

Geological Society of Zimbabwe



Newsletter

October 2014



Prof. Nic Beukes, A.L. du Toit Memorial Lecturer, contributing to the field excursion at the Orpheus Mine, Redcliff, 26th October 2014. See Field Notes in this issue of the Newsletter. Photo: Andrew du Toit.

The Geological Society of Zimbabwe, P.O. Box CY 1719, Causeway, Harare
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Editorial

During the past few months we have staged a number of events. In late October we were privileged to host Prof. Nic Beukes for his delivery of the 33rd A.L. du Toit Memorial Lecture on the, "*Origins and paleoenvironmental significance of Precambrian sedimentary iron and manganese deposits with special reference to the history of free oxygen in the ocean and atmosphere*". Nic's prominence in the fields of iron and manganese mining and research coincided with his participation in Charles Castelin's championed field trip to Redcliff and the Ripple Creek and Orpheus iron ore mines. This field day was attended by some 90 participants, 60 of whom were students. This outcome is an encouraging pointer towards the vitality of the Society and the student's Mennell Society, and to the recovery of the Geology Department at UZ. Our thanks go to the Geological Society of South Africa and Assmang Limited for making Nic's visit possible.

Dr Wolfgang Maier presented a talk to us on "*Magmatic PGE-Cr-V-Ni-Cu ore deposits: global distribution and petrogenesis*". He is the Professor for Ore Geology at Cardiff University, Wales. His research deals with petrological and geochemical processes in mafic-ultramafic igneous systems that contribute to our understanding of continental magmatism, mantle evolution, plate tectonics and the formation of magmatic ore deposits including PGE, Ni-Cu, Cr, and V-Ti-Fe deposits.

Martin Straßburger spoke to us on the topic of "*Pre-colonial Gold Mining in Zimbabwe: A mining archaeological view*". Emphasizing the Nyanga terraced terrain as having evolved as a possible gold-concentrating mechanism, the talk was attended by a healthy representation from the Prehistory Society. Alternative views on the origin of the terraces and pit structures were debated, and it appears that open minds are required in the assessment of available archaeological evidence.

The emphasis now is on the successful outcome of the forthcoming Annual Symposium to be staged at the UZ Geology Department on 28th November. We look forward to your participation, as this is the prime chance that we have in interacting with our fellows. The programme promises high stimulation and is presented elsewhere in this Newsletter. Visitors include Ben Mapane from Namibia and Gordon Chunnnett from the GSSA, who have become firm supporters of our Symposium. .

Thanks again are due to our regular contributors. It is heartening to see the strides to recovery being made at the Geology Department, and we will watch with interest as to how the new structures within the Ministry of Mines and Mining Development will be adapted. The implications relating to the application of geology and geologists under provincial management might be viewed by us with some concern. In down-sizing the effectiveness of the Geological Survey, it is hoped that its prime function of generating, curating and disseminating geological information to the public is not lost.

Tim Broderick



Chairperson's Chat

Andrew du Toit

We are making steady progress with the various initiatives to rejuvenate your Society.

Several talks have been lined up and preparations for the Summer Symposium on 28th November at UZ are talking shape.

Date	Event	Description	Champion
19 September	Wolfgang Maier	Talk	Andrew du Toit
26 September	Martin Straßburger	Talk	Andrew du Toit
26 October	Redcliff Iron Ore Deposits	Field Trip	Charles Castelin
27 October	A.L. du Toit Memorial Lecture	Lecture	Gayle Hanssen
28 November	Summer Symposium, Harare	One day symposium	Andrew du Toit
2015	Chewore Dinosaur Footprints	Weekend Trip	Ali Ait Kaci
Sept 2016	IGC, Cape Town	Zimbabwe Trips	

The Society now has a current and functional website – check out www.geologicalsociety.org.zw. You will see the first stage of the development. The second stage is to develop an Atlas section where you will be able to log outcrops, add photographs and participate in moderated discussions. Our aim is to develop this into an open and dynamic resource that will include our field excursion guide stops. Logged outcrops will be accessible through a *Googlemaps* interface.

Our new administrator, Julie Kuhn, has the membership register up to date (see the list published on the website), and has been actively following up on membership subs. Julie is in the Society's office in the Geology Department at UZ most Wednesday afternoons if you need to drop off or collect anything.

Current Paid up Membership is as follows:

Honorary – 17; Foreign – 11; Ordinary – 53; Associate – 5; Institutional – 10

We have one Student Member from Rhodes University. However, those who are Members of the student's Mennell Society at UZ are affiliated to the Geological Society of Zimbabwe.

The Membership Form can be downloaded from the website.

The Summer Symposium this year will be in Harare, and we invite all of you to participate. Our focus will be on the mineral potential of Zimbabwe and we have lined up various specialists to share their views on the potential, opportunities and constraints related to key minerals.

Articles and Reports

GSZ Tour of Iron Ore Deposits in the Redcliff Area

Led by Charles Castelin

26th October 2014

IRON ORES

Iron-formation: A chemical sediment, typically thinly-bedded or laminated containing 15% or more iron of sedimentary origin, commonly but not necessarily containing layers of chert (James, 1954). The most common type of iron-formation is oxide facies (better known in past Zimbabwean literature as banded ironstone or jaspilite). Sulphide, carbonate and silicate-facies iron-formations exist but are not common. Iron-formation is the major source of beneficiable iron-rich material in such countries as China.

Magnetite: Composition: Fe_3O_4 . When pure it comprises 72.4% iron. One of the main sources of commercially used magnetite is from Kiruna in Sweden.

Haematite: Composition: Fe_2O_3 . When pure it comprises 70.0% iron. Currently haematite represents the main source of iron ore around the world from countries such as Brazil, South Africa and Australia.

Siderite: Composition: FeCO_3 . When pure it contains 48.2% iron. Siderite used to be a common iron ore in Europe at such mines as Eisenerz in Austria.

