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UA3/8/1 John Robinson Professorship Report

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JOHN ROBINSON PROFESSORSHIP

December 1, 1993 - November 30, 1994 Report

Prepared by John T. Riley

The interest income received from the John Robinson Professorship for the 1993-94 period was \$2,600. (A total of \$2,100 has been received for the 1994-95 period.) These funds were used to pay undergraduate student salaries and to help secure extramural grants in support of research and educational activities in Ogden College. The projects, student researchers, and accomplishments supported by the John Robinson Professorship funds are summarized in the following paragraphs.

Working with young men and women on various research and service projects is one of the most enjoyable benefits of being a university professor. I am fortunate enough to have had a large group of outstanding young people choose to work with me on several projects during the past year. The work on these projects was supported in part by funds from the Robinson Professorship. Table 1 lists the 12 students and two visiting scientists who worked with me and some of my colleagues on 9 different research projects during the last 12 months. It should be noted that most of these students received academic credit for their research efforts, thus generating credit hours (and degrees) for the University.

The success of research projects can be measured by the quality and quantity of research papers presented at professional meetings and published in scientific journals and proceedings. John T. Riley, his students and colleagues presented a total of 12 papers at scientific meetings in 1994. These papers are summarized in Table 2. A total of 6 papers and final technical reports coauthored by John T. Riley, colleagues and students were published or submitted for publication during the reporting period. These papers are listed in Table 3.

One of the most fruitful uses of the funds from the John Robinson Professorship has been to offer them as matching funds in proposals to external agencies to acquire additional research support and equipment. In the last 12 months John T. Riley, either as a project director or co-principal investigator, obtained 10 grants with a total value of \$571,812 in external funds. (Dr. Wei-Ping Pan is the project director on 6 of these grants). The sources of these grants were 5 federal or state agencies and two private companies. An internal grant for \$2,000 from the President's Unrestricted Fund was also obtained for help in establishing a laboratory for the on-line analysis of flue gases from our FBC laboratory combustor. All these funds, as well as income from the Coal and Fuel Laboratory, are needed to support the various projects listed in Table 1 and other activities in the Lab. The external grants received during the last 12 months are listed in Table 4.

The pool of student researchers and state-of-the-art instrumentation acquired through research grants make it possible for the Coal and Fuel Laboratory to provide analytical services to various classes and research groups at Western. During the period from December 1, 1993 to November 30, 1994, John T. Riley and students provided free analytical services valued at

over \$20,262 to 9 different professors and their students. These services provided valuable data used by the professors and students in their classroom work, presentations, and publications.

Finally, four M.S. theses resulting from research projects conducted by students in the Coal and Fuel Lab were completed in 1994. Over the last two years these research projects were supported in part with funds from the Robinson Professorship. The theses are listed in Table 5.

I believe the interest income from the John Robinson Professorship has been used diligently over the last 12 months. I am truly grateful for these funds, and I know the young scientists who work with me on the various research projects appreciate the opportunities provided by this support.

John T. Riley
John T. Riley

12/1/1994
Date

Table 1. Research Projects and Students Supported by the Robinson Professorship from Dec. 1, 1993 to Nov. 30, 1994

No. Project Title

1. Co-Firing Refuse Fuels with Coal
2. Development of an Instrumental Method for Coal Sulfur Forms
3. Speciation of Coal Sulfur Forms in Coal
4. Inductively Coupled Plasma-Atomic Emission Spectroscopic (ICP-AES) Analysis of Solids/Water Slurries
5. Prediction of Ash Fusion and Ash Viscosity Temperatures from Elemental Composition
6. Major, Minor, and Trace Element Compositions in Composted Materials
7. Blood Serum Ion Alteration in Channel Catfish as a Function of Acute Temperature Changes
8. Development of a Method for Determining Forms of Carbon in Coal Utilization Residues
9. Surface Analysis Applications Using a Glow Discharge-Optical Emission Spectrometer (GDS-OES)

<u>Researchers</u>	<u>Classification</u>	<u>Major</u>	<u>Hometown</u>	<u>Project Nos.</u>
Michelle Lewis	senior	biochemistry	Bowling Green, KY	5,7
Mike Wilhite	senior	biology	Calhoun, KY	6,7
Karen Prow	senior	environ. sci.	Bowling Green, KY	6
David Edmonds	sophomore	biochemistry	Shepherdsville, KY	6
Kara Kleeman	sophomore	chemistry	Tell City, IN	5,6,8
Matt Renfrow	sophomore	chemistry	Bowling Green, KY	4,6
Jody Riley	freshman	biology	Bowling Green, KY	4,6
Keith Miller	freshman	chemistry	Bowling Green, KY	1
Sandra Morris	grad student	chemistry	Hawesville, KY	9
Bruce Wang	grad student	chemistry	Shanghai, PROC	4
Aiping Wu	grad student	chemistry	Guangzhou, PROC	9
Weihao Wang	grad student	chemistry	Shanghai, PROC	3
Xiaonan Fan	visiting prof.	chemistry	Huainan, PROC	1,2,6,8
Min Guo	visiting prof.	chemistry	Beijing, PROC	2,5

