type of information that is to be gained and how it will be used.
  16. Nature, scope, and objectives of the project. Include a timeline of activities.
  17. Methods, procedures, and facilities. Provide enough information to permit evaluation of the technical adequacy of the approach to satisfy the objectives.
  18. Related research (for research projects only). Show by literature and communication citations the similarities and dissimilarities of the proposed project to completed or on-going work on the same topic.
  19. Training potential. Estimate the number of graduate and undergraduate students, by degree level, who are expected to receive training in the project (see Exhibit 7).
  20. Investigator's qualifications. Include a curriculum vitae (CVs) of the principal investigator(s). **No CVs shall exceed two pages or list more than 15 pertinent publications.**
- B. **Budget Breakdown**. Submit a detailed budget as presented in the form of Exhibit 5. The budget shall include the line items presented below. Indicate the amount of cost sharing for each element: If the applicant is proposing a project of more than one-year duration, include lump sum costs for other years at the bottom of form.
- C. **Budget Explanation**: Submit a detailed description of each budget item. **Include calculations** on how your figures were arrived at and any information necessary to understand your budget (see Exhibit 6). Nonfederal portion of the budget must be detailed for each category.
1. Salaries and wages for PIs. Identify the individuals, title/position and categories of salaries and wages, estimated hours or percentage of time, and the rate of compensation proposed for everyone. If the rate of pay shown is higher than the current institution's rate of pay, include an explanation and justification.
  2. Salaries and Wages for Graduate Students. Provide personnel, title/position, estimated hours and the rate of compensation proposed for everyone. (Other forms of compensation paid as or in lieu of wages to students performing necessary work are allowable provided that the other payments are reasonable compensation for the work performed and are conditioned explicitly upon the performance of necessary work. Also, note that tuition has its own category below and that health insurance, if provided, is to be included under fringe benefits.)
  3. Salaries and Wages for Undergraduate Students. Provide personnel, title/position, estimated hours and the rate of compensation proposed for everyone. (Other forms of compensation paid as or in lieu of wages to students performing necessary work are allowable provided that the other payments are reasonable compensation for the work performed and are conditioned explicitly upon the performance of necessary work. Also, note that tuition has its own category below and that health insurance, if provided, is to be included under fringe benefits.)
  4. Salaries and Wages for Others. Provide personnel, title/position, estimated hours and the rate of compensation proposed for everyone.



5. Fringe benefits (FB). Propose rates/amounts in conformance with normal accounting procedures. Explain the cost and the basis of the rate computations. Provide a breakdown of FB. Include FB for PIs, Graduate Students, Undergraduate Students, and Others separately.
6. Tuition. Provide rates and total proposed tuition separately for Graduate and Undergraduate Students.
7. Supplies. Indicate separately the amount estimated for office, laboratory, computing, and field supplies. Provide a breakdown of the supplies in each category.
8. Equipment. Identify non-expendable personal property having a useful life of more than 1 year and an acquisition cost of more than \$5,000 per unit. If fabrication of equipment is proposed, list parts and material required for each, and show costs separately from the other items. Furniture is not allowed. A detailed breakdown is required.
1. Services or consultant. Identify the specific tasks for which these services, consultants, or subcontracts would be used. Provide a detailed breakdown of the services or consultants to include personnel, time, salary, supplies, travel, etc.
1. Travel. All estimated costs should be itemized showing the number of trips required, type of trip (field, scientific meeting, or conference attendance), the destination, the number of people traveling, the per diem and local reimbursement rates allowed by the applicant, and any miscellaneous expenses for each trip. (Note: All travel is to be in accordance with the established travel policy of the applicant's institution. A copy of the applicant's institutional travel policy may be attached). A breakdown should be provided to include location, number of personnel, number of days, per diem rate, lodging rate, mileage and mileage rate, airfare (whatever is applicable).
2. Other direct costs. Itemize the costs not included elsewhere, e.g., shipping, telemetry, computing, equipment uses charges, age dating, publication costs, or other services. Provide breakdowns showing how the cost was estimated, e.g., computer time should show the type of computer, the estimated time of use, and the established rates.
3. Indirect costs. Specify the indirect costs rate in the non-Federal column only based on the applicant's approved rate agreement. An amount equivalent to what the indirect costs would have been under the Federal portion may also be included as match under the indirect cost in the non-Federal portion.

