Drilling Agencies in Voluntary Sector

AFPRO

DRILLING AGENCIES IN VOLUNTARY SECTOR

MEETING

HYDERABAD

22 & 23 JULY 1981

CONTENTS

....contd

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GENERAL REPORT

Resume of the Proceedings

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MEETING OF THE DRILLING AGENCIES IN THE VOLUNTARY SECTOR AND MANUFACTURERS OF DRILL RIGS

HYDERABAD
JULY 22 - 23, 1981

INTRODUCTION

During August 1974, a WRD Seminar was organised at Hyderabad, which was attended by a number of AFPRO related projects.

Incidentally, after a lapse of 7 years, Hyderabad was chosen to be the venue for the meeting of Drilling Agencies in the voluntary sector. Since participants of both the above events were more or less the same core group - the AFPRO related drilling agencies - the meeting at Hyderabad generated deep interest among the participants. The mood of the meeting was that of a family get-together in all respects.

Mr. C.V. Chellappa of Water Development Society, Hyderabad, welcomed the delegates rendering due importance on the usefulness of the meeting of this type. He raised the problems of drilling equipment, spares, import of equipment and all other salient problems. He also emphasized on the formation of an association of drilling agencies, so that each one could share his experience and disseminate the knowledge.

In his Keynote Address, Mr. J.B. Singh, Executive Director, AFPRO, emphasized upon the importance of the family gathering that took place for the first time in 7 years. He stressed that in the style of working of the Drilling Agencies under voluntary sector, the social overtone must be predominent.

Col. B.L. Verma of Water Resources Development, Dept., AFPRO, concluded the inaugural session by raising the basic issues and the matters of common interest. He emphasized on the importance of setting the goals for the future years to come.

GROWTH

It is generally believed that drilling is an expensive affair and, therefore, it had not been possible for many projects to stick to drilling operations, keeping in view the aims and objectives of the voluntary organisations who are committed to provide assistance to the under privileged. The expetience of past 13 years generally supports this view

that the target groups of the voluntary sector cannot support drilling and, therefore, many of the agencies phased out of water well drilling. Yet there is a strong feeling that water well drilling is a technology needful for the broader field of development and hence many agencies specially those under AFARM, Maharashtra, have revived their drilling activities during the recent years.

Some of the agencies that continued, have demonstrated successfully that it is possible to survive with drilling operations serving the target groups mainly because a number of programmes supported by Central & State Governments, and the nationalised banks are, in fact, aimed at developing the same (voluntary agency) target groups.

One important observation, however, is that the growth of these agencies depicts a complex trend depending on the local situation and the attitude of the project itself. Each one of them have followed a distinct modality of growth, not resembling the other.

It is interesting to observe a model like WDP, Betul, which, most effectively, offers a complete package service for water well construction including site selection by hydrogeological and geophysical considerations, drilling and completion, data collection while drilling, pumping tests, installation and commissioning of pumps and maintenance services. This system also runs commercially and thus implicitly answers many questions that are often raised by other drilling agencies.

PROBLEMS

i. One of the biggest problem is that drilling being an expensive affair, it is not always possible for the drilling agencies to stick to the target groups. Most of them have compromised with the situation by serving outside the target groups but fixing their priorities for the target groups. The drilling cost is increasing day by day and the financial load on target groups is becoming disproportionately heavy. It is by and large established that unless the drilling cost is subsidised by a substantial governmental aid, the target groups cannot be served.

ii. There seems to be a dearth of trained drillers. Trained people prefer taking up jobs elsewhere and on many occasions they prefer going abroad (specially to Middle East) for a better prospect.

iii. The imported spare stocks have almost exhausted and even indigenous spares are difficult to procure. After sales service from the manufacturers is generally poor.

MEASURE OF SUBSIDY

i. There should be efforts to minimise the failures by including other inputs like geophysical survey, pumping tests etc.

ii. Projects should develop their own mechanism of subsidy; for example if one out of 10 bores is a failure, it should not be charged and the cost is to be compensated among 9 successful bores.

iii. As far as possible success and failure of the wells should not be linked with government subsidy.

iv. There could be an insurance system for failed wells. This may be worked out.

v. General consensus was that we cannot evolve a system of subsidy for the inadequate analysis of work done so far.

REVIEW OF INDIGENOUS EQUIPMENT

This discussion was initiated by Mr. J.N. Kathuria of Swissteco/Omega Drilling, Hubli, (Karnataka). He reviewed all the aspects of a good water well rig and claimed to have fabricated one of his rigs through Revathi Machine Tools, Coimbatore. Two basic issues came up while reviewing indigenous drilling equipment:-

1. Are the commonly used down-the-hole (DTH) drills e.g. Ingersoll Rand or Halco 625 meant for water well drilling? This question was aimed at pointing out the lack of versatility in these equipments.

2. Could the problem of spares in India be solved by using standard size spares at least the most common ones like nuts, belts, seals, pistons, shafts, etc.?

The first issue was discussed for a longer time and it was stressed that even though most of the pneumatic rigs used in water wells are derived from the mining (blast hole) equipment, their merit as water well drilling equipment cannot be undermined. It is, however, an accepted fact that

these equipments have some inherent shortcomings which are gradually being removed in the later models.

Col. Verma of AFPRO observed that the drilling equipment fabricated by various companies are composed of parts or components of a particular specification. Due to this, customer has to procure parts from that particular manufacturer only. It is not known why at least the minor parts should not be made to a standard specification to be universally usable in different drilling rigs.

Although the session was devoted to indigenous equipment, nothing was discussed about the simple equipments, like calyx/semi mechanical rigs.

DRILLERS' SCHOOL

Dr. V.G. Vijayam presented his paper on Drillers' training and the general consensus was:-

- the training school should not consider the model of an engineering collegeor even a polytechnic;
- more stress should be given to on-the-job training;
- the training institution should not be regarded as an instant solution to the problem of scarcity of drillers.

It is, however, interesting the none of the drilling agencies discussed why a better atmosphere cannot be created within the agencies by reviewing and altering the service conditions and emolument structures of the drillers by which they might not take a view to discontinue with the projects.

EXPLORATION UNIT, PUMPING TEST UNIT AND WATER QUALITY TESTS AS INTEGRAL PART OF DRILLING AGENCIES:

This discussion was extremely fruitful because, although most of the projects have successfully developed their infrastructures in drilling, they are yet to develop themselves as the total service agency for water well drilling. The exploration unit, pumping utest unit and water quality tests have long been discarded by some of the drilling agencies as non-productive items. But one of the agencies, namely the Water Development Project (WDP), Betul, have developed all the other wings so as to offer an integrated service and they have proved by action that it is also possible to run these units commercially.

On the other hand 6 AFPRO GIT Units at Ahmednagar (Maharashtra), Bangalore (Karnataka), Coimbatore (Tamilnadu), Patna (Bihar), Varanasi (U.P.), and Hyderabad (Andhra Pradesh), which are equipped with support service facilities, are not involved in drilling themselves. They also render their service free of cost.

Although the drilling units (run by autonomous agencies) and the (AFPRO) GIT Units were raised more or less simultaneously to act complementary to each other, the arrangement obviously did not work, except in some marginal cases.

Water Development Project, Betul could convincingly communicate the advantages of an integrated unit and they are:-

(a) cost of all the other services are 15% above the cost of drilling, but this gives the farmer the benefit of reliable results. In some cases if the well is drilled dry, the farmer is not charged.

(b) Pumping test is a positive test; hence there is no fear of variation in the performance of the borewell. Also the farmer is advised accurately on the specification and the depth of the pump.

(c) Exploration by geophysical method prior to drilling helps saving unproductive ventures like extra transport time for poor road communication, drilling of a dry bore, drilling additional footage etc.

(d) The arrangement comes in handy for the farmer who has to keep contacts with only one agency for all the concerned services.

At the end of the day it was realised that the time was short for the agenda and hence the following four points were considered for the definite opinions of the house.

(a) Where and when the next meeting should take place?

(b) What should be the follow-up action on the formation of Association of drilling agencies at the voluntary sector?

(c) What should be done for a quicker exchange of information among the drilling agencies?

(d) What about a drillers training school?

SLOW DRILLING DEVICES

During the early hours of 23rd July, two papers were presented by M/s V.K. Dixit and D.K. Fouzdar, both stressing the need for revival of indigenous technology of hand operated or semi-mechanised drills like calyx and hand percussion both in hard rock areas and in the alluvial areas. These machines are:-

(a) versatile - can be operated in different kinds of formations;

(b) easy in operation - requires little training to operate and, as such, they are operated by semi-skilled labourers from the village.

These devices presently face extinction as their demand is gradually reducing owing to rapid circulation of fast drilling rigs. The organised sector of industry and the government agencies consider them to be clumsy, slow and labour oriented. Yet they have some inherent advantages under Indian situation e.g.

(a) They consume lesser petroleum fuel;

(b) They provide imployment to rural labour;

(c) They can be transported to the remotest areas where road communication is poor.

MANUFACTURERS' PROGRAMME

This programme was devoted mainly to two aspects:-

(a) Drilling problems under various formations;

(b) Interaction of various manufacturers and the users of drilling rigs.

The first part of the mission was fulfilled to a greater extent by the participation of Mr. Brian E. England and Mr. T. Radhakrishna. It was emphasized that for a driller, each event of drilling is a unique exploration and the problems can be of infinite variety.

Mr. England propagated the idea of drilling with foam and polymer, which are believed not to have been practised in India so far. Mr. J.N. Kathuria, however, informed that the attempted drilling with foam at various sites

and found the method to be extremely useful. Mr. M.K. Moitra of AFPRO raised the question whether the polymar would create any problems for the electrical logging operations.

The interaction with manufacturers and the users of drill was equally interesting. The manufacturers clarified various points and many of the issues were left undecided hoping that the manufacturers would give serious thought to such issues and may come out with answers either through their marketing service systems or at some future gatherings. The basic issues were:-

(i) price of various products:

As the prices keep on fluctuating, the manufacturers prefer not to discuss prices at a gathering like this.

(ii) Association of drilling manufacturers:

There are practical problems in setting up of an association like this.

(iii) Directory of equipment and spares:

Only Water Development Society, Hyderabad expressed the view that they are interested in such a useful proposition.

(iv) Training of drillers:

Most of the manufacturers said that there is already approvision of such training. For broad based training, government should take the responsibility. As such, there is training school at Keonjhar (Orissa) for drillers.*

Mr. J.B. Singh of AFPRO concluded by expressing his satisfaction over the fact that so many people together could think deeply on various aspects of the problems of drilling of water wells. He expressed the view that while putting our thrust on drilling, we should also take a comprehensive view of land and water resources. The drilling is only a tool for development and hence we should not go far from the human and social aspects of the problem.

CONCLUSION AND RECOMMENDATIONS

The meeting finally concluded after having 2 days valuable discussion on:

*have since discontinued.

* the formations of a national association of drilling agencies in voluntary sector;

* Setting up of a system of communication in the form of a drillers' journal;

* formation of an institution of training for the drillers;

* slow drilling devices; are they still viable in the present day context?

* drilling problems in mixed formations and the versatility factor of the pneumatic equipment;

* directory of spares.

The house finally came out with some specific recommendations as under:-

(i) It was decided that the next meeting of the drilling agencies be held at Poona during August 3 - 5, 1982. This was proposed by Dr. S.T. Gujar, Chairman, AFARM.

(ii) The final decision on formation of an association of the drilling agencies be taken at the Poona meeting;

(iii) AFPRO should take initiative on the publication of a drillers' journal.

(iv) A committee should decide to meet and discuss the issue of the establishment of a drillers' school, its modalities and other minute details. The house nominated the following persons in the committee:-

1. Col. B.L. Verma
2. Mr. J.N. Kathuria
3. Mr. Raj Kumar Daw
4. Dr. B.G. Vijayan

INAUGURAL SESSION

WELCOME ADDRESS	Mr. C.V. Chellappa General Manager, Water Development Society, Hyderabad-500 040
KEYNOTE ADDRESS	Mr. J.B. Singh, Executive Director, AFPRO
BASIC ISSUES	Col. B.L. Verma Head, WRD Dept., AFPRO

WELCOME ADDRESS

(By Mr. C.V. Chellappa, General Manager, Water Development Society, Hyderabad)

In his welcome address, Mr. Chellappa expressed his sincere hope of creating a meaningful environment of communication in the gathering and to avail this opportunity for the utmost benefit of the drilling agencies in the voluntary sector.

He touched upon the vital issues accruing and illustrated some of them in detail. He elaborated on the the availability of drilling equipment, their indigenous production and import, the problem of spares and the difficulties in their timely procurement. He emphasized on the need of an Association of Drilling Agencies in the voluntary sector.

Mr. Chellappa was of the view that getting trained personnel for drilling operations has become a problem in the drilling business due to the mass exodus of drillers and technicians to the Gulf countries.

Mr. Chellappa hoped that interactions of this nature would benefit all the drilling agencies in the voluntary sector and, therefore, gathering of such nature should be repeated.

KEYNOTE ADDRESS

(By Mr. J.B. Singh, Executive Director, AFPRO)

I bring you very warm greetings from AFPRO's governing body and personally welcome you to this meeting. This meeting has been arranged as a family gathering where we can frankly discuss some of the important issues which we are faced with today.

During the day we will be evaluating our work, have a critical analysis of our modes, methods and techniques and we will examine how far we have progressed in our efforts to achieve integration within our teams.

We have seen during these years that there can be no development in isolation. Our plans for development must integrate all the inputs and offer a package. The question every time must be asked - Development of Water Resources for what? The package offered must fulfill the need of the individual or Project holder making the request.

In all our plans for Water Resources Development, Land and Water Integrated development, or Soil, Water, Plant development, the focus must be on the man, on the small and marginal farmer, the weaker section of the society, the landless labourers. Our aim should be to place at the service of the community, our technical competence, the fruits of the best technology available in the field of Resource development may it be water, animal husbandry, agriculture or renewable energy.

AFPRO must move in the direction of providing integrated service at regional level. Development of one resource sets into motion a chain reaction. We should be able to offer the links in the chain.

It is AFPRO's conviction that training is the key to development. Ever rising demand for training courses has placed a heavy demand on your time and resources. It will be our endeavour now to evaluate our programmes conducted during the year, with a view to select the routine courses that we should run and prepare the course packages. In short it should be our aim to streamline these courses.

We are aware that you are being repeatedly called upon to attend the Development Orientation Seminars and Workshops. On such occasion you are AFPRO's ambassadors projecting AFPRO's image. Remember our aim is to serve the small and marginal farmer, the weaker sections of the society and in projecting AFPRO's work, keep this man in focus.

We will be spending the whole day in self evaluation. Consider our strength and weaknesses, the threats and opportunity. Let us have a frank and forthright discussion. Let us, during the day's deliberations not lose sight of the important relevant issues, and the aims and objectives of AFPRO.

At the end of the day if we land up with clear goals for the year 1982 and the direction AFPRO should move into, our meeting would have achieved something.

With these words I now declare the meeting open.

BASIC ISSUES

(By Col. B.L. Verma, Head,
WRD Dept. AFPRO)

It has been long since we had a family gathering. It gives me immense pleasure to see that practically all the drilling agencies in the Voluntary Sector have assembled here today to discuss matters of common interest and set for ourselves some goals for the years to come.

There has been at times doubt in the minds of people on the relevance for the existence of drilling agencies in the Voluntary Sector, specially when large number of Drilling rigs are now available both with the Government agencies and Private owners. The call for rigs from the Voluntary Sector in drought, specially in difficult areas itself justifies the continuance of our operations. I need not therefore stress the point that in our working the social overtones must be predominant.

The Voluntary agencies engaged in drilling must organise themselves to have a common forum. May be there is a requirement to form an association or federation of drilling agencies in the voluntary sector. The agencies can use the common platform for common good.

The Drilling Equipment today costs a frightful lot of money. It is becoming more and more sophisticated. There is a constant need therefore to train people to handle this equipment; to refresh their knowledge periodically, and upgrade their knowledge. We have with the assistance from Swiss Development Co-operation organised courses for fresh entries, refresher courses and upgrading courses. We however feel that the training must be institutionalised. This can be achieved only with opening of Drillers training institutes in Voluntary Sector. This to my mind is a crying need and hopefully we will be discussing it at length today.

