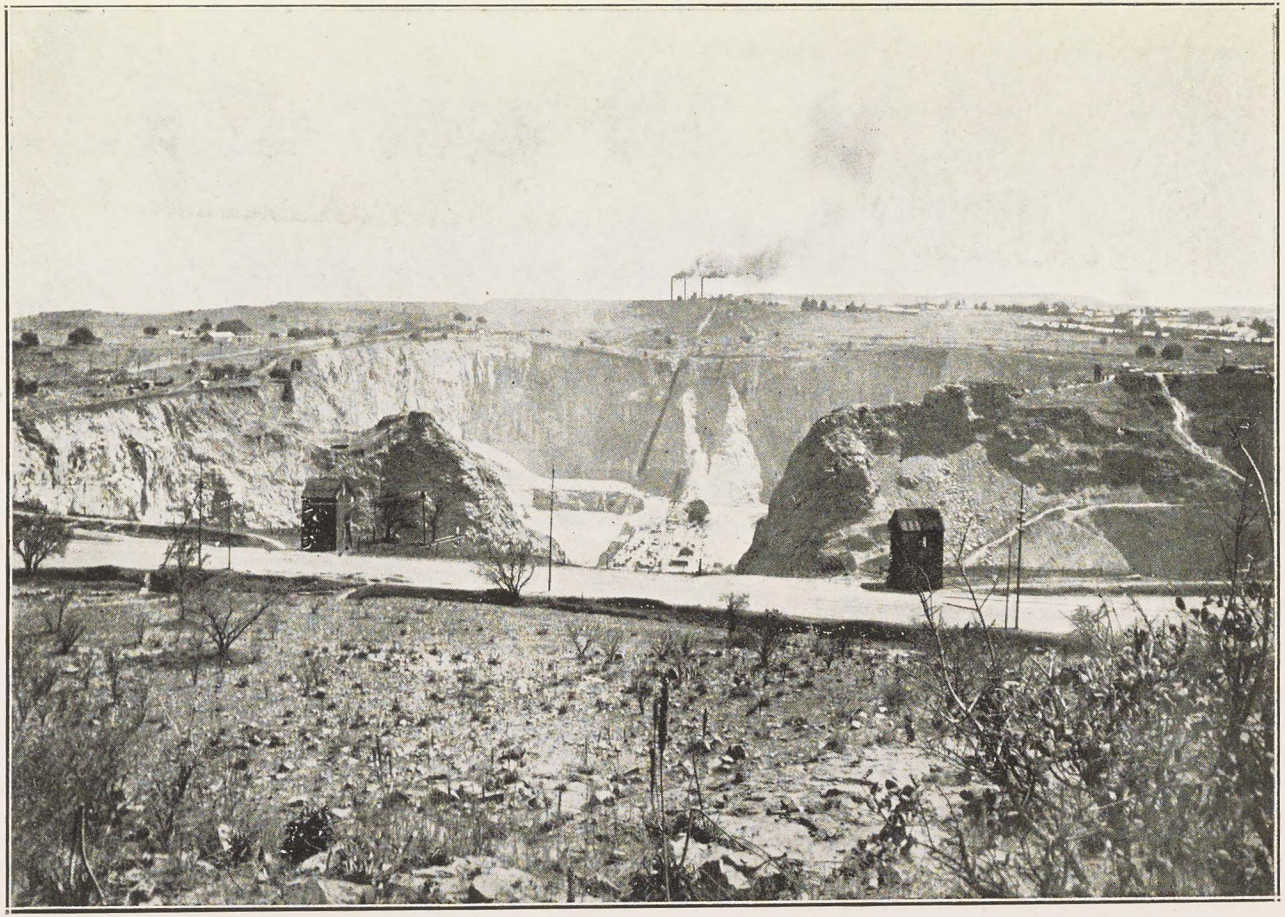
PREMIER (TRANSVAAL)
DIAMOND MINING
COMPANY, LIMITED.

NOTES
ON THE
PREMIER
DIAMOND
MINE
(TRANSVAAL PROVINCE.)



NOTES

ON THE

PREMIER DIAMOND MINE,

(TRANSVAAL COLONY.)

SITUATION.

