

LEEUEW-GAMKA DAM –

Most engineers will agree that constructing a dam is a challenging task even with the latest modern technology has to offer at your fingertips. But what if the only 'technology' at your disposal is the hoofed kind? The following letter from the Leeuw-Gamka Dam Resident Engineer to the Irrigation Department headquarters, dated 26 January, 1920, and preserved for many decades by renowned South African hydrologist, Prof Will Alexander, provides a poignant illustration of just what water engineers of old faced in their daily task to secure the nation's water supply.

Dear Sir,

The [Leeuw Gamka Irrigation Board] are unanimous that the proposal to run donkey wagons along the narrow crest of the dam, as suggested in my report, would be impracticable and fraught with great danger of accident.

As they have all had a life-long experience of capabilities of this class of animal, their opinion in the matter is to be respected, and I therefore consider it would be imprudent to insist upon a method or procedure which in their view is foredoomed to failure. So, if the draught animals and carts are to be used for the placing of the earth, a choice must be made between a horse, mule and ox. Consideration of the relative capabilities, cost of feeding, provision of

stabling, harnesses etc. and general aptitude of each of these animals leads to the conclusion that by comparison the ox, is undoubtedly the safest animal for use in this work.

The cost of feeding at the present time is excessively high, but the board are in the possession of oxen, suitable courts, trek gear, kraals, etc.

Thus it appears that for animal drawn vehicles it would be advantageous and preferable to employ the ox for work on the embankment, but the pits from which suitable material is obtainable are situated abreast of the embankment and a considerable distance from therefrom, so far indeed, that it would be impolitic to run ox carts direct from the pits to the embankment.

This photograph, taken in 1919, shows the excavation for the stilling and weir chambers of the Leeuw-Gamka Dam. The excavation was very irregular owing to cleavage found in the shale beds.



Construction of the stone pitching of the upstream slope of the Leeuw-Gamka Dam in 1918. Assistant Engineer E Jacklin is standing at the toe with Resident Engineer JJ Swalwell on the slope.



A view of the first Leeuw-Gamka Dam during construction in 1919 taken from the right bank.



All photographs from Will Alexander Archive

a poignant time in history

It is therefore suggested that donkey wagons be employed to convey the earth from the pits to a dump at the end of the embankment and use ox carts for the actual placing of the earth in position. In this way it may be found advantageous to form a dump at each end of the embankment.

In no system of working by carts is it feasible to pass to and fro in the available space, nor to run a consolidating roller at the same time as the carts are at work.

In my opinion a satisfactory manner in which to carry out the work would be to acquire light track and cocopans; remove the top foot or so of gravel from the present finished bank and with this material form a roadway from the track

along the uppermost part of the league 3-1 pitched slope. The material for a new embankment can be brought to the end of the track by donkey wagon and conveyed by the pans to the required position.

This method would allow of the soil being evenly spread and, by avoidance of any vehicles on the working area, promote the consolidating rollers being used to advantage.

Yours faithfully,

*(sgd) JJ Swalwell
Resident Engineer*

(No record could be found whether department headquarters actually complied with the request, however, on the photographs accompanying this article the use of oxen can clearly be seen - Editor)

ABOUT THE LEEUW-GAMKA DAM

The original Leeuw-Gamka Dam was an earthen structure situated on the Leeuw River, a tributary of the Gamka River on the farm *Stinkfontein* in the district of Prins Albert in the Karoo. The dam had a maximum height of 12,8 m above riverbed level and a gross storage capacity of 790 000 m³. Originally, the dam water was used for the irrigation of lucerne for stock feeding.

The dam was constructed shortly after the First World War from 1917 to 1921 by the Leeuw Gamka Irrigation Board under the supervision of the Irrigation Department, with JJ Swalwell as Resident Engineer. The dam breached in 1923 after which it was repaired and raised by the department. This time DF Roberts acted as Resident Engineer.

Siltation caused the raised dam to lose much capacity in the ensuing decades, until, by the 1950s the average water depth was less than 3 m when the dam was full.

After various investigations it was decided to construct an alternative earthfill dam across the Leeuw River 3 km upstream of the old dam.

This dam, where Will Alexander was Resident Engineer, is 21 m high above lowest foundation and 1 204 m long. An area of around 600 ha is still irrigated from this dam, although it too has lost much capacity due to siltation.

View of the Leeuw-Gamka Dam showing the basin and the 'technology' used on the dam, namely oxen, resting in the foreground. Donkey wagons are at work in the background.

Dam from the left flank showing upstream slope and stone pitching in progress.

