

Report 14-08-0001-G1425-01

**RESPONSE TO
ON-SITE EVALUATION
BY U.S. GEOLOGICAL SURVEY**

**LOUISIANA WATER RESOURCES RESEARCH INSTITUTE
2401-A CEBA Building
Louisiana State University
Baton Rouge, LA 70803**

FEBRUARY 1988

Louisiana Water Resources Research Institute

PROBATION REPORT

by

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February, 1988

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PROBATION REPORT

The Louisiana Water Resources Research Institute (LWRRRI) underwent its Five Year Review by the U.S. Geological Survey in 1987. A review panel of five members convened in Baton Rouge on January 12 - 13, 1987. Results of the review panel's evaluations indicated that the Institute is fostering relevant, high quality research. The Institute was, however, placed on probation until such time as deficiencies identified in the evaluation team's report can be corrected.

The review team addressed ten items during its evaluation. The results of this evaluation were reported by letter to Louisiana State University's (LSU) Chancellor James Wharton on March 27, 1987. A copy of the letter and the final report of the onsite evaluation can be found in Appendix A. The review team concluded its evaluation with three recommendations for action. These were:

- o to reactivate the State Advisory Board, or its equivalent, with a suitable mix representing Government and private-sector water interests to set goals and priorities for the Institute program and to evaluate the relevance of annual program proposals to these goals,

- o to reactivate the University Advisory Board, or its equivalent, to provide the Director with guidance on research priorities and assistance in technical evaluations of project proposals, and

- o to begin development of an information transfer program that is responsive to information needs of Louisiana's water resources policymakers and managers and the public, utilizing, wherever feasible, the communications expertise available in the University.

This report responds to each recommendation of the review team, providing documentation of the Institute's actions taken to correct any identified deficiencies. Additionally, this report documents other accomplishments of the Institute achieved during the one year period since the review. Format of this report will follow the ten evaluation elements utilized by the review team in an effort to show the activities of the Institute above and beyond the level of activity at the time of the the 1987 Five-Year Review.

1. Research Relevance

Three issues contributing to research relevance were addressed by the Review Panel: Institute leadership, research topics, and the State Advisory Board. The specific points made by the Panel, and the Institute's action in response to each, are discussed below.

Leadership- The absence of official leadership of the Institute was identified as contributing to a lack of focus and visibility for

the research program. To overcome this weakness, the College of Engineering appointed a new director, a half time appointment, and created a new Assistant Director position supported by the College. The goal of the new administration has been and continues to be to restore the Institute to a position of leadership within Louisiana for water resources issues and concerns. Objectives through which this goal is being achieved are to increase operational efficiency of the Institute, to increase funding available to faculty research, and to develop and implement an aggressive information transfer program that will bring recognition to the Institute while providing valuable information and education to the Louisiana citizens. The Director and Assistant Director have dedicated their efforts to achieving these objectives.

Dr. Marty E. Tittlebaum, Associate Professor of Civil Engineering, was hired in June 1987 as the Institute's new Director. Dr. Tittlebaum has been an LSU faculty member in the Environmental Engineering area for eight years, and has been the Environmental Engineering Discipline Group Leader for the last five years. Dr. Tittlebaum's expertise is water/wastewater treatment and hazardous waste management. He is actively involved in research and consulting, and is extensively published in professional journals. His resume is provided in Appendix B. His aggressive pursuit of research funding opportunities in the water resources and environmental areas will be instrumental in providing growth opportunities for the Institute.

Ms. Brenda Kelly assumed the duties of Assistant Director in July 1987. Ms. Kelly had previously served as the Technology Transfer Coordinator of LWRRRI (1982-84) prior to being transferred to the LSU Hazardous Waste Research Center. She has a Master of Science degree in Water Resources Engineering, and has worked for several years in water resources research. Her expertise includes irrigation, drainage and agricultural usage of water, in addition to technology/information transfer. Ms. Kelly was the 1985 President of the Louisiana Section of the American Water Resources Association, and has for the past six years worked closely with Louisiana's water resources professional and civic communities.

State Advisory Board - In January 1987 the Institute's State Advisory Board had one current member. The Review Panel recommended reactivation of, and more frequent guidance from, the State Advisory Board.

This board has been restructured and reactivated to provide sound technical program guidance for the Institute. In September, 1987, thirteen members were appointed to this Board. Members represent federal, state and local governments, industry, professional organizations and other Louisiana universities. The membership of this Board is given in Table 1. Committee members were selected based on their broad range of water resources interests and expertise. Responsibilities of this board's members are discussed in Section 2 - Research Quality.

Table 1. STATE ADVISORY BOARD MEMBERSHIP

<u>Number of Represent.</u>	<u>Agency or Interest Group</u>	<u>Representative</u>
2	City/Parish Govt.	John Hussey, Mayor Shreveport Sidney Barthelemy, Mayor of New Orleans
3	Federal Governm. Agencies	
	. US Army Corps of Engin.	Brigadier Gen. Sands Vicksburg, Miss.
	. US Dept. of Agriculture	Harry Hawthorne, Alexandria
	. US Geological Survey	Darwin Knochenmus, Baton Rouge
1	Industry	Jerry Daigre, Dow Chemical Co. Plaquemine
1	Professional Organizations	Rod Emmer, President Baton Rouge
	. Louisiana Section- American Water Resources Association	
4	State Agencies	
	. Dept. of Environ. Quality	Bob Hannah, Asst. Adm. Baton Rouge
	. Dept. of Health & Human Res.	Bobbie Savoie, Consult. Baton Rouge
	. Dept. of Natural Resources	Chip Groat, Director La. Geo. Sur. LSU
	. Dept. of Transportation & Development	Marty Chabert, Asst. Sec., Public Works Baton Rouge
2	Other Universities	Dr. Bobby Price, Director Water Res. Center Ruston
	. Louisiana Tech University	Don Boesch, Director LUMCON Chauvin
	. Louisiana Universities Marine Consortium	

13 Members

Research Topics- The Director and Assistant Director convened the State Advisory Board on November 17, 1987 to discuss the water resources research needs for Louisiana. Ten topics were identified by the Board as the most urgent research needs. A listing of the identified topics appears in Table 2.

Research topic input was also sought from the newly reorganized University Advisory Board (UAB). For a detailed discussion of this Board, see Section 8 of this report. The UAB meeting on November 18, 1988 provided further input on the research needs, and also suggested a prioritization of topics. The resulting composite listing of research needs is shown in Table 3.

The Director and Assistant Director, LWRRI, reviewed the research topic suggestions and recommended a prioritization of the topics provided by the two advisory boards. A draft research priority listing was formulated, and sent to each board member for his/her additional comments and suggestions. Following a three weeks comment period, the research priority topics to be used in the Fiscal Year 1988 program were finalized. These are given in Table 4.

2. Research Quality

Faculty participating in LWRRI research were judged to be competent in performing the funded research. Most research is multidisciplinary, and requires faculty research teams to accomplish the proposed work.

To assure the continued selection and support of top quality research at the Institute, the review team recommended the reconstitution of and clear definition of responsibilities of the advisory boards. As already discussed in Section 1, the two advisory boards of LWRRI have been reorganized. A significant part of this reorganization was the formulation, documentation, and communication of the functioning and responsibilities of each board. The resulting guidelines were provided to each candidate for board membership prior to his/her consideration and agreement to serve on the board. Table 5 and 6 give the newly developed guidelines established for each board. These guidelines were fully implemented with the convening of the two boards in November 1987.

Protocol for the review and selection of research proposals to be funded by LWRRI has been altered, with the newly formulated procedures implemented in December 1987 at the initiation of Fiscal Year (FY) 1988 program development process. Preproposals have been solicited and will receive a preliminary screening to determine their compatibility with the Institute's research priorities, the achievability of the project under the time and budget constraints indicated, and the appropriateness of project objectives, methodology, etc. The top ranked preproposals will be selected for full proposal development and

Table 2. WATER RESOURCES PROBLEM AREAS FOR LOUISIANA
Identified by the State Advisory Board

1. Emergency Planning
 - o Warning networks
 - o Health quality assurances
2. Hydrologic Methods and Techniques
 - o Lab & Field Methods
 - o Validity of methods
3. Coastal Area
 - o Flow measurement, prediction
 - o Wetlands loss
4. Water and Health Relationship
5. Water Allocation
 - o Emergency allocation priorities, procedures
 - o Shreveport public water supply
 - o Multi-use resource planning (ex. lake maintenance for aesthetics vs. irrigation)
6. State Water Policy
7. Agricultural Water Conservation
 - o Irrigation efficiency
 - o Water quality needs for specific crop application
8. Aquaculture
 - o Processing and marketing
 - o Waste disposal
 - o Marine seafood culture
9. Water and Waste Water Treatment
 - o Storm Water Treatment
 - o Economic alternatives to septic tanks
 - o How to meet new, more stringent treatment standards
10. Information Transfer

Table 3. WATER RESOURCES PROBLEM AREAS FOR LOUISIANA

1. Hydrology

- o Development and/or verification of lab & field methods
- o Flow measurement, prediction in coastal zones
- o Urban flash flooding
- o Non-structural approach to flood control
- o Geography of water (inventory & distribution of water)
- o Delineating ground water recharge areas

2. Water Quality

- Ground Water
 - o Chemical contamination of ground water supply
 - o Water quality needs for specific crop application
 - o Movement, Monitoring and Modeling of chemicals in unsaturated zone
- Surface Water
 - o Non-point source pollution
 - o Water quality needs for specific crop application
 - o Quality of precipitation

3. Water and Wastewater Treatment

- o Urban storm water management
- o Economic alternatives to septic tanks
- o How to meet new, more stringent treatment standards
- o Waste disposal, including aquaculture and agriculture
- o Use of natural systems for wastewater treatment

4. Wetlands Management

- o Wetlands loss
- o Wetland areas as flood buffer
- o Use of wetlands for wastewater treatment

5. Water and Health Relationship

6. State Water Policy

- o Creation of policy
- o Analysis/impacts of policy

7. Marine Seafood Culture

8. Information Transfer

9. Planning and Management

- Land Use
 - o Basin-wide management, planning
 - o Erosion control during construction
 - o Multi-use resource planning (ex. lake maintenance for aesthetics vs. irrigation)

- Water Supply
 - o Shreveport public water supply

- Resource Conservation
 - o Irrigation efficiency
 - o Scheduling & Forecasting of need for supplemental irrigation
 - o Soil loss/conservation
 - o Water conservation in aquaculture production

- Emergency Planning
 - o Warning networks
 - o Health quality assurances
 - o On-line monitoring of outfalls
 - o Emergency allocation priorities, procedures

Table 4. WATER RESEARCH PRIORITY AREAS FOR LOUISIANA.

1. Hydrology

- o Development and/or verification of lab & field methods
- o Flow measurement, prediction in coastal zones
- o Urban flash flooding
- o Non-structural approach to flood control
- o Geography of water (inventory & distribution of water)
- o Delineating ground water recharge areas

2. Water Quality

Ground Water

- o Chemical contamination of ground water supply
- o Water quality needs for specific crop application
- o Modeling of chemicals in unsaturated zone

Surface Water

- o Non-point source pollution
- o Water quality needs for specific crop application
- o Quality of precipitation

3. Water and Wastewater Treatment

- o Urban storm water management
- o Economic alternatives to septic tanks
- o How to meet new, more stringent treatment standards
- o Waste disposal, including aquaculture and agriculture
- o Use of natural systems for wastewater treatment

4. Wetlands Management

- o Wetlands loss
- o Wetland areas as flood buffer
- o Use of wetlands for wastewater treatment

Table 5. STATE ADVISORY BOARD

Purpose: To assist the Director, Louisiana Water Resources Research Institute (LWRRRI), in identifying water resources research needs for the State of Louisiana

Membership: Board members represent the water resources professional communities of the State of Louisiana, and are selected for their knowledge of and active participation in an area of water resources management or research. The Board consists of 13 members that are appointed by the Chancellor, LSU. Each member represents a distinctly different water resources focus area and serves a 5 year term.

Requirements: Each member shall participate in the annual meeting of the Board convened to assess the research needs and priorities for the Institute's annual research program. This meeting shall be called by the Institute Director and shall be held at the convenience of all Board members.

Each member shall also participate in the review of research preproposals and proposals, and rank these documents for funding preference.

Benefits: An opportunity to guide the research activities of Louisiana Water Resources Research Institute

An opportunity to communicate with fellow water resources professionals in the State, sharing ideas and expressing research needs.

Service to the State of Louisiana

Table 6. UNIVERSITY ADVISORY BOARD

<u>Purpose:</u>	<p>To develop specific task-oriented Request for Proposals statements from the research needs listing identified by the State Advisory Board.</p> <p>To assist the Director in prioritizing the identified research areas.</p> <p>To identify potential investigators who can participate in the priority research areas.</p> <p>To identify and promote areas where cooperative research programs can be developed between LWRI and other organizations, both on and off campus.</p>
<u>Membership:</u>	<p>Board members are selected from the Louisiana State University faculty, and are selected for their knowledge of and active participation in an area of water resources research. The Board consists of eight members appointed by the Chancellor, LSU. Each member represents a distinctly different water resources focus area and serves a 5 year term.</p>
<u>Requirements:</u>	<p>Each member shall participate in the annual meeting of the Board convened to assess the research needs and priorities for the Institute's annual research program. This meeting shall be called by the Director, Louisiana Water Resources Research Institute, and shall be held at the convenience of all Board members.</p> <p>Members shall also participate in the review of research preproposals and proposals, and rank these documents for funding preference.</p>
<u>Benefits:</u>	<p>Service to LSU</p> <p>Service to the State of Louisiana</p> <p>An opportunity to guide the research activities of Louisiana Water Resources Research Institute</p> <p>An opportunity to communicate with fellow water resources professionals in the university and state, sharing ideas and expressing research needs.</p>

further review. This revised protocol will yield a significant time savings to reviewers and investigators alike, and will help assure close adherence to the priority research focus.

Preproposals were solicited from the research faculty of twenty-four colleges and universities throughout Louisiana. The response to the FY 1988 solicitation was significantly increased over FY 1987. Thirty-four preproposals were received from four major universities. This differs from the nine preproposals received in FY 1987 from two universities. This increased participation in the LWRI funding program is a direct result of the Institute's promotional efforts.

3. Research Coordination

Interaction of the Louisiana WRI with both on-campus and off-campus offices and agencies is increasing. New programs and activities have been initiated at each level.

On-Campus

A new working relationship has been established with the Louisiana Cooperative Extension Service (CES) at LSU. Louisiana's water quality has been identified as a topic of mutual interest, and one around which a cooperative program can be developed between LWRI and the CES. The Institute's staff and researchers are providing technical assistance to the CES on specific water quality engineering problems encountered. In addition to this, a joint proposal has been developed to obtain funding for a water quality education program for Louisiana's citizens. Under the proposed education program, the CES would be the primary implementation network, and the LWRI would perform administrative, planning, and program materials development services. The Louisiana Department of Transportation and Development, Office of Public Works, is also cooperating in this program. Work on initial program elements has begun without funding and additional funding options are currently being pursued.

LWRI is also working with the Institute for Environmental Studies and the Center for Wetland Resources at LSU on a project dealing with wetland restoration through wastewater treatment. Currently the joint research team is negotiating with a private industry and the U. S. Environmental Protection Agency to perform a demonstration project in southern Louisiana.

Off-Campus

New activities to be jointly developed by the LWRI and off-campus agencies have been initiated. These include working with federal research offices, private organizations, and citizens' groups.

LWRI is assisting the Louisiana Federation of Garden Clubs in developing a workshop on water quality issues for Louisiana. This

event will be part of the Federation's annual conference to be held in April, 1988. The Institute's Director will also be keynote speaker at this annual conference.

The U. S. Public Health Service (PHS) and LWRI are presently working together to evaluate a unique full-scale rock-reed filter wastewater treatment system. The system is located at the Gillis W. Long Hansen's Disease Center in Carville, Louisiana. After this initial evaluation, the U.S. PHS has indicated an interest in funding LWRI to perform future research dealing with their wastewater treatment problems.

The Institute has proposed to organize and host a two-day research workshop for U. S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi. The workshop, Review of Leach Tests for Contaminated Soils, would be held in Baton Rouge in 1988. The Hazardous Waste Research Center and the Center for Wetlands Resources, both at LSU, would assist LWRI in this activity.

4. Information Transfer

The information transfer activities of the Institute were expanded during the Fiscal Year 1987 to include new routine activities as well as the initiation of extensive new programs and/or activities.

Initial activities have included in-house organizational activities to collect and document all works published during the history of the Institute, and to present faculty and students with water resources news and information of particular importance to them. A listing of the publications of the Institute, previously only partially documented, has been compiled, and will be annually updated. The resulting list, now available for public distribution, provides ordering information for requesting the water resources information and materials available through the Institute. A copy of the publications list is found in Appendix C. A water resources bulletin board is now being maintained to announce upcoming meetings, job opportunities for both students and faculty, award opportunities for students, and calls for papers.

A major information transfer activity of the Institute for FY 1987 was the First Annual Research Symposium held on November 17, 1987 on the LSU campus. This event was initiated to provide a mechanism to communicate the research plans and accomplishments of the Institute. FY 1986 faculty researchers summarized the results of their recently completed research, and FY 1987 researchers (work just beginning) presented highlights of their proposed work. Attendance at the symposium was by invitation with one hundred and fifty persons from state and federal government, regional regulatory agencies, local industry, consulting firms, professional organizations, and Louisiana universities invited to attend. Approximately sixty persons representing all the invited groups attended the Symposium. This

event will be an annual activity of the Institute, and is anticipated to follow a similar format in future years. The program for the Symposium is contained in Appendix D.

The Institute's staff has, in FY 1987, placed particular emphasis on acquainting Louisiana's research community with the research funding opportunities through the U. S. Geological Survey Sections 104 and 105 research programs. Announcements for both research programs were widely distributed to Louisiana's colleges and universities, and to research organizations throughout the state. In addition, public announcements were made at professional and faculty meetings to help assure wide participation in the programs. A significant increase in participation in these programs by Louisiana researchers occurred in the FY 1988 programs. This increase appears to be evidence of the success of these efforts. Table 7 depicts these changes in participation.

Table 7. Louisiana's Participation in Section 104 and 105 Research Programs

<u>Year</u>	<u>Section 104</u>	<u>Section 105</u>
1987	9	10
1988	34	13

Presentations by the Director and Assistant Director have been given to civic and professional organizations to help acquaint these audiences with the activities of the Institute. These were given to the Capitol Area Groundwater Conservation Commission - Groundwater Technical Committee (July, 1987) and the Louisiana Environmental Health Association (January, 1988). A poster presentation was given at the Louisiana Water Pollution Control Federation Association conference in April 1987. The materials prepared for this poster have been redisplayed at other meetings attended by research faculty, and are currently displayed throughout the College of Engineering building on campus.

The Institute staff has dedicated a significant amount of time to writing research proposals to solicit additional funding for research and information transfer programs. Proposals submitted or currently under development include:

- o Summer Research Award - Submitted to LSU; \$4,000
- o Water Quality Education Program Proposal - Submitted to USGS, Section 105; Jointly developed with LSU Cooperative Extension Service and Louisiana Department of Transportation and Development, Office of Public Works; \$350,455
- o Research Needs Workshop Proposal - Submitted to U. S. Army Corps of Engineers Waterways Experiment Station; Jointly developed with LSU's Hazardous Waste Research Center and

Center for Wetlands Resources; \$24,435.

- o Remote Sensing Applications for Petroleum Waste Management Proposal - Being developed for submission to National Aeronautical and Space Administration; Jointly developed with NASA's Earth Resources Laboratory and Louisiana Department of Natural Resources; \$590,380 (anticipated).
- o Rock-Reed Filter for Treatment of Small Domestic Wastewater Flows Proposal - Submitted to USGS, Section 105; Jointly developed with the LSU Department of Civil Engineering and the Louisiana Department of Health and Human Resources; \$262,057.

Future information transfer activities planned for the Institute include the development of a brochure about the Institute, the regular circulation of the Institute's newsletter "Louisiana Water Research", and the development of short courses and training literature for the general public. An Institute information/factsheet has been prepared for distribution at meetings and at other times when opportunities for publicizing the Institute are appropriate. A copy of this fact sheet is provided in Appendix E.

5. Training

The LWRI is committed to training science and engineering students to assume leadership roles in current and future water resources and environmental problem solving. Research projects that incorporate extensive student training elements in the proposed research are given preferential consideration over proposed research involving faculty participation only. Services provided the students by the Institute include distribution and posting of employment opportunities announcements, and announcements of financial and award opportunities for water resources/environmental students.

6. Accreditation

LSU has been and continues to be accredited by the Southern Association of Colleges and Schools. In addition, engineering programs at the University have been accredited by the Accreditation Board for Engineering and Technology.

7. Physical Resources

The physical resources of the Louisiana Institute have been expanded to include new office facilities and new equipment. These have been provided by the College of Engineering - Dean's Office, the Department of Civil Engineering, and the Division of Engineering Services.

The newly renovated offices were occupied in February 1987. The new location, 2401 A College of Engineering and Business Administration (CEBA) Building, provides significantly increased space for the Institute's offices. The newly renovated space includes the Director's office, Assistant Director's office, a conference/library room, reception area, work area, and storage room.

New furnishings to fit the expanded space have been provided by the Department of Civil Engineering. Furniture was purchased only when absolutely necessary to accommodate the Institute's new staff and new in-office operations.

Equipment acquisitions include two Zenith 100 micro-computers, two printers, and equipment to provide electronic mail connections with the Office of the Dean, College of Engineering. These items have greatly expanded the capabilities and efficiencies of the office, and are being extensively utilized. The equipment has been donated or loaned to the Institute for an indefinite time by the Department of Civil Engineering and the College of Engineering.

Library resources of the Institute are not being expanded at this time, however, efforts are currently being made to cooperate closely with other specialized library resources. Efforts are underway to become better informed and to share information with the Louisiana State Library Central Office and with the Louisiana Water Resources Information Center. It is believed that by working closely with these informational networks, a more efficient approach to information storage and retrieval can be achieved.

8. Interdisciplinary Relationships

The interdisciplinary relationship of the Institute with other on-campus centers has been expanded through two major efforts of the Institute staff during recent months, the reactivation of the University Advisory Board and the development of research proposals jointly with other departments and offices on campus.

As recommended by the Review Team, the University Advisory Board has been restructured and reorganized to enhance this interaction. Seven members have been selected from the university faculty, and one more appointment remains to be made. This advisory board structure is such that a broad range of disciplines and research interests are represented. The current membership and the disciplines represented are shown in Table 8. As discussed earlier in Section 1, this board has met and is continuously providing input into the Institute's research and administrative activities.

Joint research/information transfer programs are being cooperatively developed with other campus research and information transfer organizations. Three projects are currently underway:

Table 8. UNIVERSITY ADVISORY BOARD MEMBERSHIP

<u>Number of Representatives</u>	<u>Discipline</u>	<u>Representative</u>
1	Agriculture	Hussein Magdi Selim Agronomy
1	Biological Sciences	Not yet designated
1	Business	Stephen Farber Economics
1	Engineering	Marty Tittlebaum LWRI
1	Physical Sciences	Robert Muller Dept. of Geography
3	Special Research Interests	
	. Coastal Studies	John Day Coastal Ecology
	. Environmental Studies	Ed Overton Inst. of Env. Stud.
	. Wetland Resources	Flora Wang Cent. for Wet. Res.

8 Members

1. "Research Needs Workshop: Development of Leach Tests for Contaminated Dredge Material". Jointly hosted by the Hazardous Waste Research Center, Center for Wetland Resources, and LWRI. To be funded by the U. S. Army Corps of Engineers, Waterways Experiment Station.

2. "A Water Quality Education Program for the Citizens of Louisiana". Jointly developed by the Louisiana State University Cooperative Extension Service, the Louisiana Department of Transportation and Development - Office of Public Works, and LWRI. Funds are being sought to support the program.

3. "Rock-Reed Filter for Treatment of Small Domestic Wastewater Flows". Jointly developed with the LSU Department of Civil Engineering and the Louisiana Department of Health and Human Resources. Submitted to the U.S. Geological Survey, Section 105 Research Program.

These activities have been previously discussed under Sections 3 and 4.

9. Administrative Relationship

LWRI and its staff are actively working to develop and maintain good relationships with other administrative entities both on and off campus, and to promote the activities of the Institute and the faculty participating in its research. This is being accomplished through reactivation of our State and University Advisory Boards, development of cooperative research efforts, and participation in a number of external activities. The activities of LWRI with regard to the advisory boards and cooperative research efforts have been discussed previously in this report.

Additional activities include service on the LSU Vice Chancellor for Research's committee on Environmental Programs and the 1988 Louisiana Ground Water Seminar Steering Committee, and special assistance to the Department of Mechanical Engineering and the Hazardous Waste Research Center for technology transfer activities guidance and consultation. It is felt that all these activities together with the Institute's regular operational efforts will greatly enhance LWRI's visibility both across the University and the State.

10. Institutional Commitment

Commitments of funds and in-kind resources have been given to the Institute by the Chancellor, Office of the Dean - College of Engineering, Department of Civil Engineering, and the Division of Engineering Services. Funds have been provided to support additional staff for the Institute, and in-kind resources of equipment and services have been dedicated to the Institute to improve office performance and efficiency.

Financial support in the form of staff salaries and wages is provided by the Office of the Chancellor, the College of Engineering, and the Department of Civil Engineering. These funds support the majority of the administrative staff of the Institute.

The Office of the Chancellor, LSU, has provided two student workers, at no charge to the Institute, to assist in office and laboratory activities. This student assistance was made available beginning in October 1987.

The College of Engineering has provided money to hire an Assistant Director for the Institute. Duties of the Assistant Director were determined to be fifty percent (50%) administration and fifty percent (50%) research. Included in the administrative duties was the development and implementation of an information transfer program for the Institute. The creation and staffing of this position has been discussed under Section 1 of this report.

The Department of Civil Engineering provides 50% release time for the Director for the performance of his administrative duties within the Institute.

Physical resources for the Institute have been greatly expanded. Newly renovated offices were occupied in February 1987. The physical space was provided by the Department of Civil Engineering, and the costs associated with renovation were covered by the Office of Dean, College of Engineering. The new offices were previously described in Section 7 - Physical Resources.

Contributions of equipment to the Institute have made the performance of administrative duties more efficient. Equipment contributions, also previously described in Section 7, were provided by the Office of Dean - College of Engineering, the Department of Civil Engineering, and the Division of Engineering Services. The new computer capabilities provide word processing capabilities, computerized accounting and record keeping, electronic mail, graphics, and computer programming capabilities.

Training of the student and secretarial staff have been accomplished to help assure full utilization of the computer equipment. In-house instruction in the use of the WORDSTAR word processing package has been provided to all student and secretarial staff. Specialized training has been provided, at no charge, by the LSU Computing Center. Training has been received in the use of DOS, LOTUS 1-2-3, and BITNET. Connection with the LSU Computerized Record Keeping System has been achieved to maintain accounts, leave records and within-college electronic mail.

Professional training in administrative operations at LSU and in personnel supervision have also been provided for the Assistant Director. Instruction in new administrative requirements for staff tax

exempt benefits programs and records management have been provided by LSU personnel. Also instruction in personnel supervision was provided through participation in a recent one day seminar held in Baton Rouge. The new training will further add to the ability to improve the efficiency of the Institute's management.

Appendix A
REVIEW TEAM EVALUATION



United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VA. 22092

In Reply Refer To:
WGS-Mail Stop 424

MAR 27 1987

Dr. James H. Wharton
Chancellor, Louisiana State University
and A&M College
156 T. Boyd Hall
Baton Rouge, Louisiana 70803

Dear Dr. Wharton:

We have determined that the eligibility of the Louisiana Water Resources Research Institute, Louisiana State University and A&M College, to continue to receive grants under the provisions of the Water Resources Research Act of 1984 (Public Law 98-242) is limited to 1 year from the date of this letter. This determination, which differs from the recommendation of the evaluation team, is based on our analysis of the team's report. A copy of the evaluation report is enclosed. The team discussed its findings with Dr. Donald D. Adrian, Institute Director; Acting Dean Adam T. Bourgoynne, Jr., College of Engineering; and Dr. Sean P. McGlynn, Vice Chancellor for Research.

The University is to be commended for its recent decision to revitalize a once effective program by appointing a permanent Director for the Institute and for its allocation of new office space and facilities. It is also to the University's credit that the high quality of research and its relevance to water problems in Louisiana were maintained in the period when the Institute was without regular leadership. Nevertheless, several significant deficiencies identified in the evaluation team's report must be rectified before the 1-year limitation on future grants eligibility can be removed.

The actions needed are:

1. Reactivate the State Advisory Board, or equivalent, with a suitable mix representing Government and private-sector water interests to set goals and priorities for the Institute program and to evaluate the relevance of annual program proposals to these goals.
2. Reactivate the University Advisory Board, or equivalent, to provide the Director with guidance on research priorities and assistance in technical evaluations of project proposals.
3. Begin development of an information-transfer program that is responsive to information needs of Louisiana's water-resources policymakers and managers and the public. Utilize, wherever feasible, the communications expertise available in the University.

Dr. James H. Wharton

2

Sections 1, 3, and 4 of the evaluation team's report provide further guidance for these actions. We also endorse the team's recommendation that efforts be continued to develop a broader financial base for the program.

We will work with the Institute Director and appropriate University officials in every possible way to return the Louisiana Institute's program to the level of public recognition that it once enjoyed. Evidence of actions taken to overcome deficiencies should be addressed to Marshall E. Moss, Assistant Chief Hydrologist for Research and External Coordination, U.S. Geological Survey, 436 National Center, Reston, Virginia 22092.

The team appreciated the courtesies and assistance extended by the University during its visit.

Sincerely yours,

Doyle G. Frederick

Acting Director

Enclosure

Copy to: Dr. Sean P. McGlynn
Vice Chancellor, Office of
Research
Louisiana State University
and A&M College

Dr. Adam T. Bourgoyne, Jr.
Acting Dean, College of
Engineering
Louisiana State University
and A&M College

Professor Donald D. Adrian
Director, Louisiana Water
Resources Research Institute
Louisiana State University
and A&M College

ADMINISTRATIVELY CONFIDENTIAL

FINAL REPORT
ONSITE EVALUATION OF THE
LOUISIANA WATER RESOURCES RESEARCH INSTITUTE
LOUISIANA STATE UNIVERSITY AND A&M COLLEGE
BATON ROUGE, LOUISIANA

January 14-16, 1987

Members of the Evaluation Team:

Dr. Madge O. Ertel, U.S. Geological Survey, Water Resources Division,
Branch of Water Institute Programs, Reston, Virginia (*Team leader;
employee of the Department of the Interior)

Dr. Archie J. McDonnell, Director, Environmental Resources Research
Institute, The Pennsylvania State University, University Park, Pennsylvania
(*Director of another Water Resources Research Institute)

Dr. Robert M. Sweazy, Associate Vice President for Research and Director for
Research Services, Texas Tech University, Lubbock, Texas (*Outside
university faculty member)

Mr. Coan J. Bueche, Chief, Federal Project Section, Department of
Transportation and Development, Baton Rouge, Louisiana
(*State water-resources agency employee)

Dr. Dharmo S. Dhamotharan, Vice President, Woodward-Clyde Consultants,
Baton Rouge, Louisiana (*Private citizen)

*Specified by Public Law 98-242 to serve on the evaluation team.

INTRODUCTION

The Louisiana Water Resources Research Institute (LWRRI), located at Louisiana State University (LSU) and A&M College in Baton Rouge, Louisiana, was visited by a State Water Institute Evaluation Team on January 12-14, 1987. The team was handicapped in its preparation for the visit by lack of any advance briefing materials. Through the interviews it conducted, however, and especially with the excellent cooperation of the Acting Dean and Associate Dean of the College of Engineering in providing documentation requested, the team was able to complete the evaluation to its satisfaction.

The evaluation, mandated by the Water Resources Research Act of 1984 (Public Law 98-242), calls for onsite evaluation of each Institute for the purpose of determining, in the words of the act, ". . . that the quality and relevance of its water-resources research and its effectiveness as an institution for planning, conducting, and arranging for research warrants its continued support in the national interest." Beyond this goal, however, the U.S. Geological Survey (USGS) views the process as one that can improve the overall quality of performance and an opportunity for recognizing and improving areas of weakness at Institutes that do not fully meet the evaluation team's expectations.

Ten evaluation elements are specified in the act.

EVALUATION ELEMENTS

1. Research Relevance

Research funded through the LWRRI addresses many of the water problems documented for Louisiana, e.g., flooding, ground-water contamination, and coastal erosion.

Reactivation of and more frequent guidance from the State Advisory Board, comprised of key representatives from the Federal and State governments and private industry, would go a long way toward assuring that projects selected for funding will be more directly relevant to Louisiana water problems. This Board has not met in about 3 years. Furthermore, the membership list in the Institute files is out of date. Some of the members listed are no longer serving in the capacities that warranted their appointment initially.

Because the LWRRI has not had an official Director for over 2 years, the Institute has lacked the visibility, and perhaps the direction, necessary to rally others in the water-resources community. Now that a Director has been brought in, stronger and more focused leadership might generate more interaction with others with water-resource interests and, therefore, increase the opportunities for relevance to the problems of the State.