Limonite: This is an all-embracing name given to a complex group of hydrated oxides of iron with the general formula $\text{Fe}_2\text{O}_3 \cdot n\text{H}_2\text{O}$. Examples are Turgite: $2\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$; Goethite: $\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$; Limonite: $2\text{Fe}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$; and Xanthosiderite: $\text{Fe}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$. When pure, the most common hydrated oxide, $2\text{Fe}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$, contains 59.8% Fe. Limonite has been produced in relatively minor quantities at some satellite mines of the main haematite occurrences in Australia.

Of the four main minerals that are used around the world as iron ores only two (Haematite and Limonite) have been used in the blast furnaces at Redcliff. The main impurities occurring in iron ores are silica, alumina, manganese, calcium, magnesium, sodium, potassium, titanium, sulphur and phosphorous; those most deleterious being sulphur, phosphorous, alumina and titanium.

In estimating the actual resources of iron ore, economic and technical considerations, as well as the iron content of the rock, determine whether the deposit is classified as an 'iron ore' or an 'iron-bearing material'. Hence the definition of the term 'Iron Ore' varies with time and place. The friability of the ore is often a major consideration as good blast furnace operation requires well-sized raw material with a high compressive strength in the range 10mm to 30mm. Material, which after crushing, is below 10mm in diameter has to be discarded, sintered or pelletized. Additional requisites for iron ores used in blast furnaces are good low temperature breakdown characteristics, low phosphorous content (< 0.05%) a silica to alumina ratio greater than 2.5:1, a manganese content of $\pm 0.8\%$ and an iron content in excess of 60%.



The Geological Society field trip to Redcliff led by Charles Castelin. Ninety people, including 60 students are seen here at the Ripple Creek Mine, with Prof. Nic Beukes in attendance.

Photo: Andrew du Toit

REGIONAL GEOLOGY

The area around Redcliff is underlain by Archaean rocks of the Basement Complex. This volcano-sedimentary pile is flanked by granitic rocks of the Rhodesdale batholith in the east and the Shangani batholith in the west, both of which have components representing three major episodes of granitic activity. The first two phases are gneissic and vary in composition from granodiorite to tonalite and the third phase, which intrudes the two earlier ones, is adamellitic.

The stratigraphy of the Midlands Greenstone Belt in the Redcliff area, originally mapped by Macgregor (1937) and Tyndale-Biscoe (1949), has since been re-assessed, using lithostratigraphic units, by Cheshire *et al.*, (1979), but the threefold division of Sebakwean, Bulawayan and Shamvaian groups has been retained. The sub-division of the Bulawayan into Upper and Lower Groups as in the Belingwe Greenstone Belt (Martin, 1978) has been followed in the Redcliff area mainly because of the close similarity of the respective lithologies in the Upper part of the Bulawayan succession. However, no major unconformity between the Lower and Upper Groups, such as exists at Mberengwa, was detected in the Redcliff area (Cheshire *et al.*, 1979).

The Sebakwean Group, which is exposed some 27km south-west of Redcliff, and the Shamvaian Group 10km to the north-west, do not include any iron-formations that bear economic iron ore bodies. The Bulawayan Group was considered by Macgregor to consist of a simple syncline, the oldest members coming to the surface at the margins of the belt and the youngest being exposed in the middle. Cheshire *et al.* are in dispute with this explanation and believe that both the Lower and Upper units have an antiformal development in the far east where the rocks are intruded by Rhodesdale granites. Cross-folding causes the main trough to

plunge gently both to the north-west and south-east. The Bulawayan Group comprises the following Formations (Cheshire *et al.* 1979).

UPPER BULAWAYAN GROUP

Sunnymeade Mafic Formation

Basaltic pillow lavas with minor doleritic greenstone. Subordinate iron-formation.

Minor Unconformity

Lannes Sedimentary Formation

Immature to mature felsitic clastic sediments varying from argillite to conglomerate with greywacke, oxide and sulphide facies iron-formation and minor limestone.

Minor Unconformity

Ingwenya Mafic Formation

Massive actinolitic lava and doleritic greenstone. Basaltic pillow lava. Minor andesitic and dacitic lavas and pyroclastics.

Gradational Contact

Fife Scott Formation

Basaltic and ultramafic lavas. Ultramafic intrusions.

Faulted Contact (Minor local unconformity?)

Redcliff Jaspilite Formation

Felsitic shale and grit with minor conglomerate (re-worked pyroclastics), iron-formation and quartzite.

Minor Unconformity

LOWER BULAWAYAN GROUP

Kwekwe Felsitic Formation

Felsitic tuffs and lavas. Andesitic and dacitic pyroclastics and lavas.

Major Unconformity

The Redcliff Jaspilite Formation bears strong lithological similarities to the Manjeri Formation, which forms the base of the Upper Bulawayan Group in the Belingwe Belt. Although Cheshire *et al.* assigned the Redcliff Jaspilite Formation to the Lower Bulawayan succession in this area they entertain the possibility that, like the Manjeri Formation, it may form the basal member to the Upper Bulawayan. The writer is of the view that Cheshire's latter suggestion should be adopted. A definite unconformity, albeit minor, can be demonstrated at the base of the Redcliff Jaspilite Formation where there is an angular discordance between the bedding of these rocks and the foliation in underlying volcanics of the Kwekwe Felsitic Formation. Prendergast (2004) has demonstrated from a study of drill cores at the Hunter's Road nickel deposit that there is a gradation between volcanoclastics of the Kwekwe Felsitic Formation or Koodoovale equivalent upwards into the Manjeri-type Redcliff Jaspilite Formation.

Structure

The general fold pattern is that of a curved north-west to north-north-west trending synform and corresponding antiform. Major cross-folding on a west to north-west axis has given the greenstone belt a sinuous appearance and causes the earlier folds to plunge north and south. Renewed activity on the cross-folds gave rise to faulting close to the axial plane as illustrated by the Orpheus Fault (Cheshire *et al.*, 1979). A set of east to west compressional faults is evident in the sedimentary horizons. This faulting, which causes overlap of the iron-formation members, is probably related to the later cross-warping of the schist belt. There is the possibility that this east-west set of faults influenced the genesis of haematitic iron ore bodies.

