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APPENDIX

Geological Guide to Selected Areas of the Kruger National Park

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Introduction

The Kruger National Park (KNP) contains a considerable variety of rock types, ranging from Archaean granitoids to Recent sedimentary deposits. Some 3 500 million years of geological history is represented in an approximately 85 km east-west section at the southern area of the Kruger National Park. Older rocks are typically found in the western half of the KNP and to the east rock units become progressively younger. Some of the more important rock types found in the KNP include greenstones of the Barberton Mountain Land (approximately 3 500 million years old), granitoid rocks of the Nelspruit Batholith (approximately 3 200 million years old), syenitic intrusions associated with the Phalaborwa Complex (approximately 2 050 million years old), Soutpansberg volcanics and sediments (approximately 1 750 million years old), Timbavati Gabbros (approximately 1 450 million years old?), Karoo sediments and Lebombo volcanics (approximately 200 – 170 million years old) and Cretaceous to Recent sedimentary deposits which are best developed in the eastern region of the park.

Many of the more interesting geological features of the KNP are visible from roads and rest camps and are encountered on various foot-trails. With this in mind a series of road logs have been compiled which highlight some of the main geological features and outcrops of the Kruger National Park. Three road logs are presented here, each log representing approximately one day of travel. These logs are devoted primarily to the relatively young (approximately 200 – 170 million years old) Lebombo volcanics (Fig. 1) and associated intrusive rocks. These rocks were emplaced immediately prior to the fragmentation of Gondwanaland and are located in a north-south trending, easterly dipping faulted monocline. Recent detailed petrological studies conducted under the auspices of the Karoo Geodynamics Project (Erlank 1984) have done much to unravel the complexities of these rocks, and continuing research will no doubt add to the present picture.

Though devoted mostly to the Lebombo volcanics, the road logs presented below highlight other rock types (and soils) wherever possible. In time it is hoped to compile a complete series of road logs for the KNP encompassing all the main geological events of the region. The logs presented here were done

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for the purpose of a special field trip organized by the Geological Society of South Africa to coincide with Geocongress 86, an International Geological Conference held in Johannesburg in July 1986.

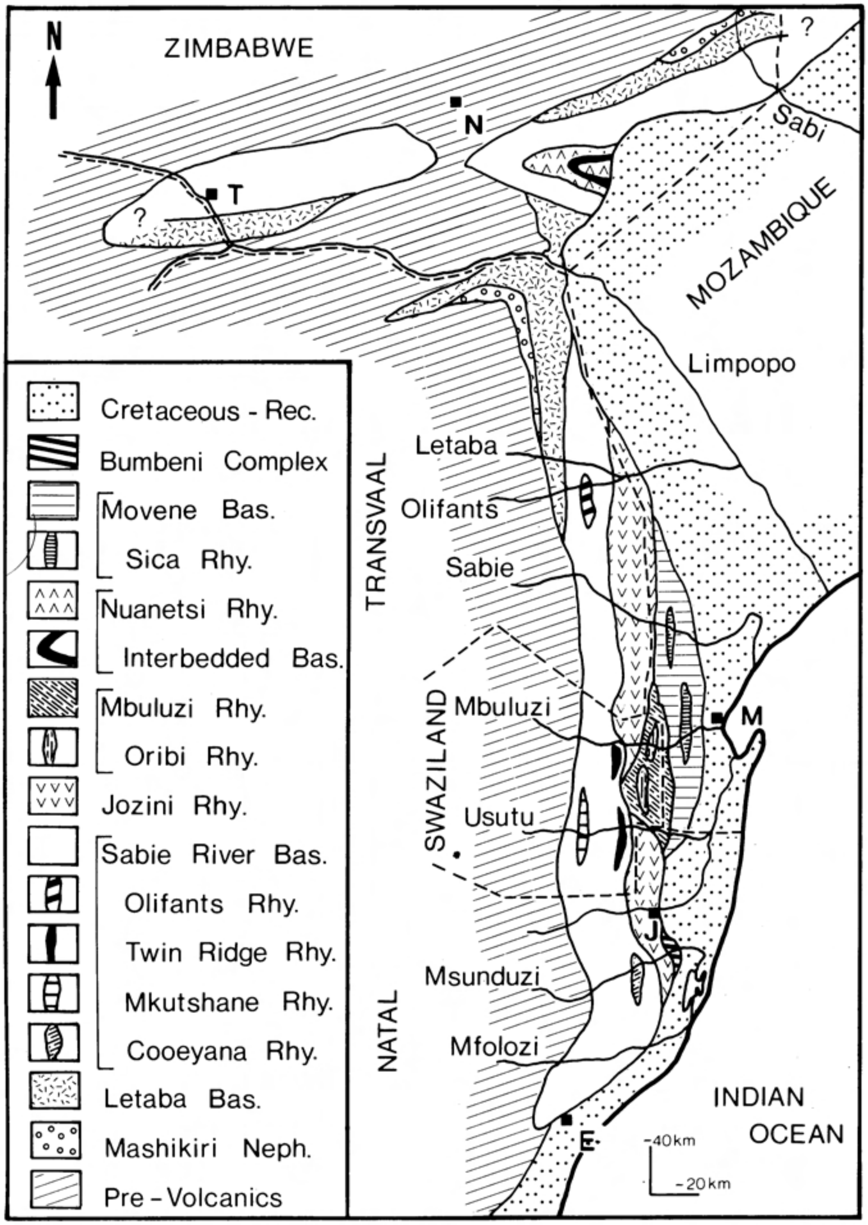

FIGURE I

Road Log 1

Assembly point: Skukuza Rest Camp Reception Office.
Departure time: 07h00 from above.

Summary

This day will be spent examining exposures in the type section of the Sabie River Basalt Formation (Fig. 2). Exposures of Jozini Rhyolites will also be visited, as well as Lebombo granophyres, and gabbros of the Komatipoort Complex (Logan 1979) will be traversed in the vicinity of Komatipoort. The initial part of the journey will be along the south bank of the Sabie River along granitoid rocks of the Basement Complex. Dolerite dykes are prevalent along the river. Karoo sediments will be encountered nearer Sabie Rest Camp. These rocks form a thin sedimentary wedge between the basement Granitoid rocks and overlying Lebombo Volcanics, consisting of Sabie River basalts in this instance. The sediments have a distinct easterly dip, in keeping with the overall easterly inclination of rocks found along the Lebombo monocline.

Travel log

Leave Skukuza Rest Camp and proceed towards the Lower Sabie Rest Camp travelling along the southern bank of the Sabie River.

Stop 1

Examine Karoo sandstones (Clarens Formation) which dip eastwards below basaltic lavas. Continue eastwards and then south, bypassing the Lower Sabie Rest Camp, heading towards Crocodile Bridge which lies about 35 km south of Lower Sabie. Leave the KNP and continue on to Komatipoort (11 km). Rendezvous outside the police station on the main road in Komatipoort.

