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REPORT ON EL-GENEINA WATER SUPPLY PROJECT

BY BRIAN MATHEW 27<sup>th</sup> March 1989

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ABOVE: EL-GENEINA WATER PROJECT - KIOSK 3 IN OPERATION

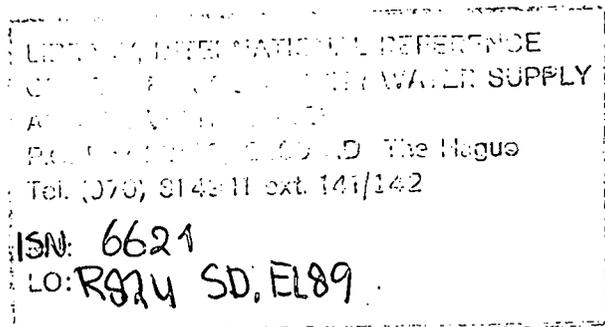
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## INTRODUCTION

This report sets out to inform all those involved in the development of the EL Geneina Water Supply Project of how the project has been advancing since February this year.

I am happy to say that there have been a number of developments, both in the technical implementation of the project but also in the social development sector. Six water kiosks are now operating under the management of locally elected water kiosk committees. Cost recovery and maintenance are now handled at grass roots level by the community. This has been the result of a community organisation campaign which has succeeded thanks to the dedication of both the water staff here on the project and the corporation, and the extremely helpful participation of three volunteers: Ms. Huwa Adem Bakeet, a teacher from Abdulla Abdulla School. Ms. Hajja Ahmed Mughtar, a Midwifery Teacher, from Geneina Midwife School, whose work with the women has been invaluable, and Mr. Edriss Hassan the Council health inspector, who has played an extremely active roll in the community kiosk meetings.

I will start with social development as it is this area which holds the key to the long term success of the project.



Overleaf: women and children at the community water meetings.



## SOCIAL DEVELOPMENT

The social development of the project is broadly following the guidelines laid out in the November 1988 Institutional development report written by John Durant. In line with this report, much of the onus of management, maintenance and cost recovery has been placed with the end users. This has been done by a campaign of community organisation. Meetings have been held at individual water kiosks to introduce the project to the people and to elect kiosk water committees to handle the management of the water kiosks at grass roots level. The meetings were carried out in the evenings by members of the project staff, members of the corporation staff and volunteers from teaching and health departments in the town. At these meetings the men and women were divided into separate groups for the introduction and discussion of the project. This was to allow the women proper representation of their views. The meetings went well and were well attended, at one meeting over one hundred and seventy people attended. Important issues were raised by the individual communities, these included the issue of who was to be the kiosk minder and how to sort out tribal problems, which as the reader will know are of major importance in Darfur at the present time. Of the first issue, the women felt very strongly that the kiosk minder (who basically manages the day to day running of the kiosk, gets people to put their money in the cash box and insures orderly queuing etc.) should be a woman, since it was felt that a woman would be more sympathetic to the other women that were collecting the water than would a man. Some of the men felt that a man was needed as he would be better able to deal with a crowd of people. Eventually it was agreed that there should be both a man and a woman at each of the water kiosks to share the job of kiosk minder, this solution is currently under revue. On



Community organisers at work - El Geneina water project





Community water meetings: women above, men below



the second point of tribal problems, usually between Arab and Fur peoples but also between the Zaghawa tribe and some Arab tribes, potential problems were sorted out, with fair sharing of the kiosks and representation on the committees agreed on. I would like to stress here that the initiative to solve these problems came totally from the people, largely in fact from the women, who in the chaotic few days when we ran the water to the kiosks without any management (basically to wash the pipes), came across problems which they knew had to be solved. There is enthusiasm for the project not least because the reduction in price for water has been by a factor of ten from that charged by the donkey water vendors. The communities have taken the concept of community management well and are already arranging that monthly meetings be held, so that important issues which come out of the initial running of the system can be raised and discussed. This is all good and we are pleased with the progress on this front; which will hopefully provide a stable base for future developments, along the lines of community health education and the development of other community projects. Other community projects which have been proposed include a sanitation campaign, which was put forward by the health department here.