### **XIII. SPECIAL TERMS AND CONDITIONS**

1. Adherence to reporting requirements. A recipient's failure to submit the required reports/documents in a timely manner may result in the withholding of payment, in termination of the award, and/or in the delay or non-issuance of a new award.
2. Adherence to the Original Research Objectives and Budget Estimates. Any commitments or expenditures incurred by the Recipient in excess of the funds provided by this award shall be the responsibility of the Recipient. Expenditures incurred prior to the effective date of this award cannot be charged against award final funds unless provided for in this award.
3. Dissemination of Results. The Recipient is encouraged to disseminate research result promptly to the scientific community. The Institute encourages the Recipient to publish project reports in scientific and technical journals. The Institute and the US Government may publish, reproduce, and use all technical data developed as a result of this award in any manner and for any purpose, without limitation, and may authorize others to do the same.
4. Violation of Award Terms. If the Recipient has materially failed to comply with the terms of this award, the Institute may suspend, terminate, or take such other remedies as may be legally available in the circumstances.
5. Budget changes are subject to approval by the Institute's Director and the USGS program manager. Pay attention to your budget distributions to avoid changes during the project period.

Exhibit 1

Page 1

## PUERTO RICO WATER RESOURCES AND ENVIRONMENTAL RESEARCH INSTITUTE

UNIVERSITY OF PUERTO RICO AT MAYAGÜEZ

P.O. BOX 9000

MAYAGUEZ, PUERTO RICO 00681-9000

## FY 2023 PROPOSAL EVALUATION FORM

Project Number: \_\_\_\_\_

Amount Requested: \_\_\_\_\_

Principal Investigator(s): \_\_\_\_\_

Title: \_\_\_\_\_

1. Is the water problem addressed significant? (30%) Score \_\_\_\_\_  
(Excellent 30, Very Good 25, Good 20, Average 15, Fair 10, Poor 5, Unacceptable 0 )

Comments: \_\_\_\_\_

2. Is the research proposal of high quality? (40%) Score \_\_\_\_\_  
(Excellent 40, Very Good 34, Good 28, Average 22, Fair 15, Poor 8, Unacceptable 0)

Consider the following points in your evaluation (1) clarify of objectives, (2) methodology to conduct the research, and (3) reasonableness of the scope of the project for the time and budget allotted.

Comments: \_\_\_\_\_

2. Does the proposal contain new approaches?  
or a novel solution to the water problem addressed? (10%) Score \_\_\_\_\_  
(Excellent 10, Very Good 8, Good 6, Average 5, Fair 3, Poor 1, Unacceptable 0)

Comments: \_\_\_\_\_

Exhibit 1  
Page 2

## PRWRERI Proposal Evaluation Form (continued)

4. Is the principal investigator and/or his research team?  
qualified to carry out the proposed research? (10%) Score \_\_\_\_\_  
(Excellent 10, Very Good 8, Good 6, Average 5, Fair 3, Poor 1, Unacceptable 0)

Comments:

5. Does the proposal make appropriate provision for the  
training of future water resources professionals? (10%) Score \_\_\_\_\_  
(Excellent 10, Very Good 8, Good 6, Average 5, Fair 3, Poor 1, Unacceptable 0)

Comments:

OVERALL EVALUATION (sum of section scores) Score \_\_\_\_\_

ADDITIONAL COMMENTS (continue on reverse if necessary)