Stop 2

This stop will be alongside the west bank of the Crocodile River to the north of Komatipoort. It consists of a spectacular continuous exposure of the Sabie River Basalt Formation (SRBF) with an interbedded rhyolite, both of which are intruded by dolerite dykes. The contacts between the rhyolite and basalt are uncharacteristically steep (30° to 60° to the east).

One basalt flow of considerable thickness (~20 m) is represented in the section. Within this flow there appears to be a gradation from sparsely amygdaloidal basalt to amygdaloidal basalt and back to sparsely amygdaloidal basalt as one proceeds upsection (Fig. 3). Samples from this flow (Table 1) enable a 'within' flow geochemical comparison to be made. It is interesting to note that while RSC38 and RSC40 (sparsely amygdaloidal) are geochemically identical, RSC39 (amygdaloidal) has a lower K, Na, Ba, Rb and Sr content. This may be a reflection of a greater degree of leaching of these more mobile elements from the more permeable amygdaloidal part of the flow. The alternating 5 cm - 10 cm thick amygdaloidal and amygdaloidal-free bands present within the amygdaloidal zone probably developed as a result of flow within the main mass of basaltic lava. At least two phases of aphyric dolerite and a later phyric phase are represented in the outcrop (Fig. 3).

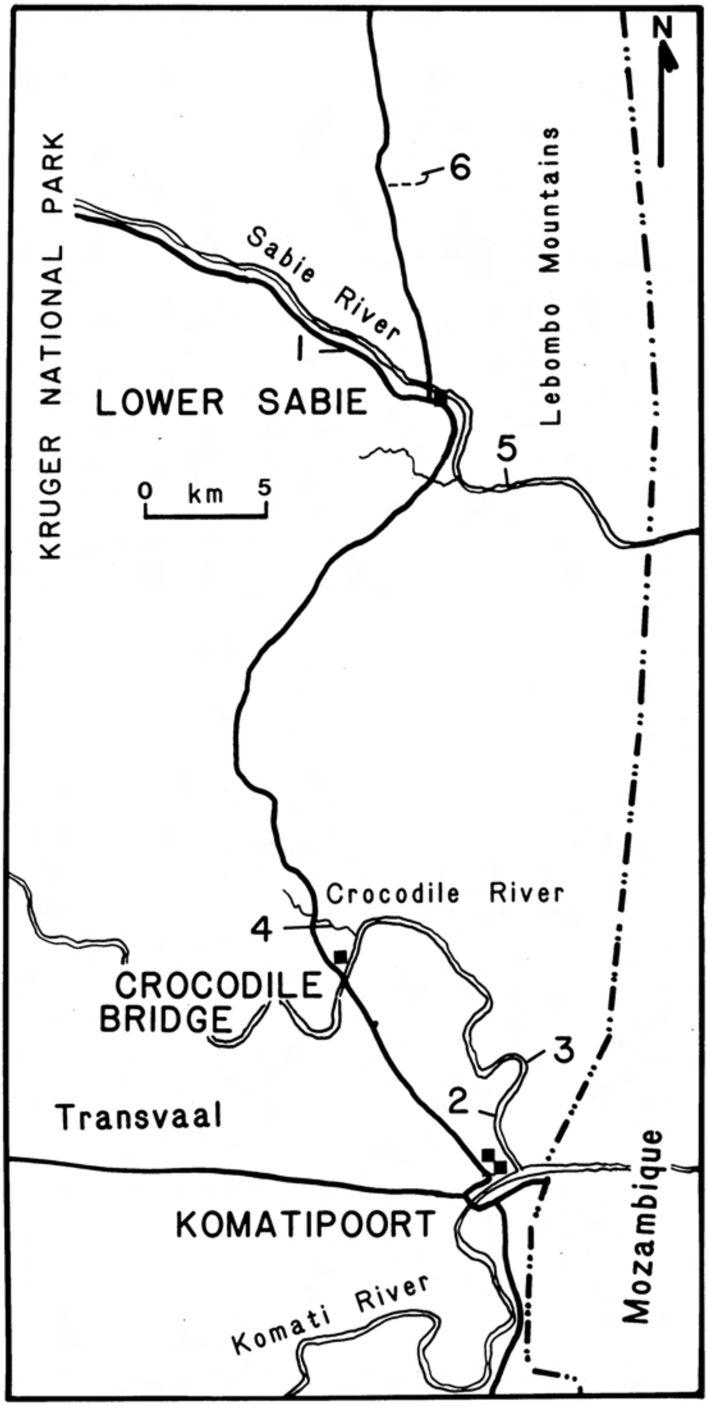
N
KRUGER NATIONAL PARK
Lebombo Mountains
6
Sabie River
1
LOWER SABIE
5
0 km 5
Crocodile River
4
CROCODILE
BRIDGE
3
2
Transvaal
KOMATIPOORT
Mozambique
Komati River