*1st Gen Phd (M.A.)
Dental School*

January 1, 1994

Table 2. Papers Presented by J.T. Riley and Students or Colleagues at Professional Meetings from December 1, 1993 to Present

- 1 paper at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, IL, February 27 - March 4, 1994
- 7 papers at the 23rd Annual WKU Sigma Xi Research Conference, March 31 - April 1, 1994
- 2 papers at the Southeast Regional ACS Meeting, Birmingham, AL, October 16-19, 1994
- 2 papers at the 80th Annual KAS Meeting in Paducah, KY, November 3-5, 1994

Table 3. Publication Activity from December 1, 1993 to Present

1. J.T. Riley, S.C. Burris, J.M. Stidam, A. Wu, and D. Zhang, "Utilization of Elemental Analyzers in University Laboratories," American Laboratory, 1994, 26(15), 15-20.
2. J.T. Riley and W.P. Pan, "Co-Firing Biomass Fuels with Coal," TVA Contract No. TV-87743V, Final Technical Report, April 28, 1994.
3. J.T. Riley and W.P. Pan, "Combination Fuels for Fluidized Bed Combustion Systems, Kentucky Department of Natural Resources, Division of Energy, Contract No. 12-34-595-(JOO-E415-05), Final Technical Report, April, 1994.
4. J.T. Riley and L.W. Rosendale, ASTM Standard Test Method D 5373 "Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Laboratory Samples of Coal and Coke," Annual Book of ASTM Standards, Vol. 5.05, American Society for Testing and Materials, Philadelphia, PA, 1993, pp. 483-486.
5. S.L. Thomas and J.T. Riley "Fungal Desulfurization of Coal," submitted to Energy & Fuels.
6. T.K. Green, L.Wang, W.H. Wang, and J.T. Riley, "Cleavage of Sulfur-Carbon Bonds in Coal at Ambient Temperatru. Methylation of 4,4'-Dimethyldibenzylsulfide," submitted to Journal of Organic Chemistry.

Table 4. Externally Funded Projects; December 1, 1993 to Present (* Denotes Project Director)

<u>Project Name</u>	<u>Funding Agency</u>	<u>Starting Date</u>	<u>Duration</u>	<u>External Funds</u>
I. With JTR as Project Director				
Upgrade of an XRF Spectrometer (J.T. Riley*, W.P. Pan, D.L. Harper, and L.L. Pesterfield)	NSF-RUI	12/20/93	2 yrs.	25,310
Utilization of Elemental Analyzers in Multidisciplinary Research Projects (J.T. Riley*, W.P. Pan, and L.B. Hughes)	LECO Corp.	6/1/94	2 yrs.	30,955
Surface Analysis Applications and Research with a Glow Discharge Spectrometer (J.T. Riley*, D.L. Harper, and W.P. Pan)	LECO Corp.	9/1/94	2 yrs.	101,900
II. With JTR as Co-Principal Investigator				
Behavior of Chlorine During Coal Combustion in AFBC Systems (W.P. Pan* and J.T. Riley)	EPRI/ICCI	3/15/94	1 yr.	114,980
Acquisition of a Quadrupole Mass Spectrometer (W.P. Pan*, J.T. Riley, and D.W. Slocum)	NSF-RUI	3/94	2 yrs.	31,827
Co-Firing High Sulfur Coals with Refuse Derived Fuels (W.P. Pan*, J.T. Riley, and W.G. Lloyd)	USDOE	9/1/94	2 yrs.	139,940
Application of Differential Scanning Calorimetry and Fourier Transform Infrared Spectroscopy to Planetary Surface Exploration (W.P. Pan* and J.T. Riley)	KY Space Grant Con.	7/1/94	1 yr.	10,000
Utilization of Optical Microscopy/Image Analysis in Multidisciplinary Research Projects (W.P. Pan*, J.T. Riley, D.L. Harper, and C. Lee)	LECO Corp.	10/13/94	1 yr.	20,900

Table 4. Externally Funded Projects; December 1, 1993 to Present (continued)

<u>Project Name</u>	<u>Funding Agency</u>	<u>Starting Date</u>	<u>Duration</u>	<u>External Funds</u>
Huntsman Thermal Analysis Summer Fellowships (W.P. Pan*, J.T. Riley, and C. Lee)	Huntsman Pkging. Corp.	10/94	5 yrs.	30,000
Multidisciplinary Incorporation of Scanning Electron Microscopy into the Undergraduate Biological and Physical Science Curriculum (N.S. Dawson*, D.W. Kuehn, D.L. Harper, C. Groves, W.P. Pan, and J.T. Riley)	NSF-ILI	8/15/94	2 yrs.	66,000

Table 5. Theses Completed in 1994

1. S.M. Myers, "Electrochemical Detection of Aliphatic Sulfur Compounds in Liquid Coal Extracts," M.S. Thesis, Chem. Dept., WKU, 1994.
2. B. Wang, "ICP Analysis of Solids/Water Slurries," M.S. Thesis, Chem. Dept., WKU, 1994.
3. A. Wu, "Controlled Oxidation Studies of Coal/Refuse Fuel Blends," M.S. Thesis, Chem. Dept., WKU, 1994.
4. W. Wang, "Speciation of Sulfur Forms in Coal," M.S. Thesis, Chem. Dept., WKU, 1994.