We have in the country today over 500 fast drilling rigs and a few thousand rigs of all kinds. Thousands of borewells are being drilled every year. Yet we do not have in our country a Journal, or a digest that publishes an account of all the work in this field, our problems, our experiences from which the readers could benefit. We must make a beginning in this direction and discuss today the measures to launch a Drillers Journal or a Digest.

If in our deliberations today we can set ourselves some goals, and define the direction in which we should move we would have more than succeeded in our mission.

Once again on behalf of AFPRO, I wish you all success in your deliberations. May we move still closer in our efforts to serve the weaker sections of the Society and work together in larger interest of the country.

ACTIVITIES, EQUIPMENTS & TEAMS

CHAIRMAN	Dr. S.T. Gujar
RAPPORTEURS	D.K. Fouzdar
	V.K. Dixit

RAPPORTEUR'S NOTE

The morning session was initiated by Mr. Thomas of Action for Water Development Society, Bangalore, who gave resume of work done by the AWDMS. This was followed by Omega/Swissteco, Hubli (Karnataka); ELC Water Development Project, Betul (M.P.); Marathwada Sheti Sahayya Mandal, Jalna (Maharashtra); AFARM, Pune (Maharashtra); Young India Project, Penukonda (A.P.); and Water Development Society, Hyderabad (A.P.); Social Work & Research Centre, Tilonia (Rajasthan) could not be present due to unavoidable circumstances. Their report was, however, made available.

The agencies like Action for Water Development, Mysore Society, Bangalore; Water Development Project, Betul (represented by Mr. V.G. Joshi); Omega/Swissteco (represented by Mr. J.N. Kathuria); Water Development Society, Hyderabad (represented by Mr. T. Radhakrishna), depicted success stories. These agencies have appreciable impact in their respective areas of operation. While Action for Water Development Mysore Society drilled 2300 borewells, 2352 borewells were drilled by Water Development Project, Betul and 115 km of drilling carried out by Omega/Swissteco Drilling in about 4000 wells and an equal number of wells by Water Development Society, Hyderabad.

As regards their growth, the Water Development Society, Hyderabad and Water Development Project, Betul gave two distinct pictures though in a different way.

The model of Water Development Project, Betul depicts the total growth of a multi-disciplinary service centre at the grass root level giving a package of complete service in water well construction. The total package included investigation by modern scientific methods, construction, testing for chemical quality and also for the quantity of water available, installation of pump and other structures and in fact assisting in bringing the water from the unknown subsurface to the farmer's field.

Water Development Society, Hyderabad grew rather in a unilateral direction of manufacturing the drilling rigs. They also marginally carry out drilling operation for rural areas like the other drilling agencies do. The drilling rigs manufactured by Water Development Society, Hyderabad are distributed in various parts of India and a number of their customers are government departments and voluntary agencies serving the same target groups as any voluntary agency of a similar nature should serve.

GEOGRAPHICAL SPREAD AND TARGET-GROUPS

It is the common impression that the drilling agencies have to walk on a tight rope to survive. Continual existance by itself depicts a success story, as it is, known that there were several other agencies, that could not pass the acid test. It had been observed earlier that it is difficult to provide service only to the target groups of the voluntary agencies that consists of:

- small farmers;
- marginal farmers.

The landless labourers are obviously out of the game and the other two groups cannot come forward because of high capital investment.

The voluntary agencies ne one hand have the inherent commitment to serve the underprivileged, while on the other hand they have to run an expensive device idling of which leads to depletion of projects resources. The agencies have, therefore, compromised by deploying their machines:

- for government and nationalized bank programmes which serve the similar target groups;

- assisting Government drinking water programmes which offer ample opportunities to serve the underprivileged;

- often working outside their normal area of operation which makes their tasks more arduous though the agencies have taken up this challenge keeping with their tradition.

IMPACT

It was more or less an unanimous realisation by the agencies that they have a good reputation and by and large people prefer their services as against those from a government agency or a private contractor; but some of the agencies specially those who are marginal in the field of drilling came out with their doubts - whether or not they should divert from their social service attitude. Drilling service is at times rewarding as it provides a source of income, but at the same time it leads voluntary agencies to develop a commercial attitude;

* also it was expressed that drilling is a business which voluntary agencies should not carry out;

** some analysed the government attitude by saying that whenever there is a calamity like drought government officials remember volagencies for a prompt and effective service; otherwise they rather prefer to ignore them;

*** regarding target groups the question of serving the effluent (rather than underprivileged) came up, but some suggested that the drilling agencies should consider themselves to be specialised agencies and they should not waste time in identifying target groups; they should instead coordinate with other grass root level volagencies, government departments and banks, who serve the same target groups.

PROBLEMS

(i) Personnel: There is a growing tendency among the trained drillers to leave the voluntary organisations, because they are offered better service in the Middle East. There seems to be a dearth of drillers in the country due to this exodus.

(ii) Spares: Foreign spares are difficult to procure and Indian companies generally have a poor system of after sales service.

ELC WATER DEVELOPMENT PROJECT, BETUL, M.P.

A DECADE IN SERVICE

INTRODUCTION

The ELC Water Development Project, Betul is engaged in water well drilling for over a decade. The Project initially started drilling work with a single Halco 625; with the time however other side activities, more rigs and equipment were added to cope with the needs of the Project's ground water development programme. Today the Project has a range of drilling rigs and experienced staff to undertake drilling in almost any geological formation, and its activities and services include ground water investigation studies, drilling of wells in hard rock and alluvium formations, revitalisation of wells, conducting yield tests and aquifer tests, water quality analysis, installation and maintenance of all types of hand pumps and power pumps. The project therefore offers A to Z services in the field of water well drilling to those who need it.

RANGE OF EQUIPMENT OPERATED & MAINTAINED BY THE PROJECT

Drilling Rigs:

1.	Halco 625	2 Nos.	capable of drilling 150 mm dia. bores upto 100 mtrs.
2.	CP 7000	1 No.	capable of drilling 150 mm dia. bores upto 300 mtrs.
3.	Extension Drilling Unit	1 No.	Revitalisation of the open wells.
4.	WABCO Rigs	3 Nos.	transferred by AFPRO & OXFAM to WDP in the year 1979. Only one rig was commissioned in 1979. Other rigs will be commissioned soon. Capable of drilling 600 ft. in alluvium formation.

TOTAL NUMBER OF BORES DRILLED BY WDP TILL MARCH 1981

1.	Halco 625 (WDP Unit) 1971-1981	477
2.	Halco 625 (AFPRO Unit) 1972-1981	598
3.	CP 7000 May 1976-1981	719
4.	WABCO June 1979-1981	44
5.	Extension Drilling (AFPRO Financed)	514

GROUNDWATER INVESTIGATION DEPARTMENT

The project started G.I.D. in the year 1972. Now the project operates two geophysical resistivity survey units. The instrument used is Terrameter. The staff of the G.I.D. includes 2 geologists and a geophysicist. Next year one more unit will be commissioned. So far the G.I.D. has undertaken investigations at 1265 sites. The success rate is 70%. Besides this the G.I.D. is engaged in basin studies and other research activities like application of remote sensing interpretation for groundwater development, chemical and bacterial quality of groundwater supplies etc.

PUMPING TEST UNIT

The Project operates two pump testing units. The pump testing unit consists of a truck mounted generator and a range of suitable submersible pumps. First unit was commissioned in the year 1971 and the other unit was commissioned in the year 1976. Together these two units have conducted 632 tests on 632 bores till March 1981. Besides testing these units are used for installation and repairs of power pumps and occasionally in emergencies for installation and repairs of hand pumps.

PUMP REPAIRS & MAINTENANCE DEPARTMENT

The Project has two such crew. These two crews are mostly engaged in installation and maintenance of hand pumps in the district. The Pump Repair Maintenance Department also undertakes construction of hand pump, platform and drainage facilities at the well sites. Since its inception the department has installed 1101 pumps till March 1981.

WATER QUALITY ANALYSIS

The Project has set up water quality analysis laboratory as early as 1974. Since then the project has undertaken analysis of 284 samples from various sources. It is worth mentioning here that we do not get enough work, and the laboratory is not busy. However, people including government officials are getting aware of the water quality problems and we hope that our laboratory will get sufficient work.

TECHNOLOGY, RESEARCH & TRAINING

A Technology Development Research and Training Cell was created in the Project in the year 1980, realising the need of research in the field of water well drilling technology. The Cell also organises training programme to provide trained hands to water well drilling industry. Two such courses organised by the Project with sponsorship of AFPRO and New Delhi received a lot of appreciation from all concerned. The Project wish to do much more this year in the future, in this field.

OTHER ACTIVITIES OF THE PROJECT

Marginal Farmer Scheme

The Project initiated and implemented a marginal farmer tubewell irrigation scheme, with the help of the Bank of Maharashtra, Betul. Under this scheme 10 tubewells were drilled for the farmers holding 2 to 4 hectares land. The wells are drilled at no risk basis. The Project undertakes drilling after proper investigation. If the well yields 2500 gph, the entire cost of the well drilling and energisation is paid by the bank against the loan account of the farmer. If the well fails to yield required minimum discharge then the project do not claim any bill. Of the 10 tubewells drilled 9 are successful. The bank has sanctioned loan to all. The well, however, could not be energised for want ot electric connection. However, we hope to get this connection soon and the wells will be energised after monsoon.

COMMUNITY DEVELOPMENT PROGRAMME

The Project has adopted a tribal village in Betul district for socio-economic development phase land improvement programme is being implemented. About 25 hectares of land belonging to villagers has been brought under cultivation this year. Construction of a small earthen dam to provide irrigation facilities to land will be undertaken after monsoon. During last summer a social work camp was organised by the project in this village. The aim of the camp was to create awareness among the villagers about environmental sanitation. The camp was a good success.

WORK IN HAND

During last financial year all rigs of the project were busy. We have in hand a contract of drilling 100 tubewells (in hard rock area), on which we will put our rig after October 1981. A contract for drilling is being negotiated at Madras at present, where we hope to start work in about 15 days. At present our two rigs are in M.P. one of which is drilling wells for the CASA in Jabalpur. Due to heavy rains our WABCO Rig is not drilling but after monsoon we hope to keep it busy on irrigation and village water supply bores.

DIFFICULTIES

The difficulties are many and problems are manifold. Years of experience has taught us to keep ahead of problems, and so we keep ourself in the business.

Trained Hand

The Middle East countries offer good opportunities for water well drilling hands. Over past few years as many as 15 senior experienced personnel from the project left for overseas jobs. Most likely this trend will continue in future also. At a time of sudden departure of senior hands, this has created great problems for us. But now we are cautious and keep on training new hands at various levels and in various disciplines regularly.

F.O.L.

During last few years (1981 was exception) shortage of F.O.L./during working season was experienced by many. A lot of time rigs were kept idle for want of fuel. We have been able to solve this problem to certain extent by obtaining a consumer pump. But that does not solve our problem when the rigs are working far away from the headquarters, Betul.

Spare Parts

Obtaining spares for drilling rigs and supporting equipment, has always been a problem. The Project maintains a good stock of fast moving parts at Betul. AFPRO New Delhi has helped us a lot from time to time by giving us spares for imported equipment. Keeping ready stock of spares and maintaining stores involves large funds and many man hours. This can be maintained if a Central Agency can be created to look after requirements of the Voluntary Agencies.

ABRAHAM ALPHUES
Project Manager
ELC Water Development
Project
Betul,
M.P.

WATER DEVELOPMENT SOCIETY, HYDERABAD

DROUGHT OPERATION AND WDS

Consequent to the heavy drought in India during the period of 1965-66, two jack hammers were supplied to Water Development Society (known at that time as Water Sources Unit) by AFPRO in 1967 to start the drilling work at Hyderabad in the voluntary sector. Due to its limited usefulness by end of 1968, 1 Halco Minor and 1 No. Halco Tiger were added to this Unit by AFPRO. While only 7200 ft. of drilling could be undertaken during 1967, these units put together could drill around 16,000 ft. of drilling during 1968. By 1969 1 more Halco Tiger was donated by AFPRO and a Rig similar to Halco Minor was fabricated by WDS, and 21,000 ft. of drilling could be carried out by these units. During these periods majority of the work is being done as test bores, blast holes and for drilling inside the existing open wells.

During 1970, an Halco 625 was provided by AFPRO and during this year many productive surface bores were completed in and around Hyderabad. By this time the requirement for surface borewells for domestic purposes also gained the momentum and therefore 2 truck mounted rigs capable of making 4 inch dia. bores upto a depth of 250 ft. were fabricated by us and added to our fleet.

During 1971 majority of the work was being done in Gulbarga District of Mysore State. Due to heavy drought in A.P. in the years of 1972 and 1973, we were approached by the Govt. of A.P. to take up drilling for drinking water purpose in the various districts of A.P. and a considerable number of successful surface bores were drilled to their satisfaction.

As the demand for drilling was mounting up locally, during 1974 our rigs were deployed for local drilling requirements. However, at the request of some entreprenuers, one of our rigs fabricated by us at that time for drilling 6" dia. bores was sent to M.P. towards the end of the year to meet the immediate requirements of agriculturists in that area. Since the spares of the Halco hammers and bits were not available freely by this time all these old items were replaced by WDS make hammers and bits whereby the work could proceed uninterrupted.

In 1975, Tamilnadu Water Supply & Drainage Board ahad pproached us for their rural water supply scheme and two of our 4" drilling rigs were sent to cater to their needs in Dharmapuri Dist. A number of borewells were completed in spite of drilling difficulties and non-approachability of sites.

Our efforts in this area could tap in all nearly 60,000 gallons of water per hour. While for Rural Water Supply the rigs were deployed in our neighbouring state, for agricultural purposes our 6" rigs were deployed at Cuddapah Coop. Sugar Factory, Cuddapah wherein nearly 70,000 gph of ground water was tapped. Due to non-availability of spares the Tiger Rigs and Minor Rigs were put out of use during this year.

During 1975-76, were requested by the Badvel Taluk Land Development Society, Badvel to rectify and augment their water supply by extension drilling of their existing borewells. Some of these borewells were partly drilled and some of them were heavily caved. Since these borewells were having good yield and BTLDS was an aided project for rural development, it was not possible for them to ignore these borewells and to go for fresh borewells in its place. Though the rectification of these borewells were extremely time consuming operation, the work was taken up by us and 11 nos. of borewells were rectified in addition to 7 nos. of fresh borewells drilled. Our efforts were highly rewarding as these borewells yielded nearly 8,000 gph of water on an average.

While the above work was carried out for agricultural purposes, we were called for our technical expertise by the SFDA, Cuddapah for the development of agricultural open wells. It was then decided that test bores to a maximum depth of 50 ft. shall be drilled in points already identified by the resistivity method, in order to study the economical viability of the scheme. Drilling stratas were tabulated for every 5 ft. in order to ascertain the suitability of the formation for excavation. Yield of water was studied at various depths which indicated the optimum depth at which maximum amount of water could be obtained economically. Further the water was analysed to ascertain its suitability. Under this scheme, 90 nos. of test bores were drilled and the results were encouraging.

During 1977, we were informed by the Nizam Sugar Factory, Shakernagar, of their immediate requirement of 6 inch dia. bores for their various farms. Though this particular area was not very suitable for DTH hammers due to clay formations, nearly 50 bores were successfully completed in spite of the difficulties. Our efforts were very much rewarded when we found that some of these borewells even yielded more than 25,000 gph of water. In fact, in certain cases, we could not drill further because of the heavy back pressure of water. In total an estimated yield of 3.5 lakh gph of water was tapped. During this period the compressor of the Halco 625 was replaced by a CPT 600 RO_2 Compressor as the original compressor was not performing satisfactorily.

During 1978, two of our rigs were sent to Vishakapatnam. Bores were drilled both for domestic and agricultural purposes in coordination with the Andhra University. Nearly 40 borewells were successfully drilled in that area.

