EVALUATION OF MON/93/005 AND FORMULATION OF A PROJECT FOR WATER AND SANITATION WITH HEALTH EDUCATION FOR POOR RURAL AND PERI-URBAN COMMUNITIES IN MONGOLIA

FOR UNDP/WORLD BANK WATER AND SANITATION PROGRAM
ON BEHALF OF THE
GOVERNMENT OF MONGOLIA

JOHN D. SKODA

1996

Evaluation of MON/93/005 and Formulation of a Project for Water and Sanitation with Health Education for Poor Rural and Peri-Urban Communities in Mongolia

March 18 to April 10, 1996

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Section 1: INTRODUCTION

According to the mission's Terms of Reference (see Annex 1) the project evaluator and the project preparation specialist visited Mongolia in March and April 1996. The project evaluator, John Skoda, was in the country from March 18 to April 10 with his arrival to coincide with the mission of Rick Pollard from RWSG-EAP. The project preparation specialist, Jonathan Hodgkin, arrived on March 22 and remained until April 20. This enabled them to work as a team for the field visits to Gobi Altai aimag, for the susequent meetings in the capital and for the preparation of a preliminary project proposal and budget.

This report contains the findings and observations of the evaluation of project MON/93/005 and recommendations for a new project to begin as soon as possible in the future. As the evaluation was directly concerned with any implications for the next project, these are drawn out under each topic and a summary of the most important ones is given in the last section. More details concerning the activities and budget of the next project are to be found in the draft project document which was developed by the project preparation specialist on the basis of discussions with the evaluator, government counterparts, UNDP and correspondence susequent to the departure of the evaluator. The list of persons met is in Annex 3.

Section 2: BACKGROUND AND CONCEPT

It is essential to keep in mind the great changes and reorganizations that have taken place in the structure of governmental and parastatal organizations. In the process of decentralization and privatization the former big organizations and their equipment have been divided into smaller units. Nevertheless, MON/93/005 project has managed to proceed within this organizational environment. It is impossible to predict precisely how the ongoing reforms will affect the water sector. But past experience shows that coordination and cooperation are possible in this environment when there is a clear objective and there is the good will of those concerned.

The concept for MON/93/005 was to combine training in planning, technology choice and community involvement with health/hygiene education; furthermore, all this was to be coordinated with parallel assistance for hydrological/geophysical studies, construction of drilled wells, installation of handpumps and construction of low-cost latrines. All components were to be integrated as a single program under the guidance of a country project team.

The current Mongolian Water Law came into force on June 1995 and is part of the law on protection of nature and environment. It provides that the central government's State Administrative Organization in charge of Nature and the Environment will have general responsibility for adequate oversight and monitoring of water and its development. Aimag governors have broad responsibility to protect water and to see that the local population has a sanitary water supply for drinking and domestic use. Likewise sum and duureg (urban district) governors have responsibility for safe water supply in their territory and for raising public awareness concerning use of water and protection against contamination. Urban water supplies (centralized water supplies) are considered to be property of the State. Water use is subject to payment of fees. Generally, aimag centers are considered urban; whereas, sum and bag centers are considered rural.

Section 3: INSTITUTIONAL ARRANGEMENTS

The implementing agency was to have been the Mongolia Corporation for Communal Economy and Services (MCCES), however, this organization was split up and the project was given to MONNAA (The State Concern of Municipal Economy) for coordination of implementation. In the course of implementation the project was managed variously by the UNV (for his short time in the post), the part-time National Project Coordinator, with some important inputs from the SWECO team and under the overall supervision of the RWSG-EAP office in Jakarta. While this has enabled the project to achieve considerable success in terms of demonstration, all concerned now agree that the project will need a full-time manager in the next phase. Expansion in the future will be aimed at involving more people and a greater range of options for systems.

It is essential to reduce unit costs during the next phase by increasing productivity and avoiding logistical delays. Therefore all this needs to be taken into account in selecting project staff. Additional locally based staff will also be required both in the project office and possibly in several aimag centers as well. One interesting possibility is the idea of having national UN volunteers. This would be an important advantage as so few foreign staff have any knowledge of the Mongolian language. The mission was informed that it may also be possible to obtain extra-budgetary for national volunteers and this should be pursued. Such staff would be most useful in the more active aimag or sum centers.

