
CORE LOGGING STANDARD OPERATING PROCEDURE

Personnel:

Diamond Drill core teching and core logging are conducted by the following personnel:

Core Logger

Core Tech

Diamond Drill Overview:

Diamond drilling is a drill designed to remove a small diameter of rock from the earth. Core teching and core logging are split into two procedures. Information on core cutting and sample shipments are also added to ensure that both core tech and core logger know what is expected.

Core Teching Procedure:

1. Load core boxes onto the core racks in ascending order within the core shack (odd numbers on top and even numbers on the bottom).
2. Ensure that the core box name and box numbers are labelled correctly. If the boxes are numbered incorrectly then correct the error and inform the driller or drill helper so that there are no further errors.
3. Double check meter tags, tags should be every 3 meters. If the meters are incorrect, inform the driller or drill helper so that they can adjust the meters at the drill.
4. Start by rotating the core so the foliation is going towards the top left, continue piecing the core together as best as possible. If the core is broken/rubbled or faulted, then continue rotating the core so the foliation is going up towards the left. The purpose of pseudo-orienting the core is to get a perfect mirror image once the core is cut.

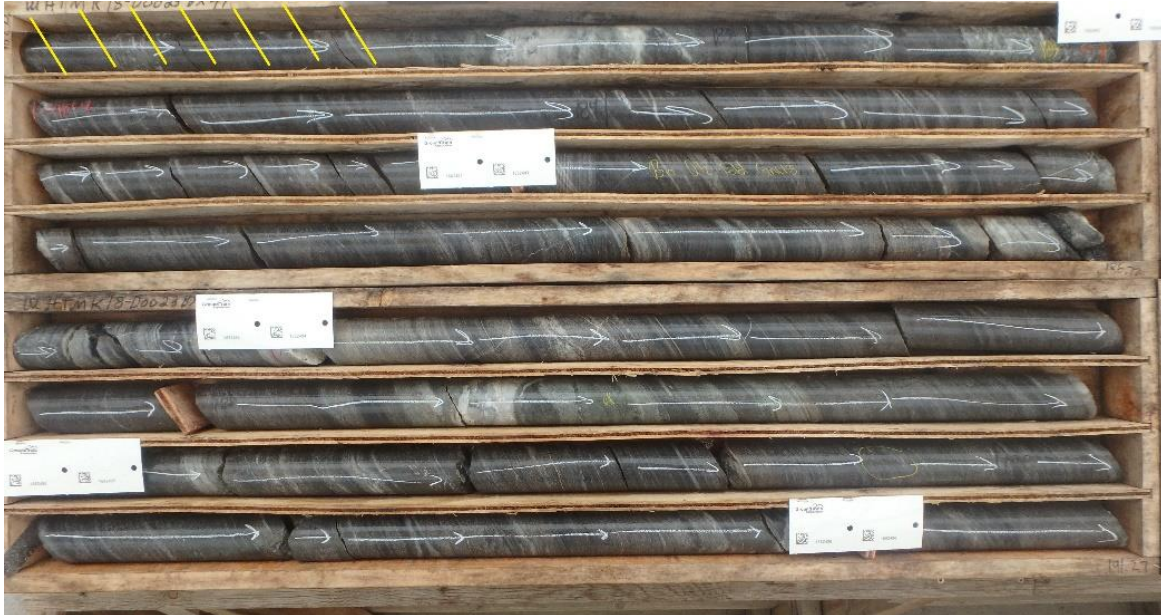


Image 1: The yellow lines in the picture show the direction of the foliation. This is the direction that the core should be oriented within the core box.

5. Total Core Recovery, Meter markings and RQD

- i. Total Core Recovery (TCR) is the sum of all measurable core recovered in a 3m (10ft) run. Using a measuring tape, measure the core from one tag block to the next tag block(3m). The length of broken core or gouge must be estimated as its true length in the ground (not as it appears spread out in the core box) and is included in the total recovery length. Do not move tags unless needed.

$$\text{Recovery (\%)} = \frac{\text{Measured Core Recovered Length(m)}}{\text{Drill Run Length (3m)}} \times 100$$

Therefore, if the sum of the measured recovered core is 2.5m and the drill run length is 3m the total core recovery would be:

$$\text{Recovery} = 2.7\text{m}/3.0\text{m} \times 100$$

$$\text{Recovery} = 90\%$$

- ii. Use the total core recovery for the meter markings, each meter between tags should be marked in black. If the total core recovery is 90%, the first meter marking will be at 0.9m mark, the second meter marking will be at 1.8m and the third at 2.7m (where the tag block is placed).



Image 2: Blue arrows showing the 3m run marked with blocks.

- iii. Rock Quality Designation (RQD) is the measured rock quality recovered from the drill hole. The RQD percent is equal to the sum of the length of the core that is 10cm or greater, divided by 3m run and multiplied by 100. With the tape measure, measure and add the core within a 3m run that are 10cm or greater. Take the sum of the pieces measured, divide by three and multiply by 100 (this is done for you within mxdeposit).
6. Enter the total core recovery and rock quality designation into mxdeposit under the Geotech tab
7. Mark the to and from on each core box (as seen in image above) using the Recovery and RQD to determine the depth reached in each core box.
8. Create core box labels (using metal tags) indicating the Hole ID, the box number and the to-from in each core box. These tags need to be stapled onto the side of the core box so that they can be identified when stacked.
9. Magnetitic Susceptibility
Using the magnetic susceptibility meter, a magnetic susceptibility reading is taken at each meter, recorded in blue on the core.
Record the magnetic susceptibility readings in the excel/google sheet.
10. Rock Density Measurements
A density measurement should be taken every new lithology and/or alteration change.
Weigh just the rock on the scale and then weigh the rock suspended in water. Take the weight of the rock suspended in water minus the volume of H₂O then take the mass of the rock and divide by that number calculated. This will give you the density (record mass of rock, mass of rock suspended in water and density of the rock). Enter this data in the excel/google sheet provided.