THE RIPPLE CREEK IRON ORE DEPOSIT

Location

The Ripple Creek iron ore deposit lies on Limeridge and Ellangowan farms 17km south-west of the Zisco (New Zim Steel) Steelworks. Access to the mine is via a dirt road directly from the Steelworks, or via a narrow tar road from Hunters Road railway siding approximately 24km from Kwekwe along the main road to Gweru. The ore body is covered by 10 blocks of base metal claims (Ripple Creek 1 to 9 and Grasskop, pegged in 1961). Narrower ore horizons to the north are covered by Zisco's Dan and Mel claims. The narrow southern extension is covered by the Ripple Creek South Claims.

Stratigraphy

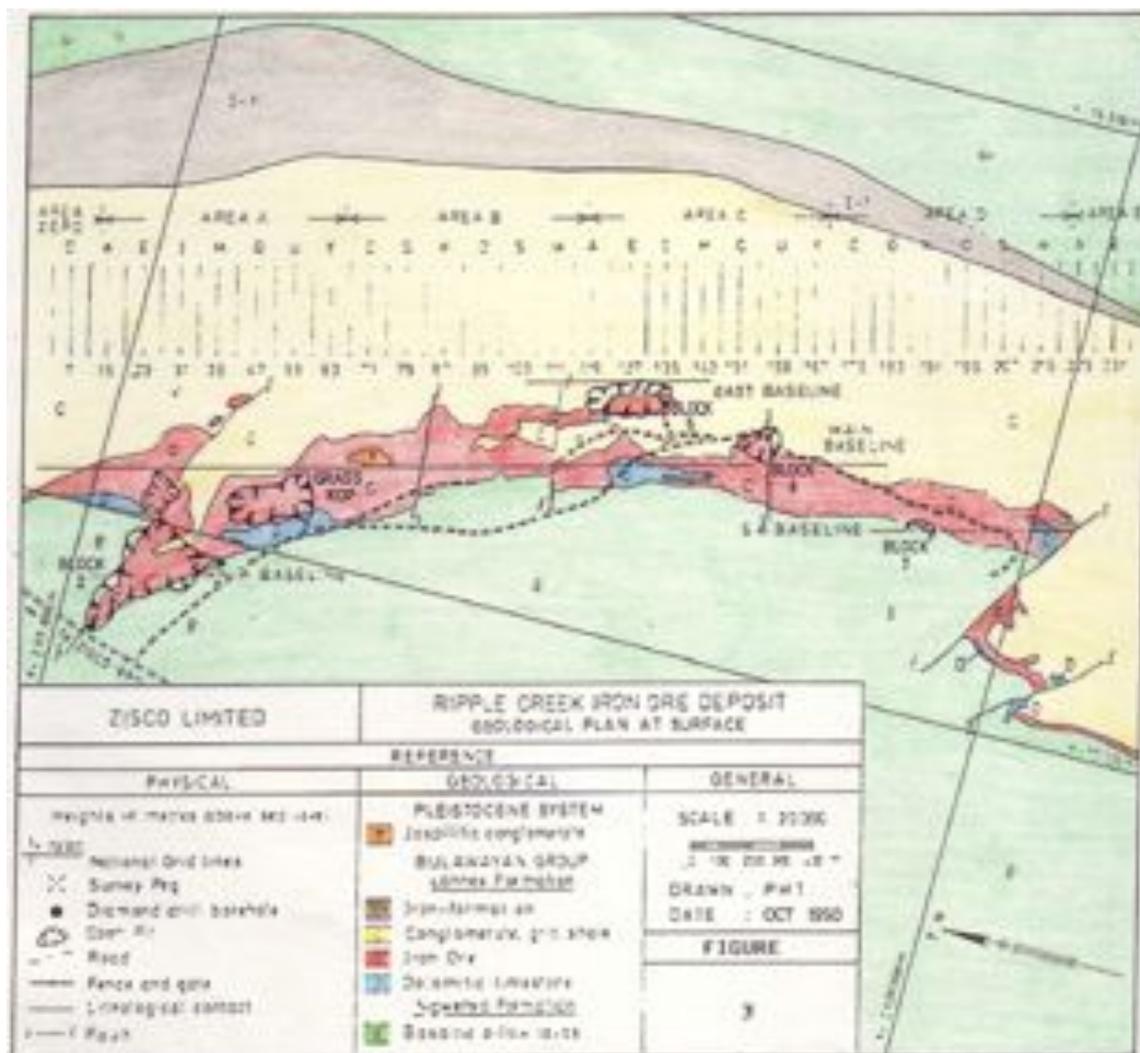
Travelling westwards from Zisco one crosses massive and pillowed lavas of the Ingwenya Mafic Formation and then basaltic lava of the uppermost part of the Bulawayan Group as the Sunnymeade Mafic Formation. The eastern limb of the intermediate Lannes Sedimentary Formation is not exposed in this area and, due to faulting that is marked by a dolerite dyke, the Sunnymeade Formation lies directly over the Ingwenya Formation. As one approaches the Ripple Creek Mine the western limb of the Lannes Formation is crossed. The Ripple Creek ore body lies near the base of the western limb of the Lannes Sedimentary Formation and is separated from the underlying lava of the Ingwenya Formation only by a thin (± 5 m) bed of felsitic shale with thin lenticular horizons of dolomitic limestone.