The Mine is situated on the farm "ELANDSFONTEIN" No. 85, approximately 25 miles East of Pretoria, near the top of the watershed dividing the Elands and Pienaars Rivers, and was discovered by Sir Thomas Cullinan, in November, 1902. The pipe is bounded by hills of an average height of 100 feet, principally of a sandstone and quartzite formation, and these form the rim rock of the pipe.

AREA.

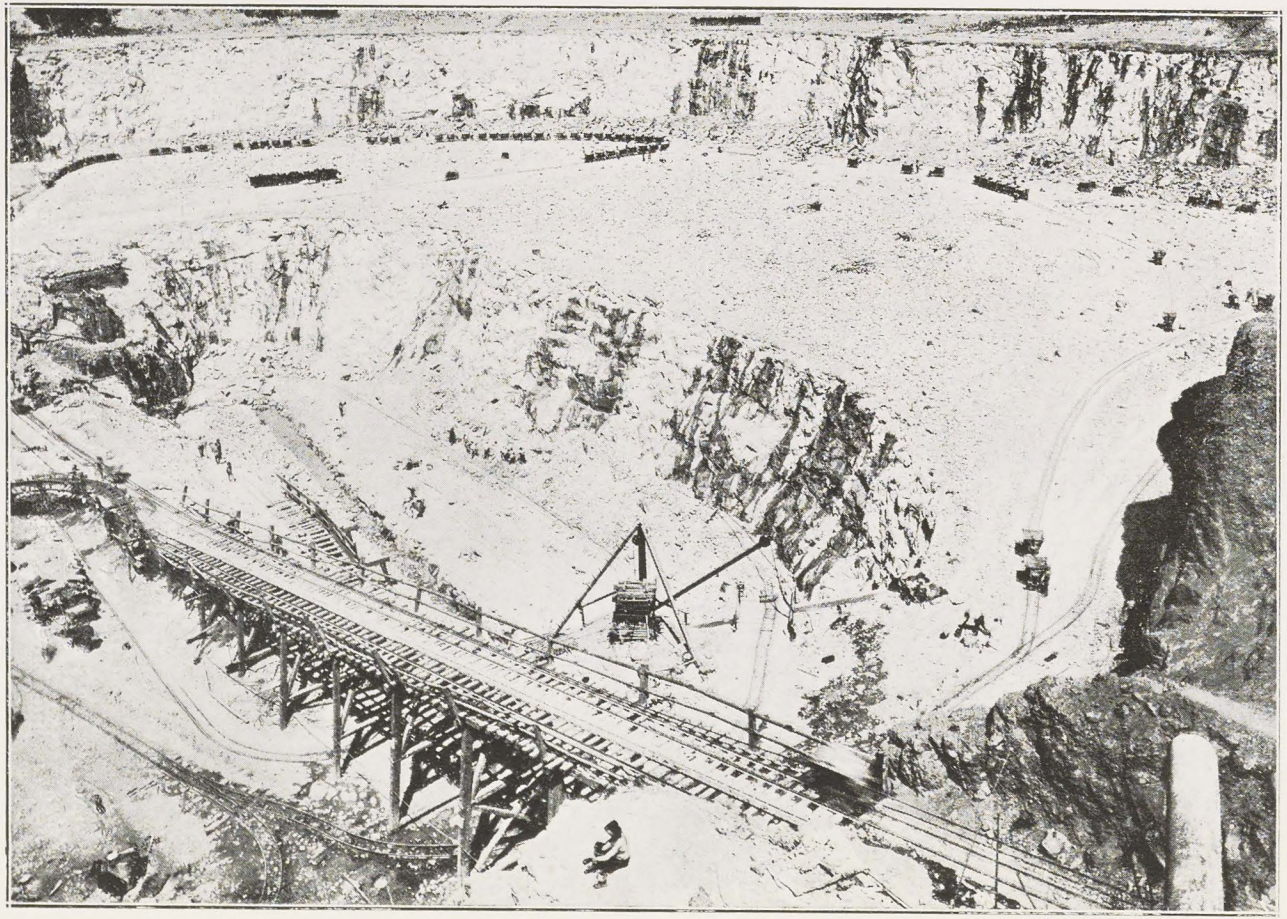
The area of the Mine is equal to 3,500 Claims of 900 Cape square feet. In English measurement this represents about 78 acres.

SYSTEM OF WORKING.