FIGURE 2

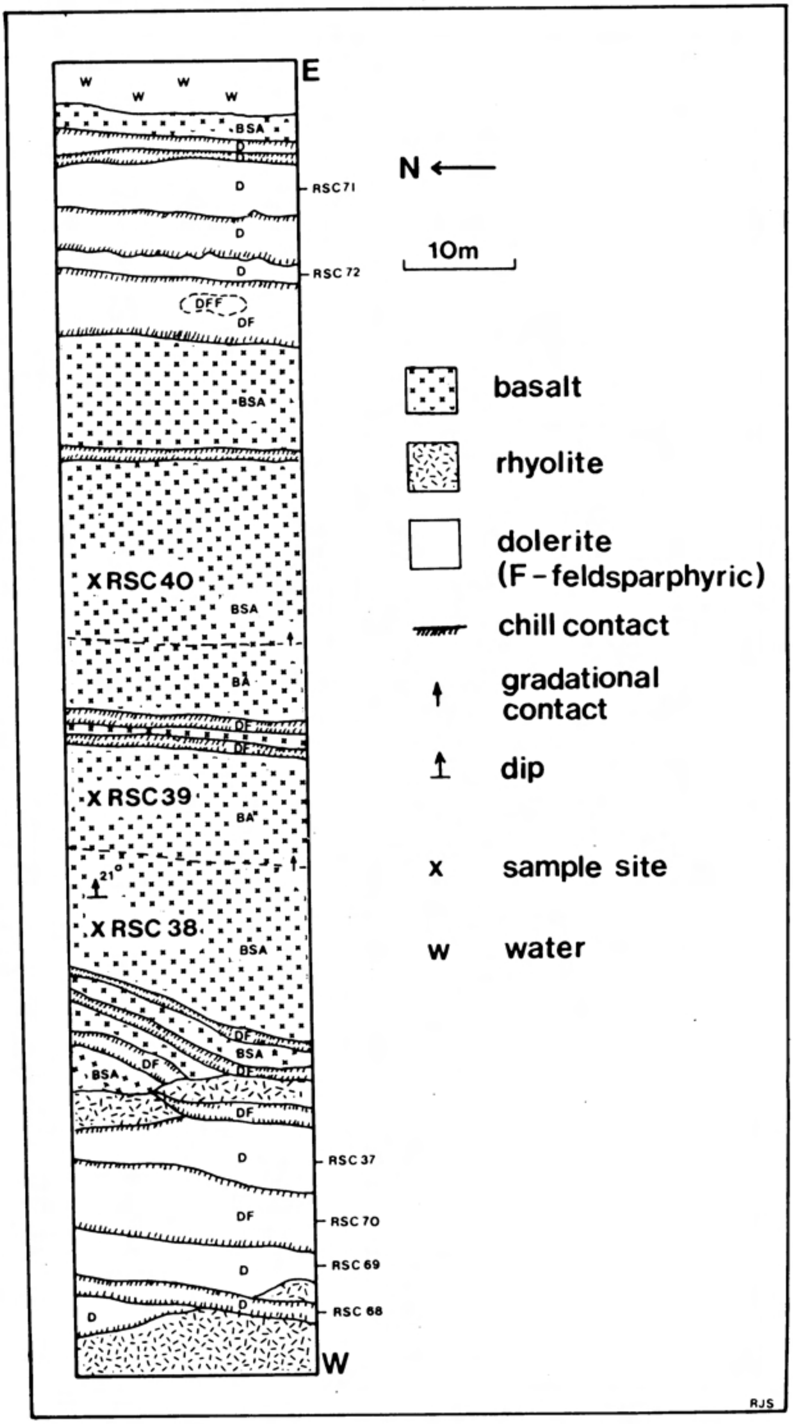
E
W
w w w w
BSA
D
RSC71
RSC 72
DFF
DF
BA
X RSC 40
X RSC 39
X RSC 38
21°
RSC 37
RSC 70
RSC 69
RSC 68
N
10m
basalt
rhyolite
dolerite
(F - feldsparphyric)
chill contact
gradational
contact
dip
x sample site
w water
RJS

FIGURE 3

Table 1
Whole rock analyses indicating with in-flow geochemical variation

	RSC38 basalt	RSC39 basalt	RSC40 basalt
weight %			
SiO_2	49,72	47,88	49,87
TiO_2	3,71	3,65	3,49
Al_2O_3	12,20	11,93	11,90
Fe_2O_3	16,53	16,24	16,33
MnO	,20	,26	,23
MgO	3,57	3,95	3,39
CaO	7,21	7,52	7,37
Na_2O	3,03	2,51	2,60
K_2O	1,22	,93	1,54
P_2O_5	,84	,82	,91
H_2O	,35	,53	,36
LOI	1,30	2,82	1,50
Total	99,87	99,05	99,49
Parts per million			
Zr	458	433	500
Y	63	59	69
Nb	37	40	45
La	50	49	55
Ce	116	109	126
Nd	80	78	89
Ba	695	289	738
Sr	511	219	523
Rb	39	20	40
Cr	2,9	3,5	2,4
V	286	290	206
Sc	27	31	29
Ni	33	33	16
Co	45	44	40
Zn	169	164	171
Cu	367	325	443

All Fe reported as Fe_2O_3, H_2O^- is adsorbed water, LOI is the weight lost upon ignition of the sample (950 °C). The analyses were obtained by X-ray fluorescence spectroscopic techniques currently in use at the Department of Geochemistry, University of Cape Town.

If time permits proceed south of Komatipoort, across the low-level bridge over the Komati River. Then proceed to the tar road and travel west towards the Moçambique border. Examine outcrops of basalt and granophyre in the vicinity of the river. An excellent exposure of a rhyolite flow base may be seen on the south side of the road approaching the border gate. Good exposures of Jozini Rhyolite may be seen along this road section.

Return to Crocodile Bridge Gate and proceed along the tar road towards Lower Sabie. Turn right after crossing the Vurhami Stream about 3 km along this main road.* Proceed along this dirt road for about 3 km and turn right again. Rendezvous at a game guard watchpost 11 km along this road.

Stop 3

A continuous section through a 30 m thick rhyolite flow near the base of the Jozini Formation is exposed. The flow has a 1 m thick tuff at the base. This is overlain by a horizontal banded zone grading successively upwards into a massive zone and then into an amygdaloidal and brecciated top.

Previous workers in Swaziland and the southern Lebombo (Urie & Hunter 1963; Stratten 1965; Bristow 1976, 1978; Cleverly 1977, 1978) concluded that the main sequence of Lebombo rhyolites were emplaced by a nuee-ardente mechanism and were therefore ash flows or ignimbrites. It is difficult to explain the tremendous lateral extent of the acid volcanism by anything other than an ignimbritic-type (explosive) eruption which in this instance may have destroyed most of the primary ignimbritic feature by intense welding, remobilization and devitrification after emplacement.

Return to the Vurhami Stream.

Stop 4

Flows containing auto-intrusive basaltic dykes. These features are formed by fluid lava from the central part of a flow being injected into fractures in the solidifying crust sometimes spreading out on the former flow surface as pahoehoe toes. The distribution of these auto-intrusions in a flow is sketched in Fig. 4.

Lunch – Crocodile Bridge.

Stop 5

Traverse east along the Sabie River. Walk about 300 m downriver to a composite dyke.* The intrusion (7 m wide), uncontaminated on the southern margin, contains ovoid mafic xenoliths (5-30 cm long) and has a matrix which becomes progressively more mafic towards the northern margin of the dyke. To achieve the degree of mixing observed it is suggested that an intrusion of dolerite was followed almost immediately by granophyre. Note too that this is the only recorded occurrence in the central Lebombo of a Karoo dyke having an east-west orientation.

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* Permission to leave a vehicle is applicable only to members of Geocongress 1986 (30 June 1986 – 4 July 1986) who have registered and are participants for Excursion 26A (The Lebombo Volcanic Belt). They do so at their own risk and under the STRICT SUPERVISION OF OFFICIALS of the National Parks Board of Trustees. *Note:* Under normal conditions, members of the public, while visiting the Kruger National Park, are under no circumstances allowed to alight from their vehicles (apart from authorised localities) or to travel on roads where entry is prohibited.