Ore Body Structure

The Ripple Creek iron ore deposit comprises the thickest portion of a long gossanous ore body that strikes north-west and forms a part of a 35km-long strike of gossanous rock. The main deposit has a strike length of 3.5km, an average surface width of 155m and extends to an average depth of 150m. The footwall of the deposit has a dip varying from 53° to 68° with an average dip of 61° to the north-east and is complicated structurally by several north-westerly and east-striking faults. The hanging wall contact is somewhat irregular and dips either west or east but in general has a mushroom shape caused by a westward dip at surface, which at depth changes to an easterly dip paralleling the footwall. It is uncertain whether this hanging wall contact is conformable with the overlying clastic sediments, or whether it transgresses them.

Ore Genesis and Mineralogy

The depth of the ore body at Ripple Creek is controlled by the oxide-sulphide interface, which is a reflection of the depth of weathering. The shallowest intersection of sulphide mineralization is 115 metres below surface on the hanging wall (east) side of the body. Diamond drill holes have reached sulphides at 150 metres below surface in the middle of the ore body and iron oxides have been found to persist to 210m in places in the footwall of the deposit. The oxide-sulphide contact is often sharp but is highly irregular. Inter-digitations of the two phases is common. Within the hydrated oxide zone the alteration process is complete and no pyrite remains. There is sometimes a narrow zone of incipient oxidation of the sulphide minerals and, without doubt, a supergene process controls the ore genesis.



Surface geology across the Ripple Creek Iron Claims, after Bimco reporting.

In contrast to the enrichment of oxide facies iron-formation there is little dispersion of silica during the supergene oxidation of the sulphide horizon. In fact, it would appear that a residual concentration of silica in the hydrated iron oxide occurs as the silica is higher in the limonitic gossan than in the underlying sulphides.

Drilling of the Ripple Creek deposit revealed that the water table within the ore zone is depressed in relation to the surrounding water levels. It is partly due to this phenomenon that the oxidation of the pyrite has extended to depths as great 150m from the surface. It is believed that the water table within the ore body is low due to the confining action of impermeable beds of argillite lying stratigraphically above and below the limonite-pyrite horizon and a hard-cap at surface. The hard-cap is produced by upward movement of iron-bearing water during the dry season. The iron is deposited from the solution at the surface when the water evaporates to seal the cavities in the otherwise very porous ore. The upward movement of water, and its evaporation, depletes the volume that gained entry to the ore body in the wet season, and thus an artificially lowered water table is maintained. The limonite hard-cap, furthermore, ensures that the ore body has a positive relief and this results in rapid run-off and poor permeation of meteoric water. It is also believed that the water table was at

a considerably reduced level during the Kalahari period (3–4 million years ago) and also possibly during Karoo times, thus further facilitating the depth of oxidation of the sulphides.

The ore consists predominantly of yellow to brown limonite and other subsidiary hydrated iron oxides with minor amounts of reddish-brown haematite and grey pyrolusite, and is considered to be the alteration product of a massive pyrite body or a sulphide facies iron-formation. The ore is friable, earthy and very porous and hence about 70% of it has to be sintered prior to charging into blast furnaces. The manganese tenor of the ore is variable and there is a tendency for greater concentrations to occur in the region of the footwall dolomites. The iron content of the deposit is extremely variable from almost zero in the intercalated shale bands up to 62.8%, although most of the ore zone contains over 45% Fe. The variation in iron is caused mainly by differing amounts of clastic or pyroclastic detritus within the original massive sulphides or sulphide facies iron-formation. This material remained in place during oxidation of the sulphides and thus dilutes the ore. A subsidiary cause of the variation in iron content is the relationship between the proportions of haematite and limonite. Unlike the hard haematite variety of ore found at Orpheus Mine and Buchwa, the Ripple Creek ore is generally friable. An average coarse to fines ratio is in the region of 30:70. Small areas of harder ore at a coarse to fines ratio, after crushing and screening at <31.5mm />10mm, of 50:50 exist. This material is generally more haematitic.

Exploration

Various exploration phases were undertaken across the Ripple Creek iron deposits.

Between 1962 and 1964 extensive mapping, trenching and percussion drilling were carried out. Drilling was undertaken at a spacing of 30m x 30m. A total of 24,673m of drilling on 1240 boreholes to an average depth of \pm 20m were achieved by contractors.

Between 1974 and 1975 contract diamond drilling at a spacing of 120m x 120m was performed. Sixteen holes with a total length of 2118m were drilled.

Further diamond drilling with in-house, Buchwa Iron Mining Company (Bimco), equipment took place between 1980 and 1989. This was at a spacing of 60m x 60m. 125 holes were drilled totalling 17,617m from an average depth of 141m (deepest hole: 286m). The drilling was extremely difficult due to the friable and broken nature of the ground and core recoveries were generally less than 50%.

In-fill percussion drilling with in-house (Bimco) track drills at a spacing of 30m x 15m took place throughout the 1980s. Generally depths of \pm 35m were achieved.

Ore Resources

Measured, Indicated and Inferred Geological Resources at Ripple Creek and Grass Kop as of 31st December 2007 amounted to 128.3 million metric tonnes at 52.2% Fe, 1.6% Mn and 9.9% SiO₂. Of this 111 million tonnes of ore were classified in the Measured category. Sulphur and phosphorous contents are generally <0.05%. Nickel, lead, copper and cobalt contents are below 100 ppm, and zinc and arsenic values are below 200 ppm. Selective mining has been carried out to produce ore at 53.5% Fe, 1.6% Mn and 8.0% SiO₂, in order to provide a grade acceptable to the Zisco blast furnaces. The Proved Mineable Ore Reserves at this grade at December 2007 amounted to 54 million tonnes giving a life, at Zisco's theoretical production capacity of 960,000 tonnes/annum of hot metal (liquid iron), of about 30 years. The resources are based on a cut-off of >40% Fe and <12% SiO₂.

Mining

Ore extraction at the mine is by conventional open pit methods involving drilling, blasting, loading and off-highway dump-truck or ADT haulage with a capacity to produce 160,000 tonnes/month at a stripping ratio of 1:1.5. Mining generally took place at several faces simultaneously to achieve an even blend from this very inhomogeneous ore.

Ore Processing

Ore processing at the mine includes primary jaw crushing, secondary gyratory crushing, stacking, blending and reclaiming. The secondary crushers are in closed circuit with 'banana' screens so as to ensure that all the ore is reduced to <31.5mm. The banana screens are specially designed to deal with the ore that is very 'sticky' in the rainy season. The plant has a metal detector, a tramp iron electro-magnet, a sophisticated automatic sampler and a dust suppression system. The plant is capable of treating 1000 tonnes/hour. The <31.5mm product from the two 60,000 tonne blending beds is transported to the Zisco Steelworks by means of a 500 tonne/hour 15.5km single flight steel-cord conveyor – one of the largest of its kind in the World. The 755mm-wide conveyor belt travels at 4.25 metres/second and is powered by four 250kW electric motors. At the steelworks ore and coal handling plant (ORCO) the ore is screened into two fractions (>10mm and <10 mm). The <10mm material is fed to a sinter plant and the >10mm goes to the blast furnaces. There is a tertiary crushing system and the >10mm fraction can be reduced to sinter feed if desired. The ore can be mixed with material from other sources such as Buchwa and may also be re-blended at the ORCO plant to improve homogeneity. The plant was commissioned in 1997 but has remained idle since March 2008 when the Steelworks ceased to function.

Production

Ore production commenced at Ripple Creek in 1965 when there was an output of 5114 tonnes, which was hauled by road to the steelworks. Up to the close of 2006 a total of 8,557,674 tonnes of ore had been produced. The maximum annual delivery to Zisco was in 1988 (595,728 tonnes). Mining was carried out by contracting companies such as Richard Costain (with Squirrel and Popplewell doing the blasting), Boart Drilling & Contracting and finally Gullivers up until 1992 when the task was taken over entirely by Bimco. Deliveries to the steelworks were by road until 1997, following which it was transported by means of the 15.5km overland conveyor.

THE ORPHEUS MINE

Orpheus Mine lies on Penwarden Farm approximately 8km by dirt road due south of Ziscosteel.

Geologically the deposit lies in the iron-formation of the western limb of the Redcliff Jaspilite Formation. The ore is a hard, dense, grey haematite enclosed by, and derived from, a finely banded grey and red iron-formation. It is believed that the ore is of hypogene origin although supergene processes have not been ruled out. The ore has formed by the leaching of silica-rich bands and possible infilling of iron. Faulting of the iron-formation and associated clastic sediments has taken place and separates the ore body from the nearby Beacon Tor deposit. This faulting could have played a role in the ore genesis.

It is believed that the claims were pegged in the late 1940's possibly when Zisco commenced operations in the area in 1947. The ore, which was of high grade at $\pm 65\%$ Fe and $<5\%$ SiO₂, was mined to 'sweeten' the ore from the North Hill, Central Hill and South Hill deposits

adjacent to the steelworks that were the main sources of ore for iron and steel-making from the time the plant opened to 1975. Records are not available to indicate what quantity was mined from the Orpheus and Orpheus South deposits, but it was possibly in the region of one million tonnes. Current Resources are as follows:

Orpheus: 224,000 tonnes at 62,0% Fe, 0.25 Mn and 6.0% SiO₂

Orpheus South: 367,000 tonnes.

Total: 591 000 tonnes.

In addition to haematite ore for steel-making the Orpheus Mine is the source of Red Ochre. The ochre, which is a soft, iron-stained talcose material, has been mined and pulverized by Bimco and sold as a colouring agent to various industrial users.



Tony Martin and Charles Castelin at the Old Orpheus-South opencut. Photo: A. du.Toit.

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The Great Southern African Train Geo-Safari
35th International Geological Congress – 4 to 13 September, 2016

ITINERARY

Sunday 4th September (Day 1)

Depart Cape Town at 11 am for Prince Albert Road – passes through the Hex River Pass and includes a short stop at Matjiesfontein Village.

Monday 5th September (Day 2)

Road trip across Swartberg Pass and through Meiringspoort. Overnight from Beaufort West to Kimberley.

Tuesday 6th September (Day 3)

Road trip to Barkly West, Wildebeeskuil Rock Art Centre and Kimberley's Big Hole. Overnight from Kimberley to Krugersdorp.

Wednesday 7th September (Day 4)

Optional tours to either Sterkfontein Caves and the Cradle of Humankind, or to see Witwatersrand geology and visit Gold Reef City. Overnight from the Pretoria area to Musina.

Thursday 8th September (Day 5)

Optional tours to either Mapungubwe National Park or the Sand River Gneiss exposures and Soutpansberg. Overnight from Musina to Rutenga in Zimbabwe.

Friday 9th September (Day 6)

Road trip to the Great Zimbabwe National Monument. Rejoin the train for overnight to Bulawayo via Somabhula.

Saturday 10th September (Day 7)

Visit to Rhodes Matopos National Park. Overnight by train from Bulawayo to Victoria Falls.

Sunday 11th September (Day 8)

View the Victoria Falls from both Zimbabwe and Zambia. The train stays at Victoria Falls Station.

Monday 12th September (Day 9)

Road trip to Chobe National Park in Botswana, followed by a river safari. The train stays at Victoria Falls Station.

Tuesday 13th September (Day 10)

The Geo-Safari ends and delegates make their own arrangements.

Total distance by train: 2795 km. Total distance by bus: 1493 km

Compiled from: Gavin Whitfield. *Geobulletin – Quarterly News Bulletin*. Geol. Soc S. Afr., June 2014, pp. 34-39.

Or visit: www.jbtours.co.za

News



Geology Department, University of Zimbabwe

Maideyi Meck

The situation at the Department of Geology seems to have now stabilized. It is currently running with 8 lecturers of whom 5 are PhD-holders and two have Masters degrees. Six of these staff are full-time lecturers whilst two are part-timers. The Department, however, has seen the departure of Ms Chinguno who is now with MMCZ. We now have three student streams - 27 have reached part 3, 24 are in part 2, and 42 are engaged with part 1 of the course. Over and above these students the Department serves 90 metallurgy, mining engineering and civil engineering students. However, the present student numbers fall far short of those needed to allow the Department to function effectively.