The Mine is being worked in Levels or Terraces, 50 feet in depth, and in view of the area of the Pipe, and the hard nature of the rim rock, it will be possible to continue the open workings to a depth of 1,000 or 1,200 feet, which will represent approximately four hundred million loads of 16 cubic feet, or say thirty four years' work calculated on an output of twelve million loads per annum.

BOREHOLES.

Nine Boreholes have been put down within the pipe area, to depths varying from 300 to 1,001 feet, and the diamonds extracted from the core obtained shows a favourable yield throughout.



MACHINERY AND PLANT.

It being the policy of the Company to start operations without delay, two temporary washing Gears were erected, comprising, respectively, three and eight pans each. Work was commenced with the former in April 1903, and with the latter in January, 1904. In view of the facilities afforded for working on a large scale, however, arrangements were subsequently made for the erection of an up-to-date direct double treatment plant capable of washing 20,000 loads of 16 cubic feet per day of 24 hours, and work with this Gear, which is the largest of its kind in the world, was commenced in November, 1905.

The Gear is divided into five sections or units which can be worked independently or collectively as required.

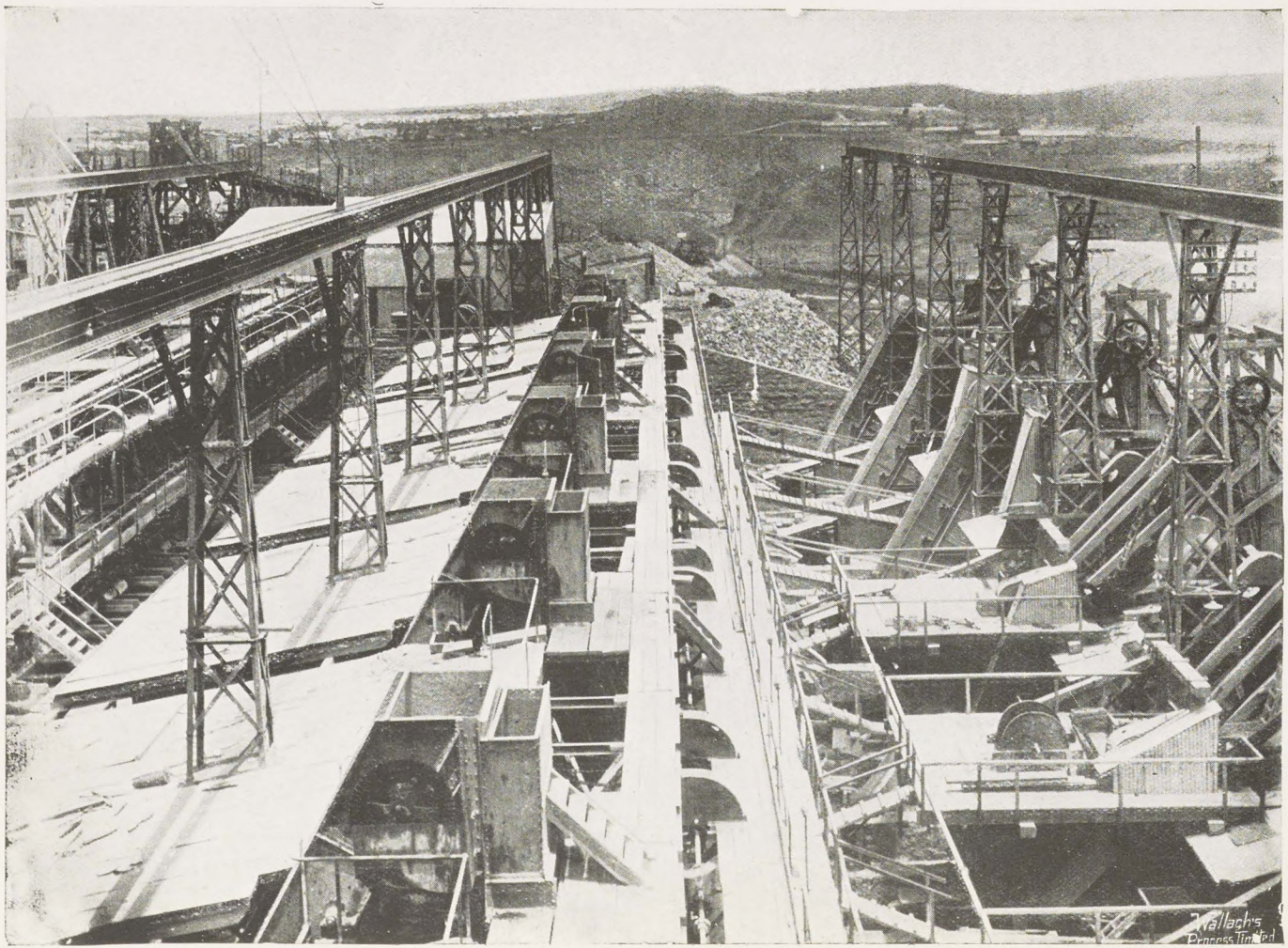
Each unit comprises the following:—

Two Comet Crushers.
Two Sets 4 ft. Rolls.
One Feed Elevator.
Eight 14 ft. Pans.
Two Sets 6 ft. Rolls.

METHOD OF TREATMENT.

The following is a description of the method of washing the ground by this plant and is known as the Direct Double Treatment System:—

The ground is hauled up from the Mine by means of a mechanical haulage to the apex of the Incline at which point the trucks disengage from the wire and gravitate along the bridge, being tipped automatically as they pass each of the grizzleys or receiving hoppers. After passing the last grizzley, the