During 1979, all of our rigs were working to meet the local requirement. However, in response to the request of the Andhra Bank Farmers Service Coop. Society Ltd., Kanekal, Ananthapur Dist. 1 rig was sent to this area. The cultivation in this area was done at that time only using the canal water and it is for the first time, the survey and exploitation of ground water was carried out. The results were good and in one bore we got over 10,000 gph water.

During 1980, while our rigs were working in A.P. fighting against the drought, our attention was drawn by CASA towards their drought relief programme in M.P. As a joint venture, our two rigs were deployed in the areas of Jabalpur, Satna and Katni and 89 bores were completed within two months.

During 1981 also, two rigs were deployed towards CASA Drought Relief Work in Trichy Dist. and Cuddapah-Nandyal Districts and 60 bores were completed. Though the drilling points in the Cuddapah-Nandyal districts were highly scattered, the work was taken up with the intention of catering the needs of the interior villagers. The remaining rigs are engaged in local drilling.

So far, we have done 3882 bores since 1970. Table given below shows the performance and achievements of our drilling unit since 1970.

Year	No. of bores	Footage drilled	Yield of Water 'V' notch method in GPH
1970	244	22,798 ft.	2,81,300 gph
1971	254	23,473 ft.	2,54,000 "
1972	325	26,032	2,97,470 "
1973	377	31,840	3,49,410 "
1974	227	18,428	2,18,350 "
1975	243	24,892	3,46,281 "
1976	307	24,929	5,73,960 "
1977	348	29,117	9,70,280 "
1978	294	35,354	3,21,165 "
1979	346	32,543	3,79,290 "
1980	556	54,172	5,04,615 "
1981 upto June	361	33,900	3,37,000 "

While commercial drilling was one for its own existence, there were schemes existing for charitable drilling and for concessional drilling for failure bores.

Since 1975, nearly 250 borewell have been drilled free of cost for philanthropic organisations, institutions, hospitals, welfare centres etc. For failure bores a concession upto 25% also have been allowed. During 1980 alone charity drilling for Rs. 2.94 lakhs and concessional drilling for 1.22 lakhs have been done by us.

Since 1975 an apprentice Course for drillers was started in order to provide job opportunities as well as to provide trained personnel in the field of drilling. So far 120 personnel were trained and have been employed by various drilling agencies. During Sept. 1980 a refresher course for drillers of DTH rigs sponsored by AFPRO was conducted by us for a week, to improve the skill and knowledge of the existing experienced drillers. Participants from various voluntary agencies took part for the above course. A fresher course for operators in DTH and Inwell Drilling Rigs sponsored again by AFPRO is being started in the first week of July which would be continued for three months.

Presented by:

Mr. T. Radhakrishna
W.D.S.
Hyderabad

SOCIAL WORK AND RESEARCH CENTRE (SWRC), TILONIA, RAJASTHAN

WATER DEVELOPMENT: PROGRESS AND PROBLEMS

BACKGROUND

The Social Work and Research (SWRC) is an integrated rural development project established in February 1972. Among other objectives the three main are i) to provide basic technical and socio-economic services from one centre located in the village ii) train para-professionals selected and identified from the village in basic skills so that they can provide the same service eventually iii) provide institutional support to the weaker sections iv) concentrate all technical, human and financial resources for the development of weaker sections and the rural poor.

Since its inception the SWRC has replicated this concept in the five States of Haryana, Rajasthan, Himachal Pradesh, Gujarat and Orissa. Punjab was also started but it was closed for political reasons. Over 400 specialists, professionals and para-professionals are involved full time in these projects.

The services being provided include medical, educational, pre-primary schools, credit, agricultural development, employment generation, training, women's development.

One of the sections of the SWRC is the ground water research and development section.

EQUIPMENT

The SWRC has the following equipment:-

1.	Halco Minor with accessories	3 Nos.
2.	Compressors (Kirloskar 300 c.f.m.)	3 Nos.
3.	Tractors	4
4.	Long Hole Drilling equipment	2 sets
5.	Compressor (for l.h.d.)	2 Atlas Copco VT5
6.	Trailors	3
7.	Jeeps (support vehicles)	3

Note: By the end of this year with the commencement of the UNICEF programme it is likely the SWRC will be receiving another complete Halco Minor unit. This will make it the 4th unit.

ACHIEVEMENTS

This is enclosed separately. The performance does not indicate the days not worked for want of spare parts, repair and maintenance etc.'

ISSUES

Some background of the SWRC water development programme has been given with a view to indicating that sufficeient experience has been gained by us to be able to raise these critical issues which should concern us all in some degree or other.

1. Are we commercially or development oriented?

Is it the purpose of the NGOs to make money or to provide a service which has a social commitment as well.

The direction the Drilling Agencies should take in the future hinges on the answer to this question. If the purpose is to make money, fair enough, but then do not-let us be honest-claim we are working for small and marginal farmers as all of us do. This is a travesty of the truth and it only exposes NGOs in a poor light.

There are some agencies drilling tube wells for irrigation. To my mind this is a commercial operation costing in some areas more than Rs. 20,000. No small and marginal farmer can afford it and if he can provide the security that means he is no small and marginal farmers because as a rule especially in backward areas this category of farmer is a non-viable proposition. It may also be advisable to remember that 70% of the farmers owning less than 2 hectares of land totally own less than 20% of the available cultivable land. They are in no position to afford these tube wells.

So let us decide=are we working for the rich or are we working for the poor?

2. Are we concerned with what is technically feasible or socially acceptable? What is our position?

The upgrading of technology that we are so concerned about must be looked from a proper perspective which takes into account our list of priorities as far as this drilling programme is concerned.

Should we go for superior and sophisticated rigs? They may be heavier and they may drill faster and the performance in footage may be impressive but is this the most important criteria under Indian conditions? Surely not.

More than ½ the 600,000 villages in India have poor roads and are not accessible to heavy traffic. It is in these poorer villages that people face acute water problems-drinking water problems. Only smaller and more mobile units can reach them. If that be the case we must only go for such units and not be swayed by other secondary considerations which appear to distort our priorities.

It is a disputed fact that the bigger and more sophisticated are urgently required during emergencies (drought, famine). We only stress on the urgency but invariably when it arrives on the site there is no hurry. The question than is what is the hurrying? So what if we can drill 3 bores a day to 200 ft? So what if we can go much deeper than conventional rigs and provide perennial safe drinking water to a village. The point is-and this is more important-where has this source been located. The point is who has access to this drinking water source. We must ask ourselves these questions.

The threat that exists, to my mind, for all drilling agencies are many. Briefly they may be listed as follows:

1. We NGOs could be seen as just another tool for exploitation by the poor because we are incapable or not prepared to face the hostility of the upper castes:

2. We NGO's could be seen as just another commercial enterprise when in fact we call ourselves agents of change:

3. We NGOs could be viewed by government as 'contractors' which in other words means that we are not expected to show any social responsibilities towards the communities we are supposed to be working for:

4. We NGOs because we are comfortably settled are not prepared to change our views even an inch so that we can accomodate the felt needs of the community at large and the scheduled caste and volnerable communities in particular.

The threat on all these fronts is very real and it is closer to reaching a critical stage than one imagines.

SUGGESTIONS

The SWRC has the following suggestions to make:-

1. That instead of going for sophisticated heavy duty rigs the NGOs decide to invest on equipment that will enable them to reach the poorest and most inaccessible of villages thus fulfilling a critical social component in the development process:

2. That we start thinking in terms of consolidation than expansion in the sense that in spite of working in one area for a number of years, I dare say, many NGOs do not know their areas at all.

   a) have they a system of collecting and documenting bore samples of each bore?

   b) have they ever thought of collecting water samples from existing drinking water sources (open wells, ponds, etc.) and testing them for contamination so that such results could be used for health education and thus justifying the need for a safe drinking water programme?

3. That AFPRO take on this collective responsibility of monitoring this information from all the drilling agencies so that we at least have an identity of our own instead of being loosely called contractors. I myself have a special objection to be called one because we are here after all committed (I think?) to helping the poor not help the rich get richer.

SUBSIDY FOR FAILED WELLS

SPEAKER — M.K. Thomas
Action for Water Development
Mysore Society
BANGALORE

RAPPORTEURS — D.K. Fouzdar
V.K. Dixit

RAPPORTEUR'S NOTE

The drilling of borewells is expensive and the small and marginal farmers are generally not capable of such heavy investment. Hopefully in recent years a number of government and nationalised bank programmes have come up that help well drilling programmes by:-

- providing loan for the initial investment;
- providing subsidy for the small and marginal farmers.

These takes care of the schemes which could be successfully commissioned. But in water well drilling, especially that in the hard rocks, a speculatory or chance element is always involved. If a well fails, the farmer or the beneficiary gets no benefit of the investment and, therefore, is put to heavy losses. Time and again measures to compensate them was thought of. The rationale and modality in this regard has always been a complicated issue.

The controversial issues involved are:

* definition of a successful well;
* criteria for selection of site;
* criteria for testing.

In Karnataka, for example, any well yielding more than 600 gallons per hour (2270 litres per hour) is considered successful under the government sponsored schemes. But most of these wells are tested by airline method which is highly erroneous. Also statistics in Karnataka (Action for Water Development Mysore Society) show that in 1969 the rate of failure was 46% which was reduced to 20% during 1981 by adopting scientific methods.

Most of the agencies felt that the failed wells could be compensated through the benefits from the successful wells and this is possible by:

(i) charging a higher rate for successful wells and not charging anything or charging marginally for the failed wells. This requires an accurate data analysis of the past work that would give the exact percentage of success based on which the schemes could be formulated;

(ii) introducing an insurance system;

(iii) introducing a government legislation.

Most of the participants, however, felt that government legislation opens ways to corruption and this creates more trouble for the working of voluntary agencies.

SUBSIDY ON FAILED WELLS

ACTION FOR WATER DEVELOPMENT MYSORE SOCIETY (AWDMS) EXPERIENCE

M.K. THOMAS*

INTRODUCTION

Over the years, Action for Water Development, Mysore Society (AWDMS), Bangalore, has been striving to encourage farmers, especially small and marginal farmers to go in for borewells for irrigation. Small and marginal farmers find it very difficult (almost impossible) to raise the funds, since it is valued at Rs. 20,000/- to Rs. 25,000/- for a borewell and pump. Besides, obviously they are over cautious about the losses they would have to incur in case the borewell fails, while a voluntary agency cannot tackle the entire problem with their limited resources.

BREAKTHROUGH

Two years ago, the State Bank of India, Hangal(one of the taluks of Dharwar District) approached us to assist the farmers in the area by drilling borewells. Since this was a pioneering work by the State Bank of India (apparently no borewells had been sunk in that Taluk for irrigation purposes), we offered to waive the cost of drilling in case the borewell failed to yeild 800 gallons of water per hour (this being the norm set by the State Government); the customer had to pay for the casing pipe used as well as for the transport of the rig and support vehicles. The sites were selected by AFPRO GIT Unit II, Bangalore. Out of 18 borewells during 1979/80/81, 2 were failures and we waived the entire cost of drilling for these two. This created interest and confidence among the farmers, and it is now expected that more and more farmers would go in for borewells. Nearer Bangalore, the adjoining district of Kolar is one of the drought prone areas in this State.

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* Mr. Thomas presented the topic of Subsidy on Failed Wells, though he did not present any written account of the same.

This paper has been developed from the two letters (1) Ref: No. Adm-11 dated 20.5.81 and (2) Ref: No. Adm-6 dated 23rd/25th May, 1981, we received from him.

Here we took up drilling in some taluks but, instead of waiving off the entire cost of drilling in case of failure, we agreed to waive only half the cost of drilling. We started this last year as an experiment - 18 borewells have been drilled out of which two were failures. This scheme has also generated a lot of interest and we have received requests from about 60 farmers for borewells. Part of the survey has been completed and we expect to start drilling next month.

INSURANCE AGAINST FAILED WELLS - SOME MODALITIES

The idea of an insurance for failed wells was thought of by AWDMS and we had contacted the United India Insurance Co. in this connection. Basically the insurance companies are not interested. Insurance is based on numbers and we found that unless several drilling agencies join together in this matter a fairly large number of borewells would not accumulate for the purpose of a sound insurance proposal. If the Government of India, in the Ministry of Agriculture or Irrigation takes up this matter with the insurance companies, we could expect some positive results.

In Karnataka, if the borewell point had been selected by proper scientific methods the chances of failure are about 10%. Our organisation decided that we would bear part of the cost of this failure and so we introduced a scheme whereby we reimburse the customer half the cost of drilling. The results have been very encouraging and more and more farmers are going in for borewells. With the added experience gained from these wells, the GIT could, perhaps, evolve methods whereby the failures would be less than 10%.

The Karnataka State had introduced a scheme whereby the State bears 80% of the total cost of failed wells where the customer (farmer) had taken a loan from the Primary Land Development Banks, the site had been selected' by the State Department of Mines & Geology (Groundwater Cell) and the borewell drilled by an approved drilling agency. This has been working for two or three years, but has yet to be renewed for this year. Since the procedures involved are cumbersome, our organisation has already withdrawn from the scheme.

As regards the 'competent agency' for locating borewells, while we try to advise customers to avail of the services of AFPRO GIT Unit II, Bangalore, the State Department of Geology (Groundwater Cell) or consulting Groundwater Geologists, it is not uncommon for customers to swear by astrologers or water diviners; we cannot refuse to drill borewells for such customers.

Limiting the 'insurance' to small and marginal farmers only, is not, in our view a very practical approach. First of all, it would then be necessary to ask the customers to produce a certificate from the Block Development Officer or Tahsildar before we take up drilling, and an enterprising customer can produce such a certificate even though he may not really be a small or marginal farmer.

Perhaps the best way of helping the small and marginal farmer would be to organise them into cooperatives and then drill borewells for the group. This is a difficult task, but has been done in Karnataka by Voltas in cooperation with the Director, Drought Prone Area Programme Authority. During the last two years we drilled 100 borewells for this project in Dharwar for the uplift of small and marginal farmers.

REVIEW OF INDIGENOUS EQUIPMENT

THEIR AVAILABILITY, CAPABILITY, EFFECTIVENESS AND OPERATIONAL PROBLEMS

CHAIRMAN — Mr. G.V. Chellappa

RAPPORTEURS — Mr. C. Udaya Shankar

Mr. K.A.S. Mani

(This section of the meeting had two separate discussions. On 22nd the discussions were held in the absence of the manufacturers, while on 23rd the manufacturers were present. Since both these discussions were complimentary to each other, they have been compiled together in this section.)

RAPPORTEUR'S NOTE

The Chairman, in his opening remarks, explained the difficulties faced by Water Development Society - a rig manufacturing agency - such as:

(i) short supply of chassis and compressors;
(ii) CPT lockout and lockout in Ashok Leyland.

The Chairman maintained that 95% of the component of the rigs marketted by the multinational companies, are indigenous.

Mr. J.N. Kathuria, while initiating the discussions, emphasized that the indigenous manufacturers should be factual in claiming the superiority of their rigs. The manufacturers should substan tiate their claim through customers.

The initiator suggested that there should be an agency to evaluate rigs. While the machine is important, the men behind matter much. Any rig should satisfy:

1. reasonable capital cost;
2. satisfactory performance;
3. good penetration rate;
4. maximum depth that can be drilled;
5. operational economy - cost per unit drilled;
6. reliability;
7. easy to replace parts, i.e. easy maintenance - built in accessories;
8. hold back mechanism for hammers.

Pneumatic rigs have become popular, easy to maintain and trouble shooting is easier but efficiency is less. Higher pressure air compressors get more work done.

Hydraulic rigs: Control is better and finer, but maintenance is complicated.

Mr. J.N. Kathuria suggested the addition of simultaneous casing hammers to DTH, to enable it to drill through collapsible formation below hard formation.

Col. Verma suggested that the rig manufacturers should design the rig in such a way that most of the spares and tool kit are common to the existing truck mounted models, so that the problems related to spares and maintenance can be minimised. Commonality of parts cut down on the inventory.