The position of the donkey vendors is also being monitored, it was decided to allow donkey water vendors to collect water from the water kiosks at the regular price of 25p / 8 gallons, and to monitor the situation. So far several developments have happened. The price the water vendors charge to the public has started to drop, because a) of competition from the kiosks and b) the fact that they do not have to travel so far to collect the water in each delivery cycle. This situation would seem to be beneficial for all concerned; not only does it mean that there is still a water delivery service

for those that require it, but that this service is now cheaper than before, and that the donkey vendors themselves have not lost their jobs. This may be because of the elasticity of demand resulting from cheaper prices. We will be carrying out a survey with a questionnaire to follow up this situation more closely.

The problem of the messy water spillage around where the donkey vendors fill their containers has been solved by insisting that donkey vendors fill up at a well drained place a distance of about 20 - 30 meters from the kiosk, this keeps the water spilled to a minimum, and the management is handled by the kiosk minders and watchmen.

The exact way in which we hope to bring health education to the kiosk communities we are still working on, however word about the project has spread and as already mentioned there has been a suggestion to introduce a sanitation element to the project, which would greatly increase the chances for the project having a beneficial impact on health in the town. This proposal came from Dr. Salich Zakaria of E.P.I. (Expanded Program of Immunization) and as it is part of a proposed government scheme should not cost the project anything.

The project has, by organising the community into recognizable units around each water kiosk, thus provided a framework for health development which does have quite exciting possibilities. Though to continue this work I see the need for coordination and permanent staff, I am thus holding discussions with Goal who have extensive experience of this work at the Meiyo community project near Khartoum.

### TECHNICAL IMPLEMENTATION

- 1) Six water kiosks are now operating under community control. A further three will be brought in to production as soon as communities are organised. Money boxes have been constructed at all nine kiosks (see illustrations 1 + 2)
  
- 2) Trench completed to G.P.06, initially it was intended to connect G.P.06 to the town supply by using the old 6inch asbestos pipe, which had been dug up from the Disa line. After extensive fruitless searching for connectors for this pipe it has been decided to use 4 inch g.s.pipe which is laying at the Disa yard.
  
- 3) The 50m<sup>3</sup> tank at Disa has been repaired and connected to the town supply, however it can at present only be supplied by the small 5m<sup>3</sup>/hr. pump at Disa, and so is not being used at the moment. This situation will be remedied when borehole GP6 is brought into action which will be pumping 30m<sup>3</sup>/hr. The pipeline to GP6 has now been laid, and we are negotiating with the Geneina electricity project installation of the transmission cable which is needed to bring electricity from the generator house at Disa to the borehole, a distance of just under a kilometer.
  
- 4) Adamata: the fencing, (toilets) and generator block have been finished at Ardamatta. Work on constructing the new kiosks for Ardamatta is also currently underway, as is the trenching. However we are still waiting for the pipes to arrive.

Overleaf: above, Woman putting money into water kiosk cash box

below, water from kiosk 5 flowing into traditional water pot.



5) The 20m<sup>3</sup> storage tank at Ardamatta is still waiting to be moved to the hospital, this will be done after the arrival of the Goal clerk of works who is organising the renovation work at the Hospital.

6) The council is arraingng to survey the generator house site for BH14 as soon as this is done construction work will start.

### COST RECOVERY

The project is as mentioned now running six water kiosks (see Map), and over the next week we hope to see a further three kiosks open. The money generated by these kiosks for the first two weeks of their operation is listed below:

| Kiosk No. | 1st Wk. of Operation | 2nd WK. Operation |
|-----------|----------------------|-------------------|
| Kiosk 2   | 526.50               | 566.50            |
| Kiosk 3   | 575.75               | 760.00            |
| Kiosk 5   | 462.75               | 555.00            |
| Kiosk 6   | 425.50               | 587.50            |
| Kiosk 7   | 244.75               | 313.50            |
| Kiosk 9   | 285.25               | 433.75            |
| TOTAL:    | 2,518.50             | 3,216.25          |

Shortly nine water kiosks will be operating from borehole 13, this will give a projected weekly income of 4,500 sudanese pounds, or a monthly income of around 19,500 Sudanese pounds. If recurring costs are compared with this income figure (that is recurring costs of operation, fuel and wages of operators, etc; but not construction wages or capital costs). Then the project is already producing a modest profit which can be turned towards contingencies.

# GENEINA TOWN

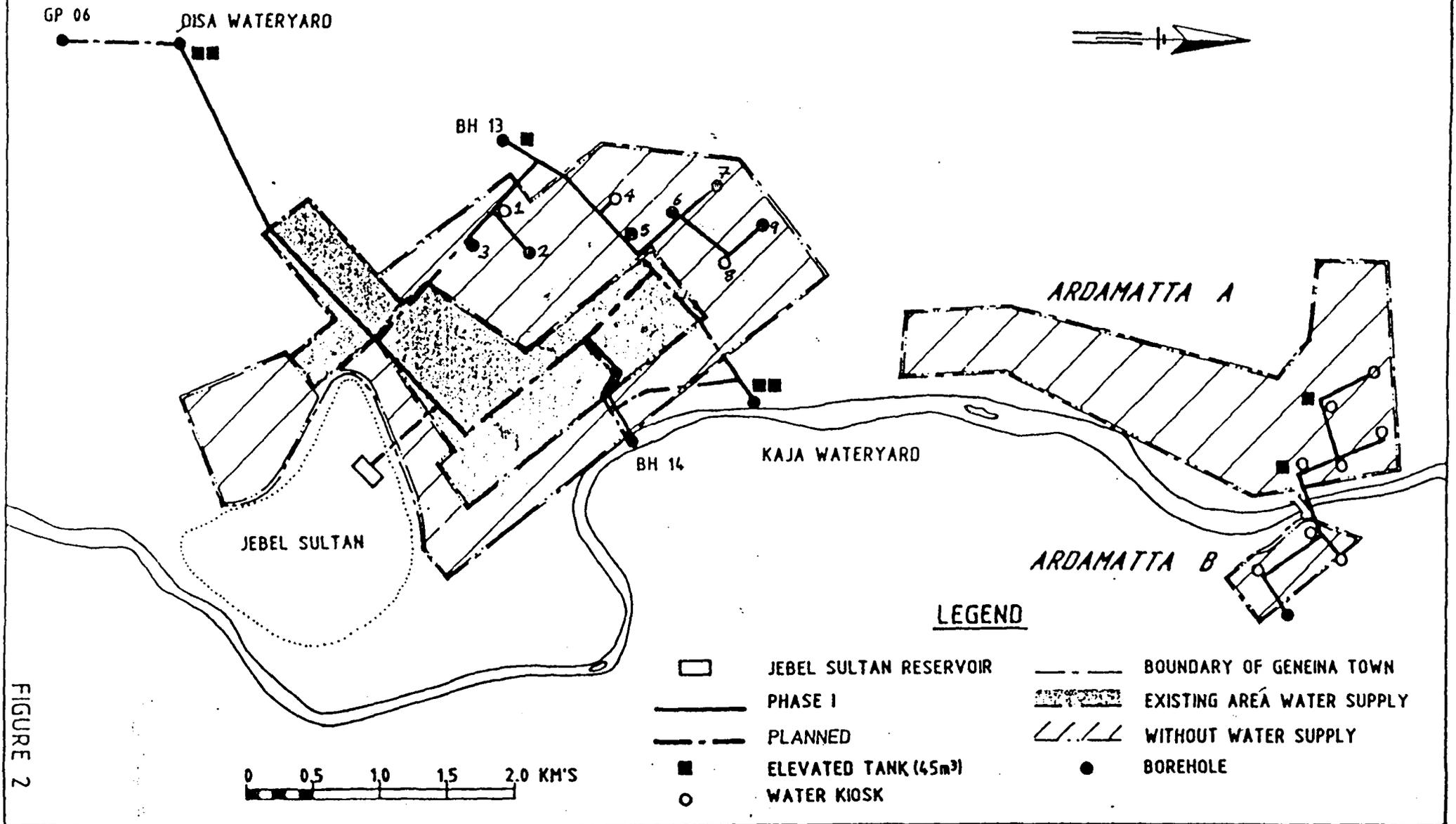


FIGURE 2

Current Project Recuring Costs 1 Wages & Rent:

| Item                          | No. units | unit cost | total cost |
|-------------------------------|-----------|-----------|------------|
| Generator/pump operators      | 2         | 300       | 600        |
| Driver                        | 1         | 300       | 300        |
| Electrition                   | 1         | 250       | 250        |
| Masonry Superintendent        | 1         | 600       | 600        |
| Acting Ass. Resident Engineer | 1         | 1,900     | 1,900      |
| Guards                        | 13        | 210       | 2,730      |
| Clark 1                       | 1         | 300       | 300        |
| Clark 2                       | 1         | 150       | 150        |
| Typist                        | 1         | 150       | 150        |
| Rest-House Cook               | 1         | 300       | 300        |
| Rest-House Rent               | 1         | 600       | 600        |
| Casheer                       | 1         | 300       | 300        |
| kiosk minders                 | 9         | 300       | 2,700      |
| kiosk watchmen                | 9         | 300       | 2,700      |
| Section total                 |           |           | 13,580     |

Current Project Recuring Costs 2 Fuel:

Borehole 13, six hours operation per day (8 gallons)

Lorry (4 gallons per day)

Landcruiser (4 gallons per day)

Cost of fuel per 44 gallon drum (excluding drum) = 500

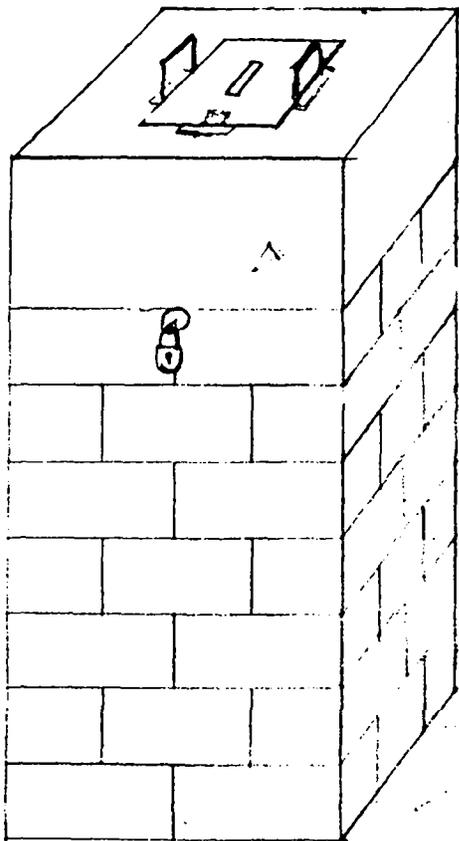
Total monthly fuel consumption = 416 gallons or 4,727 Sudanese Pounds

overleaf: diagram of project cashstand and cash box

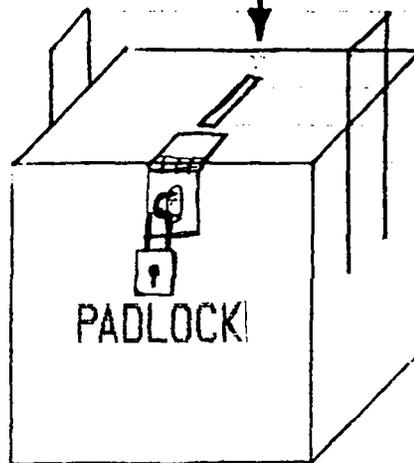
NYALA/GENEINA  
WATER SUPPLY PROJECT

اول بيعة < ٥ قرش لمهيجين  
أرفع داخل الصندوق

PROPOSED CASHBOX STAND



PADLOCK

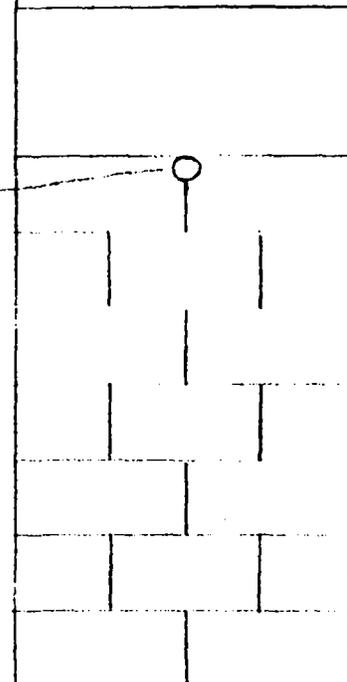
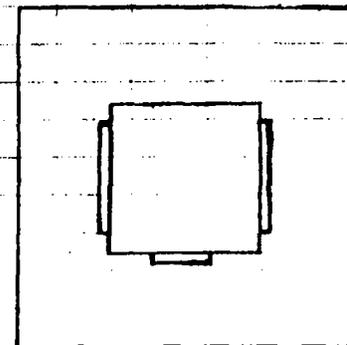


PADLOCK

CASH BOX  
(SCALE 1:5)

1" G.S. PIPE

LOCKING PIN  
(SCALE 1:5)



FOUNDATION

CASHBOX STAND (SCALE 1:10)

|  |                        |
|--|------------------------|
| TOTAL PROJECTED MONTHLY INCOME FROM 9 KIOSKS = | 19,500 Sudanese Pounds |
| TOTAL CURRENT PROJECT RECURING COSTS =         | 18,307 Sudanese Pounds |
| Net Profit =                                   | 1,193 Sudanese Pounds  |

### TRAINING

We were pleased to have a visit from Wim Welink last month, during which time he visited the technical training school here and assessed the need for training of staff. With out in any way meaning to preempt his report I would like to suggest the need for training in the following areas:

- 1) Electricians: for the correct wiring of pumps, generators and switch boards.
- 2) Generator/pump operators: for the correct procedures of operation, maintenance and repair.
- 3) Some accountancy training for project casheer.

### NEW TOWNSHIP ELECTRICITY SUPPLY

EL Geneina Town Council is currently installing a 700 Kilowatt power station. This work which started about a month ago is now well underway with the three generators now sitting on their mountings and work is in progress to get the whole system working. The work is being coordinated by Abed El Rahman a mechanical engineer from the Urban Electricity Corporation in Khartoum. Mr. Abed El Rahman has suggested that the new township electricity supply be used to provide power for the water supply system. The possibility that the water project has the option to recieve power from the town electricity supply

is an interesting development, especially as a back up to our own generators. Should the new town power supply prove reliable and cost effective it could even be considered as the future main source of supply, with our generators held in reserve as back up for the water supply. To this end, I have suggested to a recent fact finding mission from U.N.D.P., that they provide funds for the new transmission lines which would need to be constructed to carry power to the boreholes at Disa, BH13 and Ardamatta. This was done in an informal way and I cannot be at all sure of what the answer will be, so it would be as well for the donors of this project (the Dutch Government) to consider whether the construction of transmission lines to the boreholes is worthy of investment. From my own observations of the way work has been going ahead on the new electricity supply. I would say that this development is serious and should thus be considered equally seriously as a possible future source of power supply for El Geneina's water supply.

A preliminary estimate for the cost of installing the powerlines to Disa and BH13 is 400,000 Sudanese pounds.

#### CONCRETE RESERVOIR FOR THE JEBEL SULTAN?

From my own observations of the site proposed for the Jebel Sultan reservoir, I would like to respectfully suggest that a circular concrete tank is built. This would have a radius of 15 meters and a wall height of 2.5 meters, with the water level being allowed to reach 2.25 meters. This would give a storage capacity of over 1,500 m<sup>3</sup> and would I believe be considerably cheaper to construct than the proposed steel tank. It should also have a longer life. It would be constructed with a solid reinforced concrete footing

foundation and the walls would be constructed of a double layer of locally available brick with an intervening layer of reinforced concrete moulded up from the foundation. The inside wall would be plastered possibly with ferrocement and then painted with a cement slurry. The outside wall would be supported by an earth bank with a 1/4 slope. Brick colloms inside the tank would provide support for the tank roof, which could be made of a single or double layer of corogated iron sheeting, the later would provide good insulation to the tank and thus maintain continuity of temperature. If this idea is considered as being a possibility I will gladly put together a detailed estimate of materials needed.

This tank would hold approximately one days storage for the town, but in order to fill it I believe a further borehole will have to be constructed in the wadi close to the Jebel Sultan.