2. Research Quality

Institute projects are typically supervised by faculty ranking from assistant professor to full professor. In general, project results are published in quality water-related peer-reviewed journals, e.g., Water Resources Research, Water Research, Journal of Hydrology, Journal of Environmental Quality, etc. Faculty competence in water-resources fields is good.

Onsite interviews left the impression that in recent years Institute funds were primarily used to provide "seed grants" for new faculty. This practice should not become the prime motivation for project selection.

Protocols have been established for proposal review, using a University Advisory Board and State Advisory Board, and more recently, staff at the District Office of the USGS. As neither Advisory Board has functioned efficiently in recent years, each must be reconstituted and given specific responsibilities before they can carry out their review or advisory functions. The new Director appears to be committed to this proposition.

3. Research Coordination

The Institute, located within the College of Engineering, has actively solicited and funded proposals outside of the College and the University. Interaction has been pursued with such other University units as the Hazardous Waste Research Center, Environmental Studies Center, and the Laboratory for Wetland Soils. The Directors of these units have expressed a willingness to enter into collaborative efforts with the Institute. Steps also should be taken to interact with the LSU Agricultural Extension Service.

Except for activities of the USGS District Chief, there has been little interaction with the Institute from groups outside of the university community. A reactivated State Advisory Board could be used effectively for expanding communication lines.

The Institute administers only those projects funded under Public Law 98-242 grants. Efforts are underway to obtain funding from other Federal and private sources.

4. Information Transfer

In recent years, the LWRI has had limited and sporadic activity in information transfer. Research results have been published only for the professional community. A newsletter has just been started. The LWRI should consider developing short courses to meet the need for training in such areas as environmental law and waste management. The LWRI also could take more initiatives in conferences and seminars of international and national character, as well as of local concern.

There is limited public awareness of the Institute's activities. The LWRRI Director needs to work with the State and University Advisory Board and the local professional community to build a public image. Professional communications staff are on loan to the Institute to help in the endeavor.

5. Training

During the years 1982-86, 19 graduate students were supported on 18 Institute research projects. Disciplines represented included civil and chemical engineering, biology, geology, chemistry and ecology.

No evidence was provided as to the employment of graduates of the program.

6. Accreditation

The University has been accredited by the Southern Association of Colleges and Schools. In addition, engineering programs at the University have been accredited by the Accreditation Board for Engineering and Technology.

7. Physical Resources

When renovation is completed, office space for the LWRRI will be more than adequate. Laboratory space and equipment at the College of Engineering range from adequate in hydraulics to good in environmental engineering. Computer facilities, both micro- and mainframe, are good. Equipment purchased with research funds appears to be well utilized. While University library holdings are good, there was no evidence of a reference collection of water-related literature. Space for such a specialized library, however, is being made available in the new Institute offices.

8. Interdisciplinary Relationships

The Institute has interacted with a broad interdisciplinary base of faculty expertise in the Hazardous Waste Research Center, Environmental Studies Center, and the Laboratory for Wetland Soils.

The University Advisory Board needs to be restructured to enhance this interaction and to develop lines of communication within the University and the State.

9. Administrative Relationships

Because the LWRRI is located within the College of Engineering, neither it nor its Director are highly visible across the University. The Institute is, therefore, largely dependent upon the Dean of Engineering to properly influence the central administration on Institute policy and funding decisions. The current Acting Dean, however, freely allows direct access by the Institute Director to the Vice Chancellor for Research. This access is desirable and should be continued.

The Institute Director should be encouraged to establish good relationships with college, departmental, and other administrators and to actively promote his program in all facets of the University where water-resources research

potential resides. Additionally, joint project funding with existing centers or institutes that relate to water should be considered.

The Director spends approximately half-time administering the Institute. Both his teaching and research activities relate well to Institute functions.

10. Institutional Commitment

Historically, the Institute was a much stronger and more active organization than it is now, but a lack of leadership and commitment of University resources in the last 2-3 years caused it to slip significantly from that position. Recent actions, particularly the appointment of a new and permanent Director and the allocation of new office space to the LWRI, show promise for revitalization.

The University now pays 50 percent of the Institute Director's salary and that of his secretary, waives recovery of the indirect costs for Institute administration and projects, and commits approximately \$15,000 per year for Institute operation. The remainder of the Director's 9-month salary is paid by the Civil Engineering Department for teaching. His summer salary must be paid from extramural sources. By expending approximately \$25,000 for office renovation this year, the College of Engineering and the University have demonstrated a commitment to restore the Institute to a functional unit. Additional commitment, mainly in the form of operating funds and support staff, will be necessary, however, to restore the Institute to its former stature. It is noteworthy that the Acting Dean of Engineering and the Head of the Department of Civil Engineering consider the Institute program to be an important asset.

RECOMMENDATION

It is the concensus of the evaluation team that the program of the Louisiana Water Resources Research Institute demonstrates a minimum level of performance expected on the evaluation elements overall. We, therefore, recommend that the Institute's eligibility for future grants be continued under the provisions of the Water Resources Research Act of 1984.

Appendix B
RESUMES

PROFESSIONAL BACKGROUND AND QUALIFICATIONS

Marty E. Tittlebaum
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 504/767-4720 (Home)
 504/388-8508 (Office)

Personal Information

Date of Birth: October 29, 1946
 Place of Birth: Schenectady, New York
 Present Citizenship: U.S.A.
 Married/Three Children

Educational Background

<u>Degree</u>	<u>Institution</u>	<u>Field of Study</u>	<u>Year</u>
Ph. D.	University of Louisville	Environmental Engineering	1979
M.Eng.	University of Louisville	Environmental Engineering	1972
B.C.E.	University of Louisville	Civil Engineering	1971

Professional Appointments

<u>Highest Position Held</u>	<u>Location</u>	<u>Year(s)</u>
Director	Louisiana Water Resources Research Institute Louisiana State University Baton Rouge, Louisiana	6/87- present
Associate Professor	Department of Civil Engineering Louisiana State University Baton Rouge, Louisiana	7/84 present
Assistant Professor	Department of Civil Engineering Louisiana State University Baton Rouge, Louisiana	6/79- 6/84
Project Engineer	TenEch Environmental Consul- tants Inc. Louisville, Kentucky	9/74- 6/79
Instructor	Louisville Technical Institute Louisville, Kentucky	9/78- 6/79
Graduate Research Assistant	University of Louisville Louisville, Kentucky	1/73- 9/74

Research Assistant	Pollution Abstracts, Inc. LaJolla, California	1/73- 6/75
Sanitary Engineer	U. S. Environmental Protection Agency Chicago, Illinois	6/72- 1/73
Officer Training	U.S. Army Engineer Officer Candidate School Ft. Belvoir, Virginia	3/69- 9/69
Facilities Planner	General Electric Company Schenectady, New York	6/67- 9/67
Assistant Designer	General Electric Company Schenectady, New York	6/66- 9/66

Thesis and Dissertation Topics

Ozone Disinfection of Viruses in Secondary Effluent, M. Eng. Thesis, University of Louisville, May, 1972 (J. Pavoni, Major Professor).

Investigation of Leachate Heavy Metal and Organic Carbon Content Stabilization Through Leachate Recirculation, Ph.D. Dissertation, University of Louisville, May, 1979 (H. Spencer, Major Professor).

Professional Societies

Louisiana Engineering Society
American Society of Civil Engineers
Water Pollution Control Federation
Tau Beta Pi
Sigma Chi Epsilon
Chi Epsilon

Professional Registration

Professional Engineer, Commonwealth of Kentucky
Professional Engineer, State of Louisiana

Technical Publications

Refereed

1. Pavoni, J. L., Tittlebaum, M. E., Spencer, H. T., Fleischman, M., Nebel, C., and Gottschling, R., "Virus Removal from Wasterwater Using Ozone," Water and Sewage Works, 119, 59, Dec. 1972.
2. Nebel, C., Gottschling, R., Hutchinson, R. L., McBride, T.,

- Taylor, D.M., Pavoni, J. L., Tittlebaum, M. E., Spencer, H. E. and Fleischman, M., "Ozone Disinfection of Industrial-Municipal Secondary Effluents," Journal-Water Pollution Control Federation, 45, 12 Dec., 1973.
3. Tittlebaum, M. E., Pavoni, J. L., Maloy, B. F. And Kochert, T. L., "The Consultant's Viewpoint on Alternative Disinfectants," Public Works, Jan., 1980.
 4. Roy, D., Tittlebaum, M. E. and Meyer, J., "Microbiology: Detection, Occurrence, and Removal of Viruses," Journal-Water Pollution Control Federation, Vol. 53, No. 6, June, 1981.
 5. Tittlebaum, M. E., "Organic Carbon Content Stabilization Through Landfill Leachate Recirculation," Journal-Water Pollution Control Federation, Vol. 54, No.5, May, 1982.
 6. Roy, D., Tittlebaum, M. E., And Meyer, J., "Microbiology: Detection, Occurrence and Removal of Viruses," Journal-Water Pollution Control Federation, Vol. 54, No. 6, June, 1982.
 7. Madden, M. and Tittlebaum, M. E., "Biological Treatability of Pentachlorophenol Wastewater," Journal of Environmental Monitoring and Assessment, Vol. 4, No. 2, 1984.
 8. White, K. and Tittlebaum, M., "Statiscal Comparison of Heavy Metal Concentrations in Various Louisiana Sediments," Environmental Monitoring and Assessment, Vol. 4, No. 2, 1984.
 9. Patil, M. D., Eaton, H. C. and Tittlebaum, M. E., "Iron-57 Mossbauer Spectroscopic Studies of Fly Ash from Coal Fired Power Plants and Bottom Ash from Lignite-National Gas Combustion," Fuel, Vol. 63, No. 6, June, 1984.
 10. Madden, M. and Tittlebaum, M., "Oxygen Uptake Rates Associated with Biological Treatment of Pentachlorophenol Wastewater," Journal of Environmental Science and Health, Vol. A19, No. 3, 1984.
 11. Madden, M., Tittlebaum, M., and Field, S., "Microbial Substrate Utilization Inhibition by Pentachlorophenol Wood Preservative Wastewaters," Toxicity Screening Procedures Using Bacterial Systems, Edited by D. Liu and B. Dutka, Marcell Dekker, Inc., New York, 1984.
 12. Tittlebaum, M., Seals, R. and Cartledge, F., "State -of-the-Art on Stabilization/Solidification of Hazardous Organic Liquid Wastes and Sludges," CRC Critical Review Journal, Vol. 15, Issue 2, March, 1985.

