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REPORT  
ON  
CHAD WELLS REHABILITATION

Submitted To:  
USAID/CHAD  
U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

CONTRACT NO:  
ASB-0000-C-00-5178-00

Submitted By:  
Development Management Systems, Inc.

December 1986

**DMS**

no. 10, # 1

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The purpose of Contract No. ASB-0000-C-00-5178-00 with Development Management Systems, Inc. was to provide technical assistance to the Office National de l'Hydraulique Pastorale et Villageoise to implement a wells rehabilitation project which would attempt to service and repair up to 135 USAID/Peace Corps wells in the Kanem, Lake and Chari-Baguirmi Prefectures. DMS, Inc. personnel were specifically to provide the following services.

A. PROVISION OF TECHNICAL ASSISTANCE REQUIRED UNDER CONTRACT ASB-0000-C-00-5178-00:

1. Technical Training

- Formation and training of ONHPV wells technicians in the fabrication and production of wells parts,
- Guidance and supervision in the repair, maintenance and replacement of wells,
- Instruction, guidance and supervision of ONHPV technicians in the operation and servicing of drilling rigs assigned to the project.

2. Administration and Management

- Establishment of project financial accounting and bookkeeping, property management, procurement and administrative systems,
- Identification, recruitment and training of local national personnel for performance of the above functions,
- Formulation and implementation of a training plan for the project counterpart to be assigned by ONHPV, overall planning of project implementation and reporting of progress and project activities to the Director of ONHPV.
- In collaboration with other donor agencies or PVOs (such as UNICEF or CARE), as directed by USAID, assist the ONHPV to establish specific plans for the financial or material participation of villagers in future wells repair and

maintenance operations. Such plans will be designed to ensure a continuity of maintenance capability following completion of the technical assistance project.

### 3. Commodity Procurement

- Assist in the preparation of specifications for procurement of wells materials, tools, equipment, spare parts and vehicles,
- Formulate a procurement plan detailing project commodity needs, sources of supply and ordering schedule,
- Assistance in preparation of orders for U.S. source items and local purchase of materials and supplies,
- Receiving, inspection, and storage of all wells commodities.

## B. ACCOMPLISHMENTS UNDER SCOPE OF WORK

### 1. Technical Training

One of the first aspects of training the well technicians was the start of fabrication of pump parts. These parts included the wooden handles and bases, metal support plates and stands and sealing discs for the above-ground pump mechanism.

While many of the still functioning wells were in desperate need of maintenance, the fabrication of pump parts for the rehabilitation of these wells was of primary importance. DMS technicians made drawings of the parts to be fabricated along with precise measurements to be respected. Once we had finished the electrical installation (generator and wiring) and had procured the first set of local-source wells commodities in November 1985, the ONHPV technicians fabricated the first of the pump parts under the close supervision of DMS technicians.

We continued intensive training on the fabrication of pump parts through December 1985 and part of January 1986 until the

nine original ONHPV technicians were deemed capable of fabricating pump parts to the required specifications.

The second aspect of technical training took place in the area of repair, maintenance and the replacement of wells. As soon as the first set of pump parts had been fabricated, a team of ONHPV technicians, headed by a DMS technician, went to the field in order to commence maintenance and repair operations.

Maintenance and repair operations began in November 1985 and continued throughout the life of the project, with the training of the first group of ONHPV technicians being completed by May 1986.

At the same time that training on maintenance and repair was taking place, we prepared the first drilling rig for well replacement training operations. In January 1986, DMS assisted ONHPV to prepare the drilling rig, and training commenced on well replacement in the Chari-Baguirmi Prefecture. Working closely with the DMS Chief of Party, a team of ONHPV technicians moved out to the first work site to commence operations. It should be noted that, although all of the original ONHPV technicians had previous experience installing the Tysen pump and using drilling rigs, this was the first time that this particular drilling rig (Central Mine Equipment) had been used in Chad. Even so, it only took a short time for the ONHPV technicians to renew their skills and learn new techniques in machine drilling.

The last aspect of technical training to be done was the operation and servicing of the vehicles and drilling rigs assigned to the project. We started this training in December of 1985 on the first drilling rig to be placed into operation, the Central Mine Equipment rig. The Central Mine Equipment rig had been purchased for the original 677-0022 project in 1978. The rig, however, did not arrive in Cameroon until the start of hostilities in Chad in 1979. The rig, one of three purchased, was finally delivered to N'Djamena in June of 1985 when the situation was deemed safe enough to allow its reception.