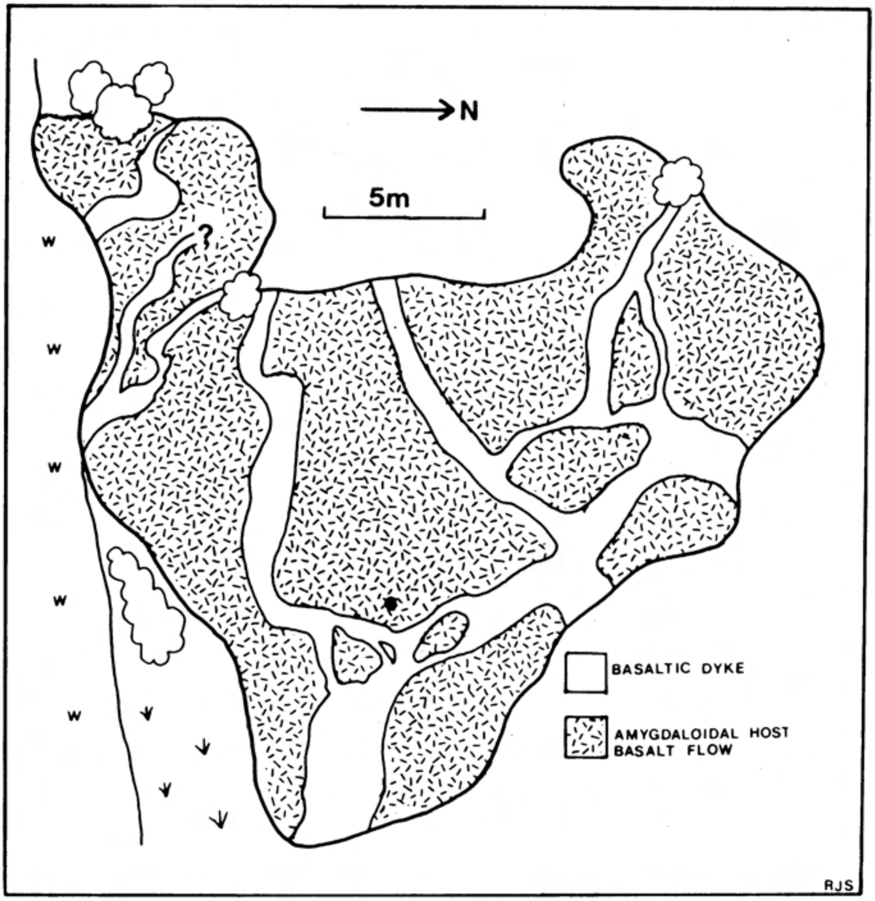


FIGURE 4

Return to the original starting point and traverse west from the vehicles, walk* about 1 km upriver observing a number of volcanic and sub-volcanic features. These include an interbedded rhyolite, pipe amygdales at the base of flows or flow lobes, interbedded tuff, pahoehoe toes, volcanoclastic material developed on flow tops and well developed columnar jointing in a dolerite dyke.

A stratigraphic section through the section traversed above is given in Fig. 5. An examination of the chemical profile for Zr shows clearly the interbedded nature of 'enriched' ($>$250 ppm Zr) and 'depleted' ($<$250 ppm Zr) lava types. Consideration of Sr as a discriminant has enabled the 'enriched' lavas to be subdivided into low-Sr ($<$600 ppm Sr) and high-Sr ($>$600 ppm Sr) groups (Fig. 5).

Return to vehicles to reach Skukuza Rest Camp by 17h30.

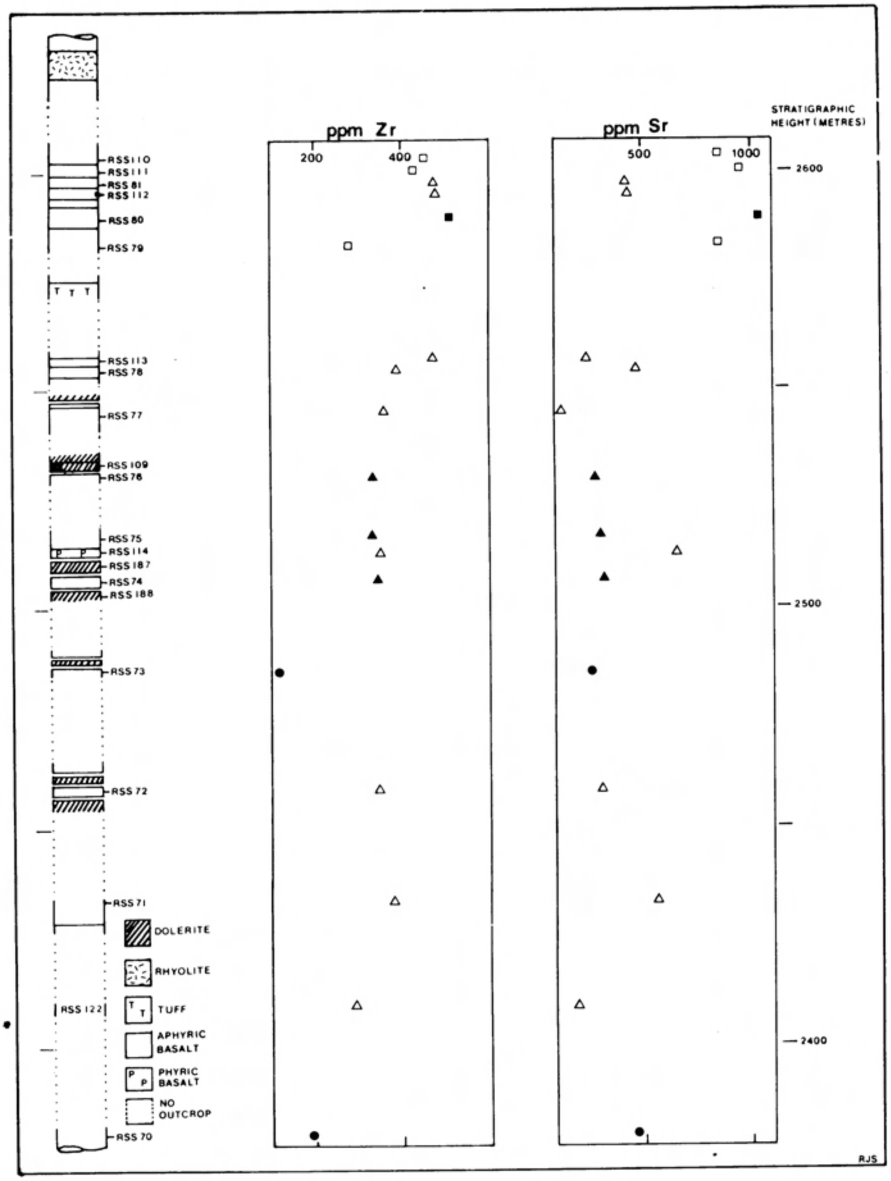


FIGURE 5

Road Log 2

Assembly point: Skukuza or Lower Sabie Rest Camp Reception Office.
Departure time: 07h00 from above.

