immense saving in transport, having a carrying capacity which was equal to that of 2,700 lorries.

Water supply in bulk, presented another serious problem. The water sources along the coast forward of Matruh had either been destroyed or left undeveloped, lest they should fall into enemy hands. Almost all the water needed had therefore to be brought from Alexandria to Matruh, and in the absence of a pipeline it had to be brought by sea and rail. From Matruh it was taken by motor transport to the forward area. Water was thus taking up much transport needed for stores.

To supply the large quantities of water now required, I ordered a pipeline to be laid between Alexandria and the forward area. I also gave instructions for the water sources at Fuka and Buq Buq to be developed. The orders for the construction of the pipeline and the development of the water source at Fuka were given on the 6th September, and on the 11th November the new water-point was opened sixty-five miles west of Matruh. A strict water ration of three-quarters of a gallon a day per man and vehicle had to be imposed in order to leave enough water to fill the new pipelines and storage tanks. In the space of two months, in spite of many difficulties, one hundred and forty-five miles of pipe had been laid and filled, and ten large reservoirs and seven new pumping stations had been built. Adequate supplies of water were then available without in any way interfering with the transport of supplies.

Large reserves of ammunition, fuel and supplies were required, since the capacity of the railway fell short of the estimated daily requirements of the force by about one-third. As transport was extremely limited and as rival demands were heavy, an early start had to be made on building up these reserves.

On the 8th August I had instructed Lieutenant-General Sir Noel Beresford-Peirse, then commanding the Western Desert Forces, to prepare plans so that work could begin as soon as the necessary resources and protection could be provided. The plan was to provide for dumping on a wide front in order to give the attacking forces complete freedom of movement. Work was to begin first at Giarabub, as the large reserves which would be needed if it were to serve as the base for the main attacking force would take a considerable time to establish.

Orders for the occupation of Giarabub had already been issued, and on the 8th August a detachment of the 7th Indian Infantry Brigade took possession of the Oases. The strength of the garrison of Siwa and Giarabub was increased during the month until it finally consisted of the 7th Indian Infantry Brigade Group and the 6th South African Armoured Car Regiment less one squadron. Covered by this force, the establishment of reserves began in the first week of September; a month later eighty-five per cent. of the total requirements had been placed in position and camouflaged.

Meanwhile the forces necessary to cover the placing of reserves in the northern area moved into position. In the middle of September the 11th Indian Infantry Brigade arrived in the coastal area, and the Headquarters of the 4th Indian Division assumed control of the forward zone, releasing the 7th Support Group to rejoin the 7th Armoured Division. On the 18th September the 7th Armoured Brigade moved forward, followed on the 4th October by the Headquarters of the 7th Armoured Division.

At midnight on 26th September, command of the forces in the Western Desert, except those in Tobruk, passed to the Headquarters of the Eighth Army. The Headquarters of the Western Desert Forces, of which Lieutenant-General A. R. Godwin-Austen had taken command in place of Lieutenant-General Beresford-Peirse, became the headquarters of the 13th Corps.

On the 4th October, as soon as it had been decided to direct the main thrust towards Tobruk, we started to establish further reserves in accordance with the approved maintenance plan. The limiting factor was the small amount of motor transport available in relation to the strength of the force* and the distances it was proposed to cover in the advance.

During the preparatory period in particular great demands were placed on transport resources. Material for the new railway and pipeline, water to fill the pipe and reservoirs, supplies for the troops covering the preparations and those in training behind, all had to be transported. Great quantities of petrol had to be moved not only for the operation but for the convoys bringing up reserves, which at one time required 180,000 gallons a day. Weak and ill-constructed petrol containers led to great waste of petrol and, consequently, to a most uneconomical use of transport. Everything possible was done to remedy this weakness, but it is probable that on long desert journeys the loss of petrol between base and consumer came to as much as thirty per cent. Even with the most careful handling the loss between base and forward base was between five and fifteen per cent. The need of a more efficient container after the German pattern was only too apparent.†

All these rival demands severely limited the amount of reserves which could be built up, and consequently the size of the force which could be maintained forward of these reserves once the advance had begun.

Nearly thirty thousand tons of munitions, fuel and supplies were stored in the forward area between the beginning of September and the middle of November. Even so these reserves were only sufficient to cover the difference between the daily rates of delivery and consumption for a week at most; when they were exhausted, the size of the force must be reduced, or an alternative source of supply opened up. Consequently, unless contact were established with Tobruk and part of the force supplied from there, the full weight of our attack could only be sustained for a week. Again the reserves held in Tobruk were not large and could maintain additional forces for

* The forces to be maintained numbered about 118,000 men, and 17,600 vehicles, and some 24 motor general transport companies and seven motor water-tank companies were used for this purpose. Average daily maintenance needs came to about 3,000 tons.

† The special merits of the German 20 litre petrol can, popularly known as the "Jerrican", were readily apparent, but its production entailed special machinery which was not immediately available. Ultimately, when the necessary plants were set up both in the U.K. and U.S.A., and also in the Middle East, the "Jerrican" pattern can became the standard British Army petrol container.