NEED FOR DRILLING TRAINING PROGRAMME

by
Dr. B.E. Vijayam

The periodical occurrence of drought for the past 4 to 5 years has resulted in massive drilling operations throughout the country. This has resulted in many unskilled personnel, operating the drilling rigs with no scientific/ technological background, leading to large number of failed borewells. In this context organising a drilling training programme on par with the ITI is a worthwhile proposal, so as to regularly release a batch of trained personnel to operate this sophisticated equipment. The points to be considered in the programme are as follows:

1. As owner of a drill rig would expect an operator to maintain the rig, the compressor and the truck and not to involve in any wasteful expenditure.

2. No specialised training is expected to be imparted at the initial stage. After gaining experience or the fundamentals, detailed programme should be taken up.

3. The drilling rig operation is an engineering technique. However, the rudiments of geology, hydrology, geophysical explorations are also a necessary part of drilling operations.

4. Lectures on theoretical aspects are as much essential as practical training. Each theory class should be promptly followed by practical classes. As far as drilling is concerned, there is no alternative to the field experience in actual drilling. Therefore, this could be scheduled at the last phase. Some of the theory classes may be supplemented by lecturers from the industry itself, who it is felt would cooperate to render this service almost free of cost.

5. The lectures should be given with the necessary assistance of audio visual aids, such as charts, slides and tapes.

6. In view of the suggested course content, it is preferable to have the intake of at least SSLC grade or ITI trainees. LMEs, if any, may be given preference.

7. A system for feed back on effectiveness of the training, both from the operator and the drill rig owner, may also be inbuilt under the training system.

SYLLABUS

Frame Work	(a)	Maintenance	- Compressor - Engine - Truck - Drilling Rig
	(b)	Operation	- Compressor - Engine - Drill Rig
	(c)	Field Repairs	- Compressor - Engine - Truck - Drill Rig
	(d)	Drilling	- Theoritical Aspects - Practical - Training
	(e)	Pumps	- Introduction - Installation - Basic Electricals
	(f)	Geology and All Allied Subjects	- Theory - Practicals

Details	(a)	Maintenance: Compressor	The introduction to the Compressor maintenance, Weekly maintenance and other periodical maintenance - 12 Hrs.
		Engine: (deepening on the make)	The maintenance procedures as laid down by the makers - 6 Hrs.
		Truck	Truck maintenance - 6 Hrs. Care of tyres, Battery Brakes, Body - 6 Hrs.

	Drilling	Introduction of the Rig - 6 Hrs. Care and maintenance - 6 Hrs. Transport & Storage Introduction to various Drilling accessories and tools and their care - 6 Hrs.
(b)	Operation: Compressor Engine	Introduction and Preliminaries to starting and stopping - 6 Hrs.
	Drilling	Setting of Rig preliminaries, starting, Precautions during drilling - 12 Hrs.
(c)	Field Repairs Compressor Engine	Trouble shooting, Unloader valve Throttle setting etc. - 12 Hrs.
	Truck	Fuel air lock tyre chaning, minor electric faults - 12 Hrs.
	Drilling	Dismantling of Hammer assembly Rotation motor Grinding of Bits - 6 Hrs. --- 30 Hrs.
(d)	Drilling	Introduction to drilling purpose and various types of drilling. Introduction to various strata of the earth formation, logging methods, Analysis of cutting, Identification of the strata and approximate estimation of cuttings. Fishing operations. Well development packs. Grouting the casing pipe in the over burden. Yield test

		Flushing before completion Various problems likely to arise in drilling. Rectification of mistakes - 42 Hrs.
(e)	Pumps	Introduction to various types of pumps, merits and choice. Installation Basic Electrical Motor Motor components, functions Electrical connections - 18 Hrs.
(f)	Geology and Allied Subjects	Introduction to Geology Types of rock, weathering Introduction to Hydrological cycle. Basic concepts of aquifers. Groundwater hydraulics. Well hydraulics Significant of Geophysical methods in groundwater explorations. Measurement of discharge. Principles of Economics related to well drilling. - 8 Hrs.

PRACTICAL TRAINING

Compressor	Operation maintenance and field repairs Problems and remedies	12 Hrs. at Factory
Truck	Maintenance and Field repairs Problems and remedies	12 Hrs. at Factory
Drill Rig	Operation, maintenance and field repairs Problems in the rig Problems due to strata etc. and remedies	84 Hrs. at site

	Visit to problem sites (special visits)	2 Sites
Pumps	Installation and electrical connections and test of electrical circuits. Assessing pump discharges	18 Hrs. at site
Geology and Allied subjects	Lithologging, drilling time logging, measurement of discharges	8 Hrs.

SUMMARY OF TIME

Theory Classes:	Maintenance	60 Hrs.
	Operation	18 Hrs.
	Field Repairs	72 Hrs.
	Pumps	18 Hrs.
	Geology and Allied subjects	8 Hrs.
		166 Hrs.

Taking 6 Hrs. lecture on a day: 29 days.

Practical training:	Compressor	24 Hrs.
	Truck	12 Hrs.
	Drill	84 Hrs.
	Pumps	18 Hrs.
	Geology and Allied subjects	12 Hrs.
		150 Hrs. or 25 days.

29 + 25 + 2 Special Field visits
= 55 days = 9 Sundays = 62 days
+ 2 Special Field visits.

PAPER PRESENTED BY KILLICK NIXON LIMITED

A.R. Samy

Many people ask: What is the best method for drilling wells? There is no single answer to this question. Each method has advantages related to ease of construction, cost factors, character of formations to be penetrated, well diameter and depth, sanitary protection and finally intended use of the well itself.

The seventies saw a revolution in the drilling field, with the introduction and concentration of Down-the-hole (DTH) drilling. Halcos have been the pioneers in introducing this technique in India. As the popularity of this form of drilling grew, so did the number of DTH drilling manufacturers.

DOWN-THE-HOLE DRILLING

Down-the-hole is rotary-cum-percussion drilling. DTH hammers penetrate the rock more by shattering the rock material than by tearing it. Nevertheless, in soft non-friable conditions, the rotary action is more effective. Maximum utilization of air is achieved as the same air which causes the piston to strike the bit also serves to expel cuttings from the bore bole. DTH hammers work on minimum down thrust and torque, therefore requires light drill tubes. It does not require powerful rotation heads and heavy down pull.

Faster rotation speeds particularly in hard abrasive conditions, could excessively wear the drill but whilst any down thrust applied in addition to that required to prevent the hammer bouncing would not improve the penetration rate but could place undue stress on the drill string.

When drilling under a head of water, back pressure is exerted against the air pressure at the hammer and as the air pressure less the back pressure approaches the minimum operating pressure of the hammer, penetration rates will gradually fall to zero. A static head of water gives a pressure of 0.43 lb. f/in^2 for each foot of water above the hammer. This is termed as back pressure. A 30 ft. head of water exerts a back pressure of approximately 15 lbs/in^2 and, therefore, if for example a hammer with a minimum effective working pressure of 90 psi was used with a compressor unloading at 210 psi; it would be possible for that hammer to work down to 250 ft. below the head of water. And with 105 psi working pressure compressor,

it would work only upto 30 ft. below the head of water. Alternatively as the water head will increase below 30 ft., penetration of hammer will gradually fall down.

It becomes clear from the above that to improve the penetration rate while using DTH method, a high pressure compressor is preferred. The higher the pressure, the better it is. High pressure compressor not only improves drilling water head is present, but also improves it in dry drilling conditions. The number of blows of hammer piston increases with high pressure compressor andhammer efficiency increases.

The introduction of the button bit some ten years ago was a land mark in the progress of DTH drilling and led to drill bit life previously unheard of. For example, in limestone the cross bits used to average 150 mts., by 110 mm dia. bit, with same size button bits the average life has increased upto 3000 mts. At today's price this represents a great amount of saving.

The reasons for the superior performance of the button bit over cross bit are:-

1. Cylindrical button inserts are precision ground to extremely close tolerances and pressed into the drill bit as an interference fit. This gives improved carbide insert retention by eliminating brazing stress.

2. Button inserts are distributed more efficiently than cross bit inserts by providing more cutting power where it is needed at the outer edge of the drill bit face.

The DTH hammers are being used more and more by rotary drillers now a days as an auxilliary tool to be used in hard formations where the life and speed of tri-cone bits are limited.

The DTH hammer is indisputably the most efficient tool available for drilling deep holes in hard rock. Its improved reliability and potential for faster drilling speeds as hammer sizes and air pressures increase makes it an attractive proposition for an even wider range of application.

To a water well driller it represents a depth of 100 m/day and to an accountant it represents the best return on his investment.

From the late seventies demand for an economical and reliable drilling method has grown stronger and stronger. A rig capable of drilling through consolidated and unconsolidated rock is being demanded. The owner's best interests are served by a good driller with sound know-how and adequate equipment.

Use of right and adequate equipment can be done only by those who know drilling and this brings us to the crucial question - need of training drillers and starting a media to exchange drilling experience by starting a driller's journal.

EXTRACT FROM LETTER NO. KRD:AFF:81:071: DATED MAY 22, 1981 FROM KRISHNA ROCK DRILLS (P) LTD., SECUNDERABAD

'Krishna Rock Drills (P) Ltd. are engaged in manufacture of DRILL RIGS and allied equipment.'

'The levels of technology for the DRILL RIGS and allied equipments produced in the country are considerably behind that of the developed countries. The manufacturers are required to take in view a total perspective of future drilling operations in the country and dadopt appropriate level of technology for up-gradation of the equipments. The main factors to be considered are:

(a) intended depth of drilling;
(b) envisaged drilling conditions;
(c) compatibility of the DRILL RIGS for such tasks;
(d) productivity aspects etc.

The data required to assess the above factors are not readily available. Hence an apex organisation should collect such data and open up dialogues with the manufacturers.'

'An integrated approach is required to evolve a 5-year plan for technological upgradation of this industry. This programme will call for considerable R & D efforts at the national level. It will be worthwhile idea to assign this task to one of National Research Institute preferably located in Hyderabad. This will greatly facilitate integration of the R & D efforts with those of the manufacturers and yield tangible results within a given time frame.'

'By and large, drillers originate from unskilled and uneducated lot who learn the trade by trial and error. More often than not, equipments are grossly abused for gaining short range benefits. The techniques adopted in drilling, generally speaking, are primitive, resulting in costly wastages.

Hence an organised system for training of drillers will be most welcome. Provision should also be made to import 'Refresher training' courses to existing drillers. Audio visual techniques should be adopted for most effective communication. Drillers should also be trained in basic and preventive maintenance aspects of drilling equipments.

'Starting a Driller's Journal is also a good idea for exchange of experience, knowledge and communicating the achievements and needs of the industry. It may be essential to adopt regional language version with sufficient illustration to enable percolation of the knowledge to the field level.'

DISCUSSIONS

B.L. Verma : As several enquiries are made would it not be considered to form an Association of manufacturers of Drilling Equipment which could bring out a Directory listing names, addresses and products with technical details available to drilling agencies.

WDS : A few years ago, there were only a few manufacturers. Today there are several to choose from. We could bring out a directory at least for Hyderabad based manufacturers.

P.R. Michael :

1. Do manufacturers offer training?

2. Would manufacturers accept custom-built orders from users.

A.R. Samy : Many agencies are not adequately organised nor have trained personnel as operators. In such cases imparting training is difficult. Besides the equipment is misutilised. If training is to be given to an organised set-up, there should be no problems to arrange this. Killicks send their engineers for as many as 2-3 months. DTH is a common rig and anyone who approaches Killick will be helped.

P.V. Narasimha Rao : We find as manufacturers that though we manufacture 30-40 per month, there is a dearth of trained people to operate this equipment. This

is a national problem. We should consider a common training programme atleast for Hyderabad based manufacturers. Could we manufacturers do this?

W D S : We train 20-30 drillers per year. There is a training school. We also invite 2 persons per user for training at our factory for 2-4 weeks. This depends however on the aptitude of the trainee.

B. England : There are 2 problems : Drilling is a unique business - a specialist job. Drillers are trained not picked up. In the Water Well Industry it is almost impossible to train from scratch. The Operators (or users) have as much responsibility as the manufacturers. The latter cannot run programmes and hence send commissioning (service) engineers so that the user sees the rig being commissioned.

B.L. V : It is agreed that after the Warranty period the manufacturers are not expected to keep on informing the users of new products, innovations etc. But when the equipment is old and needs to be replaced, in the absence of information (Directory) it is difficult for the users to make a choice.

P.R. M : There is a need for feedback from the manufacturers.

V.K. Madhok : When a party buys a rig there is a brief course at Atlas Copco head office at Bombay.

W D S : These courses would be better if given at the local level - at the user's station.

B.L. V : We have always had a good response from manufacturers when called to involved in AFPRO courses as the current one in Bangalore.

R.K. Daw : When we were customers in the beginning, the buyers (donor agencies) requested for training and it was given. But now with expansion the service is lacking.

A.R. S : It is because of shortage of engineers etc., that the manufacturers cannot attend to this satisfactorily.

P.R. M : In the context of Mr. England's suggestion what sort of collaboration could there be since it is the operating agencies responsibility to look into these.

A.R. S : The Government should take up these. There is a Keonjar Institute (Government) where training is given in drilling. We, even in collaboration cannot impart such training. We must propose more institutes on ITI basis. We have not reached the stage where we can give such training.

B.L. V : We are suggesting collaboration at Drilling agency level. Since most of us claim to have some amount of social awareness - primarily volagencies - we must consider collaboration of Drilling agencies and manufacturers, an integrated approach.

W D S : We suggest preparation of course syllabus and guidelines for starting this Training Course/ Institute.

B. E : This is almost similar to what we hear in the British Drillers Association and nothing is achieved. We have a logbook which imparts a kind of training to operators. This could be a guide for your purpose.

A.R. S : There seems to be no rational approach buying a sophisticated rig and then training literates.

W.D.S : We train boys of 7th-8th standard qualification. The initial stage being hard work of lifting pipes etc. some drop as they feel superior and prefer supervisory posts. Thus only hard workers with less emphasis on qualifications are better.

V.K. Dixit : In several programmes like Government drinking water schemes, Engineers control operators. These do not give better results; in fact the.

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qualification is not the deciding factor but aptitude and training.

J.B. Singh : Training is not a one time affair, it is on-going. The primary responsibility however is that of the manufacturers to see that the equipment is initiated (commissioned) satisfactorily. This must be realised by the manufacturers. However it is acceptable that they themselves may be helpless due to several inter-dependent components going into one Unit. We in the volagency sector (buyers) must also realise this. The Association Of Manufacturers if any, cannot obviously 'associate' except to achieve objectives as a pressure group; basically the reason being competitiveness among themselves. A Training Institute is something for which we are not prepared yet e.g. the Bihar Government purchased a Reliable Water Supply rig. This has a breakdown and could not be repaired due to lack of aptitude and because it was a multi-component rig. Finally it was repaired by a person who had picked up the knowledge on-the-job. The need for continuous training is hence obvious.

V.K. Madhok : If the initiative is taken by the users, all help can be possible from the manufacturers.

EXPLORATION UNIT, PUMPING TEST UNIT AND WATER QUALITY TEST

CHAIRMAN	Mr. C.V. Chellappa, WDS Hyderabad
RAPPORTEURS	V.G. Joshi
	L.V.R. Reddy
INITIATOR	Mr. Raj Kumar Daw

RAPPORTEUR'S NOTE

Mr. Raj Kumar Daw of Action for Agricultural Renewal in Maharashtra (AFARM), Pune, initiated the subject by stating that 'water supply system' is more than just developing a source of supply. By drilling a tubewell a source of supply can be developed, but much more is required to be done before the beneficiaries can actually use water from the well drilled. The voluntary agencies started well drilling programmes to provide water. It is, therefore, justifiable to suggest that the voluntary agencies engaged in water well drilling should offer other services related to water well drilling.

The session was then declared open for discussion. A number of delegates participated in the discussions. The main points discussed included:-

* advantage of having PTUs;
* whether the beneficiary (farmer) would pay the cost; willing/ unwilling;
* whether the project could earn enough to support these activities;
* the disadvantages of testing wells by drilling method.