Summary

Note that this day will begin from either the Skukuza or Lower Sabie Rest Camp. The first part of the travel logs thus differ slightly. This day will be

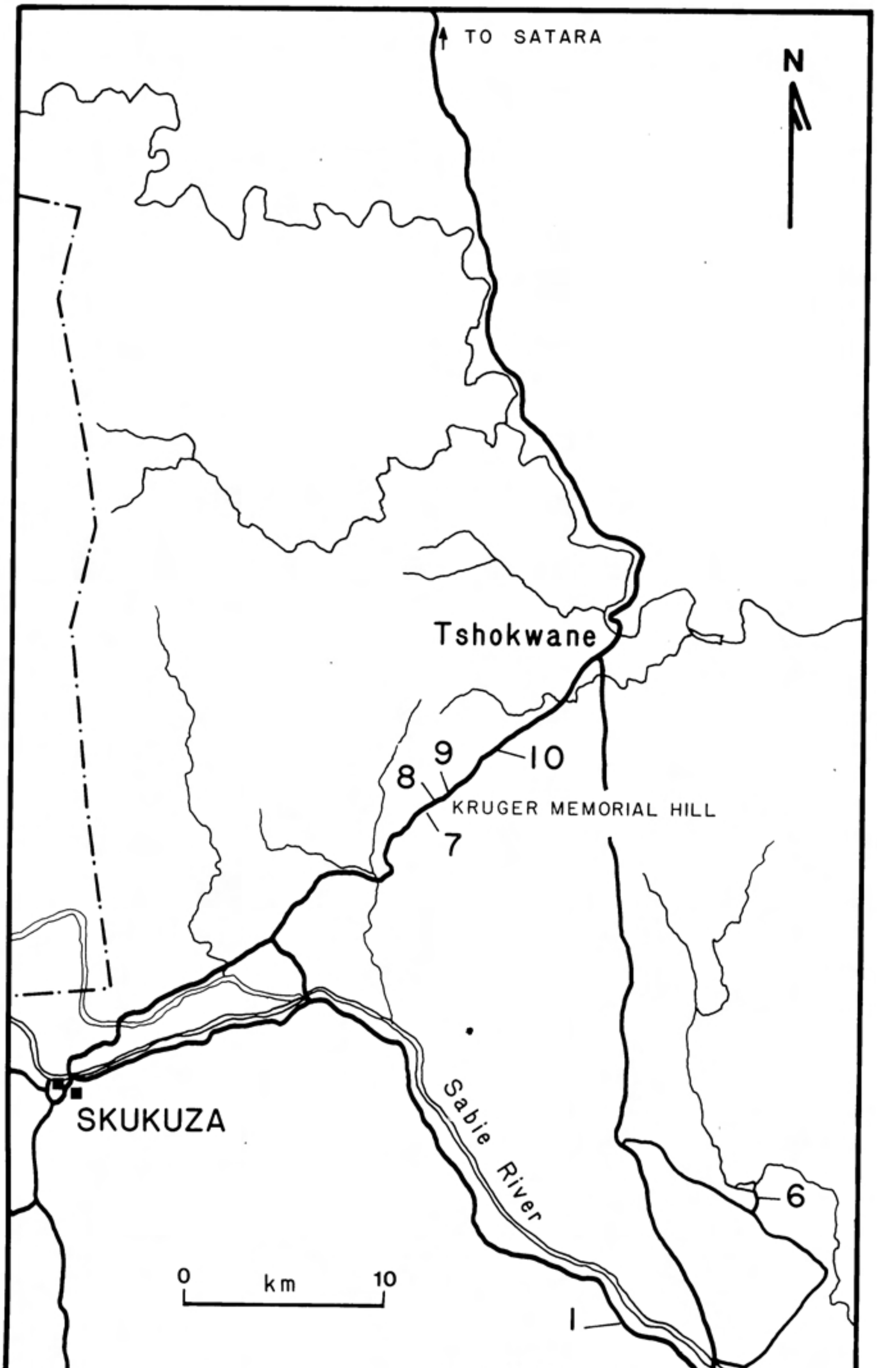
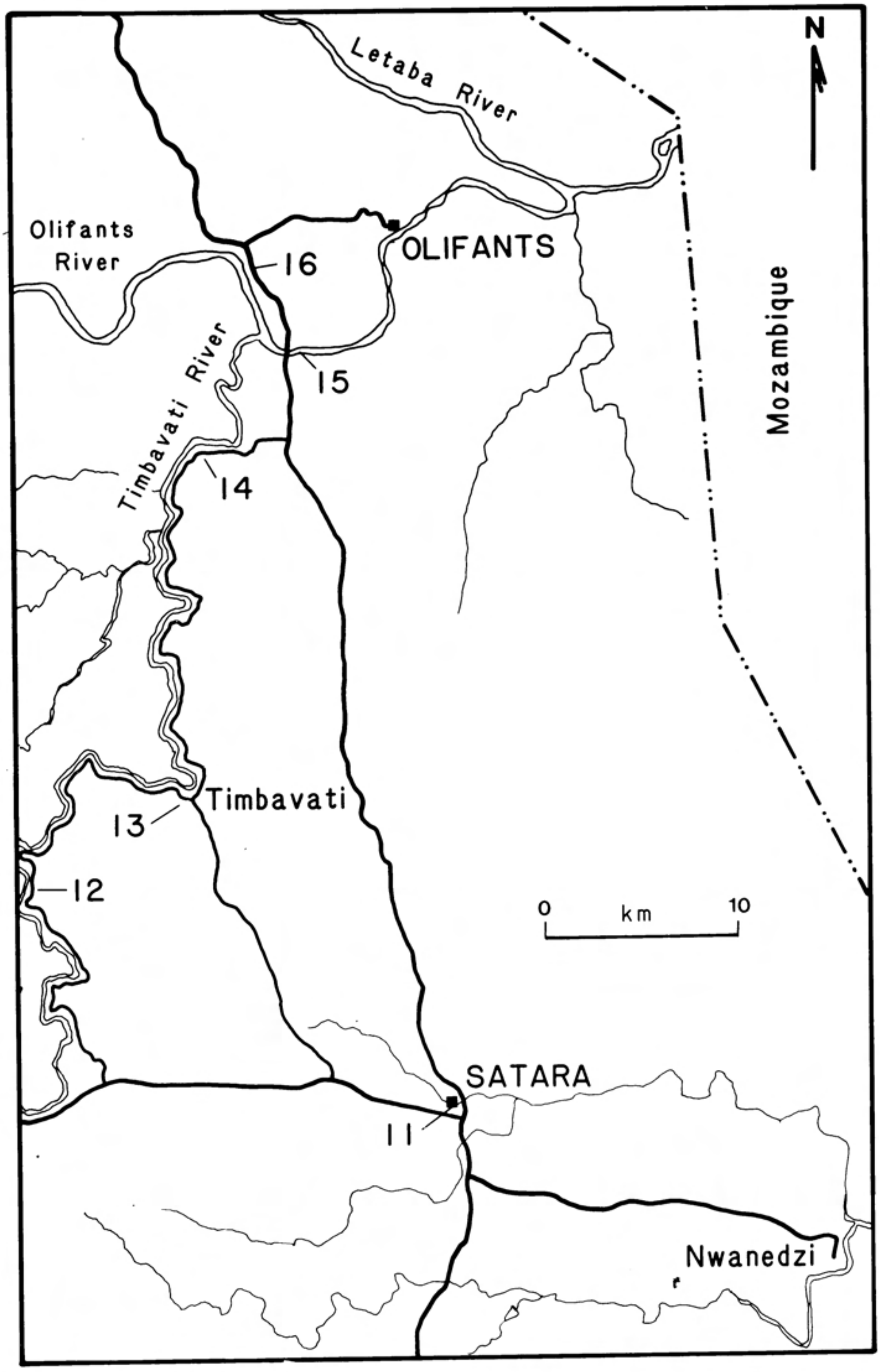

TO SATARA
N
Tshokwane
8
9
10
KRUGER MEMORIAL HILL
7
SKUKUZA
Sabie River
6
0
km
10
1
LOWER SABIE

FIGURE 6a



N
Letaba River
Olifants River
OLIFANTS
16
15
Timbavati River
Mozambique
14
Timbavati
13
12
0 km 10
SATARA
11
Nwanedzi

FIGURE 6b

spent travelling from the overnight stop (Skukuza or Lower Sabie) north to the Olifants Rest Camp located approximately in the centre of the Kruger National Park (Figs. 6a, 6b). A wide variety of rock types will be noted in the course of the day, including Basement granites and gneisses, Timbavati gabbros, Karoo sediments, and Lebombo volcanics. Various soil and vegetation types which have developed on different geological units will also be noted.

Travel log

Leave **Skukuza Rest Camp** and proceed eastwards (briefly) and northwards across the Sabie River. An excellent example of a dolerite dyke can be seen on the northern side of the river. Proceed northwards on the main tar road leading towards Satara. Stop at Kruger Memorial Hill.

Leave **Lower Sabie Rest Camp** and proceed north across the low water bridge for 1 km. Turn right at this point and proceed for roughly 1 km to the tarred road. Turn left and follow the tarred road across plains formed on the Sabie River Formation basalts. At approximately 13 km from the starting point a fairly prominent and elongated (N-S) granophyre intrusion will be encountered. Proceed away from the main road and stop at the Muntshe Ridge Lookout Point.

Stop 6

± 34 km

Muntshe Ridge Lookout Point. This stop is located near the western margin of the granophyre which is intrusive into Sabie River basalts. Note the coarse grained nature of the granophyre found in the vicinity of the lookout. Note also north-south trending dolerites forming linear zones of negative relief in the granophyre.

Leave Muntshe Ridge lookout and return to the main road, continuing north. Proceed to a T junction (± 43 km) with the main KNP north-south highway. Reset odometer and turn left.

Proceed approximately 12 km south to **Kruger Memorial Hill.**

Stop 7 (First stop for travellers from Skukuza).

± 12 km

Leave vehicles and examine Timbavati (Tsange) Gabbro and Basement granites.

Reset odometers, (turn around) and proceed northwards.

Stop 8

± 1 km

Typical vegetation associated with moderately deep yellow-brown sands developed on granitic basement rocks.

Stop 9

± 2 km

Vegetation associated with red, structured sandy clays on Timbavati quartz gabbros.

Stop 10

± 5 km

Typical vegetation associated with sodic duplex soils developed on Mikambeni (Ecca) shales.

Continue northwards to the Tshokwane Tearoom. Reset odometer at this point and then proceed north on the main tarred highway. This road follows, more or less, the contact between sandstones of the Clarens Formation and basalts of the Sabie River Basalt Formation. Good sandstone outcrops are apparent from time to time along the road side.

Stop 11

± 51 km

Satara Rest Camp. An early lunch may be taken at this point. Following lunch, reset odometers, leave the camp and proceed south.

± 1 km Turn westwards towards Orpen.
± 7 km Nsemane Dam.
± 8 km Typical vegetation associated with sodic duplex soils on Mikambeni (Ecca) Shales.
± 12 km Ngirivane turn off. Note typical vegetation associated with shallow sands and gravels developed on basement granite. Continue straight ahead.
± 15 km Typical vegetation associated with clay soils formed on Timbavati Gabbros.
± 19 km Timbavati road junction. Turn north towards Timbavati. Reset odometers.
Proceed northwards from the Timbavati junction.

Stop 12

± 17 km

Road cuttings in Timbavati gabbros. The gabbros in the vicinity are generally fairly mafic. Asbestiform veins may be seen in places.

Stop 13

± 13 km

Timbavati Picnic Spot. Cold drinks may be obtained at this point.

Sandstones of the Clarens Formation which underlie the Lebombo basalts, crop out at this point. Reset odometers.

Leave Timbavati Picnic Site and proceed north-westwards along the Timbavati River. Continue until a fairly prominent group of north-south trending rhyolite dykes are encountered alongside the road.

Stop 14

Leave vehicles* and examine a rhyolite dyke located to the south of the main road. These dykes probably represent feeders to the Olifants Rhyolites which are interbedded with basalts of the Sabie River Basalt Formation in the vicinity of the Olifants River, within the lower part of the Lebombo volcanic group.

Return to vehicles and continue to the north-west until the main tarred highway is encountered at a T junction. Reset odometer and turn left (northwards); continue north to the Olifants River. Stop on the north side of the main road bridge across the river.

Stop 15

± 5 km

Leave vehicles* and proceed downstream (eastwards) for about 0,5 km, until a xenolith rich outcrop is encountered. This exposure is of interest in that it consists of a dolerite dyke which contains abundant large granitoid xenoliths, presumably carried up from the underlying basement. Interesting melt textures are apparent in the basement xenoliths when viewed in thin section.

Return to vehicles and continue northwards.

Stop 16

± 9 km

Turn left off the tar highway and drive to the top of the Nwamanzi Lookout Point. This point is located near the top of a relatively thick dolerite sill which intrudes the base of an interbedded rhyolite flow (Olifants Rhyolite) which forms a prominent dome off to the south. Fine grained to glassy dolerite found in the vicinity of the lookout probably represents material from close to the original upper chill margin. The dolerite is distinct in geochemistry relatively to most basalts found in the Sabie River section. Note also north-south trending dolerite dykes in the river below the lookout point.