Because the rig had been stored out in the open in Ngaoundéré, Cameroon for some 5 years, there was much work to be done in order to get it into operating condition; and the repair effort lent itself perfectly to an intensive training exercise. We disassembled major components and inspected for rust and deterioration before reassembly and testing. As there were few parts available, parts of all three drilling rigs were used in order to put one rig into service.

After preliminary training on the first rig was completed, we started work on the second drilling rig, a model put out by Mobile Drill that had been purchased under a previous drought relief project in 1974. Because the life of a drilling rig can be quite long (15 to 20 years) when it is properly maintained, the ONHPV Director and the DMS Wells Technician determined that it would be cost effective and advantageous to the project goals to rehabilitate this rig. Additionally, this rig was the only machine available which could be used to replace wells in the Lake and Kanem Prefectures; areas that are notoriously difficult to travel in due to the soft and deep sands found in the area.

Training in the repair of the Mobile Rig was done in the same way as for the Central Mine Equipment rig. Components were broken down, inspected, examined and then remounted and put into operation.

DMS also trained ONHPV personnel on the use and maintenance of these machines, as well as on the use and maintenance of the project vehicles. Checklists of maintenance operations were drawn up to insure the performance of regularly scheduled maintenance operations and were used throughout the life of the project.

When all technical training had been completed with the original nine ONHPV technicians in May of 1986, the ONHPV requested (and USAID approved funding for) the addition of six new trainees to the project in June of 1986. The reason for adding new trainees

was to create a larger pool of trained technicians capable of handling all aspects of well maintenance, repair and installation, as well as fabrication of pump parts and vehicle and drill rig operation, maintenance and repair. Of the six trainees selected at the beginning, five have successfully completed training and can now be considered full-fledged ONHPV technicians.

## 2. Administration and Management

The principal activities under this category were the establishment of project financial accounting/bookkeeping property management, procurement and administrative systems. Project financial accounting and bookkeeping were set up under established DMS, Inc. systems and in accordance with USAID rules and regulations.

Property management was handled through the use of approved receiving and inspection reports, the establishment of an inventory card system that could be handled by the ONHPV technicians, and regular inventory checks.

A procurement system was set up requiring each team leader to be responsible for drawing up a list of materials needed for each operation, obtaining quotes on the materials and then handling the purchases through either cash advances or checks written to cover the cost.

Administrative systems set up include a communications and records system for correspondence, a system for transmission of water well data to the National Water Office and an approved format for technical reporting to ONHPV in French.

Identification, recruitment and training of local national personnel to perform these functions was naturally constrained by ONHPV resources. It was decided to use what personnel

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already existed within the ONHPV ranks to perform these tasks. All financial transactions which took place with ONHPV funds were handled by the chief accountant at ONHPV, who required no training on the part of DMS, Inc. technical assistance personnel. Property management was handled by an administrative assistant hired originally by DMS, Inc. to be picked up at a later date by ONHPV. Although the Administrative Assistant has recently been named Cabinet Director for the Ministry of Mines and Energy, and consequently has left the project, the property management systems are quite basic and are now being handled by the ONHPV project technicians. Local procurement, as mentioned above, is handled by the team leaders themselves, as trained by the DMS, Inc. Chief of Party. Communications record keeping and transmission of water well data to the National Water Office are now handled by the ONHPV counterpart to the project.

In the formulation of a training plan for the project counterpart, we decided to stress administrative duties over technical ones. As the counterpart assigned to the project was already a hydrogeologist, training was started on the logistical and operational planning of the project; i.e., determining where work should progress in which prefecture and assuring the availability of the necessary materials when needed at the different worksites. Although the DMS Inc. Chief of Party was responsible for overall project implementation, he worked closely with the ONHPV counterpart in all aspects of project planning. Reporting was handled on two levels. On one level, a monthly report was done in both English and French for all interested parties and on the other, the ONHPV counterpart did a bi-monthly report in French covering the technical aspects of work performed for ONHPV use.

DMS personnel also drew up specific plans for the possible financial participation of villagers in both future wells maintenance and future wells installation to be performed by

ONHPV. These plans included a detailed cost analysis of both direct and indirect costs involved in well maintenance and installation, which could be collected on a bi-annual basis for maintenance operations. Stocks of spare parts to continue these operations do exist, and could be replenished with the funds collected from the various village participants. For installation of new wells, ONHPV could collect the funds required from the village and place them in a separate account for use as needed in replenishing depleted stocks and for operating expenses.

To help promote a continuation of maintenance and repair activities beyond the present termination date, DMS attempted to coordinate these maintenance efforts with donor agencies such as FAI (Fonds d'Assistance Italien), CARE, UNICEF and FED, of which the prime objective was to identify and establish standard methods of operations for maintenance of all pumps installed under ONHPV auspices. Ideas discussed among different donors included standardization of all pumps being installed, and the extent to which villagers can reasonably be expected to participate in wells projects on either a financial or material level.