Interestingly exploration unit and water quality tests were almost neglected during discussion, probably for want of time.

To some of the participants it appeared that the additional services would be too expensive and, therefore, prohibitive since the burden ultimately is passed on to the poor farmer. This was, however, clarified by the agencies who use these services. The total cost of exploration and testing ranges between 10-15% of drilling. Also it was clarified that in view of the long term benefits and overall .gains in terms of regional water resources development, the cost of investigation and testing should be considered an integral part of drilling.

The representative of the ELC Water Development Project reported that Water Development Project, Betul, offers package programme in the field of water well drilling. As a result the beneficiaries get everything done through one single agency. The project services are preferred over other contractors because of the reasons stated above. Initially the project had to subsidize these services. Now, however, the farmers and government officials understand the importance of these services and are ready to pay.

For a short while merits of airlift method for yield testing was also discussed, since the method comes in handy for the drilling agency and used by most of them. The inherent disadvantages with the system was, however, brought to the notice of the assembly.

(a) measurement of yield is not realistic, as the pumping rate varies with the increase in the lift;

(b) drawdown cannot be measured, so one does not know the depth of pumping water level;

(c) recovery is not measured. All factors described above play an important role in selection of the pump.

While supporting PTUs, Mr. J.B. Singh stated that the farmer is interested in getting best returns on his investments. By conducting proper yield using PTUs, one can give correct recommendations to all beneficiaries and hence the beneficiaries will be willing to pay.

In this remarks, Col. Verma stated that if a farmer pumps water at the rate of 1500 gph based on the 'V' notch yield, when the probable yield of the well is 3000 gph, the farmer will not be getting best returns on his investment. On the other hand if he pumps a well at higher discharge, he stands to lose, as the pump may run dry quite soon.

He further stated that the data can be used by hydrogeologist for evaluation of the aquifer characteristics.

He also suggested that voluntary agency who do not have PTUs can use services of the AFPRO GIT Units, and offer package deals to farmer including survey, drilling and pump testing collectively.

Due to limited time, the subject was not discussed in full. Water quality test was not discussed at all.

FUTURE OF SLOW DRILLING DEVICES IN WATER WELL INDUSTRY

SPEAKERS

Mr. D.K. Fouzdar
Sr. Hydrogeologist
AFPRO GIT Unit IV
Patna.

Dr. V.K. Dixit
Sr. Hydrogeologist
AFPRO GIT Unit V
Varanasi

WATER WELL DRILLING INDUSTRY IN INDIA - VERSATILITY AND IMPACT OF PNEUMATIC DRILLS IN THE CRYSTALLINE ROCK TERRAINS AND THE FUTURE OF SLOW DRILLING DEVICES

by
Dilip Fouzdar
Senior Hydrogeologist
AFPRO

1. PROGRESS OF FAST DRILLING RIGS - 1966 - 1981.

Highly mechanised water well drilling for hard rock area had been carried out in a big way during 1967 when severe drought gripped csome part of India, particularly Bihar. Pneumatic drills were deployed for the first time and it was particularly successful at least in the context of drought. Most obviously this success was reflected commercially which in the later years offered this system of drilling a permanent place in the drinking water and irrigation programmes. It was widely accepted because of certain qualities which on one hand established this system in the water well drilling industry for the hard rock areas, on the other hand it blocked the ways, if not totally, for the various type of slow drills like hand bores, hand percussion and calyx - most of which are labour based. This is more or less true for alluvial areas as well where slow drills are facing a setback owing to the threats offered constantly by the fast drilling systems like the Direct and Reverse Rotary rigs.

The present trend is seemingly heading towards the ultimate extinction of slow drilling systems which could be diagonised as their natural death. This review is aimed at assessing the performance of pneumatic drills in water well industry particularly its versatility and impact in the hard rock areas with a view to highlight its merits vis-a-vis manual and semimechanised (calyx) drilling systems.

2. THE DOWN-THE-HOLE HAMMER DRILLING SYSTEM.

Although the down-the-hole hammer drill is not the only type among the pneumatic drills that was initially deployed for the water well drilling, it turned out in the later years to be the major if not the exclusive device among the pneumatic drills. It also underwent rapid modifications in the recent years to emerge as the most effective drilling system for water well drilling in the hard crystalline formations. We may try to summarise its merits as under:-

i) Mobility - These are truck mounted hence are transportable. This specially qualifies them for emergency operations like drought.

ii) Speed - These are extremely fast in penetrating crystalline formations including granites, quartzites, basalts and metamorphic rocks. A bore of 60 m. depth takes at an average 2 days to complete (actual working 16 to 36 hours).

iii) Support - The units of drilling are designed in a compact manner requiring minimum labour. It also eliminates use of drilling mud (gel) or water as compressed air is the drilling medium.

iv) Capability - In this system, water bearing regions are clearly identified as water from the formation is issued immediately to the surface by the compressed air. On completion it is not generally difficult to assess water availability in the hole as it is visible and measurable.

v) Cost - At least when the system was introduced roughly 15 years a ago, it appeared cheap as compared to other existing devices.

3. SLOW DRILLING DEVICES.

As against this, manually operated slow drilling devices apart from having a lacklustured appeal, are wrongfully regarded as unscientific. Some of the basic reasons for the phasing out of these devices from hard rock areas during the last 15 years were:-

- that they are extremly slow and are totally ineffective in hard unweathered formations of granites, basalts, quartzites etc. A 150 mm. (6") dia. bore drilled upto 45 m. - 60 m. (150 - 200') depth range takes about a month to complete.

- as such, these are labour based low powered drills hence they perform economically only upto a limited depth.

- they require a sizable amount of water at site because water is used as the drilling medium. It is at times difficult to arrange so much of water specially if the area is passing through a spell of drought.

- as a side effect of using drilling mud - which consists of a mixture of cowdung and fine clay in this case - the subsurface channels of groundwater gets chocked. Development measures requiring use of expensive machineries are generally not followed. Cowdung slurry leaves a bad stench which takes time to be removed. This is a striking disadvantage for drinking water bores.

- it is also widely believed that by hand operated drills or even by calyx drills it is not possible to know the position of percolating regions and therefore the drillers in this case would not be in a position to guide on the water availability, an aspect so important in water well drilling. In Pravara Nagar area district Ahmednagar, Maharashtra hundreds of bores drilled at the bottom of dug wells were regarded unsuccessful as they showed no immediate improvement over the yield of the dug wells. In fact many of these bores had struck productive confined aquifers in Deccan basalts which could be identified at a later date only through detailed hydrogeological investigation.

- these devices are too clumsy to be run commercially or to be managed departmentally.

4. COST EVALUATION.

Capital investment on the down-the-hole hammer rigs is the major factor that affect the drilling cost. Mostly they are run and managed by highly skilled personnel hence labour component and overheads on the drilling cost is also high. In fact expenditure on labour per diem is extremly high as compared to slow devices, although, owing to high output rates, the labour cost per metre of drilling in down-the-hole manner system may not be as high. Expenditure on development is minimal partly because drilling mud is not used and partly as the air flushing by itself is a developing agent. In fact the rapid drilling rate alone compensates for the capital cost and sophisticated infrastructure to a greater extent.

But while offering all these advantages to the cost factor, certain economic disadvantages specially under the Indian conditions are also in-built in this system, for example:-

- as the capital cost is high, the component of interest would have to be linked w th the output of the machine. This invariably calls

for a very prompt, efficient and fast action which is at times not possible as the operation of drilling has to be coordinated among a number of individuals and agencies. The unit has also to earn a large amount on depreciation.

- heavy expenditure is incurred on account of wages of skilled operators and mechanics. Hold-ups in the field or wastages of drilling time due to unproportional travels cause the unit to suffer losses.

- for the imported units specially, and also for the indigenous unit delay in supply of spares at times tend to cripple the unit. In fact, in this respect the drilling units totally depend on the manufacturers who handles supply of spares and service facilities centrally.

5. HYDROGEOLOGICAL INVESTIGATION.

It may not be out of place to bring in the subject of hydrogeological investigation here. Most of the drilling agencies may, however, like to skip this unproductive issue. This by itself is one of the side effects of deployment of fast drilling rigs.

It is widely known that the hard rock areas are generally not as promising as the alluvial areas so far as the drow from a single well is concerned. The possibility of irrigation tubewell in a wider part of penensular India is rather limited. Costwise, a tube well (of equal depth and diameter) in the hard rock area may not be more expensive than that for the alluvial area. But, the former would yield much less thus producing water that is highly expensive. This restricts a common farmer in the hard rock area from undertaking the risk of tubewell irrigation. He is also not certain that his attempt would be successful as often well yield is too megre to be used economically.

This eventuality could be eliminated to a greater extent through a systematic approach. In India, a millions of water wells may bave been drilled during the last 15 years. Yet it would be difficult to trace back the locations and the formational details of as low as 10 percent of such wells. Seldom formation logs are collected seriously by the drilling agencies. Often it is carried out half heartedly as the job is generally regarded as unproductive. This is obvious because the performance of a drilling unit is always judged quantitatively from the total length drilled and the number of wells completed. For that matter even dry bores earn money for the drilling agencies.

In fact commercial drilling agencies are so heavily burdoned with cost liabilities that they are too prone to resort to adhocism. Unfortunately this is true for the drill rigs of voluntary agencies who do not apparently have profit motives. There is no reason why this should happen to government operated rigs as well who renders a free service.

Unless the drilling data including that from the dry bores are systematically collected and compiled - the results in a particular area cannot improve. It is a step by step approach and should continue over the years. But such an important issue is too frequently sidetracked though it is never rejected in principle. May be the technology of well drilling is not being promoted with a long term objective. Lack of coordination between the production units (drilling agencies) and the investigation units (hydrogeological study and recommendations) leads to the gradual quality detereoration and other side effects. It must be acknowledged however that good work has been carried out in some areas where well drilling is extremely successful.

To complete this statement, it must be mentioned that there are areas within the region traversed by the crystalline rocks were ground water can be tapped quite economically, it should however be supported by:-

(a) macrolevel study on groundwater balance and recharge worked out on the basis of small watershed,

(b) comprehensive approach taking conjuctive use of surface and groundwater as the objective,

(c) well specing and well density factors over the watershed, and

(d) microlevel study for the location of well sites.

6. TARGET GROUPS.

In the alluvial areas, it has been successfully displayed that investment on a tubewell is quite profitable. In hard rock area, it is not encouraging, the limiting factors being:-

- high cost of drilling,
- fear of striking mergre quantity of water or no water,
- non-availability of drilling services,
- lack of trust to country devices.

The drilling is therefore carried out:-

i) by the government departments responsible for providing drinking water supply in the rural areas at 100 percent government cost. Obviously a majority of people in these villages share the benefit of this technology. The villages having poor road communication are however deprived of this facility as mobile rigs do not reach there.

ii) a few privileged small and marginal farmers to whom both the bank finance and drilling services are available.

iii) yet fewer, privileged wealthy farmers who have the capacity to invest and to whom services of a drilling agency is available.

iv) rather rarely, industry requiring water, they are capable though of hiring drilling services, whatever the cost may be.

7. A CASE FOR THE SLOW DRILLS.

It may be concluded from the above that the services of water well drilling, specially by the highly mechanised fast drilling rigs, cannot reach a vast majority of population. These include:-

a) People living in the remote villages where road communication is poor

b) Farmers of the area where services of a drilling agency is not available

c) Small and Marginal farmers falling in the approachable area, but the initiatives of government agencies and nationalised banks are poor

d) People of the area which has been marked unfavourable for tube-well drilling due to some reason or the other.

Out of the above, a) and b) constitute a vast majority and they can be covered through promotion of slow drilling devices. Obviously this has to come through organised efforts and for the best results, undesirable elements from the slow devices have to be eliminated. Obviously these devices would have some inherent advantages like:-

a) They are low cost slow machines hence idling would not cause any imbalance to its cost economics.

b) They can be transported by bullock carts or even manually hence they can reach even the remotest village.

c) They do not require highly skilled operators.

d) Use of imported machinery, spares and consumables could be eliminated to a great extent. Deployment of labour would minimise use of fuel and lubricants.

e) They provide employment to skilled, semi-skilled and unskilled labours.

Obviously this proposal would be complete on making a few modifications on the system:-

i) To eliminate limitations, the agencies should maintain hand percussion and calyx (chill shot) drills together to offer flexibility and versatility to the infrastructure.

ii) Objective training programmes have to be arranged to improve the skill of the drillers and data collection.

iii) Special measures have to be taken for the development of bores. This may involve additional time, efforts and expenditure to the overall cost of drilling.

iv) These units should also be provided with hydrogeological services comprising of well siting and pumping tests.

Obviously by these developments the highly mechanised fast drilling rigs would not be put to loss who may still have their importance at various fields. It is however apparent that the myth of their mobility and speed is obviously exploded when we think of their present target groups and the adhoc nature of their impact. The advantage of their faster transportability and a high penetration rate may be a reality in the events of drought relief operations but surely the slow drills would not be much behind as 30 calyx drills and accessories acquired with an equal capital investment as that of a high powered rig would together show a progress that would not at least be inferior (30 calyx rigs can together drill 210-240 tubewells per year in hard rock areas as against

144 - 160 tubewells by a highly powerful down-the-hole hammer rig). Additionally they would provide employment for at least 300 young man in the rural areas.

8. INITIATIVE FROM THE VOLUNTARY AGENCIES.

Voluntary agencies had all along been helpful in promoting the technology of the down-the-hole hammer drilling. Though it all began with good intention, it is almost exposed now that under the existing socio-economic conditions this highly expensive technology cannot reach the common farmers level. On the other hand, simple devices like hand percussion or calyx have the qualities to serve a wider community and they have adequate flexibility and versatility to be really useful for the purpose.

Most of the voluntary agencies dealing with water resources development aim at helping the underprivilged. Instead of their gradually phasing out from drilling business it would be just proper if promotion of manual or semi-mechanised devices is now given a higher priority.

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"Science can be a tremendous help to mankind but wrong or shortsighted short-term uses can cause incalculable harm. Modern technology may have cleared the dust of poverty but it has spread its own pollution which is destroying our environment."

- Indira Gandhi -
(Message to 'United Nations Water Decade 1081 - 1990')

SCOPE FOR CALYX DRILLS/SEMI-MECHANIZED EQUIPMENT FOR HAND PUMP PROGRAMMES

by
Dr. V.K. Dixit

Of the 5,76,000 villages in India, approximately 1,53,000 problem villages are categorised in hard rock areas or desert regions. The available information suggests that a balance of 1,03,000 problem villages are yet to be provided with safe drinking water. On rough estimate basis Rs. 675 crores had been provided for the problem villages for potable drinking water. The UNICEF programme of Drinking Water supply and sanitation decade 1981-1990 has highlighted the importance of providing potable drinking water which merges with national policies and plans. The provision of appropriate equipment for drilling and installation, spare parts and need for study of the available existing agencies to undertake this service, would reveal that a considerable gap exists between the number of bores to be drilled and service capability of various agencies taken together.

With the recent advancement/modification in the pneumatic drills, the DTH has emerged as the most effective drilling system for water wells in hard rock areas but the programme generates no employment opportunity in rural areas, and it siphons .out the resources, which are spent on the problem village, into the urban economy. To be more particular it could be mentioned that DTH completes a borewell within 1-2 days involving trained workers and funnel out the drilling charges, say Rs. 9,000/- allocated for each bore from that village. Thus the benefit accrued goes invariably to the economically higher sections of community.

Another shortcoming is related to the inaccessibility of these sophisticated machinery to remote problem villages with poor road communication. These villages never get the benefit of a borewell although fund allocations are duly made.

Considering the above problem it is appropriate time to consider promotion of semi-mechanised/calyx drills for drinking water borewells in the context of UNICEF's 1981-1990 decade programme.

