PUERTO RICO WATER RESOURCES AND ENVIRONMENTAL RESEARCH INSTITUTE

104B SECTION RESEARCH PROGRAM

4th Quarterly Progress Report

Date of the report: March 26, 2007 **For Quarter Ending:** April 1 , 2007

Project Tittle: 'Use of Waste Tire Crumb Rubber to Remove Inorganic and PAHs Species from Aqueous Solutions'

Name of Contact (PI): Oscar Perales-Perez

Telephone: 1-787-8324040 (3087) **Fax:** 1-787-265-8016

E-mail: operalesperez@yahoo.com

Names of Co-PI: Felix Roman

Percentage of work completed in this period (%): 15%

Accumulative Percentage of work completed (%): 75%

Completion Date:

Project status: Scheduled ___ Suspended _X__ Delayed ___ Cancelled ___ Completed
Activities progress: (according to work schedule submitted with application)

Task #	Major Activity	Date started	% Completed	Estimated date of completion	Date Completed	Dependant on task(s)
01	Chemical (acid) activation of crumb rubber (preliminary tests)	April 3rd, 2006	90	May, 2007		Reparation of ICP-AOS system
02	Sorption of phenanthrene at pH 6	February 20, 2007	50	June 15, 2007		
03	Calibration of GC/MS system for phenanthrene determination	February 1, 2007	90	April 2007		
04	Calibration of GC/MS system for acenaphthylene determination	March 1, 2007	50	May 31, 2007		
05	Sorption of naphthalene by crumb rubber	November 1, 2006	80	May, 2007		

Summary of Progress on Project this Quarter: The progress can be summarized as follows:

- A BET specific surface area analyzer and a pH-stat unit (to control pH during sorption tests) have been purchased with ADS-PR funds. The equipments arrived to our labs on February 2007 and are in the process of installation.
- Preliminary sorption tests of naphthalene from aqueous solutions using mesh 14-20 crumb rubber suggest a very fast sorption. The concentration of naphthalene, measured by GC-MS, decreased from 0.9 ppm to 0.037 ppm after 24 hours of contact at room-temperature.
- GC/MS was capable to detect phenanthrene concentrations in water from 0.5 ppm to 0.005 ppm.
- Preliminary sorption tests of phenanthrene (initial concentration 500 ppb) from aqueous solutions using mesh 14-20 crumb rubber at pH 6 suggest a very fast sorption for a crumb rubber concentration of 10 g/L and 5 g/L. The removal efficiency was as high as 99% in the first 90 minutes of contact. The sorption rate was delayed for lower amounts of crumb rubber; 28 hours were required to reach equilibrium when a crumb rubber concentration as low as 0.1 g/L was used.
- The parameters of the Langmuir and Freundlich isotherms were determined for the sorption of phenanthrene.
- The optimum GC-MS protocol for determination of acenaphthylene was determined. This protocol will be used in the sorption tests to be reported at the end of the project.
- Our last results were reported in 'La Gaceta Colegial' (Enero-febrero, 2007) and 'Dialogo' (Febrero-Marzo, 2007).
- A radial interview at the University Radio system was aired on December 2006.
- Posters and oral presentations of our work were included in last EXPOCHEM (UPRM), PRISM (March 2007, Bayamon, PR).
- Our work has been presented at the last ACS National Meeting in Chicago, March 26-30, 2007.
- A peer-reviewed technical book paper has been submitted for publication in Cleantech. A poster presentation will also be part of our participation at Cleantech (May 24-26, 2007, Santa Barbara, CA).
- Collaboration with the AAA has been established. The use of crumb rubber will be evaluated at the Mayaguez Water Treatment Facility. The project started this March 2007.

Problems encountered and/or assistance need:

- Damages on ICP-OES and GC-MS have not been solved. However, we are using available instrumentation in the instruction lab at the department of Chemistry to evaluate our experiments. Ongoing efforts are focused on the complete reparation of the GC-MS unit.
- Despite reported problems and thanks to the support from the instructional lab at the department of Chemistry, we continued with our research activities.

- Based on the above reported unforeseen events, detailed in the attached letter, we respectfully request the extension of the duration of our project in order to complete expected work.

Certifications:
As the Principal Investigator, I certify that the information contained within this quarterly report accurately reflects the status of this project.

Dr Oscar Perales-Perez, PI March 26, 2007
Associate Professor