Core Logging Procedure:

1. Classify major and minor lithologies within the core, marking the units using yellow china marker. Draw the contacts on the core, double yellow line is a major contact and a single yellow line is a minor contact, indicating depth to the right of the contact. Write the major lithology in yellow near the top of the interval, this makes it easier to distinguish unit changes within pictures.
2. In mxdeposit indicate depth, lithology and description of the rock unit within the lithology tab. In your comments include colour, texture, alteration, mineralization and any distinguishing features of that unit (ex. Faulting, fracturing, veining etc.). Add alteration under the alteration tab determine the style of alteration and the intensity adding comments to describe the alteration further. Break out areas of higher alteration intensity from lower intensity alteration intervals. If mineralization (ex. Gold, pyrite, specular hematite etc.) are visible within the core add the mineral abundance and type under the mineralization tab. Break out areas of increased mineralization from surrounding lower abundance sections. **DO NOT** cross intervals for alteration and mineralization (alteration and mineralization should end at each lithological unit).
3. Measure foliation, fractures, faults, veins, fold etc. and enter the depth and angle into mxdeposit. Measure the structure using a protractor (determining alpha angle) and determine the depth with a measuring tape. Try to get a minimum one structure per box or every 10m.
4. Once logging is complete, determine if the hole is sampled the whole way through or if it is spot sampled. Samples should be less than 2m and greater than 5cm. Mark the samples out using red china marker, draw a line indicating where the sample starts/ends with arrows on either side to show if the sample is consecutive or not. **DO NOT SAMPLE ACROSS MAJOR LITHOLOGICAL BOUNDARIES!** Two styles of sampling are:
 - i. Spot Sampling is used when there is little to no alteration and/or mineralization within the rock. The rock is classified as “dead rock”. Take 1-2m samples randomly throughout these units trying to take at least one sample per box.
 - ii. Whole hole sampling is sampling the entire drillhole. Areas of increased alteration and mineralization should be pulled out as samples.
5. Once the samples have been marked out, enter the depths in the sample book. Ensure that the first sample taken for the hole and first page in the sample book has the drill hole name written in the book. Every 20, 40, 60, 80, 00's samples are either a blank or a standard. The order switches back and forth between the blanks and standards. Rip the tags out of the sample book and place at the end of the sample to be stapled to the core box.
6. Enter the samples into mxdeposit, ensuring that there are no errors.

7. Mark the core being sampled with white arrows indicating the downhole direction (see image 3). This is to ensure that the core is cut perpendicular to the arrows and kept in the box. The core left in the box should be a mirror image of the core being assayed.
8. Once the core has been teched, logged and sampled take wet pictures of each bench. Indicate hole number, box numbers and from-to on the white board. Try taking each picture at the same height and angle.
9. Label the photos: HoleID_box# and add the photos into mxdeposit.



Image 3: Photo indicating the red lines separating the samples with sample tags at the end of each sample. The white lines indicating the downhole direction and the half of the core with the white lines should be left in the box and the other half in the ore bag to be sampled.

Core Cutting:

- The core cutter should refer to the Rock Saw SOP for the saw and cutting instructions.
- The core in each sample interval will be cut in half (unless otherwise requested), one half will go in the corresponding sample bag with the correct sample tag and the other will stay in the box. The core should be cut perpendicular to the white arrows drawn on the core. This ensures that each half of the core is a mirror image.
- Each sample should be placed in separate ore bags ensuring that there is no mixing of samples with the sample number written on the ore bag.
- Ore bags are put into rice bags to be shipped out.

- Each Rice Bag should have the Hole ID, sample sequence, number of samples, date (month and year) and the bag number in the shipment. Note: max five samples per rice bag and double check that the QA/QC samples are in the correct rice bags.

Sample Shipments:

- Shipments generally go out every Sunday and Thursday, but there may be additional flights during the week.
- Max 27 rice bags per shipment. Each drill hole is a separate shipment and need separate COC's.
- Ensure that each ore bag is in the correct rice bag including the QA/QC samples. Write the bag number on the ore bag including the total number of bags in the shipment (bag 1 of 22).
- Zip tie, flag and put security tags on each ore bag. Use different flagging tape colours to indicate different shipments.
- The rice bags need to be weighed and the total weight of each shipment is needed for the logistics manager.
- Use the sample shipment template; fill out the sample type, the property, the security tag, sample sequence, bag number, bag weight and date that it leaves the camp. The shipment ID includes the property, year, month, day, the shipment number (generally 01 but if there are two shipments of the same sample then this number will change) and what type of sample (core vs RC). Ex: WHT20181024-01-DD
- Fill in the COC for Bureau Veritas Minerals
 - For diamond drill core samples, the rejects are to be picked up and the pulps are to be returned after 90 days at cost.
 - For RC/RAB samples, the rejects are paid disposal after 60 days and the pulps are paid disposal after 90 days.
- Print out two copies of each sheet, staple the COC to the excel sheet, get the WGO representative to sign the COC's. One copy gets filed and the other copy is placed in the first bag of the sample shipment. The rice bag with the copy of the COC should be flagged.
- Once samples have left camp send an email containing both documents to BV, the expeditor, logistics and director of exploration.
- File the sheets into the final shipments folder on the team drive.