We should point out to USAID, however, that we see little likelihood of the ONHPV being able to implement or act upon these plans without the continued intervention of direct expatriate assistance at the management level. A more detailed discussion of this issue is presented in Section D, Summary of this report.

### 3. Commodity Procurement

A large part of the work performed under the contract was dependent upon the ordering and receipt of stocks of wells materials, tools and equipment and the proper vehicles and spare parts to perform well repair and replacement. As delays in ordering and delivery are often a major stumbling block to

project start-up, quotes were requested and all major orders of U.S. source materials were placed before U.S. technical assistance arrived on site.

The next step in the procurement process was to identify suppliers for local source commodities and to arrange schedules for periodic replenishment of these items. Local source items included wood, metal, cement and the nuts and bolts required for pump fabrication. Also included were expendable supplies such as oil, grease, joint compound, etc. As mentioned above, a great deal of responsibility was placed upon the ONHPV technicians to identify sources of supply of these items and to procure them, with the intention of assuring a capability to continue this procurement after the end of the project.

Receiving, inspection and storage was performed for all commodities upon receipt. As a follow-up system, an inventory card system was set up to allow simplified tracking of quantities of material in stock to permit timely replenishment of needed commodities.

#### 4. Wells Rehabilitation Work Performed Under the Contract

Actual well work done under the contract took place in three prefectures: the Lake, the Kanem and the Chari-Baguirmi. At the end of the contract, 160 wells were rehabilitated in the three prefectures. Of this number, 65 were rehabilitated and 95 were reinstalled. These figures represent a 118% completion rate of the original 135 wells to have been rehabilitated under the original contract.

As a result of a the contract extension, the number agreed upon for final rehabilitation was 155. The 160 wells rehabilitated under the project by 31 December, 1986 represent a completion rate of 103% of the new figure of 155 wells.

C. ADDITIONAL ASSISTANCE FURNISHED UNDER CONTRACT NO.

ASB-0000-C-00-5178-00

As mentioned above, the original number of wells to be rehabilitated under the project was set at 135. However, due to decreased commodity costs from quantity discounts, there were enough funds left to increase commodity purchases and extend the contract through 31 December, 1986 at no additional cost.

The increased time allowed under this contract extension permitted three additional outputs from the project. First, the additional time allowed the installation of 25 more wells than originally planned. Secondly, additional well commodities were purchased to provide for future maintenance needs. Thirdly, the extra time allowed for the training of five more ONHPV technicians who will assist in future well drilling/maintenance activities.

D. SUMMARY

The emergency wells activities undertaken by DMS in accordance with the contract scope of work were very successful in accomplishing the immediate objectives of: (1) providing 160 potable water supply points in as short a time span as possible, (2) re-equipping the Chadian ONHPV program with basic tools, equipment and wells parts, and (3) retraining the ONHPV technicians in the necessary technical and operational skills to provide continued wells maintenance and repair activities.

DMS would like to strongly emphasize however, the fact that some form of continued technical assistance is necessary to fully accomplish the long term goal of institutionalizing the Chadian capability to maintain and service these wells, particularly at the management level (see attachment C). While great strides were made at the technical and field level, the ONHPV does not yet have the capability to manage a project of this nature. The original ONHPV project manager counterpart assigned to the

project was reassigned during the course of the project; although he was replaced with a second counterpart, neither one had a strong enough management background or skills whereby he could be reasonably expected to manage the project on his own within the short time period of the project.

DMS made significant efforts to formulate a planning basis for the continuation of wells repair and maintenance activities by the ONHPV. We also made sincere attempts to ascertain the interests of other parties such as UNICEF, CARE, FED, PEACE CORPS, etc., to assist the ONHPV in the management level with future well activities. Unfortunately we were unable to identify any party with sufficient resources or interest in such an undertaking.

While we realize that a significant and costly intervention in the area of water wells by USAID might not be within its financial means or consistent with its long-term development strategy for Chad, we strongly urge USAID to consider some form of continued management assistance to the ONHPV with the hopes that the legacy of this emergency relief project can also contribute to Chad's more long-term development needs.

DMS project activities have met and in many cases exceeded its contract requirements. However, in the hope that our and USAID's efforts will have a lasting impact, we would like to offer any assistance possible in furthering the ultimate goal of institutionalizing the Chadian capability to provide future sources of potable water for its rural population.