REVIEWERS SIGNATURE \_\_\_\_\_

REVIEWERS NAME \_\_\_\_\_ PHONE \_\_\_\_\_

ORGANIZATION \_\_\_\_\_

ADDRESS \_\_\_\_\_ DATE \_\_\_\_\_

## Exhibit 2

**RESEARCH PROPOSAL (Example)**

- 1. Project Number:** Leave blank
- 2. Title:** Aromatic Degrading of Bacterial Population and Bioremediation of Contaminated Groundwaters
- 3. Focus Categories:** GW, TRT, WQL
- 4. Keywords:** Bacteria, Biodegradation, Biological Treatment, Treatment, Bioremediation
- 5. Duration Period:** March 1, 2022 – February 29, 2023
- 6. FY 2021 Federal Funds:** \$22,000
- 7. FY 2021 Non-Federal Funds:** \$0
- 8. Principal Investigators:**  
John Dow 1, Department of Biology, University of Puerto Rico at Mayaguez.  
John Dow 2, Department of Civil Engineering, University of Puerto Rico at Mayaguez.  
John Dow 3, Center for Microbial Ecology, Michigan State University, East Lansing.
- 9. Congressional District:** PR-098
- 10. Statement of the Critical Problem**
- 11. Statement of Results or Benefits**

## Exhibit 3

**FOCUS CATEGORIES**

ACID DEPOSITION	ACD
AGRICULTURE	AG
CLIMATOLOGICAL PROCESSES	CP
CONSERVATION	COV
DROUGHT	DROU
ECOLOGY	ECL
ECONOMICS	ECON
EDUCATION	EDU
FLOODS	FL
GEOMORPHOLOGICAL PROCESSES	GEOMOR
GEOCHEMICAL PROCESSES	GEOCHE
GROUNDWATER	GW
HYDROGEOCHEMISTRY	HYDROGEO
HYDROLOGY	HYDROL
INVASIVE SPECIES	INV
IRRIGATION	IG
LAW, INSTITUTIONS, AND POLICY	LIP
MANAGEMENT AND PLANNING	M&P
METHODS	MET
MODELS	MOD
NITRATE CONTAMINATION	NC
NON-POINT POLLUTION	NPP
NUTRIENTS	NU
RADIOACTIVE SUBSTANCES	RAD
RECREATION	REC
SEDIMENTS	SED
SOLUTE TRANSPORT	ST
SURFACE WATER	SW
TOXIC SUBSTANCES	TS
TREATMENT	TRT
WASTEWATER	WW
WATER QUALITY	WQL
WATER QUANTITY	WQN
WATER SUPPLY	WS
WETLANDS	WET

## Exhibit 4

Page 1

**Keywords**

Note: The keywords describe areas of interest as related to water, e.g. “Cooling” refers to water as used in cooling. “Fertilizers” implies the effect of fertilizer on water characteristics, etc.

<b>A</b>	28. Biological Control	55. Data Analysis
1. Acid Deposition	29. Biological Treatment	56. Data Storage and Retrieval
2. Acid rain	30. Biomonitoring	57. Decision Model
3. Activated Carbon	31. Biotechnology	58. Demand Management
4. Activated Sludge	32. Birds	59. Denitrification
5. Adsorption and Exchange	33. Boating	60. Desalination
6. Aeration	34. Brackish Water	61. Developing Countries
7. Agriculture	35. Brines	62. Disinfections
8. Algae	<b>C</b>	63. Distillation
9. Alkaline Scale	36. Cartography	64. Distribution System
10. Anaerobic Treatment	37. Channels	65. Drainage
11. Animal Waste	38. Chemigation	66. Drilling
12. Aquaculture	39. Chlorination	67. Drought
13. Arid Climates	40. Climate	68. Dynamic Programming
14. Aquatic Plants	41. Cloud Seeding	<b>E</b>
15. Aquifer Characteristics	42. Coastal Engineering	69. Earth Dams
16. Aquifer Parameters	43. Coastal Zone	70. Economics
17. Atmospheric Models	44. Computers	71. Ecosystems
18. Atmospheric Processes	45. Conflict Managements	72. Education
<b>B</b>	46. Conjunctive Use	73. Energy Budget
19. Bacteria	47. Conservation	74. Energy Use and Conservation
20. Basalt Hydrology	48. Contaminant Transport	75. Environmental Sanitation
21. Base Flow	49. Conveyance Systems	76. Epidemiology
22. Bays	50. Cooling	77. Estuaries
23. Beaches	51. Crop Water Use	78. Estuarine Modeling
24. Benefit-Cost Analysis	52. Crustaceans	79. Eutrophication
25. Benthos	<b>D</b>	80. Evaporation
26. Biodegradation	53. Dairy Waste Management	81. Evapotranspiration
27. Bioindicators	54. Dams	