13. White, K. and Tittlebaum, M., "Heavy Metal Distribution and Relative Contamination in Louisiana Bottom Sediments," ASCE Environmental Engineering Journal, Vol. 111, No. 2, April, 1985.
14. Garcez, I. and Tittlerbaum, M., "Investigation of Leachability of Subbituminous Fly Ash Enhanced Road Base Material," Fly Ash and Coal Conversion By-products: Characterization, Utilization, and Disposal I, Materials Research Society Symposia Proceedings, Vol. 43, 1985.
15. Eisenberg, S., Tittlebaum, M., Eaton, H. and Soroczak, M., "Chemical Characteristics of Selected Fly Ash Leachates," Journal of Environmental Science and Health, Vol. A21(4), pp. 383-402, 1986.
16. Walsh, M., Eaton, H., Tittlebaum, M., Cartledge, F., and Chalasani, D., "The Effect of Two Organic Compounds on a Portland Cement-Based Stabilization Matrix," Hazardous Wastes and Hazardous Materials, Vol. 3, No. 1, 1986.
17. Chalasani, D., Cartledge, F., Eaton, H., Tittlebaum, M., and Walsh, M., "The Effects of Ethylene Glycol on a Cement-Based Solidification Process," Hazardous Wastes and Hazardous Materials, Vol. 3, No. 1, 1986.
18. Tittlebaum, M. E., "Solid and Hazardous Wastes and Water Quality," Journal - Water Pollution Control Federation, Vol. 58, No. 6, June 1986.
19. Eaton, H., Walsh, M., Tittlebaum, M., Cartledge, F. and Chalasani, D., "Organic Interference of Stabilization/Solidification of Hazardous Wastes," Environmental Monitoring and Assessment, in press.
20. Tittlebaum, M. E., Eaton, H. C., Cartledge, F. K., Walsh, M. B. and Roy, A., "Procedures for Characterizing Effects of Organics on Solidification/Stabilization of Hazardous Wastes," Hazardous and Industrial Waste Testing and Disposal, Vol. 6, ASTM STP 933, D. Lorenzen, R. A. Conway, L. P. Jackson, A. Hamza, C. L. Perket and W. J. Lacy, Eds., American Society for Testing and Materials, Philadelphia, 1986, pp.308-318, 1986.
21. Skipper, D.G., Eaton, H. C., Cartledge, F. K. and Tittlebaum, M., E., "Scanning Electron Microscopy/Energy Dispersive X-ray Analysis of Type 1 Portland Cement Pastes Containing Parachlorophenol," Cement and Concrete Research, Vol. 17, No.6, 1987.
22. Skipper, D. G., Eaton, H. C., Cartledge, F. K. and

Tittlebaum, M. E., "The Microscopic Fracture Morphology of Hardened Type 1 Portland Cement Paste Containing Parachlorophenol," Hazardous Waste and Hazardous Materials, accepted for publication.

23. Sheffield, A., Makena, S., Tittlebaum, M., Eaton, H. and Cartledge, F., "The Effects of Three Organics on Selected Physical Properties of Type 1 Portland Cement," Hazardous Waste and Hazardous Materials, Vol. 4, No.3, 1987
24. Tittlebaum, M. E., "Solid and Hazardous Wastes and Water Quality," Journal - Water Pollution Control Federation, Vol. 59, No.6, June, 1987.
25. Garcez, I. and Tittlebaum, M., "Leachability of Lignite Fly Ash Enhanced Road Base," J. Environmental Science and Health, Vol. 22, No.7, 1987.

Non-Refereed

1. Pavoni, J. L., Tittlebaum, M. E., Spencer, H. T., and Fleischman, M., "Ozonation as a Viral Disinfection Technique in Wastewater Treatment Systems," Proceedings of the First International Symposium and Exposition on Ozone for Water and Wastewater Treatment, Washington, D. C., Dec., 1973.
2. Tittlebaum, M. E. and Pavoni, J. L., "Virus Inactivation in Secondary Wastewater Treatment Plant Effluent Using Ozone," Proceedings of the Conference on Viral Survival in Water and Wastewater Systems, University of Texas, Austin, Texas, April, 1974.
3. Malone, R. F., Tittlebaum, M. E., Crane, S. M., Sanders, N. S. and Alston, S. R., "Water Related Problems in the Coastal Zone of Louisiana," Technical Report No. 7, Louisiana Water Resources Research Institute, Nov., 1980
4. Dantin, E. J., Hill, J. M., Harlow, C. A., Malone, R. F. and Tittlebaum, M. E., "Plan of Study for Evaluating the Effects of Lignite Mining in Louisiana on Water Resources," Technical Report No. 8, Louisiana Water Resources Research Institute, June, 1981.
5. Tittlebaum, M. E., Cartledge, F. and Seals, R., "Technical Feasibility of Stabilization of Hazardous Organic Wastes and Sludges," Final Report to the Hazardous Waste Research Center, LSU, February, 1983.

Presentations

1. Tittlebaum, M. E., and Spencer, H. T., "Ozone Disinfection of Viruses," Presented at the Institute of Ozone Treatment of

Sewage, University of Wisconsin, Milwaukee, Wisconsin, Nov. 1971.

2. Tittlebaum, M. E., Spencer, H. T., Pavoni, J. L., and Fleischman, M., "Ozonation as a Viral Disinfectant and Tertiary Treatment Process," International Ozone Institute, Washington, D. C., Dec., 1973.
3. Tittlebaum, M. E., "Wet Landfill: Innovative Solid Waste Disposal Technique," Presented at the joint meeting of the Kentucky-Tennessee AWWA and WPCA, Knoxville, Tennessee, Oct., 1974.
4. Tittlebaum, M. E., Hagerty, D. J., and Pavoni, J. L., "Rapid Landfill Organic Carbon Content Stabilization through Leachate Recirculation," Fifth Annual Environmental Engineering and Science Conference, Speed Scientific School, University of Louisville, Louisville, Kentucky, March, 1975.
5. Tittlebaum, M. E. and Pavoni, J. L., "The Consultant's Viewpoint on Alternative Disinfectants," Presented at the National Symposium on Wastewater Disinfection, U.S.E.P.A., Cincinnati, Ohio, Sept. 1978.
6. Tittlebaum, M. E., "Limits of Technology," AMSA National Conference on Pretreatment and Hazardous Waste Management, Albuquerque, N.M., Feb., 1982.
7. Tittlebaum, M. E., "Economics of Hazardous Waste Management," ASMA National Conference on Pretreatment and Hazardous Waste Management, Albuquerque, N. M., Feb., 1982.
8. Roy, D., Tittlebaum, M. and Jackson, R., "Destruction of Hazardous Wastes by Photolytic Ozonation," Louisiana Conference on Water Supply, Sewerage and Industrial Wastes, Louisiana Water Pollution Control Association, Monroe, La., March, 1982.
9. Patil, M. C, Eaton, H. C. and Tittlebaum, M. E., "Coal Fly Ash As Seen by Electron and Optical Microscope," Louisiana Society for Electron Microscopy, New Orleans, LA, June, 1982.
10. Patil, M. E., Eisenberg, S. H. Soroczak, M. M., Tittlebaum, M. E. and Eaton, H. C., "Surface Chemistry and Morphology of Coal Fly," Air Pollution Control Association, New Orleans, LA, June, 1982.
11. Madden, M. A., Tittlebaum, M. E., and Field, S. D., "Microbial Substrate Utilization Inhibition by Pentachlorophenol and Preservative Wastewaters," First International Symposium on

- Toxicity Testing Using Bacteria, Burlington, Ontario, May 17, 1983.
12. Tittlebaum, M. and Cartledge, F., "Applicability of Solidification to Organic Wastes, Environmental Assessment of Waste Solidification Seminar, Environment Canada, Vegreville, Alberta, Nov. 21 and 22, 1983.
 13. Garcez, I. and Tittlebaum, M., "Leacheability of FLY Ash Enhanced Road Base Materials," Materials Research Society, Boston, MA, Nov., 1984.
 14. Eaton, H., Walsh, M., Tittlebaum, M., Carledge, F. and Chalasani, D., "Microscopic Characterization of the Solidification/Stabilization of Organic Hazardous Wastes," Energy-Sources and Technology Conference and Exhibition, Dallas, TX, Feb., 1985.
 15. Garcez, I. and Tittlebaum, M., "Investigation of Leachability of Lignite Fly Ash Enhanced Road Materials," Seventh International Ash Utilization Symposium, Orlando, FL, March. 1985.
 16. Tittlebaum, M. E., "Current Research at LSU's Hazardous Waste Research Center on Solidification of Hazardous Wastes," Louisiana Department of Environmental Quality Solid Waste Management Conference, Lafayette, LA, April, 1985.
 17. Tittlebaum, M. E., "Current Research in Solidification of Hazardous Waste," Louisiana Water Pollution Control Association Annual Technical Seminar, Baton Rouge, LA, May, 1985.
 18. Eaton, H., Cartledge, F. and Tittlebaum, M., "Solidification/Stabilization of Hazardous Organic Wastes," International Conference on New Directions and Research in Waste Treatment and Residuals Management, Vancouver, B. C., June, 1985.
 19. Tittlebaun, M., Eaton, H. and Cartledge, F., "A Procedure for Characterizing Interactions of Organics with Cement: Effects of Organics on Solidification/Stabilization," Third International Symposium on Industrial and Hazardous Waste, Alexandria, Egypt, June, 1985.
 20. Tittlebaum, M. and Hendershot, P., "Optimum Treatment for Coal Pile Leachate," International Conference on New Directions and Research in Waste Treatment and Residuals Management, Vancouver, B. C., June, 1985.
 21. Cartledge, F., Chalasani, D., Eaton, H., Tittlebaum, M. and Walsh, M., "Characterization of Chemical Interactions of Organics with Cement," 5th International Conference on

Chemistry for Protection of the Environment, Leuven, Belgium, Sept., 1985.

22. Tittlebaum, M., Cartledge, F., Chalasani, D., Eaton, H. and Walsh, M., "Characterization of Chemical Interactions of Organics with cement: Effects of Organics on Solidification/Stabilization," International Conference for New Frontiers for Hazardous Waste Management, Pittsburg, PA. Sept., 1985.
23. Eaton, H. C., Tittlebaum, M. E., and Cartledge, F. K., "Techniques for Microscopic Studies of Solidification Technologies," Incineration and Treatment of Hazardous Waste, Proc. of the 11th Annual Research Symposium, Cincinnati, OH, EPA/600/79-85/028, 1985.
24. Skipper, D. G., Eaton, H. C., Cartledge, F. K. and Tittlebaum, M. E., "Scanning Electron Microscopy/Energy Dispersive X-Ray Analysis of Type I Portland Cement Pastes Containing Parachlorophenol," Proceedings of the 8th International Conference on Cement Microscopy, Orlando, Fl, April 7-10, 1986, pp. 93-107.
25. Roy, A., Eaton, H. C., Skipper, D. G., Cartledge, F. K. and Tittlebaum, M. E., "Phase Formation in Cement/Organic Mixtures," Proceedings of the 8th International Conference on Cement Microscopy, Orlando, Fl, April 7-10, 1986, pp. 47-51.
26. Eaton, H. C. Chou, A., C., Cartledge, F. K. and Tittlebaum, M. E., "A Transmission Electron Microscopy Study of the Interaction Between Type I Portland Cement and Ethylene Glycol," Proceedings of the 8th International Symposium on the Chemistry of Cement, Rio do Janeiro, 1986.
27. Tittlebaum, M. E. and Eaton, H. C., "Correlations Between the Microstructure and Measured Physical Properties of Solidified Organic Hazardous Wastes," 3rd International Symposium on Operating European Hazardous Waste Management Facilities, Odense, Denmark, Sept. 1986.
28. Sheffield, A. and Tittlebaum, M., "Techniques Utilized to Evaluate Solidification/Stabilization of Organics," American Institute of Chemical Engineers National Meeting, Houston, TX, April, 1987.
29. Sheffield, A., Tittlebaum, M., Cartledge, F. and Eaton, H., "Dynamic Leachability of Hazardous Organic/Cement Mixtures," 4th International Symposium on Environmental Aspects of S Stabilization/Solidificatin of Hazardous and Radioactive Wastes, ASTM Committee D-34, Atlanta, GA, May, 1987.