A total of 14 students have been placed on attachment with various mining companies. The Department greatly appreciates the gesture extended by these mining companies, most of whom face their own viability challenges. We are still trying to place the remainder of our students with geologically orientated companies and institutions, allowing them to get the relevant work exposure to satisfy their degree requirements.

The Mennell Society is up and running and they are organizing events for themselves. This Society has received substantial donations, advice and encouragements from the Geological Society of Zimbabwe as well as from individuals.

As a Councillor to the GSAf for the Southern African Region (2012-2016) term, Dr Meck will happily forward any geological news and views from Zimbabwe for inclusion in the GSAF newsletter.

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Note: DG – Department of Geology; GSZ – Geological Society of Zimbabwe

Other Staff Members at DG: Dr T Mulugheta; Dr T Njila; Mr T Marova; Mr G Chinoda; Ms D Mudimbu

The Professor Tom Blenkinsop UZ Geology Field Trip Fund

Following the successful presentation of the 2013 A.M. Macregor Memorial Lecture in Harare and Bulawayo, and his lead of the field trip in the Renco Mine area, Professor Tom Blenkinsop made a generous donation of \$200 to the Geological Society of Zimbabwe (GSZ). This was in support of University of Zimbabwe (UZ) geology student field trips. Over the years the UZ Geology Department has been under funded, resulting in their failure to raise sufficient money to conduct the mandatory field trips for its students. The GSZ responded by donating funds and materials from its own resources as well as from members. This assistance went towards the welfare of the geology students, especially in meeting costs for field trips.

Using the donation from Prof. Blenkinsop as seed money, the GSZ has now established the "*Professor Tom Blenkinsop UZ Geology Field Trip Fund*" to be administered by its Executive Committee. Tom has indicated an interest in supporting the Geology Department on a long term basis, not only to help in mobilizing funds for various activities, but by also providing moral and material support. Annually the students go on their main field trip, which lasts around 2 weeks with direct costs being in the range of \$6000 per class. Therefore we are appealing to all our members to donate generously to this worthy cause both in cash or in kind. Materials such as fuel and food are most welcome.

The direct benefits that accrue to the geological profession are that it ensures a properly trained graduate. Referring to the adage that the best geologist is the one who has seen the most rocks, our students need quality field trips. From these field excursions we also want to develop the Zimbabwe Geology Atlas.

Your donations, either in cash or in kind, should be forwarded to our Treasurer, Collins Mwatahwa – E-mail: cmwatahwa@Angloplat.com or to our Administrator, Julie Kuhn - E-mail: geol.soc.zimbabwe@gmail.com

THANK YOU FOR YOUR GENEROSITY

H. N. Gumbo

June 2014



ZIMBABWE

Geological Survey Department

Forbes Mugumbate

Staffing and related matters

The structure of the Geological Survey has been seriously affected by the recently approved restructuring of the Ministry of Mines and Mining Development. Sixteen posts for geologists have been removed from our establishment and transferred to provincial Mines offices. This means the Geological Survey is now left with 13 positions for geologists. Ten of these posts are filled at present.

It is still not clear how the Geological Survey will interact with those geologists who are attached to the provinces, as these will come under the authority of a Provincial Mining Director. A total of 40 geologist's and 32 geological technician posts are allocated to the 8 provincial offices. Details of how the new structure of the Ministry will work are still being debated.

The following are the major meetings / conferences recently attended by some members of staff:

- **Temba Hawadi**, Director, attended the 16th China Mining Congress and Expo in September.
- **Forbes Mugumbate**, Deputy Director, visited Australia (Queensland), Zambia and South Africa to study these country's systems for managing their mining titles.
- **Frank Muzanehamo**, Senior Geologist, attended a workshop of African Geological Surveys held in China in October.
- **Ernest Mugandani**, Principal Geologist, attended the consultative and validation workshop for the African Minerals Geoscience Initiative Project held in Addis Ababa in October.
- **Brian Muteta**, Geologist, is attending a four-month training workshop in economic geology in Japan.
- **Sibongubhle Mpindiwa**, Principal Geologist, was part of the Government delegation that went to China for Exim Bank loan negotiations.
- **Tapiwa Magidi** and **Two Kufahakurambwi**, Geologists, attended a training workshop in Remote Sensing in Botswana during November.

Projects

Regional Geochemical Mapping

Through a bilateral co-operation project with the China Geological Survey, the Department completed stream sediment geochemical sampling over an area of 24 000km² around Harare and Gweru to be recorded at a scale of 1:250 000. The samples are being analyzed in China.

African Development Bank Project

The Department successfully applied for a grant from the African Development Bank under the Governance and Institutional Strengthening Project (GISP). The project is now being implemented to upgrade equipment and software, and to publish outstanding bulletins. Equipment is being delivered at the time of compilation of this report.

MINING INDUSTRY NEWS

Forbes Mugumbate

Restructuring of the Ministry of Mines and Mining Development

Cabinet has approved a new structure for the Ministry comprising 8 Provincial Offices coinciding with the administrative provinces of Mashonaland East, Mashonaland Central, Mashonaland West, Midlands, Matebeleland North, Matebeleland South, Masvingo and Manicaland. The offices will be located in each of the provincial capitals. As a result, the Ministry's registry of mining cadastral information is being transferred to the respective provinces. Harare and Bulawayo are parts of Mashonaland East and Matebeleland North respectively.

The new structure replaces the old-established five mining districts. The posts of Chief Mining Commissioner, Mining Commissioners, and Assistant Mining Commissioners, have been removed from the Ministry. The incumbents have been put on indefinite leave pending their posting to other ministries. Meanwhile the Permanent Secretary has assumed the powers and functions of the mining commissioners in terms of the Mines and Minerals Act until such time as the amended Act is promulgated.