trucks are "righted" automatically and re-engage on to the return wire to the Mine. When the ground is tipped into the grizzleys, the bars of which are set 2½" apart, the finer ground passes between these bars through two sets of 4 ft. corrugated rolls, and is joined by the coarse ground after it has been reduced by the Gyratory crushers. The four feet rolls reduce the ground to ⅞" and from thence it falls to the Elevator pit. From this point the whole of the ground is elevated and discharged into a four way hopper for distribution to the top pans. In the pans the ground is carried round by means of revolving arms fitted with triangular teeth set in the form of a spiral. These teeth force the diamonds and other heavy deposit with which the diamonds are associated, to the outside edge of the pan, the lighter material flowing out at the discharge situated on the inner rim.


Wallach's
Pioneer Tin Pad

The discharge from the top pans passes through a set of 6 feet smooth rolls, which finally reduce the ground to 3/16", and thence into the bottom pans, the overflow from the bottom pans passing to the Tailings Elevators, which discharge the waste ground in the valleys below the Machine.

Arrangements are made to extract the heavy diamondiferous deposit from the pans continuously, one load of deposit being obtained for every hundred loads of ground treated. This deposit is conveyed to the Tube Mills where approximately 50% is reduced to slimes and discarded, the balance is then classified and passed over the grease tables. The diamonds, together with a very small proportion of concentrates, adhere to the Grease Tables, the remainder of the concentrates passing over the tables to the "dump". The Tables are cleaned automatically and the deposit together with the grease gravitates to an Electric heater, where the deposit is separated from the grease and the former placed on the Sorting Tables where the diamonds are picked out by hand.

