SWAZILAND

ANNUAL REPORT

OF THE

GOVERNMENT GEOLOGIST

FOR THE YEAR ENDED

31st DECEMBER, 1943

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I. INTRODUCTION

1. The writer is able to report continuous achievement in work of the preliminary Geological Survey of this territory.

2. As work progressed, however, it became apparent that something more than a Geological Survey was required for assisting the development of minerals in Swaziland. Cases constantly arose in which it became increasingly difficult to determine the mineral rights at particular points in Swaziland, and frequently it was almost impossible to answer prospectors' queries as to the procedure necessary for prospecting from area to area, and which portions of certain Crown Mineral Areas were open and which closed. Although the accumulation of such information and work therein entailed does not ordinarily come within the scope of a geological survey, nevertheless the writer decided that it was essential for mineral development and therefore did as much as possible to clear up the problems, only, however, to a certain extent at the expense of general reconnaissance geological work throughout the territory.

3. Funds for the work are available up to the end of May, 1944, but it seems likely, as the work so far accomplished shows that there is further scope for such when extended to include general mineral development and underground water supply, that the period may be extended beyond that date.

II. GENERAL

(A) PREVIOUS GEOLOGICAL WORK IN SWAZILAND

4. Some further references to Swaziland in geological literature have been noted from the Transactions of the Geological Society of South Africa, a set of which has been acquired by this office, namely: G. A. F. Molengraaf's report as State Geolgoist to the S.A. Republic for the year 1897[1]*, in which reference is made to Forbe's Coal Concession and the Mbabane tin deposits; A. L. Hall[2], *Notes on the Tin Deposits of Umbabaan and Forbe's Reef in Swaziland*, and G. W. Bond[3], *Notes on the Mineralised Belt of Jamestown Series, Forbes Reef, Northern Swaziland.*

(B) PROGRAMME OF WORK

5. The Programme[4] established in the previous year of examining all known and reported occurrences of base metals and materials important to the war effort, at the same time undertaking reconnaissance geological work, was continued satisfactorily.

6. More information was required concerning the mineralization on Concession No. 9 M, where tungsten is alleged to occur, and also with regard to the quantity and quality of the coal and lime deposits on Nsalitshe hill near Hluti, visited when on reconnaissance the previous year[4] in South-Eastern Swaziland.

7. A temporary overseer was therefore appointed to assist in the excavation necessary in these places, and the writer camped at Nsalitshe during parts of July and August to supervise the work personally. While encamped there, the opportunity was taken to start a plane-table geological map of the area in the vicinity of Nsalitshe and Hluti, as the geology of the area is extremely interesting, the unconformity at the base of the Karroo System being well exposed.

* [1] etc., refer to Bibliography, section VII.

depredations aided by the goats, which eat even roots, have resulted in a tremendous amount of soil erosion on the slopes and sides of Nsalitshe hill and many others in the vicinity. The ground in places is really an appalling sight : vegetation, except for persistent aloes and thorn bushes, has practically vanished ; very little top soil is left ; gullies and dongas are forming at a rapid rate.

139. The landowners are seemingly unaware of the spoilation of their land, which in the writer's opinion should be brought to their notice, and expert advice given as to the combating of this menace.

140. Another point is that the water supply which collects in the old coal workings could be utilized. Water in this vicinity is scarce during the dry season. The writer had to send about 1½ miles to the Mgamude stream for good drinking water. The adit could be easily drained to lead the water to a sump outside where a place for watering cattle could be installed. The Natives are known to have used this water as a domestic supply, as soon as it became available on re-opening the adit mouth. It may not be a large supply, but nevertheless it might serve to ameliorate the situation to a certain extent.

(I) WATER SUPPLY AT FARM CRAGGIEMORE

141. The Farm Craggiemore, owned by Mr. D. A. Rose, is on the northern side of the Maloma-Nsoko road at a point 8 miles from the former place. It is located on typical rolling bushveld country.

142. The writer's advice was requested as to the potentialities of the vicinity for an underground water supply, but by the time camp was pitched on the farm drilling operations by a contractor with percussion equipment from Piet Retief had started at a site chosen by a water-diviner.

143. It was not possible to complete the geological investigations in the time available. Nevertheless it has been possible to size up the salient structure, etc., with the data collected. This is shown in Figure 4.

144. The homestead is located on the bushveld amygdaloid, but is very near the contact of this lava with the underlying Karroo sediments which outcrop about two miles to the immediate west. The top band of the sediments consists of a very fine-grained white to grey quartzite. This probably represents a sandstone recrystallized by the heat from the overlying lava at the time of the flow. All the rocks in this vicinity are intruded very extensively by dolerite dykes and sills ; the former being anything from a few inches up to hundreds of feet in width. Most of the dykes strike remarkably uniformly in a direction N. 17° E. which is perpendicular to the direction of dip of the strata eastwards. The dykes must therefore occupy a fissure system in the lava and sediments developed during the formation of the monoclinal structure which is so characteristic of the area. It is interesting to note in this connexion that the calcite fissure veins of Nsalitshe mentioned previously in this report are also similarly orientated. These veins are presumably later than the dolerites, and therefore it is only natural to assume that the forces producing the structural deformation, i.e. elevation of the hinterland or depression in the coast region to form the very extensive monocline, must have continued to be operative after the invasion of the pre-existing rocks by the dolerites.

145. The section in Figure 4 must be taken only as approximate, as shown by the dotted lines. The thick dolerite sill is known to exist from its numerous outcrops in the Ngwenyane donga. Its exact depth under the site of the borehole, however, is a matter of conjecture, as accurate readings of dip of the strata were unobtainable. This depth may also be complicated to a certain extent by faulting.

146. There are also very probably many more dykes present than are actually depicted. These dykes are the primary cause of the general difficulty of obtaining adequate and persistent underground water supplies in this type of geology. They tend to split up the country rock into a series of elongated trough-like reservoirs (as

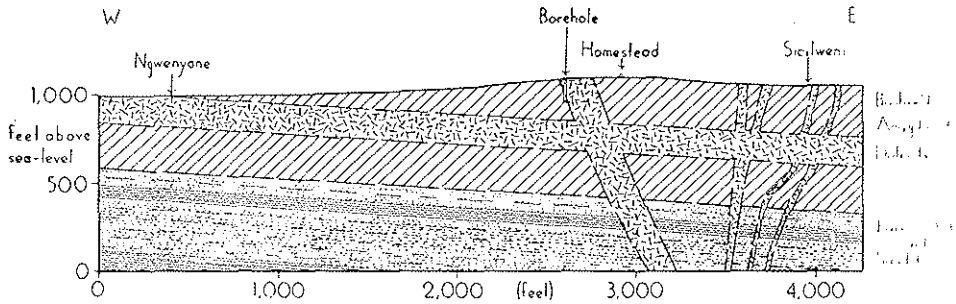

FIG. 4
Section illustrating the local geology at Farm Craggiemore.

will be readily apparent from the right-hand portion of the section). The dolerite is a hard compact rock and generally, except when fissured, is impervious to water. This water is prevented from draining from one side of a dyke to the other and therefore from one reservoir to another. Any supply that exists underground will be restricted to its own natural reservoir between dykes and will therefore have a restricted drainage area for its replenishment. Thus supplies to be obtained will be usually small and tend to decrease if in any way over pumped.

147. The site drilled is located on the western side of a dolerite dyke about 170 feet wide. This continued to 97 feet and proved to be very hard going for the drill. At the latter depth the rock changed to amygdaloid as shown by the white chips of secondary quartz and zeolite in the borings. These provide a reliable guide in many instances. Where, however, the lava is non-amygdaloidal, it is frequently difficult to distinguish it from dolerite, especially in small chips. Hard compact rock was again struck at 135 feet and persisted to 147 feet. This could conceivably be another dolerite sill (not shown in figure). At this point the hole has been temporarily abandoned, as difficulty was experienced by the hole tending to deviate from the vertical at an interface.

148. From the diagram it becomes obvious that there is a reasonable chance of obtaining a supply at this point until the wide dolerite sill is reached, and provided there are not more larger dykes present to the immediate west of the site.

149. When the geological map started is completed, it might be possible to indicate a site between known dykes and located more favourably with reference to drainage of the area and the present water supply, which consists of a small stream, the Sai lweni, draining northwards. This stream is alleged to be perennial, except under exceptional drought. Its flow is small and its quality brackish. Shallow wells, bottomed on dolerite, have been dug on its eastern bank with fair success. The water is also brackish and may be anticipated to decrease considerably in times of drought.

150. As 147 feet have already been drilled, the writer is inclined to recommend further drilling with suitable equipment for at least 80 feet, although, of course, it is impossible to guarantee a supply under existing circumstances.

151. The rainfall of the area in the region of 28 inches per year should result in the accumulation of underground water.

152. The drainage area of the vicinity is poor, as it is located on a low watershed between streams draining north to the Great Usutu and south to the Ingwavuma. Nevertheless the underground drainage, as already explained, is not normal, and therefore the catchment area of a site is of slightly less importance than usual.

153. Drilling in the Union in these rocks has been undertaken. According to Frommurze[13] there has been one failure in three, i.e. a 67% success. Drilling in the Karroo series has yielded slightly better results giving one failure in four, i.e. a 75% success. It is thought that with expert geological supervision these success rates might be increased considerably.

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Mbabane, February, 1944.