Each Province is to be headed by a Provincial Mining Director who will hold a mining-related degree, and he will be deputised by four professionals representing geology, mining engineering, metallurgy, and mining promotion. Each of these deputy directors will be assisted by four professionals and four technicians.

The Ministry is currently on a massive recruitment drive to fill these posts. The existing departments are currently overwhelmed by new recruits who are supposed to be acclimatizing and familiarising themselves with their professional responsibilities before being posted to their allocated province. The majority of these recruits have been transferred across from the Ministry of Education. It remains to be seen how effective this process will be, especially with regards to the application of geology. Support-staff have been deployed to each province to deal with accounts, human resources and administration issues. Thus the size of the Ministry has expanded several times.

The Ministry has also been expanded through the introduction of two new departments – the ICT Department and the Department of Beneficiation and Value Addition. Two new posts of Principal Director have been created. One will be in charge of Mining Promotion and Value

Addition, while the other will be responsible for directing geological, mining engineering and metallurgical activities.

New Mining Cadastre

A giant step forward has been made towards implementation of the new computerised mining cadastre. Adjudication of tenders submitted by consulting companies has already been done and the results were submitted to the Tender Board for further processing. It is hoped the successful consultant will be announced soon. As part of the adjudication process, a team from the Ministry, which included this writer, visited Queensland in Australia, Zambia, and Canada to study established cadastral systems in these countries.

Zimbabwe Mining Indaba

The sixth successive Mining and Infrastructure Indaba was held in Harare from 8-10th October 2014 under the theme '*Mining: a catalyst for infrastructure development in Africa*'. Those concerns raised at previous Indabas remain unresolved. These include i). completion of the amendments to the Mines and Minerals Act; ii). clarification of the Indigenization Policy especially with regards to mineral exploration and mining; iii). the granting of exploration licences especially for EPO's; iv). and guarantees relating to the supply of electricity to mines.

Meanwhile only four EPO's have been granted to indigenous applicants. This reticence reflects badly on the state of mineral exploration in Zimbabwe. By comparison, Zambia had 2400 active exploration licences in place in September 2014.

Diamonds Confiscated

Zimbabwean diamonds worth US\$45 million that were on auction in Belgium were attached by a group of 12 former commercial farmers, ostensibly to effect payment to compensate them for a breach in a bilateral investment treaty when their farms were taken under the land reform programme. This follows immediately after Zimbabwe had won a case against Amari Resources who had attached diamonds for breach of contract after their joint venture project with the ZMDC was cancelled by government. These events have led to calls for diamond auctions to be conducted locally. However, a local auction that followed the Belgian events was a disappointment as the diamonds only fetched an average US\$70 per carat compared to the US\$140 obtained in Belgium. Suspicions are that the buyers conspired to deliberately under-value the diamonds so taking advantage of the desperate situation that the producers are in to raise money for their operations. Another local auction is scheduled for November 2014 to coincide with the Diamond Conference to be held in Harare from 6-7th November 2014.

Russian Platinum Deal

Zimbabwe and Russia recently signed a deal to mine platinum in the northern part of the Hartley Complex. The project, officially launched by Russian Foreign Minister Sergei Lavrov and President Robert Mugabe, will see Russian companies investing US\$1.6 billion to eventually their capacity to produce 600 000 ounces of pgms per annum.

Makomo Resources

The coal industry's new producer Makomo Resources is doing extremely well. The company has become the biggest supplier of coal to the Hwange Power Station. A total of US\$200 million has been invested cumulatively during the past five years, which has resulted the company competing well with Hwange Colliery in terms of coal production. Production capacity has increased from 200,000 to 300,000 tonnes per month following the recent

commissioning of a washing plant. The company is gradually expanding its markets in the sub-region.

Zimplats Mine Collapse

Bimha Mine, Zimplats' biggest underground mine partially collapsed resulting in loss of about half of the company's production potential. Fortunately there were no injuries to workers as the collapse was anticipated. However, some equipment could not be salvaged. The collapse was apparently caused by bad ground conditions associated with a shear zone. The company is considering various options to re-open at least parts of the mine.

News about Zim Geoscientists

We hope your contributions may improve with the Facebook initiative. Talk to you on the Geological Society of Zimbabwe Group, an open link. Join us there for better communication.

The following is extracted from our website and refers to the Redcliff Field Trip and the AL du Toit Memorial lecture at UZ.

Every two years, the Fellows Committee of the Geological Society of South Africa invite an esteemed academic researcher to present the Alex du Toit Memorial Lecture to Branches and Divisions of the GSSA, and to associated societies in neighbouring countries. Zimbabwe is privileged to be included.

The objective of the lecture series is to assist researchers of international repute to travel to our branches and divisions to deliver a lecture in their specific field of research that will be of interest to most geologists, as well as to honour the life work of Alex du Toit.

This year Professor Nic Beukes, University of Johannesburg in South Africa was selected to deliver a talk on: **“Origins and paleoenvironmental significance of Precambrian sedimentary iron and manganese deposits with special reference to the history of free oxygen in the ocean and atmosphere”**

The talk, which was delivered on 27th October 2014 in Harare, was attended by 30 members and students.

Thank you to the Geological Society of South Africa and Assmang Limited (www.assmang.co.za) for sponsoring the event.

On the day before the talk, the Society visited Redcliff, and the Ripple Creek and Orpheus mines under the guidance of Charles Castelin. The visit was joined by Prof. Beukes and was well attended by approximately 90 people, including 60 students who are mostly associated through the Mennell Society.

Please provide us with news about yourself or other geologists. We need to keep in touch with all of you out there. E-mail: hgumbo@mweb.co.zw or makari@zol.co.zw

Conferences

The 6th International Platinum Conference. SAIMM, 20-22nd October, 2014. Sun City, South Africa. <http://www.saimm.co.za> cameron@saimm.co.za

The 23rd International Geological Congress, Cape Town, South Africa – 2016.