CHARI-BAGUIRMI PREFECTURE

VILLAGE	NUMBER OF WELLS	REPAIRED OR REINSTALLED	TO BE REINSTALLED	DATE OF LAST REPAIR OR REINSTALLATION
BARRIERE EAU	1	1	0	10/09/86
MALESI	3	3	0	29/08/86
AMDJAMENA ABAKE	1	1	0	26/08/86
SEIBA	1	1	0	23/08/86
BLABILIM	1	1	0	19/08/86
MISKINE	1	1	0	16/08/86
MARA	2	2	0	02/09/86
AMDJAMENA	2	2	0	08/08/86
GASSI	2	2	0	30/05/86
KLESCOUM	1	1	0	25/05/86
LINIA	4	4	0	21/01/86
SAWS	2	2	0	30/11/86
WALIA	1	1	0	17/04/86
KOUNDOUL	3	3	0	15/04/86
ETENA	2	2	0	08/04/86
DJIMSE	1	1	0	14/01/86
MANDELIA	4	4	0	14/03/86
BATALAY	1	1	0	14/01/86
KOURNARI	1	1	0	31/03/86
MAILAO	2	2	0	15/01/86
KOULAMARA	1	1	0	15/01/86
LOUMIA	6	6	0	16/07/86
KALGOA	3	1	2	15/01/86
GAMBAROU	2	1	1	15/01/86
CAISSA HAROUN	1	1	0	29/03/86
MOGROUM	2	0	2	
GUELENDENG	1	0	1	
BIRBARKA	1	0	1	
MASSAKORY	9	9	0	31/10/86
GUELERIE	1	1	0	21/02/86
KAMEROUM	2	2	0	08/11/86
COQUEVILLE	5	5	0	30/11/86
TOURI	1	0	1	
MABRIO-AKAI	1	1	0	20/05/86
BAKARA	1	1	0	28/05/86
FARCHA	1	1	0	20/12/86
TOTALS	73	66	7	

LAKE PREFECTURE

VILLAGE	NUMBER OF WELLS	REPAIRED OR REINSTALLED	TO BE REINSTALLED	DATE OF LAST REPAIR OR REINSTALLATION
BALADJA	3	3	0	04/05/86
KOULOUDIA	3	3	0	10/05/86
MALLOUM	2	2	0	16/05/86
ALBOUT	2	2	0	20/05/86
N'GOURI	4	4	0	25/05/86
BADERI	3	3	0	26/02/86
YALITA	1	1	0	26/02/86
DJIGIDADA	2	2	0	27/02/86
TOUI	1	1	0	02/06/86
MADIKAMEROUM	1	1	0	02/07/86
MOUN	2	2	0	21/06/86
BOL	14	14	0	27/06/86
MATAFO	4	2	2	24/06/86
MELIA	1	0	1	
N'GUELIA	3	1	2	05/03/86
BROUMTCHOULOUM	1	1	0	05/03/86
NGOLIO	1	0	1	
TCHINGAM	1	1	0	05/03/86
BAGA-SOLA	7	2	5	06/03/86
BERIM	1	1	0	30/06/86
KAYA	1	0	1	
MAYALA	2	0	2	
BAGA-KISKRA	3	2	1	07/03/86
DABOUA	3	3	0	09/03/86
CATAVEROUM	2	2	0	09/03/86
KISKAWA	3	3	0	10/03/86
MAGUI	2	0	2	
LIWA	5	2	3	11/03/86
GUIM	2	1	1	11/03/86
MBOU	1	1	0	12/03/86
GOURTOULA	2	2	0	12/03/86
YUGOU	1	0	1	
MAYAKOURA	1	0	1	
AMEROUM	2	0	2	
TOTALS	87	62	25	

KANEM PREFECTURE

VILLAGE	NUMBER OF WELLS	REPAIRED OR REINSTALLED	TO BE REINSTALLED	DATE OF LAST REINSTALLATION OR REPAIR
MANOU	1	1	0	18/10/86
BELTE	1	1	0	15/10/86
BERCHIDANDAI	1	1	0	03/11/86
RIG-RIG	3	3	0	31/10/86
AMBI	1	1	0	12/10/86
YORO	1	0	1	
AYOULOUM	1	1	0	11/12/86
FEDERKE	1	1	0	08/10/86
FOYO	1	1	0	22/10/86
YOGORO	1	1	0	05/12/86
DIGAFRAYE	1	1	0	08/12/86
KOULOLOUTTI	1	1	0	17/12/86
BOULABIRIM	1	1	0	06/11/86
TALGOU	1	1	0	14/12/86
MOUAL	2	2	0	05/08/86
BESSA	2	2	0	10/08/86
MOTOA	2	2	0	28/05/86
MOURZUGI	2	0	2	
MONDO	2	2	0	20/08/86
LOURI	2	2	0	08/09/86
GELEP-DINGA	2	2	0	24/12/86
ILLILI	2	2	0	28/08/86
SITI-MALERI	1	0	1	
DOKORO	1	1	0	10/09/86
GRANTECI	1	1	0	
UNI	1	1	0	27/12/86
TOTALS	36	32	4	