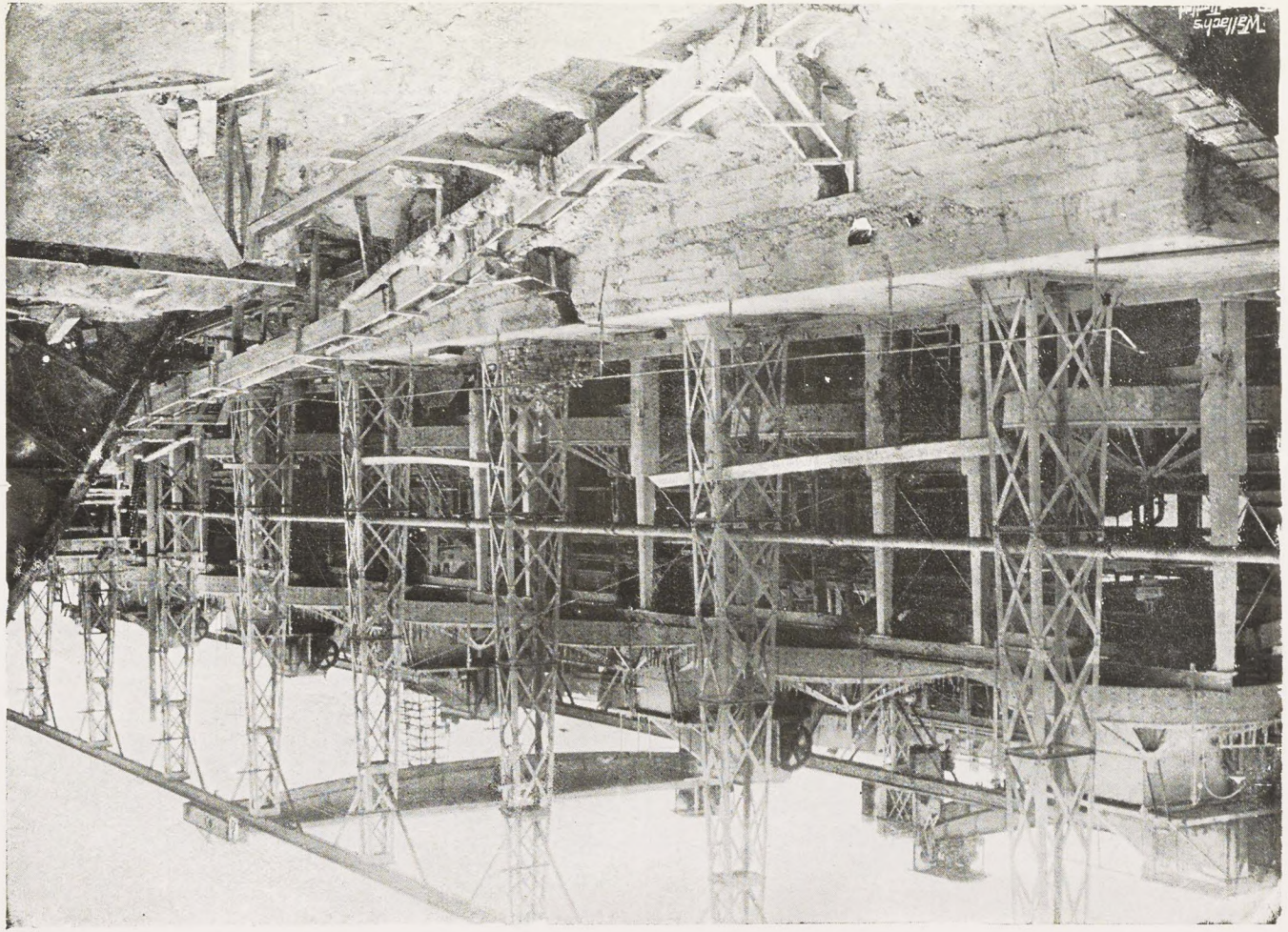
NO. IV. GEAR.

In February, 1907, it was decided to add still further to the washing machinery, and plans were accordingly prepared for a Pulsator plant for the treatment of ground direct from the Mine with a capacity of 28,000 loads of 16 cubic feet per day of twenty-four hours. This plant is arranged in seven units, each unit comprising the following:—

Two Gyratory Crushers.
Two sets of 4 ft. corrugated Rolls.
Two Feeding Elevators.
Sixteen Pulsators (8 for first and 8 for second treatment).
Two small Pulsators (for reducing concentrates).
Eighteen Deposit Elevators.
Two sets of 6 ft. smooth Rolls.
One Settling Dam.
One Centrifugal Pump.

Work with the first unit of the No. IV. Gear was commenced in May, 1909, and the whole plant comprising seven units has since been completed.

The method of treating the ground by this Gear is similar to that already described so far as the crushing is concerned. The ground, after being reduced by the 4 ft. Rolls, gravitates to the first Elevator pit.



From this point the whole of the ground is elevated and discharged into a hopper, which distributes the ground equally to the first treatment Pulsators. These pulsators consist of cast iron boxes 3' 9¾" x 3' ½" x 6", fitted with sieves with 1¼" perforations 6" below the top edge of the box on to which the ground is discharged. Behind the Pulsator box and connected to it by means of a 24" diameter pipe, is the plunger box containing the plunger, which is operated by an eccentric carried on a shaft overhead. Immediately adjoining the plunger box is the main water launder, which is kept full continually by means of the centrifugal pump which obtains its supply from the settling dams, and which supplies the plunger box through a flap valve which can be regulated to pass the amount of water required. On the upward stroke of the plunger the valve is opened and the water allowed to pass from the supply launder to the plunger box, the valve being closed again on the downward stroke of the plunger which then forces the water through the 24" pipe connecting same to the Pulsator box and lifts the ground on the sieve. The plunger makes 120 strokes a minute, the length of the stroke being 1¾", and in the course of pulsation the ground is entirely free throughout the sieve allowing the diamonds and other material of the same or greater specific gravity to pass through the perforations to the bottom of the Pulsator box. From this point small elevators extract the deposit continuously, and discharge same on to a conveyor belt, which delivers into a smaller pulsator situated at the end of each unit, where the deposit is still further concentrated, the residue from this source being again elevated and discharged on to a central conveyor running parallel to the Gear, which in turn delivers on to a belt at right angles to it which conveys the concentrates to the storage tank for final treatment by the Tube Mills and Grease Tables. The concentrates extracted from the Pulsators represent about 1 per cent. of the total ground washed.

The ground and water which is discharged from the first treatment pulsators passes over sieves with 1/12" perforations where the water is screened out and utilised again in the second treatment pulsators, the ground passing to the 6 ft. smooth rolls, where it is finally reduced to 3/16". From this point the ground gravitates to the second elevator pit, from whence it is elevated and discharged into the second treatment pulsators, where the process already described is repeated. The overflow from the second treatment gravitates to an elevator pit connected to the settling dams, where an

elevator fitted with perforated buckets lifts the tailings out of the water discharging same into a loading box, where the fine sand contained therein is extracted. The water is circulated continuously and is only discarded after it becomes too dirty for further use. From the loading box the tailings are trammed out and deposited in a dump by means of a haulage arranged for the purpose.

OUTPUT.

Up to 31.10.25 ..... 106,251,194 Loads of ground have been treated by the combined Gears, from which diamonds weighing ..... 24302.688 Carats have been recovered.

STEAM POWER PLANT.

This comprises two vertical triple expansion engines, each capable of developing 1,500 horse power fitted with condensors, air and circulating pumps, etc.

ELECTRIC POWER AND LIGHTING PLANT.

This consists of one 1,500 K.W. turbo-generator, one 750 K.W. and two 350 K.W. three phase alternators which generate a current at a pressure of 5,300 volts, also three 350 K.W. direct current dynamos which generate current at a pressure of 500 volts. This power is transmitted to four sub-stations for distribution throughout the Mine and works.

The lighting of the open workings of the Mine is efficiently carried out at night by means of searchlights, which are situated at convenient points on the surface.

BOILERS.

A battery of fourteen Babcock & Wilcox boilers, equal to 7,000 Horse Power, working under a steam pressure of 200 lbs. per sq. inch, supply steam for driving the whole plant. Coal bunkers having a capacity of 1,700 tons adjoin the boilers, into which the coal is delivered direct from the railway trucks.

CRANES.

Six overhead travelling cranes operated by electricity control both Gears and facilitate the work of renewals and repairs.

WATER SUPPLY.

In order to make provision for a permanent water supply, a Pumping Station was erected at the Wilge River, about 23 miles distant from the Mine. A concrete weir 900 ft. long and 30 ft. high has been constructed

across the Wilge River forming a reservoir having a capacity of eleven hundred million gallons, which is full at the present time. The catchment area is equal to 1,200 square miles. Four triple expansion engines, working ram pumps, have been erected, each pump being capable of delivering 1,000,000 gallons per day. At present 3,000,000 gallons per day are being pumped to the Mine at a cost of about 2d. per 1,000 gallons. Steel pipes 20" and 21" diameter respectively have been laid from the Pumping Station to the Mine.

LABOUR.

At present ..... natives and ..... white men are employed throughout the Company's works.

POPULAR DATA.

The pipe is more or less oval shaped. In its longest axis extending in a North Easterly and South Easterly direction it has a length of about 2,000 feet. The short axis is about 1,500 feet. Roughly it is half a mile in length by a quarter of a mile in width.

The height above sea level of original grass level at centre of pipe was 4,800 feet.

The Southern rim of pipe is practically on the same level as the floor of No. III. Engine Room.

The general grade of the Mine is worked at 1½ per cent., the fall being from South to North end.

The length of the main mechanical haulage is 3,000 feet, and the grade of the incline is 1 in 5.

Levels.	Height above sea level.
Wilge River Pumping Station	4,618 ft.
Highest point on pipe line	5,122 ft.
Reservoir at Mine	5,000 ft.
Cullinan Station	4,923 ft.
Original grass level centre of Mine... ...	4,800 ft.

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PRINTERS, PRETORIA