As things developed MONNAA coordinated all of the activities of line ministries and parastatal companies involved. Capacity was increased in these units as they received training and equipment. Clearly the Ministry of Health has an increased capacity to produce and field test, health and hygiene education materials. The Ministry of Energy, Geology and Mining, the Institute of Geology and Mineral Resources and staff of the "Tsahuur" Company have benefited from the exposure to the SWECO training.

The capacity of these units could be further increased, if the coordination could be improved, and if adequate tools and equipment are provided. It should be noted that project is paying for the part-time National Project Coordinator and also hires short-term consultants from the other ministries and company units. Although the amount of money spent for this is not large and these units provide valuable services, it would be good to clarify the government counterpart funding and staffing arrangements in the new project document keeping in mind that greater demands will be placed on the staff of these units in the next phase of the program. It also will be necessary to provide some budget for local consultancies. Office, laboratory and workshop space were only marginally adequate in some of these units and may have to be increased in the future.

The mission reviewed the institutional arrangements and carefully considered any alternative arrangements that might improve the coordination and implementation of the future project. The most promising ideas which emerged from discussions of this are as follows:

a) the project office should be in the Ministry of Infrastructure and Development at a level appropriate to the expanded scale of the project; and

b) the project's Steering Committee should include present members plus the Ministry of Food and Agriculture.

The Ministry of Food and Agriculture has long been concerned with rural water supply and still has staff with relevant skills and some suitable equipment at the aimag level. The Ministry of Nature & Environment is presently not as involved as it should be in view of its responsibilities under the Water Law. The mission also noted that the increased demands being placed on all

departments in the next phase require a high level of government coordination and oversight Therefore the National Development Board and the Ministry of Infrastructure and Development need to be most actively involved and represented on the Steering Committee.

Section 4: PROJECT STRATEGY, ACTIVITIES AND OUTPUTS

The project strategy called for combining components from several donors in order to bring the resources to bear on training, technology choice, community involvement, health education and equipment for hySeveral minor components such as formulation of water quality standards and demonstration of appropriate treatment facilities do not appear to have been well defined and were perhaps not feasible. It would be very difficult to operate treatment facilities in rural areas and in urban areas chlorinating facilities already exist. Supply of chemicals to such plants can be difficult and they may wish to consider alternatives (e.g. electrolysis of brine); however, the future project may provide technical literature but material and equipment supply would probably require funding from a separate project. The project may also provide information and advice on water quality standards, but the final responsibility for any changes in these rests with the godrological studies and drilling. Considering the complications involved, this was relatively successful in terms of physical results and very successful in terms of demonstration and building public awareness and demand for handpump water supply systems in rural and peri-urban areas. Nevertheless, closer and more effective management of the components and of procurement/logistics will be needed in order to move beyond the pilot phase towards an expanded and cost-effective program.

The community response to the water supply component is very positive. The handpumps are heavily used during the water collection hours. This positive community attitude has been communicated to local government officials who in turn are pressing water sector officials and decision makers to expand the numbers of handpumps available to poor rural and peri-urban communities. The response to the low-cost sanitation component was not so clear; because most of the people already use pit latrines and as fly screen was generally unavailable, the ventilation pipes/shafts do not stop the entry/exit of flies. The health and hygiene education was eventually accepted and appreciated (see comments below under "Health Education"); however, people felt that should be more closely coordinated and linked in time to the water supply improvement/installation work. On balance the overall community and government response is clearly sufficiently strong to justify be continuation and expansion of the program's activities.

The objectives of increasing interest/policy support among officials for poverty focused water and sanitation development through demonstration of methods and enhanced knowledge of health/hygiene were achieved in large measure through the project activities. The drilling of wells was managed by SWECO in collaboration with "Tsahuur" Company (actually this is a concern of the Ministry of Energy, