

## **Lamont-Doherty Itrax core scanner**

### **Serial #4042**

#### NOTES ON ABBREVIATIONS:

kV = kilovolts (x-ray tube voltage); mA = milliamps (x-ray tube current)

#### DATA:

The data produced by the Itrax is reported as 'counts' (peak area integrals) of elements, Al thru U, and can be converted to concentrations with proper calibration, done separately. \*\*

#### DIFFERENT TUBES AVAILABLE:

The Lamont Itrax has three x-ray tubes with different anodes to choose from; Molybdenum (Mo), Chromium (Cr) and Rhodium (Rh). The Mo-tube is used to analyze samples for heavier elements, the Cr-tube for lighter elements (Al, Si, P...) and the Rh-tube is used if you want to analyze for Molybdenum. You cannot analyze the tube element, so if you are interested in Cr, you cannot use the Cr tube.

Only one tube can be used in the machine at a time so if you would like to analyze a sample using the Mo-tube and the Cr-tube the sample would need to be run once with one tube, the tubes swapped out then the sample run with the second tube.

The top x-ray energies (kV multiplied by mA) for each tube are: Mo 3,000W; Cr 1,900W; Rh 2,200W. This is important to note when choosing your run parameters.

#### SAMPLE SIZE:

Samples to be run on the Itrax must be less than 180cm long by 12cm wide by 6cm thick. Samples must have a nearly flat surface. In order to protect the XRF sensor, the machine first does a 'surface scan' of the sample and identifies any areas that deviate from the surface height by more than a couple of millimeters. The sensor will then skip over these uncertain areas as well as up to 2cm on either side of the surface bump/crack.

#### RESOLUTION:

Our x-radiography has a resolution of 20-200 microns. To change the resolution of the x-radiograph, the 'slit' over the opening of the x-ray imager must be manually set. Higher resolution scans take up more memory (more data files) and the scan will be done in 'chunks' so the data files are not overly large. X-radiography scan time is dependent on the density of the sample and the tube being used (200-800 milliseconds per point).

XRF analysis has a resolution (step-size) of 0.2-2cm. It is important to note that, regardless of the step-size chosen for the XRF analysis, data will be recorded continuously over that interval and reported as a single data point. For example, if you set the XRF step-size to 1cm, the machine will record a continuous scan over each 1cm step but report each step as a single data point at the 0.5cm mark (0-1cm data reported as 0.5cm, 1-2cm as 1.5cm, etc.).

XRF analysis time can be as low as 2s/2mm.

The x-radiograph has a width of 20mm and XRF analysis has a width of 8mm across the sample surface.

#### X-RADIOGRAPHY:

An x-radiograph of a sample can reveal structures that are too fine for the eye to see or that are obscured by surface layers. Revealing these structures can be important when trying to correlate data.

#### LINE SCAN IMAGING:

The digital RGB line scan camera is equipped with 3x2000 pixels, 3x16 bit RGB high color definition and 50 micrometers pixel size. The camera offers up to 500 true levels per color channel. A digital contrast enhancement post-processing tool can be applied for improved image detail visibility. The included crossed polarizing filters minimize glare effects on wet surfaces.

MAGNETIC SUSCEPTIBILITY:

The Itrax is also equipped with a magnetic susceptibility meter. This data can be used to more easily correlate the Itrax data with analysis done on other instruments (ie, the Geotek MSCL).