Return to vehicles*, drive back to the main tar highway and continue northwards. Approximately 200 m along the highway, turn right and drive to the Olifants Rest Camp, which is located atop a major, interbedded rhyolite dome. Spectacular views of the Olifants River and surrounding flat lying basalt plains are afforded by the location of the Olifants Camp. This will be the end point of this day's travel.

Road Log 3

Assembly point: Olifants Rest Camp Reception Office.
Departure time: 07h00 from above.

Summary

This day will be spent examining the Lebombo volcanics in the Olifants River section (Fig. 7). Road and river sections in this region allow access to a complete section of Karoo sediments and Lebombo volcanics. The volcanics include Mashikiri nephelinites, Letaba picrite basalts, Sabie River basalts and Jozini rhyolites. Two major interbedded rhyolite units referred to as the Olifants rhyolites are located in the Sabie River basalts. Dolerite sills have intruded along the base of these rhyolites. A multitude of intrusive rocks will also be seen on the day including rhyolite dykes, a series of basaltic dykes representing portion of a ring dyke intrusion, and a portion of a dyke swarm which intrudes basalt flows to the east of the Olifants Rest Camp.

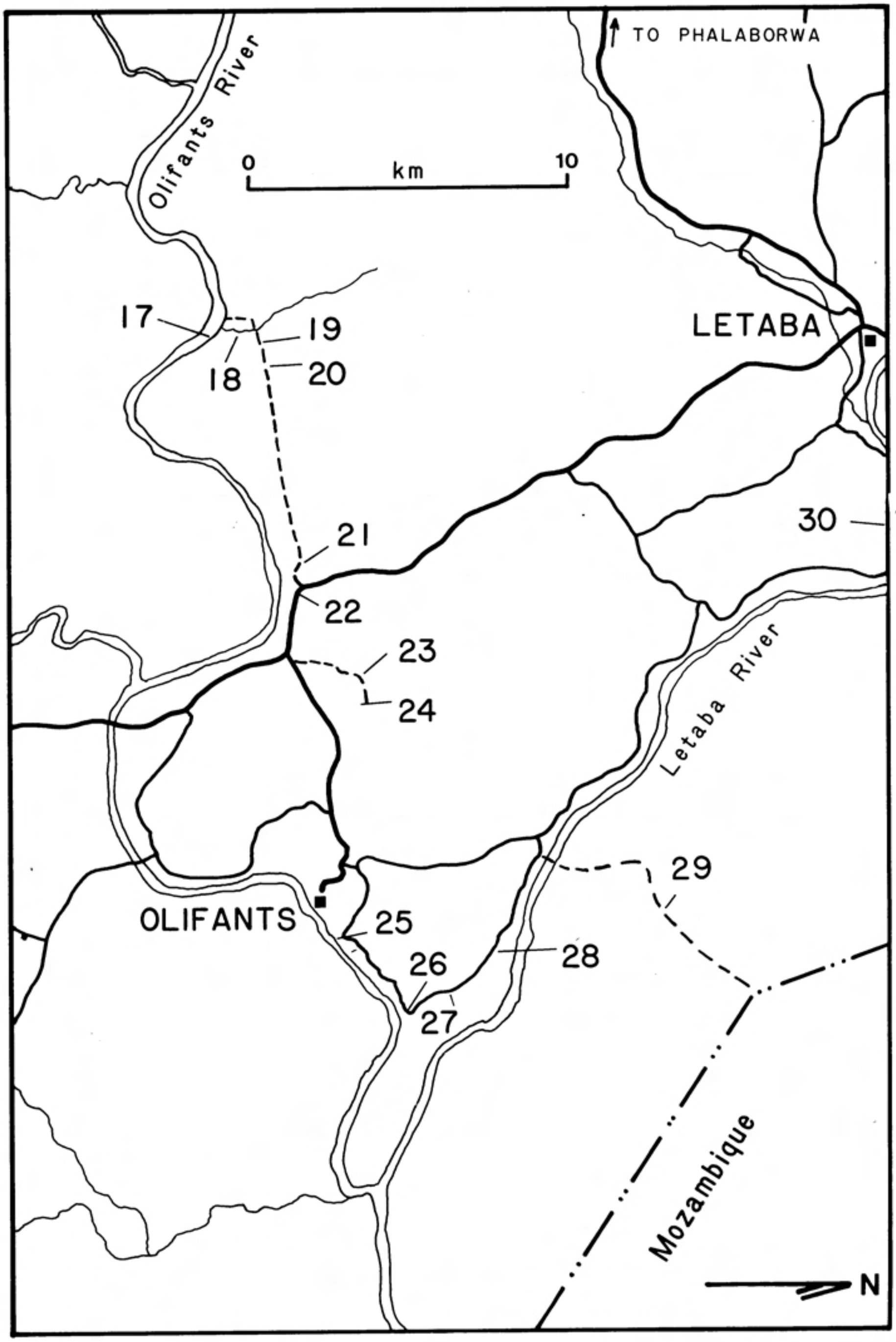


FIGURE 7

A number of interesting extrusive rock will also be examined. These will include composite flows of mafic and felsic material. Dyke rocks of similar character representing possible flow feeders will also be examined. A particularly interesting macroporphyritic basalt flow will also be visited alongside the Letaba River. This flow contains giant felspar phenocrysts (up to 5 cm) and contains many interesting flow structures indicative of irregular flow and convection within the flow during emplacement.

More details of the rock to be examined in the Olifants River section can be found in the following publications: Bristow (1984a, b), Cox & Bristow (1984), Cleverly, Betton & Bristow (1984) and Allsopp, Manton, Bristow & Erlank (1984).

Travel log

Leave Olifants Rest Camp and proceed by way of the main tourist route to the west. Leave the main tourist road* and proceed westwards along an east-west fire break track located immediately to the north of the Olifants River. Proceed for some 8 km along this track until the track splits in two at the base of a rocky decline. Take the left fork towards the Olifants River. Leave vehicles* at the top of the river bank and proceed eastwards on foot down the Olifants River. Proceed downstream towards the prominent cliff-face present on the north-east side of the Olifants River several hundred metres downstream from where the vehicles were parked.

Stop 17

This locality provides an excellent outcrop in which to study the base of the Lebombo volcanic succession. Overall the outcrop consists of massive off-white Clarens sandstones at the very base (adjacent to the river), a thin but easily recognizable sequence of reworked volcanoclastic rocks, and dark-grey to black, scarp forming Mashikiri nephelinites. Distinct breaks are present between the Clarens formation and overlying volcanoclastics, and likewise between the volcanoclastics and overlying nephelinites. Localized development of dense vesicles filled with amygdaloidal material at the base of the lowermost lava flow, and disturbed and altered patches of volcanoclastics and lava indicative of possible phreatomagmatism suggest that the volcanoclastics were relatively wet at the time of emplacement of the hot lavas. Note also the repetition of strata in this area due to small north-northwest trending strike faulting.

