

Dear Alumni,

Great news! K-State's Geology Department has now assembled all of the resources needed to move forward with the purchase of a new X-Ray Diffractometer (XRD). This has been made possible by a generous donation from the Alumni Council, a separate donation from Paul and Deana Strunk and co-funding from the K-State College of Art & Sciences Large Equipment fund.

As you can imagine, we are over the moon by this development! State-of-the-art equipment is essential to a modern earth science program and this acquisition will enhance significantly the instructional environment and research capability of our department.

The instrument we intend to purchase is a PANalytical Empyrean multi-purpose x-ray diffractometer. This is a top-of-the-line instrument that is ideally suited for a wide variety of sample types, ranging from bulk powders to large samples, minute inclusions in large specimens and liquids. This means it will be able to support a wide range of potential users across the department. One particular advance of this instrument, relative to earlier models, is that it will enable study of samples at pressures and temperatures relevant to reactions of interest, rather than being limited to ambient P and T.

The instrument will enhance both the research and educational missions of the department. It will allow our students to have hands-on experience of using a cutting-edge research tool and to perform detailed quantitative and qualitative analyses of geologic materials in house. Just a few of the research areas that will benefit from this acquisition include:

- bioavailability and mobilization of toxic trace metals (e.g. Se, W, As, Mn) in soils and environmental wastes;
- *in situ* rock fracture propagation study and studying thermal expansion of core plugs;
- applications to petroleum geology, such as analysis of zeolites from alteration of volcanic ash deposits, clay-mineral diagenesis and the occurrence of heavy minerals in shales.
- mineral sequestration and biomineralization processes;
- modeling CO<sub>2</sub> sequestration in saline aquifer and depleted oil reservoir to evaluate regional CO<sub>2</sub> sequestration potential.

We will be working to purchase and install the new instrument in Thompson 103 over the spring and summer, and aim to have it fully functional by the fall.

On behalf of the whole department, please accept my thanks to you all for your continuing support.

Pamela Kempton  
Professor and Head  
K-State Department of Geology