INVENTORY OF MATERIAL  
TURNED OVER TO ONHPV

Vehicles

4 Toyota pick-ups, model BJ-75  
1 Mercedes truck, model 1113

Office Equipment

4 Desks, local manufacture  
6 Chairs, local manufacture  
1 Electric typewriter, Xerox  
1 Photocopier, Xerox  
1 Air-conditioner, Airwell  
2 Tables, local manufacture

Shop Equipment

3 Tool kits, Snap-On  
3 Sets of pipe tools, Rigid  
2 Grinders, McMaster, Peugeot  
4 Electric drills, Black & Decker, Peugeot

Wells Material

330 meters of 2 pipe  
76 wooden handles  
76 wooden bases  
14 sacks of cement  
150 base plates  
142 sealing discs  
75 bolts  
231 pistons  
109 foot valves  
1368 meters of pump rod  
45 cylinders  
99 screens

# DMS

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Ref. #14-49-86

May 7, 1986

Ms. Nancy McKay  
AFR/PD/SWAP Rm 2733  
U.S. Agency for Int'l Development  
Washington D.C. 20523

Dear Nancy:

I hope that the debriefing I presented the other day was informative and that it will help AID to evaluate the the progress of the project to date.

In response to questions raised at the meeting regarding the future status of the Chad wells program, I would like to summarize my thoughts as follows. The emergency wells rehabilitation efforts have been very successful in accomplishing the immediate objectives of: (1) getting as many wells as possible (70) back into an operational state in as short a time period as possible (5 months of field operations), and (2) re-equipping the Chadian ONHPV program with the basic tools, equipment, and technical skills necessary to recommence wells repair and service operations. I think it is important to point out, however, that a continued technical assistance effort is necessary to fully accomplish the long term objective of institutionalizing the Chadian capability to maintain and service these wells.

The institutionalization of wells repair and maintenance capabilities within the Chadian public or private sector is essential to the long range goal of extending permanent, potable water supplies to Chad's rural population; which is one of the key factors in assisting Chadians to be less susceptible to the effects of droughts and other development constraints. While institutionalization will not be an easy objective to reach, there are a number of concrete steps which could be pursued in the near future with relatively small amounts of technical assistance and at reasonable costs. A preliminary study should be made of the willingness and ability of the target Chadian population to support the costs of ongoing wells servicing operations, and an investigation should be made of the possibilities for privatizing the wells servicing operations, based on the costs of renting or buying the equipment and tooling provided by the project. AID could make use of some of the professional expertise already in Chad by asking the DMS wells technician to explore with VITA different options for

Attachment C, P. 1

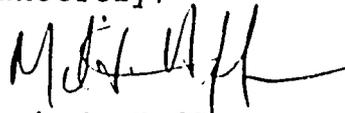
assisting in the establishment of a small business enterprise dedicated to wells repair and maintenance.

Regardless of whether the wells program follows a private or public path, there will be a need for additional technical assistance in the immediate future. The ONHPV staff and organization have made tremendous progress over the last six months; however, as the field technicians improve their technical skills in the operation of equipment and repair of wells, the focus of outside technical assistance should move up the ladder to more management related objectives. If AID and the ONHPV are to achieve the maximum return on the efforts - already expended, they must provide for some additional technical and management assistance during the transition from emergency to development oriented activities.

The idea of the Peace Corps' possible return to Chad, as Yvonne John suggested, could also be an appropriate intervention to meet the wells program's needs. They could combine technical and project management assistance with an ability to determine the most appropriate form of village participation. The Peace Corps would need some initial training, of course, but the costs would be more than justified by the long term benefits derived.

During the remainder of the present wells rehabilitation project, DMS will be concentrating on efforts to establish within the ONHPV essential administrative, logistics, and management systems necessary for the continued operation of the ONHPV wells program. We will also, as much as time allows, attempt to investigate some of the options mentioned in this letter and share our findings with you and the AID Mission in Chad. In the meantime, should you have any comments or questions, or if I can be of any assistance whatsoever, please do not hesitate to contact me.

Sincerely,



Mark J. Heffernan