Barkly Phosphate Niton XRF Procedures

2 Niton Portable XRF were used throughout the Barkly Phosphate Drilling program from the 22nd November to the 8th of December 2009. All 36 drill holes and samples were XRF with the following instruments:

Drill holes BTRC001 to BTRC018 was done with the Portable Analytical Solutions (PAS) hired Niton XL3t model.

Drill holes BTRC019 to BTRC036 was done using the Mantle Mining own Niton XL3t-500 model, which was just refurnished and recalibrated.

The supervising geologist, Siong Looi has been trained to use the Niton portable XRF by JBS Technology in 2006 and recently 2009 completed CSA Global in house training with the Innov-X System portable XRF Omega series. He holds a current NT Radiation Licence, No. 09180. All XRF work and procedures was done under his supervision and all instrument settings were identical for both instruments used.

The following methodology documents the procedure used during the XRF work throughout the program for both XRF instruments.

Sample Preparation

All samples from the drill hole pass through a cyclone cone splitter that was attached to the MLM Drilling rig and were collected at 1m intervals. Of the sample approximately 15% of the sample was collected into a plastic sample bag 300x450mm in dimension, typically 2-6kg in weight. Each sample bag has written on it a unique sample number, with an identical ticket book number inside.

One field assistant was in charge of making sure the sample number matches the recorded depth, recording the weight of samples (using ordinary bathroom scales) and enclosing the sample bag by folding over the opening and stapling it together. Where possible (ie if the sample wasn't too much for the sample bag) enough room was left so the sample could be shaken up and homogenise.

The second field assistance would line up the sample bags in numerical order and homogenise the sample as best as possible before taking the XRF reading and then afterwards place them in a bulk bag of 5-7 sample lots.

XRF Procedure

All XRF instrument settings done throughout the drilling program was in Soil Mode, readings displayed in PPM and for duration of at least 90 seconds. Soil mode was chosen as Phosphorous could not be detected in Mining or any other modes. 90 seconds is the minimum time required for the XRF to take a

full suite of elements. All readings below 90 seconds were rejected and retaken. Due to time constraints and the lengthy time required for each reading, in most cases only 1 reading was taken for each sample.

As there were no reliable Phosphorous standards available, no correction to the XRF readings were applied. The Niton extension with legs was used to help ease the operators comfort while taking the readings. As there was only 1 drill hole which intersect ground water, all the samples in the program had very low moisture content.

As part of the daily maintenance the shutter aperture was check to ensure it was clean. A 3M plastic film was stuck over it to help minimise dust, as there were generally little dust in the field XRF work area the use of Gladwrap over the aperture to help keep it clean was deem not necessarily.

- At the start of every hole or day the XRF trained field assistance would firstly calibrate the shutter, using the instrument's internal calibration, this take approximately 60 seconds.

- A XRF manufactures standard will then be XRF for at least 90 seconds. Initially TILL-4 (Niton medium soil standard) was used, then after GBW-7411 (Niton high soil standard). It should be noted that either of these standards are partially good for calibrating for Phosphorous (P) as the Phosphorous in the standard are too low for our purposes. As there been no prior drilling results in which to make our own standards these were the best available at the time.

- As part of instrument's data entry the standard used, the drill hole number and sample number was entered into the instrument.

- Before taking the XRF reading the operator will first shake the contents of the sample bag to help in its homogeneity. The sample bag is then placed in the ground and the Niton portable XRF instrument over it. Good contact with the sample bag and instrument was checked before the reading was taken. Once completed any detected elevated readings of Phosphorous, Uranium or Molybdenum was recorded on the sample record sheet.

- At a later date the supervising geologist would select the sample numbers in which to send away for further laboratory analysis. Those samples selected are placed into calico bags with the sample number written on them and then placed into polyweave bags containing 4-5 calico sample bags.

Post XRF Data Processing

All work here was carried out by the supervising geologist, other than the transfer of data from the XRF instrument to a laptop.

- At the end of every day data collected during the day was downloaded, copied and backed up onto cumulative spreadsheet called "**Barkly Project XRF Readings YYMMDD**".

- Here firstly the all the data was copied into the worksheet called "**Raw Data**". No modifications from the XRF instrument were made in this worksheet.

- The next worksheet was called "**Edited Data**". Here modification to the sample numbers (usually only the last 4 digits are entered in the XRF instrument) and corrected data entry errors were done.

  It is checked that all samples indeed have XRF readings and there were no outstanding samples readings. Any inconsistency or ambiguity with the work done was questioned to ensure the data was correct. This was done on a daily bases so any potential errors could be identify and corrected immediately.

  Another 2 more columns titled "**Fm**" and "**To**" were inserted into the worksheet, which corresponds to the depth of the sample. These would be cross checked with the geological logs and the sample record sheet to ensure the data is correct.

  The shutter calibrations, standards readings, rejected and miscellaneous readings were omitted from this worksheet.

- The third worksheet is "**Rejected Readings**". Data which the readings did not go for at least 90 seconds or when the one morning the XRF was reading unusually high, was cut and pasted into this worksheet.

- Forth worksheet titled "**QAQC - Standard Readings**". All shutter calibrations, standard readings and any duplicate readings of samples (that had durations of at least 90 seconds) were placed into this worksheet.

  Another 2 more columns titled "**Fm**" and "**To**" were inserted into the worksheet as well.

- The fifth worksheet was titled "**Misc Readings**", this are all readings on items and samples that we were curious of what it contained.

Once the "**Edited Data**" was completed, the data would then be copied over to "**XRF Edited for Geology Data**" worksheet in the "**Barkly Phosphate Geology**" spreadsheet.

- Here the data rows would be rearranged, base on the drill hole ID and sample depth. If the sample had multiple readings only one would be chosen, which be usually the one with the higher duration as they tends to be more accurate.

- Once the data is organised, columns "**G**" (**SAMPLE**) to "**CF**" (**Sc Error**) is copied into the "**Geology with XRF data**" worksheet and pasted after the "**Comments**"

- As a check that data has been copied correctly, column "**Q**" (EScale) in worksheet "**XRF Edited for Geology Data**", checks that the XRF sample numbers matches those with the geological logs.

- To assist with the data analysis, the XRF results of Fe %, Ca %, P%, P Error, U % and Mo % was copied and inserted in front to the Lithology in the "**Geology with XRF data**" worksheet.

  It should be noted that the Mantle Mining XRF unit gave much higher Phosphorous Error than those from PAS unit, typically 3 to 5 times higher error readings with the Mantle unit. As comparing the standards readings between the 2 units, the Mantle unit again was readings Ca much higher than the PAS unit. A quick overview shows all other elements seem on par to what we expect from the standard.

  As the XRF data was in PPM the following formula is use to get the percentages "**=(XXXXXX/1000000)*100**", where XXXXXX is the cell reference.

Throughout the data processing period numerous checks were taken to ensure the data is correct and daily backups of the work done so there would be no lost of data in event of hardware failure.

Siong Looi Dec 2009