Exhibit 4  
Page 2**Keywords**

F	111. Hydrobiology	139. Land-Water Interactions
82. Fertilizers	112. Hydrogeology	140. Law
83. Fish Ecology	113. Hydrologic Models	141. Leaching
84. Fisheries	114. Hydropower	M
85. Flood Control	115. Hypothermia	142. Marketing
86. Flood Plain Management	I	143. Marinas
87. Fluid Flow	116. Ice	144. Marine Resources
89. Fluid Mechanics	117. Impoundments	145. Marshes
G	118. Indian Water Issues	146. Mathematical Models
90. Geochemistry	119. Industrial Wastewater	147. Membranes
91. Geographic Information Sys.	120. Infiltration	148. Microclimatology
92. Geomorphology	121. Information Dissemination	149. Mineralogy
93. Geophysics	122. Insecticides	150. Mining
94. Geothermal Power	123. Insects	151. Model Studies
95. Glaciers	124. Institutional Relationships	152. Moisture Uptake
96. Great Lakes	125. In-stream Flow	153. Mountain Lakes/Streams
97. Groundwater Hydrology	126. Inter-basin Transfers	154. Multiple-Objectives Planning
98. Groundwater Management	127. Invertebrates	N
99. Groundwater Modeling	128. Ion Exchange	155. Navigation
100. Groundwater Movement	129. Irrigation	156. Nitrogen
101. Groundwater Quality	130. Irrigation Management	157. Numerical Analysis
102. Groundwater Recharge	131. Irrigation Scheduling	158. Nutrients
H	132. Irrigation System	O
103. Hazardous Waste	133. Isotopes	159. Oil-Water Interfaces
104. Health Effects	K	160. Open Channels
105. Heal Budget	134. Karst Hydrology	161. Operation Research
106. Heavy Metals	L	162. Optimization
107. Herbicides	135. Lagoons	163. Organic Compounds
108. History	136. Lakes	164. Osmosis
109. Hydraulic Structures	137. Land Use	165. Oxidation
110. Hydraulics	138. Landscape Management	166. Ozonation

**Keywords**

P	198. Resource Development	229. Soil-Water Relationships
167. Perched Water Table	199. Resource Planning	230. Solar Energy
168. Percolation	200. Reverse Osmosis	231. Solute Transport
169. Pest Management	201. Riparian Vegetation	232. Springs
170. Pesticides	202. Risk Analysis	233. Statistics
171. Phosphorus	203. Risk Management	234. Stochastic Hydrology
172. Photosynthesis	204. River Basin Development	235. Stochastic Processes
173. Phreatophytes	205. Riverbeds	236. Storm Water Management
174. Physical Chemistry	206. Rivers	237. Streams
175. Planning	207. Runoff	238. Subsidence
176. Plant Growth		239. Subsurface Drainage
177. Plant Pathology	208. Saline Soils	240. Surface Drainage
178. Plant Stress	209. Saline-Freshwater	241. Surface-Groundwater
179. Plant-Water Relationships	Interfaces	Relationships
180. Policy Analysis	210. Salinity	242. Suspended Sediments
181. Pollutants	211. Sanitary Landfills	243. Synthetic Hydrology
182. Pollution Control	212. Saturated Flow	244. Synthetic Organics
183. Ponds	213. Seawater	245. Systems Analysis
184. Port Facilities	214. Sedimentation	246. Systems Engineering
185. Power Plants	215. Seismology	T
186. Public Health	216. Septic Tanks	247. Thermodynamics
187. Pumps	217. Sewer Systems	248. Tideland
R	218. Shellfish	249. Time-Series Analysis
188. Rainfall	219. Shipping	250. Tourism
189. Rainfall-Runoff Models	220. Shore Birds	251. Toxic Substances
190. Rainfall-Runoff Processes	221. Shore Protection	252. Trace Elements
191. Range Management	222. Sludge	253. Trace Organics
192. Recreation	223. Snow	254. Tropics
193. Reefs	224. Socioeconomic Issues	U
194. Regulatory Permits	225. Soil Chemistry	255. Underground Storage Tanks
195. Remote Sensing	226. Soil Erosion	256. Unsaturated Flow
196. Reservoir Management	227. Soil Microbiology	257. Urban Drainage
197. Reservoir Modeling	228. Soil Physics	258. Urban Hydrology