30. Cartledge, F., Chalasani, D., Eaton, H., Roy, A. and Tittlebaum, M. E., "Mechanisms of Interaction of Phenols with Cementitious Stabilization Matrices," 4th International Symposium on Environmental Aspects of Stabilization/Solidification of Hazardous and Radioactive Wastes, ASTM Committee D-34, Atlanta, GA, May, 1987.
31. Tittlebaum, M., "Study of Morphology and Microchemistry of Solidified/Stabilized Hazardous Wastes," Thirteenth Annual Research Symposium, Land Disposal, Remedial Action, Incineration and Treatment of Hazardous Waste, USEPA, Cincinnati, OH, May, 1987.

Funded Research Grants and Contracts

Awarded

"Effects of Lignite Mining Upon the Water Resources of Northwest Louisiana," w/R. Malone, J. Hill and C. Harlow, State of Louisiana, Department of Natural Resources, 1 year, \$26,000, 1979.

"Dynamics of Bottom Sediment Pollutants," w/J. Suhayda, United States Environmental Protection Agency, 1 year, 83,5000, 1980.
 "Investigation of Algae Removal by Induced Air Flotation," Office of Water Research and Technology Allotment Grant, 1 year, \$32,783, 1980.

"Performance Evaluation of Delta Process Equipment, Inc. Individual Home Wastewater Treatment System and Marine Sanitation Device," Delta Process, Inc., 1 year, \$15,000, 1981.

"Treatability of Hazardous Materials Associated with Wood Preservatives Utilizing Mutant Bacteria," State of Louisiana Board of Regents, \$49,000, 1981.

"A Study of the Surface Chemistry of Louisiana Lignite Fly Ash," w/H. Eaton, State of Louisiana Department of Natural Resources, 6 months, \$12,154, 1982.

"Destruction of Hazardous Organic Wastes by Photolytic Ozonation," w/ D. Roy, hazardous Waste Research Center, United States Environmental Protection Agency, 1 year, \$46,780, 1982.

"An Assessment of the Technical Feasibility of Stabilization of Hazardous Organic Liquid and Sludges," w/ R. Seals, Hazardous Waste Research Center, United States Environmental Protection Agency, 1 year, \$32,433, 1982.

"Stabilization/Solidification of Hazardous Wastes and Leachates Utilizing Lignite Fly Ash," LSU Center for Energy

Studies, \$14,966, 1983.

"Identification of Bonding and Interfering Mechanisms Associated with Stabilized/Solidified Hazardous Organic Wastes," w/ R. Seals and F. Cartledge, Hazardous Waste Research Center, United States Environmental Protection Agency, 1 year, \$57,595, 1983. Refunded 1984, \$42,000; 1985 \$52,000; and 1987, \$68,000.

"Treatability of Lignite Fly Ash Leachate," Office of Water Policy, U. S. Department of the Interior, 1 year, \$22,060, 1983.

"Performance of Evaluation of Mo-Dad-1, Inc., Individual Home Wastewater Treatment System," Mo-Dad-1, Inc., 1 year, \$20,000, 1984.

"Microstructural and Microchemical Characterization of Selected Wastes," Environment Canada, \$20,000 (with H. C. Eaton and F. K. Cartledge), 1986.

"A Study of Cement Stabilized Wastes," U. S. Army Corps of Engineers, \$20,00 (with H. C. Eaton and Cartledge), 1986.

"The Interaction of Organics with Clay Minerals and Soil U. S. EPA, \$60,000 (with H. C. Eaton and F. K. Cartledge), 1986.

"Characterization of Selected Solidified Wastes," Chem Fix Technologies, Inc., \$15,000 (with H. C. Eaton and F. K. Cartledge), 1986.

"Inventory of Heavy Metal Data: Louisiana Coastal Zone," La. Department of Natural Resources, 10 mo., \$20,000, 1986.

"Characterization of Solidified Hazardous Wastes from Cementitious Fixing Agents," USEPA, HWERL, 3 years, \$160,000, 1987.

"Louisiana Water Resources Research Institute," U. S. Geological Survey, 1 year, \$105,130, 1987.

Technical Reviews

The Universities Council on Water Resources, Inc./United States Department of Interior Research Proposal Reviews, 1983, 1985, 1986, 1987.

Water Resources; Technical Paper Reviews.

CBS Educational and Professional Publishing; Holt, Rinehart and Winston; Textbook Review.

Brooks/Cole Engineering Division; Textbook Review.

USEPA, Industrial Environmental Research Laboratory;
Proposal Review.

American Academy of Environmental Engineers; Technical
Paper Reviews, 1986.

National Science Foundation; Hazardous Wastes Treatment and
Disposal Seminar, 1986.

Consulting

Enviresponse, Inc.; Edison, NJ
Delta Process Equipment; Denham Springs, LA
Mo-Dad-1, Inc; Denham Springs, LA
James M. Montgomery, Consulting Engineers; New Orleans, LA
J. J. Krebs and Sons, Consulting Engineers; New Orleans, LA
Dawson Engineers; Baton Rouge, LA
McDermott, Inc; Morgan City, LA
Ch 2M-Hill, Washington, DC
Environmental Science and Engineering; Baton Rouge; LA
Louisiana Department of Environmental Quality; Baton Rouge, LA
Shell Chemical Co., Norco, LA

Patents

Two-Stage Wastewater Treatment System for Single Family Residence,
U. S. Patent 4,664,795, May, 1987.

Professional Experience

Marty E. Tittlebaum, Associate Professor of Civil Engineering possesses expertise in the areas of water and wastewater treatment and reuse, water quality management planning, solid waste disposal, resource recovery, and hazardous waste management. He holds Bachelor of Civil Engineering, Master of Environmental Engineering and Doctor of Philosophy degrees from the University of Louisville. Previous to his association with Louisiana State University, Dr. Tittlebaum was affiliated with TenEch Environmental Consultants, Inc. as a project engineer. His primary duties were direct supervision of several engineers and engineering technicians on variety of planning and design projects. Dr. Tittlebaum was also previously employed by the United States Environmental Protection Agency as an administrative specialist and sanitary engineer in the Construction Grants Branch, Region V. His primary duties were review of all wastewater treatment plant construction sites. Dr. Tittlebaum also attended Leadership Preparation School and Engineer Officer Candidate School while serving in the U. S. Army.

In the area of water and wastewater treatment and reuse Dr. Tittlebaum has been involved in studies in such areas as virus removal from wastewater and drinking water and ozonation as a water and wastewater treatment method. He has completed investigation of innovative solid waste disposal techniques and landfill leachate treatment. He has co-authored several technical papers describing the results of various studies in which he has participated.

Dr. Tittlebaum has also been involved in water quality management planning in conjunction with the Louisville SMSA Water Quality Management Planning Study, the Mississippi and Tennessee River Basin Studies in Kentucky, and the 201 Facilities Planning Studies for Campbellsville, Danville, and Bowling Green, Kentucky. His experience with the U. S. Environmental Protection Agency has enabled him to become familiar with water quality standards, planning needs and management techniques. He has been personally involved in review and revisions to water quality standards for the states of Iowa and Tennessee.

With regard to solid waste management, Dr. Tittlebaum has served as project engineer for several associated studies for the city of Louisville Sanitation Department. These studies involved evaluation of the city's existing incineration facility and development of an incinerator operations accounting system, evaluation of the existing collection routing system, and establishment of a computer system to be utilized by the city for waste collection management.

Dr. Tittlebaum was involved in point and nonpoint source analysis portions of the Des Moines, Iowa and Grand Rapids, Michigan 208 Areawide Waste Treatment Management Plant. He also served as project engineer for the Des Moines, Iowa and Chatanooga, Tennessee 208 Studies, as well as the Iowa Statewide 208 Study. He has also completed a hazardous treatment plant final design and specifications, together with several industrial and municipal water quality sampling programs, and industrial wastewater pretreatment design and promotional activities.

Dr. Tittlebaum is currently a full member of the graduate faculty at Louisiana State University. He has taught several senior and graduate level courses in the sanitary/environmental engineering program of the Civil Engineering Department. He is also involved in curriculum development, supervision of several graduate students in curriculum development, supervision of several graduate students in curriculum development, supervision of several graduate

students and research proposal preparation. His primary areas of emphasis are hazardous waste management and unit operations for wastewater treatment. Presently he serves as Director of the Louisiana Water Resources Research Institute and is responsible for administering and overseeing the work of the Institute. This work includes promotion of water resources research including obtaining and administering research funds and technology transfer. It also involves promotion of graduate work and advanced training in the broad area of water resources.

Dr. Tittlebaum's recent research efforts include evaluation of an innovative aerobic treatment process, biological treatment of wood preservative wastes, an investigation of algae removal for ponds and wastewater lagoons, and stabilization/solidification of hazardous organics. He is also involved in a number of lignite coal fly ash utilization studies.

Dr. Tittlebaum has also served as a consultant, expert witness and technical advisor to several Louisiana Police Juries and citizen groups with regard to hazardous waste treatment and disposal facilities permit applications. He has reviewed technical data and applications for both surface and sub-surface facilities to be located in Ascension, Point Coupee, Livingston and Evangeline Parishes. In this capacity, he has had the opportunity to work closely with government agencies and concerned citizen groups.

Dr. Tittlebaum has served on an Ad Hoc Committee reviewing and evaluating new solid waste rules and regulations for the State of Louisiana, Department of Natural Resources. He is also serving on the hazardous waste research program review committee for the U. S. Army Waterways Experiment Station. He is an invited participant in a National Science Foundation sponsored workshop on hazardous waste treatment and disposal.

Dr. Tittlebaum, along with investigators from the Departments of Mechanical Engineering and Chemistry at LSU are currently involved in several hazardous waste research projects. These projects deal with stabilization/solidification of hazardous organics and decontamination of soils and are being funded by the USEPA, Environment Canada U. S. Corps of Engineers and the USEP Hazardous Waste Research Laboratory.