Summer Symposium 2014

The line-up so far

Geological Society of Zimbabwe Summer Symposium 2014		
28th November 2014, Department of Geology University of Zimbabwe		
Registration (incl teas and lunch) \$25 for members (non-members should join)		
Start	Topic	Speaker
08:15	Welcome & Atlas Project Demonstration	Andrew du Toit, Society Chairman
09:00	Overview of Mineral Resources - Tip of an Iceberg	Forbes Mugumbate
09:25	Hydrocarbon Potential in Zimbabwe	Brent Barber
10:05	The role of mineral policy legislation and its impact on investment potential- examples from Africa, Australia, North America and South America	Ben Mapane (Keynote Speaker)
10:55	A snapshot of PGE resources of the Great Dyke	Collins Mwatwa
11:20	Comparison between Sulphide ores and Oxide ores on the Wedza Complex of the Great Dyke of Zimbabwe	Freddy Chivwi
11:45	The Waterberg Platinum Discovery	Gordon Churnett
12:10	Determination Of Optimal Combination Of Recovery Rate (R _{om}) And Level (Cut-Off Grade) Based On The Polygon Method Of Reserve Estimation	Lyman Mlambo
14:00	Exploitation of gangue minerals and their contribution towards a country's economic development	Kennedy Magoma
14:25	The History of Mica Mining in Zimbabwe	Tim Broderick
15:15	A Review of RioZim Current Exploration Activities	Luckson Manda
15:40	SRK's prospective on new mining business for the past 5 Years	Armon Nglazi
16:05	QA/QC in Exploration.	Jones Bishi
16:30	Summary	Ben Mapane

PLEASE PUT 28TH NOVEMBER 2014 IN YOU DIARY NOW

3D EARTH EXPLORATION (Pty) LIMITED

Geophysical Contractors & Mineral Exploration Consultants

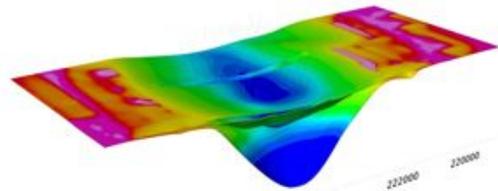
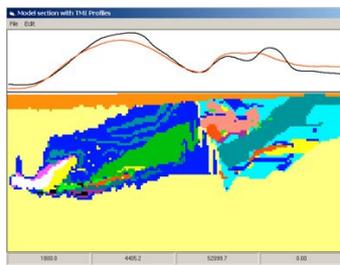
3D Earth Exploration is a Botswana-registered company operating in the Africa theatre and provides the following services:

- Ground geophysics surveys
- Physical rock properties measurements ...&... 3D Data processing and interpretation

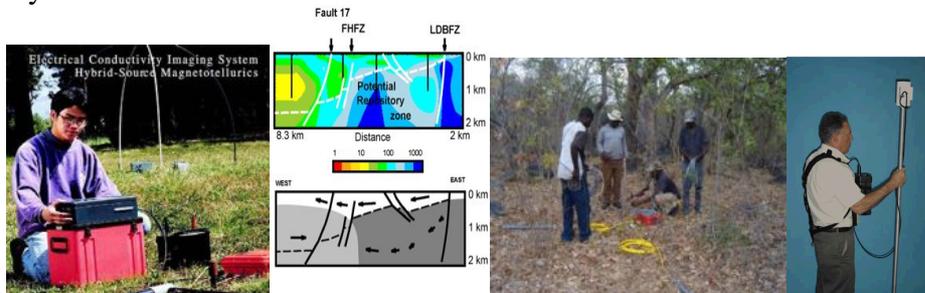


GDD MPP-EM2S+ Magnetic susceptibility and conductivity probe and aximOnsite data processing

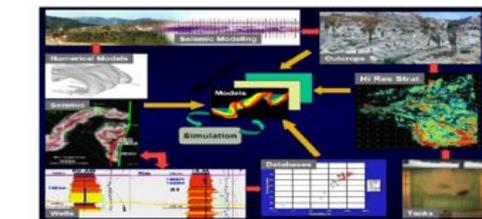
- 3D magnetic and gravity data modelling



- CSAMT, ground magnetic surveys, Induced Polarisation, gravity (CG3/5, La Coste), rock properties, EM, GPR, radiometrics and a wide range of other ground geophysics surveys.



- 3D Data integration and visualisation



CONTACT:

For more information please contact Mr Hillary Gumbo +263-772-566912, email: hgumbo@mweb.co.zw



GSZ Research and Development Fund

Enquiries relating to the distribution of funds through this facility should be made through the standing Chairperson.



SEG Timothy Nutt Scholarship Memorial Fund

This fund will be available to provide financial support for geology students and young economic geologists located in Zimbabwe or in Southern Africa with ties to Zimbabwe. The fund may be used to support SEG student chapter activities, travel to meetings, field trips, for research or study grants, technical lectures or any other activities approved by the SEG Regional Vice President for Africa.

Applicants must describe what the project is, why the research is important and how it is to be done.

An estimate of expenses for the project must be included with the application.

Grants are expected to be fully utilized by year-end.

Grant recipients are required to provide a year-end accounting of how the money was spent together with a suitable progress report or final abstract.

See the Society of Economic Geologists website for further details and the next call for applications.

GEOLOGICAL SOCIETY OF ZIMBABWE: CONTACT DETAILS OF MEMBERS OF THE EXECUTIVE COMMITTEE FOR 2014		
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Kuhn, Julie	Administrator & Secretary	geol.soc.zimbabwe@gmail.com
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Institutional Membership, 2014

Bruker RSA

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Samrec Vermiculite Zimbabwe (Pvt) Limited

SMC

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Zimbabwe Mining Development Corporation

Zimbabwe Mining Investments

Zimbabwe Platinum Mines Limited