From stop 17 proceed northwards along the face of the cliff and proceed upstream along a small tributary of the Olifants River.

Stop 18

After entering the above tributary climb out the west bank and examine nephelinites characterised by abundant large amygdales and textures which are generally much coarser than those in rocks examined at Stop 17.

Continue upstream to the gravel road. Turn westwards along the road and return to the vehicles.

Retrace the original route eastwards. Stop a couple of hundred metres after ascending the crest of the incline present above the stream up which the previous foot traverse had followed.

Stop 19

Leave vehicles* and walk westwards. This stop is now on olivine-rich basalts representing the base of the Letaba River Formation. Continuing westwards to the crest of the low ridge will reveal nephelinites which underlie the picrite basalts. The picrite basalts are characterised by dark brown weathered surfaced and glassy black interiors. Pits on weathered surfaces represent olivines which have through alteration left voids.

Return to vehicles and continue eastwards. Stop alongside a distinct ridge characterised by a vegetation line.

Stop 20

Many ridges such as that noted previously will be encountered in the picrite basalts. They typically consist of coarse grained olivine rich rocks and represent picrite dykes cross cutting the Letaba basalts.

Continue eastwards. Time permitting, one or two other stops will be made at exposures of picrite basalt and picrite dykes.

Stop 21

Stop in, or near the small gulley (stream)* which is located immediately to the west of the main tar highway. On inspection of rocks in this area it will be noted that they are considerably more amygdaloidal (vesicular) and lighter in colour than the picrite basalts examined in previous stops. These rocks now represent olivine-poor (low-MgO) tholeiitic basalts of the Sabie River Basalt Formation, which overlie picrite basalts of the Letaba Formation. It would be possible, time permitting, to retrace the route just travelled and demarcate (relatively precisely) the contact between the picrite-basalts and olivine-poor basalts.

Return to vehicles and proceed to the main tar highway. Drive eastwards for a few hundred metres and stop on the north side of the road.

Stop 22

This stop* will be alongside a large, north-south trending rhyolite dyke. The dyke is chemically similar to the Olifants rhyolites and hence considered to be a feeder to these flows (domes).

Return to vehicles and travel eastwards. Leave the main north-south tarred highway and take the road to the Olifants Rest Camp. Immediately after doing so turn to the left (north) and proceed along a gravel track.* Proceed along this track until a prominent koppie is encountered along the right hand side of the track. Proceed a few more hundred metres and stop where the road cuts across the end of the koppie.

Stop 23

Rhyolite dyke. Leave vehicles* and inspect exposures of flow banded, contorted and brecciated rhyolite. The exposures examined represent portion of a large irregular rhyolite dyke which trends approximately north-south.

Leave vehicles* at this stop and proceed eastwards on foot for several hundred metres.

Stop 24

This stop will be made to examine a series of highly oxidized reddish-brown "basaltic dykes". The dykes are generally vesicular (amygdaloidal) and rarely exceed about 2 m in width. They show well developed columnar jointing (horizontal) and are present as a swarm of radial intrusions. A particularly well exposed "basaltic" dyke is present in the stream about 50 m south of the gravel track. Overall it would appear that the dykes may represent the western margin of a ring dyke or cone sheet intrusion.

Return to vehicles and travel back to the tar road leading to the Olifants Rest Camp. Continue on this road eastwards back onto the rhyolite dome on which the Olifants Camp is located. Immediately following the ascent onto this dome turn left taking the Loop Road which leads east. Turn right and head south after descending down the eastern flank of the dome. Continue along this road until it makes its first close approach to the Olifants River. Leave the vehicles* at this point and walk down to the north bank of the Olifants River.

Stop 25

This stop will consist of a foot traverse upstream along the north bank of the Olifants River. This area represents a classic section of Lebombo geology and provides superb exposures of a wide range of extrusive and intrusive rocks. Sedimentary/tuffaceous rocks will also be seen in the form of intercalated red-sandy horizon (boles) between basalt lava flows. Intrusive rock types will include composite dykes and excellent exposures of a variety of dolerite dykes. Extrusive rocks will include composite flows and numerous basalt flows showing a variety of flow features. The eastern edge of the Olifants Rest Camp rhyolite flow will also be observed. This flow shows well developed flow banding and flow contortions along its margin. Local autobrecciation is also apparent. Overall the Olifants rhyolite dome appears to be a composite unit made up of successive rhyolite flows.
Return to vehicles and travel eastwards. Stop at the eastern-most lookout point alongside the Olifants River.

Stop 26

This stop will provide a view of the Jozini rhyolites which form a prominent escarpment downstream of the lookout. Note the well developed columnar jointing in the rhyolites.

Continue east and then north along the loop road. Approximately 5 km after leaving the lookout turn right (eastwards) towards a ridge of Jozini rhyolite.

Stop 27

Briefly examine outcrops of Jozini rhyolite.

Return to the main loop road and travel west, then north-west. Stop in a gentle dip.

Stop 28

Examine macroporphyritic lava flow of the Sabie River Basalt Formation. This flow contains the largest phenocrysts noted in any basalt flow of the Lebombo (and probably Karoo basalt province as a whole). If time permits follow this flow northwards into the Letaba River where excellent outcrops of macroporphyritic lavas are present. At least two flows of this type are apparent in the river bed. They show generally fine grained margins with the greatest concentration of macrophenocrysts in the centre of flows. Irregular flow structures are also apparent in a few exposures.

Return to vehicles* and continue to the north-west. Continue until a no-entry sign is encountered on the right hand side of the road. Follow this route* to the north-east across the Letaba River and proceed eastwards up on to the Jozini rhyolites.

Stop 29

At this point a granophyre intrusion will be encountered. The coarse nature of this rock type is clearly apparent. Note that in this case the granophyre intrusion does not form prominent topography, as in the case of granophyres intruding basalts, *e.g.* Muntshe Ridge.

Proceed east to the KNP fence alongside the Moçambique border. Stop at a point where a good vantage point of the Moçambique Lowveld is obtained. The border fence is located on Jozini rhyolites. Note prominent ridges off to the east in Moçambique. These are formed by rhyolites known as the Sica beds which are interbedded with the Movene basalts. These basalts overlie the Jozini rhyolites.

Return to the Letaba River. Proceed across the low level bridge, turn right and follow the river upstream to the Engelhardt Dam. Stop and leave vehicles.*

Stop 30

Proceed to the dam wall and examine a composite dyke which consists of a coarse to medium grained felsic (granophyric) matrix supporting numerous mafic xenoliths.

Return to vehicles and return to Olifants Rest Camp or exit at Phalaborwa Gate, depending on previous arrangements.

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