#### PROBLEMS SECTION

1) Over heating of the new Lister generator at borehole 13. This has proved to be somewhat of a problem, and in order to maintain continuity of supply to the new water kiosks we have moved one of the other two new generators up to act as a stand by. In fact both generators have been subject to overheating and so until this problem is solved and the generators able to run reliably we are going to continue to operate two generators at BH13. This does mean that there is now a shortfall of at least one generator and possibly three if the overheating is to prove to be common to all of the new generators. The solution proposed by the acting assistant resident engineer Mr. Yahia Salih El-Amin is that any new generators purchased for the project should be of the

Lister water cooled type, preferably using a cooling tower. This type of generator is, according to the A.A.R.E., more able to deal with the high temperatures here than is the present air cooled type. Another aid which could help the present situation would be the use of extractor fans fitted to the roof of the generator houses to prevent the build up of hot air above the generator. However it should be mentioned that the second generator is situated outside the generator house and this is also subject to over heating, though not so badly, and so this is not a complete answer.

#### FUEL STORAGE.

As mentioned in my report letter the issue of fuel storage is an important one. If the water supply is to operate independently and consistently throughout the four month rain season then a fuel store of sufficient size is required. At the estimate of 36,000 litres fuel per month mentioned in John Durant's Institutional Development report(appendix X), a four month fuel store would need to hold 144,000 litres of diesel fuel. There exist three main possibilities which would allow for a reduced fuel store,

- 1) The provision of year round road access to Geneina, in which case a one month fuel supply would suffice (see aerial photograph of the broken bridge at Ardamatta; evidence of the obstacles which need to be tackled if a reliable road is to be built).

- 2) The provision of power to the boreholes from the town electricity supply, which is currently being revived, and is previously on page 9. This would require that the electricity board have a sufficient fuel supply, and in any case a sufficient back up supply should be stored for the borehole generators since the new electricity supply service may be subject to the sorts of



problems which rendered the previous town electricity supply out of action.

3) That the 20 hours of water supply proposed in John Durants report be reduced.

I would suggest that the first two possibilities although desirable are probably not completely attainable in the foreseeable future, and that the third option is undesirable. Thus a fuel store capable of keeping the water supply running throughout the wet season is ultimately essential to the long term success of this project.

For the short term the quantity of fuel required for the water supply this wet season is as follows.

- 1) Project supply including 6hrs per day from BH13, operation of lorry and landcruiser. = 44 x 44 gallon drums of fuel
- 2) Estimated Water Corporation fuel requirements:

The Corporation currently relies on two thirsty generators to pump the bulk of the water piped to the town. If the new generator at BH14 is brought into production before the rain season then this will have a significant impact in reducing the consumption, however even with this reduction the quantity required will be about 82 Drums, and this would include a restriction of pumping to about six hours per day.

The joint fuel requirement is about 126 Drums, this cannot really be split because both the project and the Corporation share both a store and a storeman, and any separation would cause unnecessary friction and would probably be politically unworkable. This amount of diesel must thus be procured before the onset of the rains. I would suggest that the project purchase what it requires and the corporation find what it requires, this way

any shortfall which does occur during the rain season can be apportioned to which ever side fails to get hold of the required amount before the roads become blocked.

It is especially important that this fuel store is collected since paradoxically water becomes extremely short during the rainy season, this is because the local wells become swamped by the rising waters in the wadi.

#### OUTSTANDING ORDERS

1) The landcruiser pickup, and pipes for Ardamatta which arrived at Port Sudan in January, have still not been delivered to Geneina. This is apparently due to bureaucratic difficulties between the various ministries and departments involved in the clearence of the goods. It would be nice if they arrived before the wet season, otherwise I will have to buy a horse!

2) The small fuses ordered for the generators have still not arrived and so we are now operating the generators without fuses. It would be really nice if we could recieve these fuses as soon as possible. Please send:

30 x 4 amp - 250 volt

30 x 0.5 amp - 250 volt

30 x 2.5 amp - 250 volt

3) The three 50m<sup>3</sup> water tanks are alledgedly waiting for collection at EL Fasher, Mukhtar EL-Bushra is currently investigating.