**Keywords**

259. Urban Planning	271. Water Quality	285. Water Use Monitoring
260. Urban Water Systems	272. Water Quality Control	286. Watershed Management
V	273. Water Quality Management	287. Waves
261. Viruses	274. Water Quality Modeling	288. Weather Data Collection
W	275. Water Quality Monitoring	289. Weather Forecasting
262. Waste Disposal	276. Water Quality Standards	290. Weather Modification
263. Wastewater	277. Water Resources Development	291. Weeds
264. Wastewater Irrigation	278. Water Reuse	292. Well Hydraulics
265. Wastewater Treatment	279. Water Rights	293. Wetlands
266. Water Chemistry	280. Water Softening	294. Wildlife Management
267. Water Demand	281. Water Treatment	Z
268. Water Harvesting	282. Water Treatment Facilities	295. Zooplankton
269. Water Law	283. Water Use Data	296. Zoning
270. Water Levels	284. Water Use Efficiency	

Exhibit 5

<b>Fiscal Year: 2000</b> <b>Principal Investigator:</b> <b>Project Title:</b>			
<b>Cost Category</b>	<b>Federal</b>	<b>Non-Federal</b>	<b>Grand Total</b>
<b>Total Salaries and Wages for:</b>	<b>\$19,713.00</b>		<b>\$19,713.00</b>
Principal Investigator	\$2,625.00		\$2,625.00
Graduate Students	\$14,400.00		\$14,400.00
Undergrad Students	\$2,688.00		\$2,688.00
<b>Total Fringe Benefits for:</b>	<b>\$313.00</b>	<b>\$0.00</b>	<b>\$313.00</b>
Principal Investigator	\$275.00		\$275.00
Graduate Students	\$0.00		\$0.00
Undergrad Students	\$38.00		\$38.00
<b>Tuition for:</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>
Graduate Students	\$0.00		\$0.00
Undergrad Students	\$0.00		\$0.00
Supplies	\$1,200.00		\$1,200.00
Equipment	\$0.00		\$0.00
Services or Consultants	\$0.00		\$0.00
Travel	\$774.00		\$774.00
Other Direct Costs	\$0.00		\$0.00
<b>Total Direct Costs:</b>	<b>\$22,000.00</b>		<b>\$22,000.00</b>
Indirect Costs Federal		\$11,000.00	\$11,000.00
Indirect Costs Non-Federal		\$0.00	\$0.00
<b>Amount Proposed</b>	<b>\$22,000.00</b>	<b>\$11,000.00</b>	<b>\$33,000.00</b>
Total Costs at host Institute University	\$22,000.00	\$11,000.00	\$33,000.00
Total Costs at other university (name)	0	0	\$0.00