RESUME OF
BRENDA GAIL BRUNER KELLY

EDUCATIONAL BACKGROUND

<u>Degree</u>	<u>Institution</u>	<u>Field of Study</u>	<u>Year</u>
B.S.	University of Tennessee	Geography/ Economics	1971
M.S.	Georgia State University Clemson University	Geography Water Resources Engineering	1979

EMPLOYMENT

<u>Date</u>	<u>Position</u>	<u>Responsibilities</u>
July, 1987- Present	Assistant Director La. Water Resources Res. I. Louisiana State University 2401A CEBA Building Baton Rouge, LA 70803	Administers USGS contract; supervises office staff; develops and implements information transfer program; and conducts funded research.
Ap., 1982- Present	Technology Transfer Coord. La. Water Resources Res. I. Hazardous Waste Res. Ctr. Louisiana State University Baton Rouge, LA 70803	Develop and coordinate transfer of technical information through publications, conferences, short courses, training programs, and technical assistance.
July - Sept., 1986	Special Assignment from Present Job Office of Dean College of Engineering Louisiana State University	Assisted in development of \$21.5 million research proposal, coordinating faculty input, writing, editing, and publishing final document. Also coordinated development of 20-minute promotional video tape for soliciting industrial support for project.
Nov., 1985- Feb., 1986	Special Assignment from from Present Job Office of Secretary La. Dept. of Env. Quality P.O. Box 44066 Baton Rouge, LA 70804	Staff Assistant to the Louisiana Hazardous Waste Advisory Board. Drafted Board's report on recommendations for the alternatives to land disposal of hazardous waste for Louisiana.
Jan., 1981- Oct., 1981	Agri. Science Assoc. II Agri. Engineering Dept. Clemson University	Conducted research on the efficiencies and cost effectiveness of irrigation systems.

	Clemson University Clemson, SC 29631	of irrigation systems.
Nov., 1980- Aug., 1981	Program Development Asst. South Carolina Appalachian Council of Governments Greenville, SC	Designed and implemented a small lakes water quality study; devel- oped environmental impact state- ments and other environmental information publications.
June-Aug., 1980	Staff (Summer Employment) Systems Technol., Inc. Xenia, OH	Performed preliminary evaluation of potential sanitary landfill sites.
Aug., 1977- May, 1979	Graduate Assistant Agri. Engineering Dept. Clemson University Clemson, SC 29631	Maintained climatological and hydrological data for Clemson Research Watershed; conducted study on evaporation.
Mar., 1973- May, 1975	Graduate Assistant Geography Department Georgia State Univ. Atlanta, GA 30303	Taught undergraduate Physical Geography laboratory classes covering weather and climate, map reading, and physical land features.

PROFESSIONAL ACTIVITIES AND SOCIETIES

American Water Resources Association - Member, National and State Level
President, Louisiana Section, 1985
Membership Chairman, Louisiana Section, 1984
Program Chairman, Louisiana Section, 1984
Ground Water Technical Committee Chairman, 1986-87
Session Co-Chairman, 1986 Annual Conference

Universities Council on Water Resources - Delegate
Chairman, Public Service Committee, 1984-1985
Conference Coordinator, 1984 National Conference

Member, Ground Water Contamination Seminar Series - Planning Committee,
1985.

Member, Ground Water Symposium Planning Committee, Sponsored by the La.
Attorney General's Office, 1984.

Member, Louisiana Geological Survey's Capital Area Recharge Region Study
Advisory Committee, 1983.

Expert Witness, Louisiana Senate Committee on Natural Resources hearing on
H.B. 177 - Disposal of Hazardous Waste in Salt Domes, 1983.

Funded Research:

1. "Information Dissemination for Better Understanding of Louisiana's

Water Resources". U.S. Department of Interior, Office of Water Policy, \$12,000, 1984.

2. "Technology Transfer Program for Treatment Alternatives for Hazardous Wastes". U.S. Environmental Protection Agency - Office of Solid Waste/Treatment, Reduction and Recycling Program, \$90,000, 1984-1985.

PERSONAL INFORMATION

Address:	4513 Floynell Drive Baton Rouge, LA 70809	Date of Birth:	April 29, 1949
Telephone:	(504) 293-7031	Place of Birth:	Knoxville, TN
Hobbies:	Hiking, Tennis, Square Dancing	Citizenship:	U.S.A.

PUBLICATIONS AND PRESENTATIONS

OF

BRENDA GAIL BRUNER KELLY

Publications

"Comparison of Methods of Estimating Soil Moisture Regime," Joint authorship with E. Martin and T.V. Wilson, Proceedings: American Society of Agricultural Engineers, 1979.

Chapter 18: "Environmental, Social and Economic Impacts". 208 Areawide Water Quality Management Plan, S.C. Appalachian Council of Governments, 1981.

Small Lakes in the Appalachian Region. Joint authorship with Joe Kirk and Carroll Missimer. S.C. Appalachian Council of Governments, 1982.

"Economic Evaluation of Subsurface and Center Pivot Irrigation Systems in the Southeast Coastal Plain." Proceedings: American Society of Civil Engineers - Irrigation and Drainage Division, 1982.

Proceedings of the Symposium and Workshop on Hazardous Waste Management: Protection of Water Resources, Co-edited with Elvin J. Dantin and Roger K. Seals, L.S.U. Printing, November 1982.

1982-83 Annual Report of the Hazardous Waste Research Center. L.S.U. Printing, November 1983.

"Information Dissemination for Better Understanding of Louisiana's Water Resources". Project Completion Report, Louisiana Water Resources Research Institute, September 1984.

Reference Directory on the Treatment Alternatives for Hazardous Waste, with Elaine Eby and Stan Groves, U.S. Environmental Protection Agency, December 1984.

1984 Annual Report. Hazardous Waste Research Center, L.S.U. Printing, July 1985.

Recommendations on The Alternatives to Land Disposal of Hazardous Waste for Louisiana. A report of the Louisiana Hazardous Waste Advisory Board submitted to the Secretary, Louisiana Department of Environmental Quality, January 1986.

Five Years at the Hazardous Waste Research Center: Past Performance Summary, May 1986.

Proposal: Center for the Development of Petroleum Waste Management

Technologies, Co-editor with Harvill C. Eaton, College of Engineering, Louisiana State University, submitted to the National Science Foundation, pp. 131, September 1986.

Brochures

Pollution Solution: A Citizen's Guide to the Detecting and Reporting of Water Problems. S.C. Appalachian Council of Governments, March 1981.

Hazardous Waste Research Center. Louisiana State University Printing, April 1983, revised and reprinted 1987.

Non-Technical Articles

"Hazardous Waste Research Center Established at LSU". LSU Engineering News, College of Engineering, Vol. 14, No. 1, 1983.

Newsletter

Directions in Hazardous Waste Research, Quarterly publication of the Hazardous Waste Research Center, LSU Printing, 1982-1987.

Louisiana Water Research, publication of the Louisiana Water Resources Research Institute, LSU Printing, 1987.

Presentations

"Comparison of Methods of Predicting Evapotranspiration". Seminar, Clemson University, Clemson, South Carolina, April 1979.

"Economic Evaluation of Subsurface and Center Pivot Irrigation Systems in the Southeast Coastal Plain". American Society of Civil Engineers: Irrigation and Drainage Division Conference, July 1982.

"Technology Transfer Program of the Hazardous Waste Research Center". Presented to the HWRC Policy Board and Scientific Advisory Committee, December, 1982 and 1983.

"Research Activities at EPA's Louisiana State University Hazardous Waste Research Center - A Center of Excellence". Poster presentation at the U.S. EPA Symposium on Incineration and Land Disposal of Hazardous Waste, Cincinnati, OH, April 1985.

"Research Activities at EPA's Louisiana State University Hazardous Waste Research Center - A Center of Excellence". Poster presentation at the U.S. EPA Symposium on Incineration and Land Disposal of Hazardous Waste, Cincinnati, OH, April 1986.

Presentations(cont.)

"Activities at the Hazardous Waste Research Center, Louisiana State University", Poster presentation at the U.S. EPA Symposium on Incineration and Land Disposal of Hazardous Waste, Cincinnati, OH, May 6-8, 1987.

"Activities of the LSU Hazardous Waste Research Center", Capitol Area Groundwater Conservation Commission: Technical Committee, October 13, 1986.

"The Louisiana Water Resources Research Institute", Louisiana Environmental Health Association, January 20, 1988.

Appendix C
PUBLICATIONS LIST

PUBLICATIONS
OF THE
LOUISIANA WATER RESOURCE RESEARCH INSTITUTE

Dr. Marty E. Tittlebaum
Director

2401 A CEBA Building
Louisiana State University
Baton Rouge, Louisiana 70803
Telephone: (504) 388-8508

November 1987

LWRRRI PUBLICATIONS: Bulletins

10/87

Handbook of Basic Water Law	Bulletin 1	June 1966
The Measurement and Comparison of Costs for Alternative Water Replacement Projects	Bulletin 2	October 1966
Salt-Water Encroachment Into Aquifers	Bulletin 3	October 1968
Water-Resources Manpower Supply and Demand Patterns to 1980	Bulletin 4	May 1970
The Present and Future Ground-Water Supply of the Baton Rouge Area	Bulletin 5	February 1970
Subsidence and Ground-Water Offtake in the Baton Rouge Area	Bulletin 6	October 1970
An Economic Reappraisal of the Toledo Bend Multiple-Purpose Water Project	Bulletin 7	October 1970
Geochemical Hydrology of the Baton Rouge Aquifers	Bulletin 8	March 1972
The Mississippi River - A Water Source for Texas?	Bulletin 9	March 1973
Cyclic Storage of Fresh Water in Saline Aquifers	Bulletin 10	May 1975
Aquifers as Processing Plants for the Modification of Injected Water	Bulletin 11	August 1980
If the Old River Control Structure Fails?	Bulletin 12	September 1980
Alternate Water Sources for the Baton Rouge - New Orleans Industrial Corridor	Bulletin 12A	September 1980
A Change in the Course of the Lower Mississippi River: Description and Analysis of Some Economic Consequences	Bulletin 12B	September 1980

LWRRRI PUBLICATIONS: Technical Reports

The Recent Alluvium of Thomas and Duncan Points	Technical Report 1	June 1967
The Present and Future Ground Water Supply of the Baton Rouge Area	Technical Report 2	Sept 1967
A Summer Limnological Study of Lake Pontchartrain, Louisiana	Technical Report 3	Sept 1968
Physical, Chemical, Bacterial, and Plankton Dynamics of Lake Pontchartrain, Louisiana	Technical Report 4	Sept 1969
Epifaunal Invertebrates as Indicators of Water Quality in Southern Lake Pontchartrain, Louisiana	Technical Report 5	May 1975
Demonstration Project to Store Fresh Water in a Saline Water-bearing Formation: City of Houma, Louisiana	Technical Report 6	Feb 1979
Water Related Problems in the Coastal Zone of Louisiana	Technical Report 7	Nov 1980
Plan of Study for Evaluating the Effects of Lignite Mining in Louisiana on Water Resources	Technical Report 8	Aug 1981
Use of Twin Wells and Water-Source Heat Pumps for Energy Conservation in Louisiana	Technical Report 9	Dec 1981

10/87

LWRI PUBLICATIONS: GT Series

The Flood Control Capabilities of the Atchafalaya Basin Floodway	Bulletin GT-1	April 1967
Hydrology of Neogene Deposits in the Northern Gulf of Mexico Basin	Bulletin GT-2	April 1969
Economic Aspects of Ground- Water Basin Control	Bulletin GT-3	February 1970
Geohydrology of the Shallow Aquifers of Baton Rouge, Louisiana	Bulletin GT-4	October 1969
Possible Failure of the Low- Sill Control Structure at Old River, Louisiana: Economic and Physical Consequences	Bulletin GT-5	July 1976

PROJECT COMPLETION REPORTS

<u>TITLE</u>	<u>AUTHOR(S)</u>	<u>QUANTITY</u>
Algae Removal by Induced Air Flotation (May 1982)	Tittlebaum, Holtman	5
Application to the Principle of Maximum Entropy (POME) to Hydrologic Frequency Analysis (1984)	Singh, Rajagopal	18
Biodegradation of Hazardous Chemical Wastes (1984)	Pelon, Murray	28
Biological Removal of Chlorinated Hydrocarbons from Water (Oct 1985)	Templet	19
Chemical Quality of Surface and Sediment Pore Water in Louisiana and Mississippi Estuaries (Oct 1973)	Snowden, Otvos	1
A Continuum Mechanics Approach to Streamflow Modeling (July 1983)	V. Singh, S. Prasad, L. Ubertini	2
Co-treatment of Water Softening and Wastewater Sludges (May 1982)	Bowie, Gautreaux	6
Development of a Methodology for Evaluating Waste Disposal Sites (August 1982)	J. Hill, R. Malone, S. R. Alston	14
Development of a Simplified Chlorinated Hydrocarbon Screening Technique for Water and Sediment (August 1984)	Templet	8
A Discrete Kernel Model for Simulation of Multilayered Aquifers (1984)	Illangasekare	17
The Dispersion of Continuously Injected Effluents in Open Cannels (Feb 1973)	Harrison, Wehe	3

PROJECT COMPLETION REPORTS (Cont.)