The following advantages could be visualised in calyx drill/semi-mechanised drill vis-a-vis the DTH:

1. simple mechanism results in fewer breakdown;

2. cost of maintenance/running is considerably less;
3. calyx can drill from 2" to 6" dia. bores;
4. calyx can drill extension bores in dug wells;
5. the unit can work throughout the year in remote areas;
6. since a core is obtained by this method, changes in formation hydro-geologic properties can be deciphered. The core loss could reflect presence of fractures etc.

COST ANALYSIS

A calyx machine is assessed to be 3.4 times less in generating the profit than a DTH rig, whereas the investment is approximately 48 times more in DTH rig than that of semi-mechanised calyx drill. The profit yield against this investment works out to be 14.06 times.

TABLE-1 - Cost Analysis of Truck Mounted Rigs and Calyx Rigs

Type of Machine	Capital Cost	Recurring/ Running per annum	Bank interest per annum	Work progress: total footage drilled per year	Drilling rates per foot	Estimated total income p.a.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Truck mounted DTH	12,00,000	2,50,000	1,68,000	10,000	65	2,32,000
Semi-mechanised/ calyx	25,000	20,000	3,500	1,000	40	16,500

From the above table the comparison of recurring/running expenses of one DTH to 30 calyx amounts to 2.5 times less. During a 10 year project, one DTH may earn a total of Rs. 65 lakhs while recurring/running bank expenses of Rs. 42 lakhs. Thus the profit over the decade is Rs. 23.20 lakhs which is more than two times the original cost of the machine, while the total proposed achievement is much more in terms of footage.

PROBLEMS OF DRILLING IN HARD ROCK AREAS

CHAIRMAN	Mr. J.N. Kathuria Omega/Swissteco Drilling Hubli
RAPPORTEURS	Mr. J.S. D'Souza
	Mr. M.K. Moitra

PROBLEMS OF DRILLING AGENCIES IN HARD ROCK AREAS

The two main type of drilling machines used to develop ground water resources are the percussion and Rotary type, and a wide choice of drilling equipments are available within these two.

For hard rock drilling we would always think of using down-the-hole drilling method as it gives the fastest penetration. Not only it is fast but it also is economical. Today a number of DTH drilling machines are being used in our country and therefore, my discussion on drilling difficulties and problems encountered in drilling are limited to this method of drilling. A few of the problems are as follows:-

1. Collar Formations

While drilling to deeper depths, moisture or negligible amount of water formed at shallow depths prevents the cutting to come our freely and tends to accumulate in these regions. The result would be improper penetration added with excessive strain on the motors. If this continues, it is possible that drill rods may get stuck due to excessive formations of collar. We have experienced this phenomena a number of occasions and in certain cases the stuck .too is had to be extricated by suitable methods. However, this problem can be eliminated by close observation and by giving proper flushing initially with air and later on if required by introducing water injection system while drilling.

2. Clay Formation

(a) In overburden

Drilling through this formation is usually a difficult task while using the DTH equipment. This formation sometimes sticks to the drilling tool and even block the flushing systems completely and even the hammer cease to function. Here to solve this, either an augar or water injection system could be made use of.

(b) Below hard rock

Here the drilling can be effected only through water injection method. Insertion of casing is being dealt with separately. While discussing the case of intermittent soft and hard formations.

3. Weathered Zone

Depending upon the extent and nature of weathering, the problem varies. In highly weathered horizon, the collapsible nature, the presence of clay and pebbles make drilling very difficult. When it is encountered at shallow depths the problems might be solved with great difficulties. But if encountered at higher depths the drilling may have to be abendoned.

4. Boulders

Boulders found at shallow depth and deeper depths offer great difficulty in drilling. These boulders are likely to shift due to the vibration of the hammer and pressure offered by it. It becomes still worse when water is found in these layers. If it is not observed properly, it is likely that the tools get jammed and at times it may not be possible to extricate them.

5. Highly Fractured Zone

In these formations, the cutting coming out are likely to be of larger size so that it may not come out through the annular space available. These pieces may obstruct the free movement of the Rotation and winch and there is likelihood of the tools getting stuck. For an experienced driller, it would be easy to locate this formation. By giving proper feeding and rotation, this problem can be solved to a great extent. Further, to clear this formation, it would be advisable to raise and lower the tool more frequently, so that the protruded material can be broken and cleared. If this is not done properly, the pump may not go in freely.

6. Intermittent Hard and Soft Formations

This again becomes a problem for drilling and this can be solved to a great extent by adopting a proper drilling method. The method normally adopted in drilling varies in two ways.

Method-I

The overburden till the hard formation is first drilled using an overburden bit and cased initially followed by continuation of drilling using bits of nominal bore diameter. In this method if soft formations are found below the hard formation, it may not be possible to save the bore since the soft formation is likely to collapse, unless a smaller dia. casing pipe is inserted to cover this formation.

Method-II

Starting the drilling with bits of nominal bore diameter, till the bore is completed subsequent to which reaming is carried out through the hard and soft formations and finally casing pipe is inserted. The selection of reamer shall depend upon the type of formations, e.g. reamers in conjunction with hammer or reamers directly coupled to the drill rods.

DISCUSSIONS

The question hour produced the following queries and replies:

L.V.R. Reddy	:	In Gujarat there exists a problem of tapping fresh water at depth : the over burden may be 100 feet, contains saline water and overlying basalts which contain fresh water. Is there a method to tap fresh water?
L.V.R.	:	C.G.W.B. has drilled some bores. There is an inter-connection between fresh and saline zones; 4-5feet may have to be sealed around the borehols.
D. Malkani	:	After inserting casing pipe, the annular space around the pipe has to be (cement) grouted. This may take a day extra but is a must for sealing off the contaminated shallow zone or saline zones.
P.R. Michael	:	As you draw fresh water, saline water intrudes.
D. M	:	This can be avoided if the grouting is done properly.
P.V. Narasimha Rao	:	If you drill a larger diameter hole and fill the annular space with cement and then drill further this problem can be solved.
C. Uday Shankar	:	In Jammalamadugu after penetrating through the hard rock some collapsible formation can be encountered. The Government operators do not take up these problems.. Volagencies however did commendable jobs in these areas despite risks involved.

M.K. Moitra : The eastern part of Tamil Nadu has a regional fault with soft rock (compact alluvial clay) and 500-1000' feet of drilling is required. There is no agency to take up this job. Such areas e.g. Ramned and Puddukolai Districts have tremendous Ground water potential.

J.S. D'Souza : In parts around Bangalore (granite rocks) problems occur in Northeastern and parts of Southeastern portions : the problem that is encountered in an increasing number of cases is the existing sand/ silty formations after firm rock has been penetrated. Combination rigs are the answer if these problems are known before hand, but what would be the solution when DTH rigs are only operating in the area?

D.K. Fouzdar : Collapsible formations require patience. Using a ring bit, flushing must be done till the hammer can be fitted again and drilling continued. This has to be repeated several times.

WELL DRILLING FOR RURAL WATER SUPPLIES

by
Brien E. England

Mr. England began his talk by expressing concern about preferences for the slow drilling methods to fast rigs. He opinioned that there was place and requirement for all types of rigs. Drilling being a new adventure one can only give a general idea. Each type would have its own problems. He stressed that what he is to speak about is nothing but a combination of ideas.

There are problems of rigs not being able to approach or drilling not being possible for various reasons such as geological formations, approach etc. Significant areas have thus to be neglected. With the assistance of a Geological Map Of India various types of areas were described. The alluvial areas, also has problems and the Government of India has considered development of these areas. Where rotary drilling (RD) is advantageous and rotary combined with DTH has tremendous advantages this latter combination rig is ideal. The CR starts as a RD and then has the capability to be employed as a DTH (feed system etc.). Thus drilling through overburden using the RD method and a quick switch to DTH when firm rock is encountered is possible in the combination type of rig.

The flushing system (air) is used for both types of system though the air requirement may be different. RD needs less pressure while the DTH requires more air for the hammer. A larger hole is drilled for the casing pipe after which the DTH drills through.

Features of C.R.:

* ability to handle drill pipes and drill string

* properly designed to handle drill collars

* R.D. applies weight (pressure) at the bit while DTH applies pressure at the top (feed Motor)

* same drill pipes can be used for RD and DTH.

* drilling pipe should have maximum holes which is important for DTH where pressure is required at the hole bottom.

The problems of drilling in soft formations can be solved by use of foam with 'air.' The mixture is injected by pumps slowly so that cuttings are lifted in the foam. The foam film forms a barrier on the soft formation. Though time consuming, patience is necessary and pays even in cases where sands are considerable. Time however is a major factor. This has to be done quickly.

MULTI-TRUCK SYSTEM

In Orissa the 2 truck system has been employed: 1 truck carried the rig and the 2nd the compressor. This enables approach to areas where the larger single carrier system creates complication. This system also helps keeping the compressor away from the drill rig.

Since most wells are 150-200 feet deep further developments are being considered e.g. mounting the rig, which is smaller than the compressor, on a Mahindra (FC) type jeep. Hands-England also manufactures such rigs. This could get to more areas and could be the answer to the much slower bullock-cart-mounted type rig.

Another controversial subject is that concerning the type of compressors. Manufacturers have concentrated on the screw-type designed for American and European conditions, which require maintenance of high standard and this is not possible in rural Indian conditions e.g. the filter has to be changed in time or else it could lead to serious repair costs. The piston

type (PTC) on the other hand is more suited to Indian conditions; maintenance and spares costs are relatively low. Engine reboring can be done and over-size rings used thus extending the life. The most important factor in the PTC is fuel consumption, it requires 2/3 that for the STC, in most conditions only 1/3 that of the STC. Drilling conditions are under no load condition 1/3 of the time. Some people shut down but restarting being costly this should be avoided in the present fuel crisis. On an average drill rig Rs. 40 - 50,000 could thus be saved.

An important part of drilling operations is drill string handling. Bigger rigs employ the carousal type loader (5-8 lengths). The time required is short until all pipes have been used and then have to be refilled; this is time consuming, especially when coming out of the hole. The Jib Type (or side-arm) loader is hence suggested. This picks up, puts on and couples and vice versa when coming out of the hole. This saves a lot of time which is important.

To summarise in short:

1. Rotary Drilling has a significant role if it can handle DTH; a combination of the 2 is the best type.

2. The 2-truck layout would be best suited.

3. Smaller type of vehicles e.g. Mahindra FC Jeeps would be most versatile.

4. Foam could be used for problem soft formations; these are available in India. Polymer could be added to stabilise the foam. A foam flush drilling could (but not necessarily) have a small compressor.

(Mr. B. England amplified his talk with a slide show before question hour).

DISCUSSIONS

J.N. Kathuria : 1. We have been operating Ingersoll Rand Trucm-3 DTH rigs satisfactorily handling upto 180 feet of overburden. Since foam has been recommended it must be mentioned that the foam available in India is of inferior quality. This has been realised and it is hoped that improvements will be made.

2. When the 2-truck concept has been suggested we could end up with 3 trucks.

B. England : Yes, it could be a multi-truck layout.

V.K. Sardana :

1. Can the combination rig handle boulder formation?

2. The smaller vehicle suggested could be the Mahindra FC Model ($1\frac{1}{2}$ tonnes).

3. In the 2 truck system, if one truck can reach the site the second also could reach.

B. England : These have already been answered. In case of the 2-truck system, the rig would be on a smaller vehicle and compressor on the large vehicle.

Overburden with boulders is definitely a problem. If the boulders are large DTH could be used and for smaller boulders the drop chisel method could be employed.

J.N. Mathuria : Is the cable tool facility provided on your combination rig?

B. England : No, not at present.

R.K. Daw : What is the maintenance problem on multi-truck system, where the compressor is kept away from the drill site?

B. England : With the compressor kept some distance away from the hole, the life is longer.

R.K. Daw : What maintenance component is a saving on the 2-truck system?

B. England : If the only problem is getting to a difficult approach area then the 2-truck system despite the extra cost is the only solution; otherwise the area is denied any water at all. Besides for one British Leyland you can get 2 TATA trucks so the costs would not be that of a factor.

Col. B.L. Verma : This question of preference for Piston Type compressor must be reviewed: there are agencies willing to wait for a year and import a screw type.

B. England : This analysis of Piston type versus Screw type is my own analysis and may be rather controversial. Fuel and maintenance economy may be the criteria. However if higher pressure is required one may have to go in for a screw type compressor. Operation at 100 psi in my opinion is insufficient for DTH. So this is a controversial issue.

C. Uday Shanker : Should one go in for a combination rig so that it can handle any area? Again what is the comparitive economical implications of the DTH versus combination type for hard rock areas.

B. England : Whether one chose a DTH OR A combination type both would amount to about the same, costwise though the DTH would be marginally cheeper. Performance-wise there is nothing to choose between them though control of feed rate is different. Handling of drill pipes, casing pipe etc., have limited capacity on DTH. So feature for feature the combination is more versatile. Hence DTH is slightly cheaper and efficiency is similar but marginally better in the combination.

C. Uday Shanker : What rig would be preferred for conditions where 100 feet of collapsible formation is followed by hard quartzite rock (DTH or CR?).

B. England : The soft formation has to be cased before drilling further in the hard rock. If the formation is unstable, larger diameter may have to be considered in this zone.

K.M. Namboodiri : What is the effect of 'foam sealing' on the yielding zones in the collapsible formation?

B. England : This depends on the flow. If it is a minor flow it will have to be sealed off and grouted. But if it is a major flow it will stabilise.

V.K. Dixit : In quartzite formations, abrasive cuttings accumulate at the hole bottom. Will foam be useful in removing these?

B. England : Foam can be used both in DTH and CR. In Rotary Drilling the volume of air needed is low (small compressor) and hence cuttings are brought up slowly: uphole velocity is 14-40 feet per minute. In DTH there is higher velocity because more air is needed for hammer operation. Added to the foam is the polymer to make it stronger and help stabilise it; these are better than bentonite.

V.K. Dixit : In the marginal alluvial areas, overlying lime-stone, upto 150 feet there are no aquifers. Mud rotary is used upto the bedrock and then roller bits. Water is then struck but collars have been lost twice. Water levels are progressively lowered with the drilling depth and finally there is a well collapse. What combination rig can be employed in such limestone terrains? Is percussion-cum-rotary useful?

B. England : If the flow is substantial it has to be cased. Percussion-cum-mud rotary may not help because energy is lost. If mud is used it must be heavy mud.

V.G. Joshi : Regarding the use of polymers and foam for sealing what method is used for disintegration of the foam polymer and how would the quantity of water be affected?

B. England : Foam disintegrates rapidly, with polymer added it takes logger. In 'muds' you achieve this by 'well development'. Tests have been conducted on the safety of foams and polymers and they have been given a clean chit.

D.K. Fouzdar : You suggest what type of flushing in combination rig?

B. England : With the equipment supplied, water flushing is possible.

D.K. Fouzdar : In India drill operators use cowdung in place of mud.

B. England : I have not had experience in this line, provided mixing is done this could be considered.

P.R. Michael : The Ajantha paintings have their background made with a mixture of paddy, husk, clay and cowdung and have lasted for years.

D.K. Fouzdar : The dung is removed by developing.

V.K. Sardana : What is your plan for manufacture of rigs in India?

B. England : Our aim is to make rigs and make a modest profit. We would have to stop in England and mount them in India. To suit conditions here we consider some changes e.g. fitting Perkins Engines which do not pose after-sales problems in India, but have kept the factory in England running as it is not our wish to close fdown in England sand set-up in India.

M.K. Moitra : In alluvial areas where rotary rigs are employed as also where a series of formations are encountered and where saline fresh-water conditions are encountered in a hole, a technique called well-logging is also employed (for deciding the design of the well). Bentonite mud which is used has an Electrical Conductivity value which makes a perfect combination with clay and sands. What is the Electrical Conductivity of foam-polymer?

B. England : We have no experience on this since we do not manufacture foams and polymers.

Open House : 1. What is the type of rig we should begin with in business?

2. Whether 2 trucks are desirable or not?

Replies : The type of rig depends on the demand and area of operation and also on the supply position. In case of institutional demand DTH is preferred for atleast the first four years. The DTH is suitable for shallow bores as on Government contracts. In-well drills could also be considered.