Exhibit 6  
Page 1

### BUDGET JUSTIFICATION

Project Title: Example Budget

<b>Salaries and Wages for PIs.</b> Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual.
J.D., Associate Professor and PI YR 1, 1 weeks of summer period: $(\$94,500/9) \times (3/12) = \$2,625,200$
<b>Salaries and Wages for Graduate Students.</b> Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual. (Other forms of compensation paid as or in lieu of wages to students performing necessary work are allowable provided that the other payments are reasonable compensation for the work performed and are conditioned explicitly upon the performance of necessary work. Also, note that tuition has its own category below and that health insurance, if provided, is to be included under fringe benefits.)
MS student, \$1,200/month during 12 months = \$14,400
<b>Salaries and Wages for Undergraduate Students.</b> Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual. (Other forms of compensation paid as or in lieu of wages to students performing necessary work are allowable provided that the other payments are reasonable compensation for the work performed and are conditioned explicitly upon the performance of necessary work. Also, note that tuition has its own category below and that health insurance, if provided, is to be included under fringe benefits.)
Undergraduate students: \$8/hr, 12 hr/wk during 28 weeks. Total \$2,688.
<b>Salaries and Wages for Others.</b> Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual.
None
<b>Fringe Benefits for PIs.</b> Provide the overall fringe benefit rate applicable to each category of employee proposed in the projects. Note: include health insurance here, if applicable.
Fringe benefits are calculated based on current rate 9.05% for faculty during summer period (\$275).

<b>Fringe Benefits for Graduate Students.</b> Provide the overall fringe benefit rate applicable to each category of employee proposed in the projects. Note: include health insurance here, if applicable.
N/A
<b>Fringe Benefits for Undergraduate Students.</b> Provide the overall fringe benefit rate applicable to each category of employee proposed in the projects. Note: include health insurance here, if applicable.
1.4% for undergraduate students (\$38).
<b>Fringe Benefits for Others.</b> Provide the overall fringe benefit rate applicable to each category of employee proposed in the projects. Note: include health insurance here, if applicable.
NA
<b>Tuition for Graduate Students.</b> Provide time & amount. In-state or Out-of-state tuition?
None requested.
<b>Tuition for Undergraduate Students.</b> Provide time & amount. In-state or Out-of-state tuition?
None requested.
<b>Supplies.</b> Indicate separately the amounts proposed for laboratory and field supplies followed by a breakdown of the supplies in each category.
Total of \$1,200 braked down as: 1) Lab chemicals, reagents and media: \$800 2) Glass bottles and gloves: \$400
<b>Equipment.</b> Identify non-expendable personal property having a useful life of more than one (1) year and an acquisition cost of more than \$5,000 per unit. If fabrication of equipment is proposed, list parts and materials required for each, and show costs separately from the other

items. A detailed breakdown is required.
Not requested.
<b>Services or Consultants.</b> Identify the specific tasks for which these services, consultants, or subcontracts would be used. Provide a detailed breakdown of the services or consultants to include personnel, time, salary, supplies, travel, etc. A breakdown is required for each cost.
N/A
<b>Travel.</b> Provide purpose and estimated cost for all travel. A breakdown should be provided to include location, number of personnel, number of days, per diem rate, lodging rate, mileage and mileage rate, airfare (whatever is applicable).
Partial support for one trip to the ASCE conference to present research results: Air plane ticket: \$776.
<b>Other Direct Costs.</b> Itemize costs not included elsewhere, including publication costs. Costs for services and consultants should be included and justified under "Services or Consultants" (above). Please provide a detailed breakdown for costs listed under this category.
Not Requested
<b>Indirect Costs.</b> Provide negotiated indirect ("Facilities and Administration") cost rate. If indirect costs are provided please include a copy of your current Indirect Cost Rate Agreement so the rate can be verified.
Indirect costs are 50% of the modified total direct cost not including equipment cost. $\$22,000 \times 0.5 = \$11,000$ . Non-federal indirect cost = \$0.00

## Exhibit 7

**EXPECTED TRAINING ACCOMPLISHMENTS**  
**ACADEMIC LEVEL**

<b>FIELD OF STUDY</b>	Undergraduate	Master's Degree	Ph.D. Degree	Post Ph.D.	Total
Chemistry					
Engineering: Agricultural					
Civil					
Environmental					
Chemical					
System (Industrial)					
Other*					
Geology					
Hydrology					
Agronomy					
Biology					
Ecology					
Social Sciences					
Computer Science					
Geography					
Law					
Resources Planning					
Other (specify)					
Totals					

\* Less than 5 students in any one field of study.