BASE Newsletter April 2021

Dear colleagues, Barberton and Archean enthusiasts,

I just returned from a 12-day visit to South Africa where I met in Barberton on April 7 and 8 with Nic Beukes and several other key members of the drilling project in order to brief landowners and stakeholders on the drilling project and to visit the proposed drill sites with them. I am now back home in Germany (in quarantine!) and writing to bring you up to date on developments.

Stakeholder Briefing and Site Visits

Nic Beukes and Bertus Smith came from Johannesburg. We all met Rodney ("Rod") Tucker, a highly experienced operations and well site geologist (among other qualifications), who will supervise the drillers. Present for all or parts of the meeting and the site visits were landowners or representatives from Barberton Mines (site 1), Mountainlands (site 2), the Forestry company SAPPI (sites 3, 4-1, 4-2, and 4-3) and Nkomazi Wilderness (site 5). Also present was the Ecologic Control Officer (ECO) for the project, Tony Ferrar from Barberton, and the Science Liaison Officer of Mpumalanga Tourism and Parks Agency (MTPA), Johan Eksteen, as well as Astrid Christianson from Barberton Tourism.

On the first morning, Nic Beukes briefed all participants on the objectives, structure and financing of the project. The afternoon of the first day and the entire second day was spent by visiting all eight proposed drill sites in order to discuss and reach agreement on spud locations (coordinates), footprint of the operation, access roads, water supply, environmental questions, expected noise and hours of operations, permitting etc. At each site, I showed maps and cross sections and explained the objectives, in part by walking the surface projection of the proposed drill path.

We did not identify any fundamental obstacles to drilling at these proposed sites. At Site 1 (on Fairview Mine Access Road), the new manager asked us to move the site about 200m (from -25.733166°, 31.096052° to -25.734014°, 31.097478°) to a slightly larger and more remote site because the proposed site along the busy road appeared to narrow. This will add to the base of the expected stratigraphic column and possibly reduce its top somewhat but leave the core target stratigraphy unaffected. All people at site 1 will also have to go through a lengthy examination and training process in order to be allowed to work on mine property. At some sites in the SAPPI forests, we will have to clear some young eucalyptus and pine (which have grown since our 2017 visit to ca. 10-14 m height !). But all other sites are either in grassland, on level forest road junctions, in parking lots on disturbed sites, or on recently harvested forest plantations which do not pose environmental or access problems. The environmental and permitting staff with us saw no principal problems; we are therefore optimistic that they will see our applications, including the Environmental Management Plans, through without undue delay.



Sites 4-1 (distal Lomati Delta Complex; trees on either side are ca. 3.5 years old – remember our visit in 2017 ?), site 4-3 (proximal Lomati Delta Complex, recently harvested), site 5-1 (grasslands of the Nkomazi Game Reserve).

Focus on science and fundamental research

Repeatedly, it became apparent that it will be very important to distinguish and differentiate our research drilling from any drilling related to mineral exploration, in particular from active gold mining. Gold exploration, drilling and mining has a long and established tradition in the Barberton region for more than 140 years (and almost as long in the world's richest goldfields a few hour's drive away on the Witwatersrand) whereas concepts of fundamental science are far less established. Thus, in most people's perception (including politicians, admin staff, business people but also teachers, students and pupils), a drilling rig and core material are always associated with exploration, the search for gold, and subsequent activities of open-pit and subsurface gold mining with its environmental effects of pollution, business wealth, speculation, boomtown economics etc. We therefore need to stress in all our activities that our drilling is the very opposite to mining: Fundamental, curiosity-driven science in general, the search for life, the origin of photosynthesis, the history of our planet etc. In contrast to private mining activities, our actions are taxpayer-financed, our motivation transparent, and our results, including the drill core and all results, publicly viewable. The need to offset us from mining is particularly important because we will be drilling seven of the eight holes in a recently declared World Heritage Site which was declared for its geological heritage and against intensive opposition from the mining industry and the relevant government departments. We must definitely avoid any perception that our results will be used by the mining interests to strengthen their case in a dispute they have not fully lost yet.

What is a challenge is also an opportunity: We have an excellent chance to showcase the scientific discovery process through drilling activities and drilling results as they occur ("science as it happens"), except for the less accessible sites 1 and 5, and are fortunate to have not only dedicated, experienced and efficient local support (tourism, World Heritage Site staff) but also regional and national support.

Core processing, storage and display

We may be able to use a magnificent building to process (that is, to cut and describe), store and temporarily display the drill core in the central part of a former (1920s-era) historical machine hall in downtown Barberton. In its left wing, the local branch of the provincial museum is housed (where we may have a semi-permanent exhibition); in its right wing, there are several small shops, including a café. The very large hall in the center of the building is currently virtually unused. Parking, recreational parks, supermarkets, B&B-style accommodation and more shops are across the street, adjacent or within walking distance. It is the absolutely perfect site to showcase science. Nic and I have submitted a four-page proposal to use this central hall and exhibition room, and have strong local support. The

issue, however, needs to be decided by government which owns the building. In case we cannot use this hall, we have a good privately owned substitute candidate, also in central Barberton but somewhat smaller.