The 2-truck concept is to be considered from the point of economics (cost ± 2 lakhs). Savings on maintenance expenditure and cheap cost of labour in India. Maintenance costs are low, investment costs are high. Therefore unless there is a special advantage, the 2-truck system is not an advantage.

B. England : Agreed. But in cases where approach is the problem, the system must be considered and consideration also should be given on the work to be done.

J .N. Kathuria : If distance are not much, tractor-mounted rigs could be considered. But there are disadvantages.

W.D.S. : Tractor mounted rigs also manufactured with the compressor mounted on a trailer.

B. England : The Agricultural tractors are designed to work in these areas have also been used by us.

CONCLUDING SESSION

SPEAKERS: Mr. J.B. Singh

Mr. B.E. England

Dr. S.T. Gujar

Mr. A. Fernandez

Mr. R.K. Daw

RAPPORTEURS: Mr. J.S. D'Souza

Mr. M.K. Moitra

I.B. Singh

We have been gathered over the last 2 days to exchange our views and decide on the future course of action. This is what we had decided when we planned this meeting of AFPRO specialists, operators of AFPRO rigs and to complete the picture, Manufacturers of Drilling Equipment particularly those based at Hyderabad and those closely associated with AFPRO, like Killick Nixon. There is however a class of people missing i.e. the beneficiaries who obviously cannot be brought here for logistic reasons. This group of individuals however were kept in our mind - their priorities, needs etc., during our deliberations.

We have gone quite deep into all aspects starting with investigation and ending with utilisation of drilling. We have attempted to touch the high levels of ideals e.g. it was pointed out that we were doing jobs for the better offs. Another way, is to work for 'better offs' to pay for the 'have nots'. We have thus done a thorough review into the basics and have met now after 7-8 years.

For AFPRO, drilling is the main thrust. We have also felt that instead of diversifying too much we have gone into a specialised subject i.e. Water Resources. We have thus reviewed our past and from this have attempted to project a future action plan e.g. we have agreed to form a Forum Association Of Drilling agencies etc. These are positive sides.

On the negative side, I have to be a little critical, even of myself, a self retrospective. We have tried to describe water as a commodity meant only for Exploitation. We have not tried to think of the human angle. We have to think of an Integrated approach e.g. Land and Water. Hence I would request you to think of water to be judicously used for the betterment of the people and hence an integrated approach from various angles must be formost in our minds. Many of us have done commendable work in this angle but have forgotten about this.

Another direction of integration is the idea of joining hands. There should also be a joining of hearts i.e. what AFPRO stands for otherwise there would be no justification for our actions. One way to achieve this is to put things together and circulate to all involved; a second way on the part of AFPRO is to bring about association in a more meaningful manner, understanding each other's strength and weaknesses; thirdly, it has been decided to meet once a year (and not once in 7-8 years), specifically deciding the date. We have enough time for synthesising our motives and efforts unlike Western countries where it is one of competitiveness. We should continue sharing - we should take pride that we are able to share even in our poverty. This needs serious thought.

B. England

I have been delighted to be present at this Meeting. Though I did not know what to expect I have met several interesting people and heard many experience.

S.T. Gujar

Over the past 2 days we have been discussing several matters in great detail but have yet to touch on basic issues and not found suitable solutions. We however feel stimulated and hence take this as a beginning to prepare for regular exchanges. This meeting has centred rigs but hope that we will broaden our perspective and talk of Water the next time. We have discussed much and due to our long standing association we pool our strength together, when there is a call from the Government to AFPRO in an emergency. I must express gratitude for contribution in thought, material, finance, etc.

Thank you all and AFPRO especially to enable us to meet in a free atmosphere.

A. Fernandez

CIDA, (Canadian International Development Agency) to which I belong appears to be a donor but we are actually receivers. The donor image is not ture. This meeting has been in ways similar to CIDA meetings where the commercial-social interests clash. In the last analysis both are inter-related. But in the long run if we do not look in the correct perspective to Water we will be dead.

I have known AFPRO since the early 60s before AFPRO was born and association has been carried on and off over the years. In fact we will be involving AFPRO in several programmes e.g. in Andhra Pradesh where we have offered 60 crores for social forestry, Land and Water Utilization etc.

I thank each and everyone in AFPRO.

Mr. R.K. Daw of AFARM proposed the vote of thanks.

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APPENDIX

W R D SEMINAR

HYDERABAD

6TH AUGUST 1974

OPENING REMARKS

by
Gen. P.O. Dunn

(Extracts)

"The question we must always ask ourselves, and we certainly must do so again at this Seminar, is: Are we in fact assisting the small and marginal farmer?. And if the answer is yes, are WRD projects doing so in the manner in which they said they would operate when they initially asked for assistance?"

"How are WRD projects actually helping the small farmer when the cost of drilling alone is approximately Rs. 15/- a foot for a 4 inch bore and less, and Rs. 36/- a foot for bores of 6 inches and more? We must also remember that by the time the well is completely developed, the final cost is about Rs. 5,000 for a 4 inch bore well and Rs. 10,000 - Rs. 12,000 for the larger bore well. We realise the difficulty all projects face with regard to this, and we hope a solution exists. Particularly, we would like to know how those projects that do not have their own integrated credit schemes or which have not involved themselves in government sponsored schemes like the SFDA and MFAL, are actually helping the small man."

"We have been told that the WRD projects in the Maharashtra areas have decided to phase out of drilling operations in favour of the government. We are not clear what the last clause is meant to convey. On the other hand we know that three probjects in this very area have asked for additional rigs."

"Personally, I believe that there is no basic disagreement between AFPRO and projects on principles or fundamental issues. But somehow we don't seem able to click with some projects. I may be wrong - and I sincerely hope I am - but I have a hunch that this apparent lack of rapport is because of the mistaken belief that AFPRO has only a butterfly existence, that it will shortly cease to exist and, therefore, it should not be taken too seriously. On the other hand it could be possible that some believe that the end justifies the means and, therefore, promises can be made and broken in the so called interest of the poor.

I take this opportunity to dispel any notion that AFPRO's existence is ephemeral. We are convinced that AFPRO has a mission to fulfil and we mean to fultil it. Moreover we know that certain donor agencies continue to be very interested in our existence and have on principle agreed to support AFPRO fully for at least another ten years. We feel, therefore, it is necessary at this juncture, for both AFPRO and projects to once again take stock of the situation and to see how we will proceed together from now on."

The AFPRO - related Implementing Agencies and the Equipments held by them - during 1974

	Implementing Agency	6" Bores & above	4½" Bores	
			Halco Tiger	Halco Minor
(a)	AWDM Society, Bangalore	3	-	-
(b)	Omega Drilling, Hubli	2	-	-
(c)	CWADP, Coimbatore	1	2	1
(d)	War-on-Went, Jalna	1	3	-
(e)	M.M. Water Dev. & Mech. Training, Vadala	1	-	4
(f)	Water Development Project, Betul	1	-	-
(g)	Water Development Society Hyderabad	1	2	1
(h)	MEDS, Indore	2	-	-
(i)	Water Development Society, Indore	1	-	-
(j)	BWDS, Kudra	2	-	-
(k)	Indo-Norwegian Agri. Dev. Project, Deoria	1	-	-
(l)	SCDS Tubewell Project, Chandigarh	2	-	-
(m)	MPSM, Nasik	-	2	2
(n)	Baramati Agricultural Development Trust, Baramati	-	1	-
(o)	Sholapur Well Service, Sholapur	-	1	-
(p)	Technical Drilling Team, Shrirampur	-	-	1
		18	11	9

Credit Schemes for the Development of Small & Marginal Farmers

PREAMBLE

1. In order to provide irrigation facilities and other agricultural inputs and services to small and marginal farmers, it is accepted that credit facilities have to be made available, since this type of farmer does not have the resources to pay for them.

2. Small and marginal farmers who are being assisted by any project may be receiving credit facilities from:

   (a) private lending parties;
   (b) banks directly or through SFDA/MFAL and other government schemes;
   (c) banks through donor agency funds acting as collateral security;
   (d) volagency funds - schemes operated at project level directly.

3. At the onset it is perhaps desirable to avoid making credit facilities available through private lending parties because the drawbacks and malice involved with, which are too well known to be repeated.

4. For quite some time now, credit to the agriculture sector has received greater attention from banking institutions specially the nationalised banks. More recently efforts to help small and marginal farmers have taken priority.

5. The purpose of this paper is to discuss credit facilities being made available to the small and marginal farmers through banking institutions.

6. Credit facilities made available to the farmers directly by projects need little discussion, for the reason that draw-backs of such schemes outweigh benefits offered, e.g.

   (a) the project by getting involved in giving loans directly, becomes a lending institution rather than being a service agency.

   (b) Beneficiary farmers tend to take a charitable view due to voluntary nature of the project and to regard loans as give away grants.

   (c) More importantly, limited credit facilities can only [illegible] available through this effort. The money does not multiply as in the case of bank schemes, whereby if X rupees are deposited as collateral in a bank the credit scheme will be worth [illegible] rupees and more.

CREDIT SCHEMES THROUGH BANKS

7. As outlined in paragraph 2 above, bank credit schemes may be direct, or in collaboration with other agencies. Whatever be the case, the important considerations which perhaps need discussion at the Seminar are:

(a) A small/marginal farmer needs package assistance, both in terms of inputs/services and credit facilities:

(i) In order to ensure that all inputs and services required are made available, it is desirable that a project should consider all disciplines. An agency engaged in water resources development providing irrigation facilities to farmers should also have separate divisions providing agricultural-custom services, inputs like seeds, fertilisers, pesticides etc. However, if adequate and satisfactory facilities exist with other agencies in the same area of operation, it is obviously not necessary for a water resources development agency to involve ifself in all these activities but experience shows that this is rarely the case.

(ii) The agency providing inputs and services requires payment for the supplies/work done. Credit facilities made available to a farmer by a bank should provide funds for all these needs. Credit schemes formulated by volagencies should certainly take care of this aspect. If a farmer has received money to pay for irrigation facilities and does not have money to pay for land levelling or say for seeds and fertilisers, the water facility will be under-utilised and even if utilised fully will be at a very high cost since the farmer will be obliged to take private loans at exhorbitant rate of interest to pay for the other inputs.

(iii) An issue pertaining to credit but in relation to water resources development is the fate of a farmer who gets a dry well. A loan taken by such a farmer either becomes a bad debt, or if the farmer pays for it he often becomes bankrupt. There are government schemes in certain States which subsidize such dry wells and certain project personnel have ideas about over-coming this major obstacle. A detailed discussion on the topic would be desirable.

8. AFPRO's TIS through its publication no. 27 has outlined bank-cum-donor agency credit schemes being implemented through Bihar Water Development Society, Kudra and Social Centre, Shrirampur. This publication may serve as a useful reference paper for discussion.

Measures to Increase the Scope and Effectiveness of Investigations/surveys in Water Resources Development

1. The primary objective of the AFPRO related water resources development programme was to bring about improvements in ensuring water supply particularly to the marginal/small farmer and in support of drilling projects engaged in this task.

2. Keeping in mind this objective, there was a need:

   (a) To assess the amount of water needed particularly by small farmers for irrigation and domestic consumption.

   (b) To locate such sources of water - both surface and ground - in the context area.

   (c) To determine the best method of exploiting and managing the available water, and,

      (i) to advise on the constructing and drilling of bores for new wells, digging of tanks, erection of bunds etc.

      (ii) To advise on measures for deepening or revitalising the existing open wells;

      (iii) To advise on steps for improving the recharge to the groundwater source, so as to improve conditions to bring about perennial supply as near as possible.

   (d) To assist in installation of suitable water-drawing devices and distribution systems so that water is obtained at the places and time where it is required.

3. Hitherto stress by the drilling projects seems to have been towards:

   (a) drilling or digging new ewells;

   (b) deepening or revitalising existing open wells;

Less frequently has attention been paid to measures that should logically follow e.g. installation of pumps or suitable water drawing devices towards an integrated appraoch to water management oriented to comprehensive agricultural development. There is evidence of an increasing

awareness within AFPRO related drilling projects of some management aspects such as measures for conservation of water resource, but enough does not seem to have been done.

4. AFPRO has made available the services of Groundwater Investigation Teams to the projects in their efforts directed towards water development. Whatsoever be the reasons, from past experience of the teams' activities, it appears that the projects have not adequately or sufficiently been able to make use of the services of the GIT. Statistics show that on the request of the projects, the G.I. Teams taken together have investigated a total of 2435 sites during 1973 and recommended 1669 sites for drilling/digging. Of these, only 622 sites were actually taken up by the projects. This illustrates an apparent disproportion. This feature is more pronounced in some states than others.

Perhaps now is the time to enquire what are the factors that have brought about this imbalance if the statistics reported are to be taken as correct, and what remedial measures need to be taken?

5. AFPRO is already engaged in formulating a plan to rationalise these AFPRO teams so as to provide:

(a) greater flexibility in areas of operation to match the need;

(b) more effective control and regulation of activities to avoid unnecessary and/or incorrect dissipation of resources;

(c) broadening the scope in aims and objectives so as to include for e.g. investigation of surface water resources, and advice on water management;

(d) finding ways and means of the Teams becoming self-supporting.

6. In view of what is stated above, the aim of these G.I. Teams in water resources development would include, and obviously the teams should as a specialised body, be in a position to give advice on:

(a) - assessing water requirements and choosing a site for water development;

- the method of development i.e. bunding, tanks, wells etc.
- selection of pumps
- land use and conservation practices;

(b) They will provide short duration training facilities in geohydrology to project staff and also to University students capable of absorbing such knowledge.

(c) They will not initiate proposals but can help project executives to draw up development programme and, within limitations, advise on how best to execute them.

(d) They will undertake technical feasibility studies for establishing water resources development programmes in new areas.

(e) They may be associated with any agency which has allied policies and similar programmes for the development of the marginal farmer.

8. Further suggestions in this context are welcome.

Working Capital Concept

1. The generally quoted and accepted definitions of working capital are:

(a) Current Assets less Current Liabilities equals Net Working Capital.

(b) The concept of gross working capital is somewhat different and more often defined as the amount of funds invested in current assets that are employed in the business process.

2. In the context of our water resources development programme, specially in respect of well drilling activities, working capital consists of that portion of finance which is required to meet financial obligations of a day to day nature that have to be paid for before financial receipts materialise for work done. It is this concept which is discussed further.

Working Capital - Why?

3. Finance are required to make capital assets productive. In the case of drilling projects, funds are, interalia, required for meeting current operational costs, e.g. salaries, fuel oil & lubricants, purchased stores and services, rents and taxes, office expenses etc. Money is needed to pay for this and this ready money should be available to the project holder; hence the need for a buffer, that is working capital.

Working Capital - From Where?

4. The source of working capital may be:

(a) owner's capital;

(b) advances for contracted work;

(c) reserves - part of excess of income over expenditure for on-going programmes.

(d) borrowings - which may be in the form of a bank loan.

5. In the case of volagency drilling projects, working capital may be identified under one of the following categories:

(a) grant-in-aid from funding agencies;
(b) advance payments for contracted work, if any;
(c) reserves - part of excess of income over expenditure;
(d) loan from funding agencies.

Working Capital - How much?

6. For a continuing programme, working capital will always be in circulation. The extent of finances required for the purpose will, however, depend upon:

(a) the lead time i.e. the time span between the commencement of work and receipt of payment for work done;

(b) business terms of the implementing agency e.g. terms of payment, mode of payment etc.

7. Elaborating the foregoing in the context of drilling programmes, working capital will be required for operational expenses as outlined at paragraph 3. The extent of finance required will depend upon actual drilling time and billing arrangements, payment terms and mode of payment agreed between project implementing agency and the client. For example, in an arrangement wherein three months work done is billed for in one lot at the end of that time, and takes a further three months for billing and receipts to materialise into money, the working capital requirement will be for a six month period. On the other hand, an arrangement wherein one month's work done is billed at the end of that month and the

time taken for billing and payment to be received is a further one month period from date of completion of work, the working capital requirement will be for a period of two months only.