<u>TITLE</u>	<u>AUTHOR(S)</u>	<u>QUANTITY</u>
Effect of Diverting Mississippi River Water To Texas on Sedimentation in the River (March 1974)	Alawady	2
Effect of Viscosity Ratio on the Recovery of Fresh Water Stored in Saline Aquifers (April 1977)	Kimbler, Whitehead	10
Fate of PCB and Dioxin in Louisiana's Aquatic Environment (Sept 1983)	Pardue, DeLaune, Patrick	6
Floodwater Nutrient Processing in a Louisiana Swamp Forest Receiving Agriculture Runoff (Dec 1981)	Kemp, Day	1
A Geomorphic Approach to Hydrograph Synthesis, with Potential for Application to Ungaged Watersheds (June 1983)	V. Singh	4
Hydraulic Conductivity of Rockfill (July 1983)	A. A. Hannoura, K. McManis	35 Vol I 5 Vol II
Information Dissemination for a Better Understanding of Louisiana's Water Resources (Sept 1984)	Worm	7
An Investigation Into the Removal of Algae by Fine Sand/Silt Filtration (Nov 1981)	Naghavi, Malone	8
Mathematical Models for Ungaged Watersheds with Potential for Quantifying the Effect of Land Use Changes on Streamflow (Oct 1984)	Singh	3

PROJECT COMPLETION REPORTS (Cont.)

<u>TITLE</u>	<u>AUTHOR(S)</u>	<u>QUANTITY</u>
A Method of Determining the Quality of Irrigation Water to Achieve Optimum Growth of Bottomland Hardwoods in North Louisiana (Feb 1970)	Wilson, Miller, Banks	1
A Multivariate Approach to the Investigation of Nutrient Interaction in Barataria Basin, Louisiana (April 1983)	A. Witzig, J. Day	10
Nutrient Assimilation Capacity of Shallow Coastal Lakes (1983)	Delaune, Smith, Patrick, Sarafyan	8
Optimum Treatment for Coal Pile Runoff in Louisiana (August 1984)	Hendershot, Tittlebaum	5
Oxidation of Trace Contaminants in Drinking Water (Dec 1985)	F. Groves	20
Prediction of Hydrothermal Regimes in the Proposed Darlington Reservoir (Sept 1986)	Field	2
Radioactivity in Mississippi River Water (April 1977)	Iddings, Knaus	5
Reaeration Rate Estimation Using the LAG in Dissolved Oxygen Concentration (Jan 1983)	M. Waldon	4
Reclamation of Polluted Farm Ponds (July 1977)	Robbins, Nelson	19
Reliability Analysis of BOD Kinetics in a Small Southern Stream Governed by the Discharge of an Oxidation Pond (1981)	Crane, Malone	3

PROJECT COMPLETION REPORTS (Cont.)

<u>TITLE</u>	<u>AUTHOR(S)</u>	<u>QUANTITY</u>
Role of Mycorrhizae in Land Application of Municipal Wastewaters (August 1983)	J. Robbins	5
Sucrose Removal From Cane Sugar Mill Waste Streams by Ion Exchange (Oct 1976)	F. Groves	12
THM Precursors Removal From Surface Waters Using Ozone-Hydrogen Peroxide Oxidation (July 1982)	Fernandes	10
A Trophic State Index for the Louisiana Coastal Zone (April 1983)	A. Witzig, J. Day	4
Wastewater Treatment by Ligand Exchange (June 1983)	F. Groves	5
Water Quality Variation in the Potable Water of Grand Isle, Louisiana During Periods of Water Shortage (Feb 1983)	M. B. Walsh, R. Malone, E. Dantin	5

LWRRI THESES

<u>TITLE</u>	<u>AUTHOR</u>	<u>QUANTITY</u>
Analog Simulation of Anisotropic Permeability (May 1974)	Ronald E. Rinard	1
Black Willow (Salix Nigra Marsh) as a Bioaccumulator of Radioactive Pollutants in Fresh Water Ecosystem (Dec 1976)	Lynn R. Curry	1
The Design, Construction, and Testing of Consolidated Anisotropic Sand Models (May 1972)	D. L. Hinners	1
Dispersion & Gravity Segregation of Miscible Fluids in Porous Media for Stratified Radial Flow Systems (Jan 1968)	Anil Kumar	2
Effect of Dip on the Subsurface Storage or Disposal of Fluids in Saline Aquifers (August 1975)	Joseph A. D'Amico	1
Effect of Failure of the Old River Control Structure on Municipal and Industrial Water Supplies (May 1977)	Howard J. Redmond	1
The Effect of Flux & Gravitational Forces on Miscible Displacement in a Thin Homogeneous Bed (August 1973)	Walid J. Esmail	1
The Effect of Mixed Zone Length on the Growth of Viscous Fingers During a Miscible Displacement (August 1977)	Calvin C. Barnhill	1
Effect of Viscosity Ratio on the Recovery of Fresh Water Stored in Saline Aquifers (Dec 1975)	Bipin K. Agrawal	1

LWRRRI THESES (Cont.)

<u>TITLE</u>	<u>AUTHOR</u>	<u>QUANTITY</u>
Environmental Factors Affecting the Properties & Precipitation of Coloring Colloids in Aquatic Habitats (August 1973)	Billy R. Bordelon	1
Enzyme Process Design for Water Treatment (Dec 1976)	Steven W. Johnston	1
An Evaluation of Twin Wells for Use with Water Source Heat Pumps (May 1981)	Joseph R. Buller	1
Experimental Study of Multi-Cation Diffusion in an Artificial Quartz Sandstone (Dec 1974)	Ronald K. Stoessell	2
Geological Factors Influencing Recharge to the Baton Rouge Ground-water System, with Emphasis on the Citronelle Formation (August 1967)	Brian E. Parsons	2
The Influence of Brackish-Water Intrusion on Macro-invertebrate Associations of the Lower Tchefuncte River, Louisiana (August 1975)	Maureen M. Mulino	2
Investigation of the Technical Feasibility of Storing Fresh Water in Saline Aquifers (August 1966)	Omar J. Esmail	1
Measurement of & Calibration for Gamma Spectroscopy of Mississippi River Water (August 1976)	Orren W. Williams	1
The Relationship Between the Presence of Dissolution Features at the Salt-Caprock Interface & Saline Plumes in Aquifers Surrounding Salt Domes (Dec 1982)	Martin L. Wouch	2

LWRRRI THESES (Cont.)

<u>TITLE</u>	<u>AUTHOR</u>	<u>QUANTITY</u>
The Simulation of Whole Core Permeameter Flow Geometry (August 1974)	Louis O. Chemin Jr.	1
A Study of the Technical and Economic Feasibility of Using Sewage Effluent for Irrigation in Lincoln Parish (August 1967)	Robert P. Cantrell	5
A Study of the Technical and Economic Feasibility of Using Sewage Effluent for Irrigation in Quachita Parish (Nov 1968)	Fernando A. Calvo	2
A Technique for Irrigating Bottomland Hardwood Trees with Papermill Effluent in North Louisiana (May 1970)	Ishtiaq Ahmed	6
The Transport of Chlorinated Hydrocarbons in Dilute Aqueous Solution Through Saturated Cohesive Deposits of Southern Louisiana (August 1987)	Laqique Haider	1
Unequal Density Miscible Displacement in Thin Homogeneous Tilted Beds (Dec 1971)	Thomas R. Painter	1
The Use of Bounding Wells to Control Flux in Underground Water Storage Projects (August 1974)	Edmond J. Langhettee	1
The Use of Bounding Wells to Counteract the Effects of Gravity in Dipping Aquifers (May 1978)	Thomas E. Williams	1
Use of Bounding Wells to Negate the Effects of Gravity and Pre-Existing Groundwater Movement in Dipping Aquifers Used for Storage (August 1979)	Paul J. Abadie	1

LWRI THESES (Cont.)

<u>TITLE</u>	<u>AUTHOR</u>	<u>QUANTITY</u>
Zonation of Lake Pontchartrain Invertebrates in a Polluted New Orleans Outfall Canal (August 1978)	Michael F. Rayle	2

LWRI DISSERTATIONS

<u>TITLE</u>	<u>AUTHOR</u>	<u>QUANTITY</u>
Discharge Model of the Mississippi River Evaluation of the Impact of Diversion of Water to Texas (May 1972)	O. Arguello	1
Economic Aspect of Ground-Water Basin Control (May 1979)	Larry Falk	1
Storage of Fresh Water in Saline Aquifers Using a Well Field (August 1974)	W. Whitehead	1
Geochemical Hydrology of Ground Water in Baton Rouge, Louisiana (Jan 1971)	Rashid A. Khan	3
Movement in an ACHM Overlay in the Vicinity of Overlaid Joints on a PCC Pavement (1978)	Terry J. Dantin	1

Appendix D
PROGRAM
FIRST ANNUAL RESEARCH SYMPOSIUM

Appendix E
LWRI INFORMATION/FACT SHEET

ABOUT THE INSTITUTE

September 23, 1987

Established: 1964 by the Federal Water Resources Research Act

Purpose: To encourage original, purposeful water research and simultaneously to promote graduate work and advanced training in the broad area of water resources.

To obtain and administer additional research funds to further promote protection and enhancement of Louisiana's water resources.

To make the results of research available to the public through publications and special activities as conferences, workshops and training programs.

Organization: The Institute has a permanent staff of three: the Director, Assistant Director, and Staff Assistant. These staff members are assisted in the administration of the federal grant program by two advisory boards: University Advisory Board and State Advisory Board.

Location: 2401A CEBA Building
College of Engineering
Louisiana State University
Baton Rouge, LA 70803
Telephone: (504) 388-8508

Research History: Research supported by the Institute is conducted by faculty of the universities and colleges of Louisiana. Historically work has been funded in the areas of surface and ground water hydrology, flooding, ground water protection, water quality management, resource planning and management, innovative technologies, and coastal and wetlands protection.

Publications: Results of research are made available to the public via a quarterly newsletter, and project technical and completion reports. Special reports and bulletins are prepared as needed to make available crucial research findings and information.