Left: The historic BIAS (Barberton Iron and Steel) machine hall at the mouth of Rimer's Creek in downtown Barberton. Center: Barely used central segment of this hall. Right: Main exhibition hall of the Museum, housed in the distal end of this building. Room for improvement.

Finances and Schedule; Staffing

On the financial front, we have had mixed success. Martin van Kranendonk's Australian proposal was turned down; he will rework and resubmit in August. Decisions on the British (first submission) and French, and Dutch proposal (resubmissions) are pending. All other countries represented by the Science Management Board succeeded in having proposals funded which include drilling funds. But I would ask all of you proposal writers from other countries to include a drilling contribution

Legal staff at ICDP and at UJ appear to be close to reaching an agreement on the wording of the contract regulating the transfer of the ICDP funds (to which the German DFG funding has been added). Drilling funds in a dedicated UJ account will enable Nic to negotiate, in the name of CIMERA and UJ, with the drilling companies. Nic is more qualified than I am to comment on the likely outcome and the structure of the drilling operation but it currently still appears that we may be able to start drilling in August this year and, if using two drilling rigs, would end operations already by December, January or February. Operations would thus be shorter than originally.

Drilling will probably start towards the end of the dry season. We would therefore try to drill Site 5 (Nkomazi; problematic to access when wet) first and sites 1 and 2 (next to paved roads) last. Summer rains usually start in November in this region and continue through February. However, seasonal patterns have shown more volatility in the past years. Drilling during the rainy season in the SAPPI forests would also greatly reduce the fire risk.

It is unclear how much international staff we would REALLY need to help with the core. Travel under Covid conditions is laborious and can be risky, and in weighing the pros and cons you may well decide to rather stay at home, visit the websites and read the daily reports. Nic and our Barberton geological contacts feel comfortable that they would be able to muster locals or students from UJ, Wits or Pretoria to help out. However, I would nevertheless encourage all of you who can justify their decision to travel to themselves, family and colleagues to visit the drilling operations and to allocate some time to help out with processing the core. This would possibly also give you an opportunity to help with educational and outreach activities which are currently in the planning stages by our Barberton-based EOP (Education, Outreach and Publicity) team and will include school visits, working with students at the newly founded University of Mpumalanga in Nelspruit, explaining the project to visitor groups etc. as well as take time to get to know the geology of the Barberton Greenstone Belt. Although the

climate may be sweltering during midday on some summer days, exposures will be good prior to the growth season. Outcrops along the roads, quarries and rock faces will be easily accessible so that your visit could also be combined with a field trip.

Publications; Communications

At the Science Management Board last week, we discussed ways to strengthen our communication and internal coherence. We are under ICDP regulations anyway which require the operations manager to submit daily drilling reports, monthly progress reports etc. and the lead-PIs to publish within a short time after the end of operations a comprehensive core description and operations report so that we all will use common depths, sample numbers, lithologies etc.

We recognized, however, a need to inform each other timely about our research activities (expressed e.g. in conference abstracts) and in upcoming publications. We ultimately followed Mike Tice's recommendation to adopt guidelines in use by NASA's Perseverance team.

(1) Anyone submitting a manuscript or abstract that builds on materials or data collected as a direct result of the drilling project should circulate a draft to the entire science team (about 40 persons worldwide) at least two weeks prior to submission. This rule will apply to anyone listed as a co-author on such a draft (so that, even if you are the 10th author on a manuscript and the first nine are not on the drilling project, you still need to pass the draft along). Such authors should consider requests for co-authorships from other team members who believe they contributed materially to the results. They would also be well-advised to consider comments or suggestions from other team members. The point here is not to enable vetoes, but to promote openness and fairness and help disseminate our results more quickly within the science team while we all work (more or less simultaneously) on the core.

(2) Anyone submitting a manuscript or abstract on the target units and principally about one of the central topics of the drilling proposal but not using core material (e.g. microbial mats, microfossils, tectonic settings, depositional environments etc.) should also circulate a draft to the entire science team at least two weeks prior to submission. There is no expectation of entertaining new co-authors in this case. This guideline simply acknowledges that we are all collaborators and seeks to maintain a base level of openness. (N.B.: I'll circulate some recent manuscripts because my group has worked a lot on regional Moodies recently).

(3) Seminar: Beginning one month prior to drilling, we should hold monthly online meetings open to the entire science team where we will discuss operations and present ongoing science. Anyone obtaining samples from the cores will be expected to present at least once on their planned science.

(4) During drilling and core description, the management committee should consider having meetings at about the same frequency to receive updates and to contribute to operational decisions.

(5) We will create a repository for publications exchange and archival. (I am looking for someone to manage this).

Any questions ? Don't hesitate to contact Nic Beukes or myself.

Best regards, Christoph (and Nic)