8. The extent to which finances will be required from funding agency will depend upon:

   (a) advance payment, if any, made available to the implementing agency for the contracted work;

   (b) operational reserves generated by the agency during its previous operations;

   (c) business terms, specially the credit terms available to the implementing agency.

9. Whether the finances required by an implementing agency from a funding agency be a grant-in-aid or loan will depend upon the agency's projection of income and expenditure. If annual projection of excess income over expenditure is such that repayment in instalments is possible, the amount required should be as a loan. However, if the excess of income over expenditure expected is so little that it will not be possible for the agency to repay anything, the amount would obviously have to be a grant.

What is Working Capital NOT

10. Having considered what is working capital and how much it should be, it may be helpful to clarify what working capital is NOT. Non-recurring expenses such as those connected with installation, testing, setting-up, reconditioning of machinery, and the like DO NOT form a component of working capital.

11. While calculating FUNDING requirements for working capital, it is necessary that the implementing agency's own resources e.g. advances receivable, income reserves and credit terms available, should be taken into account and accordingly funding requirement reduced.

MAINTENANCE LOG FOR EQUIPMENT

PREAMBLE

1. This short note is intended to outline the importance and necessity for keeping a log record of all repairs and maintenance carried out on any machine. This aspect needs to be given even more importance for equipment which is transferable from one project to another, as is the case with AFPRO owned equipment lying with several implementing agencies in the field.

Importance & Necessity

2. A maintenance log i.e. a record of repairs and maintenance carried out on a machine, provides information on the mechanical state of the machine at a point of time and may also give a reasonable indication as to when the next repair/overhaul may become due. This may provide a good means for forecasting spare-parts requirement. For example, if during a particular overhaul 0.010" oversize piston rings have been used, the need and time to have the next oversize rings can be easily visualised and arrangements for procuring the same made well in time. One may argue that there is little need to record such information systematically since it can be deduced any way from other records. This can hardly be a convincing argument. Personnel may change from time to time and thus keeping track of "other records" will also vary from person to person. What is more important is from the point of view of equipment transfers, which aspect is briefly mentioned below.

3. When a project's implementing agency declares certain equipment surplus and available for transfer, AFPRO allocates the same to another implementing agency but necessarily this has to be on an "as is where is" basis. The reason for transfer on an "as is where is" basis is because AFPRO has no funds of its own to pay for repairs/overhauls that may be required or the staff to supervise overhauls. This does not mean that AFPRO is unappreciative of the need of the intended recipient project agency requiring funds to repair and overhaul the equipment taken over by it on transfer. If the recipient agency thinks fit to prepare a proposal for funding the repair/overhaul cost, AFPRO can scan and if appropriate and merited, forward the same to a donor agency for consideration of financing the costs in case it is beyond the capacity of the implementing agency to meet the expense out of its own resources.

4. The question that arises is - how to make a reasonable forecast of financial needs for such a repair/overhaul without carrying out extensive stripping in advance. Neither recipient project, nor AFPRO, can be aware of the condition of the equipment and usually records maintained hitherto are often too inadequate to indicate its mechanical condition. The condition of equipment can best be reported on by the holding agency. Very often this agency itself keeps inadequate.record in one place of all the information that it is desirable to know to determine the actual current mechanical condition of equipment. Except for generalised statements when declaring Equipment as surplus remarks are made such as "the machine is in working order" or "the machine required extensive repairs", and very often no particularized details reported.

5. The necessity and importance of keeping a maintenance log can well be appreciated from the above. If a maintenance log could be kept for each piece of equipment regularly, anyone and at any time can form a reasonable idea of its mechanical condition and make a fair forecast of repairs, replacement required etc.

For Discussion

6. Having established the need for maintenance logs, there is perhaps room for discussion as to what type of information should be recorded and in which form. We believe implementing agencies can together provide useful suggestions and arrive at a reasonable standard proforma on which to record maintenance information.

THE PROBLEM OF FAILED WELLS

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Realising the benefits of irrigation, increasing numbers of farmers are applying for wells to be drilled on their lands. Subject to getting suitable guarantees, financing agencies are making funds available for the drilling of wells.

The farmers who get successful wells have irrigation, which they did not have before. Consequently, they can increase their agricultural production, earn more, repay the loans with interest, and also enjoy a better standard of living. Everybody is happy!

But what about the unlucky ones whose wells failed? More often than not, the farmer has obtained a loan from a bank or other financing agency, mortgaging his land, which is probably all he has to his name. When the well drilled for him fails, he is left in the unhappy situation of having no possibility of increased income, but on the other hand, he either has to repay the loan taken and the interest thereon, or loss his land to the financer.

Unfortunately, the cost of drilling does not reduce itself if the well is a failure. (Cost of pipe is not considered, as it is removed in case of failure).

In Karnataka, the State Government subsidises such failed wells to the extent of waiving the total interest plus 20% of the loan amount. In special cases, this 20% can be extended to 50% at the discretion of the Deputy Commissioner. However, since the banks usually finance 80% of the total cost, this subsidy of 20% is equal to 16% of the total cost. In exceptional cases, the banks may finance upto 90% of the total cost, in which case, the Government subsidy works out as 18% of the total cost. This still leaves the owner of a failed well with liability of anywhere from 55 to 40% of the total cost. Obviously, this is a big risk for the farmer, especially, in areas where the percentage of failure is high.

From the above, it is apparent that ways and means have to be found of eliminating, and if that is not possible, of reducing the drilling of failed wells. In case the failure cannot be elimnated altogether, measures have to be taken to reduce the financial burden on the owner of a failed well.

As far as preventing drilling of dry well is concerned, better job of site selection has to be done than has been done so far. To this end, the AFPRO G.I. Teams and the State Groundwater Cells can help. But geophysical surveys etc. also cost money. So if these surveys can help only in reducing the number of failed wells, they do not solve the problem entirely; but give it a different colour. It boils down to finance---------. "How can the financial liability of the owner of a failed well be reduced?"

Why not get the lucky owners of successful wells to pay something towards the cost of failed wells? Since not everyone is a philanthrophist, it may be difficult to get people to pay for the bad luck of someone else. One possible solution is to offer a "guarantee of success" if the site has been selected by the geophysists. In short, the scheme would work like this:

1. Each applicant for a well would have the site selection by the geophysists.

2. If the site is recommended for drilling, the applicant (or the bank, on behalf of the applicant) would pay a certain sum (let us call it 'F') per foot of drilling towards the "guarantee".

3. If the well fails, there would be nothing more for the owner to pay.

4. The Government subsidy for failed wells (let us call this 'G') per foot would be adjusted against the client's loan by the bank.

5. If the well is successful, the client (or the bank, on behalf of the client) would pay the approved drilling charges per ft. (let us call this amount 'DC'), in addition to the amount 'F' per foot (#2 above).

To sum up,

(a) The failures would pay only 'F' per ft.
(b) for failed wells, the Government subsidy would be 'G' per ft.
(c) the owner of successful wells would pay 'F' + 'DC' per ft.
(d) the total cost of the drilling agency would be DC x feet drilled.

To operate on a no-profit-no-loss basis, the economics of this can be reduced to a mathematical formula:

$$DC \times 100 = (F+G)\ \%\text{-age failure} + (DC+F)(100 - \%\text{-age failure})$$

This will reduce to, $$\text{Failure \%-age} = \frac{100\ F}{DC - G}$$

In the above formula, DC (Drilling Charges) will be fixed, G (Government Subsidy) can be considered fixed at 16% of DC for practical purposes. Therefore, 'F' becomes directly proportional to the Failure percentage.

If the Drilling Charges (DC) is fixed at Rs. 40/- per foot, some values of 'F' (financial obligation of owner of failed well) with and without the Government subsidy 'G' of 16% of 'DC' (i.e. Rs. 6/40 per ft.) are shown below:

If 'F' is taken	With 'G' of Rs.6/40 per ft. maximum 'FP' may be	Without 'G' maximum 'FP' may be
Rs. 5/- per ft.	14.88%	12.5%
6/- "	17.86%	15.0%
7/- "	20.83%	17.5%
8/- "	23.81%	20.0%
9/- "	26.76%	22.5%
10/- "	29.76%	25.0%

In case some people feel that 'F' @ Rs. 10/- per ft. is too high for the poorer farmers, please bear it in mind, that in deserving cases the Government subsidy can be increased to 50% of the loan amount, i.e. 40% of the cost.

As such, in the case of a 200 ft. well that has failed.

'F' will be , Rs. 10 x 200	=	Rs. 2,000/-
'G' ordinarily @ 16% = Rs. 6.40 x 200	=	Rs. 1,280/-
Total liability of failure (G+F)	=	Rs. 3,280/-

For poor farmers, 'G' can be 40% = Rs. 16 x 200 = Rs. 3,200/-
So, liability of poor owner of failed ewell is,
Total liability of failure LESS Government subsidy:

i,e. Rs. 3,280/- MINUS Rs. 3,200/- = Rs. 80/- only.

If this scheme is to be made practical, the following are some questions that would need answering:

1. Can owners of failed wells in different areas have different liabilities, or should a uniform rate be made applicable for 'F' for larger areas, say, whole states?

2. If 'F' is kept low and the actual 'FP' exceeds the estimated, how and where will the funds come from to meet the "loss"?

3. (i) If 'FP' is lower than estimated, should the annual surplus be returned to the beneficiaries of the project at the end of the year?

   (ii) If yes, then, to whom should the surplus be returned, the failures or the successful owners or both?

   (iii) If both, then, in what proportion?

4. Should the annual surplus be kept by the financing agency and the benefits of it be offered to the applicants in the subsequent year/s as they have to pay higher costs for drilling, pipes, pumps etc.?

5. Can AFPRO G.I. Teams help to reduce the failure percentage?

6. If AFPRO G.I. Teams are to be used, who will meet their costs?

7. Can the G.I. Teams operate this scheme and meet their operational costs out of the proceeds?

8. Can the interest earned on the deposits of obsolecence reserves paid by the projects be pressed into service for this purpose, and/or be used in any other way to help the poor farmers?

Can this scheme work? If not, how else can we, operating on a no-profit-no-loss basis, help the poorer farmers?

SUMMING UP

Aim And Purpose

(a) The donor agencies, we know, are supporting projects to help the poor farmer. And they believe that it is only this category of farmer that you are helping.

(b) Most WRD projects represented at this Seminar have said that while they accept the Aim, they find it difficult to help the small, unviable man without also working for the viable man, and also doing work for institutions, municipalities, industry and the like. What was not mentioned - because statistics were not available - was the ratio of help between the two categories.

(c) One project, Vadala, thought differently. Because the project holder disagreed at this point with what was recorded in this summing up as his statements, he was asked to put down in writing exactly what he thought he said. His statement appears in the Annexure that follows.

Phasing Out Of Drilling Operations

(a) The Maharashtra Group of projects stated that it believed that WRD projects would have to phase out of drilling operations in government financed programmes.

(b) The Group was uncertain if the projects could carry on drilling unrelated to government financed programmes. This matter was under consideration and the general feeling was that it would take another 6 months to determine the answer. Should it be found that projects had to phase out, the actual phasing out would take them anything between 6 months to 2 years.

Integrated Credit Schemes

It was generally recognised that unless the small farmer was able to obtain credit he really could not be helped by projects. It was also generally agreed that charity was not the answer in a development programme which aimed to develop a man with dignity. In any case there was just not enough money (ex-donors) to cater for the requirements.

The Seminar was also of the opinion that some kind of integrated credit scheme was essential. However, credit or money by itself was of little use if the necessary inputs were not present. All but one project - Vadala - believe that volagencies that worked for poor farmers should involve themselves in some kind of credit scheme. It was felt that this was part of their work. On this account there was some discussion about whether credit schemes should be operated through banks or by projects. Almost all projects supported the former arrangement.

At this point AFPRO explained the nature of some credit schemes encouraged by government and operated by nationalised and land development banks, both categories of which were established to help the small farmer. The principles and the mechanics of these credit systems were broadly mentioned and AFPRO strongly recommended that project got in touch with the local authorities that operated these schemes.

With regard to this AFPRO stressed the need for projects to study some of the useful schemes which other projects were involved in or when helping to operate. The mandatory obligations of the nationalised banks in loan arrangements for the poor farmer were stressed. Also mentioned was the interest taken by some donor agencies; these had contributed the equivalent of 25% of the the total loan requirements because the farmer (the loanee) could not himself provide the amount. This donor contribution was in fact the required collateral against possible bad debt. During this discussion all projects, less one, affirmed the honesty of the Indian farmer and his sincereity in the matter of repayment of loans.

In this connection, AFPRO stated that it was AFPRO's policy to not or assist projects that insisted that they themselves act as bankers. AFPRO would not endorse project requests for money for such purpose. Project holders were not trained as bankers nor had they the staff for the purpose; moreover it would also create all round a bad image if volagencies also assumed the role of the money lender. The normal banking system was within reach and it should be used.

Area Development

The need for community or area development projects was mentioned by Mr. Mangalam of Coimbatore but not really elaborated upon. Mr. Ayyangar said that AWDM was planning a scheme for area development and hoped it would be soon ready. It was mentioned that the Baramati Trust also had a limited area development scheme which was designed to help a group of farmers as opposed to helping individual farmers. The Executive Director

added, that such schemes usually entailed large sums of money and few donors were likely to come forward with the required amount. The Baramati Scheme for instance involved Rs. 30 lakhs.

Groundwater Investigation Teams

All projects were very satisfied with the support given them by the AFPRO G.I. Teams. They added that the incidence of dry wells had been greatly reduced since these teams began operating. The success rate was now between 80 to 85 percent and G.I. Team Leaders felt that it would increase after further experience.

AFPRO mentioned that they had plans to reorganise or rationalise the teams with a view to better performance and greater flexibility. The reasons for rationalisation appeared to be appreciated by the Seminar.

Drought Prone Area Programme

This subject was not one of the Agenda subjects but was introduced by the AFPRO Executive Director.

It was brought to the notice of the Meeting that the Government of India (Ministry of Agriculture) had recently invited coordinating agencies such as AFPRO to attend a conference on the subject. At the Conference the Director of the Drought Prone Areas Programme sought the assistance of volagencies in implementing this programme which was a part of the national development plan. What information was available to AFPRO on the subject was conveyed to the participants. The programmes covered 54 districts and most of them were the districts in which AFPRO related projects worked. On an average 5 - 6 crores of rupees were earmarked for each district over a 5 year period. Government were prepared to support financially and technically the on-going projects of volagencies provided government had approved them.'

All projects agreed in principle to collaborate with government in this programme. AFPRO said it would so inform the Ministry of Agriculture. AFPRO also undertook to send all WRD projects further details.

COMMENTS

by
Raj Kumar Daw
M.M. Water Dev. & Mech. Training,
Vadala

(Extracts)

To help the small farmer with drilling:

(a) We have to work through people and institutions who finance small farmers;

(b) This means contracting work from the institution who help small farmers;

(c) Our experience indicates that we would like in no way to get involved in funding the small farmer. But since it is the small farmer who has to be helped, we feel that we have to work indirectly through banks, government departments, etc.

(d) Most of our past work has been for drinking water supply through the government. We are now exploring possibilities of working for the small farmers through Land Development Bank, sugar factories, rehabilitation people etc.

(e) The drilling rigs involve a lot of chances to be taken for water supply. We feel that we can (and we have been able to) help small farmers with blasting and extension drilling. We have developed this aspect to the extent of trying to take complete well construction work and we have constructed a crane to lift the blasted debris from wells. With this crane (cost about Rs. 25,000/- and made mostly in Vadala) we can construct an open well 5 to 6 times faster than the usual method of lifting debris by bullocks.

(f) Drilling in isolation cannot help a small farmer very much. A number of other inputs and services are required to uplift the small afarmer. So we see ourselves as trying to provide complete agri. services to a farmer. We shall try to:

- locate water by drilling blasting long, hole drilling, complete well construction etc.

- to deliver the water by pumps, irrigation systems etc.

- to use the water effectively by soil conservation land levelling.

We have confirmed ourselves to water and its use, but at some stage we will have to further back to water conservation and we are going forward to soil conservation. The small farmer needs a number of other services apart from just a bore.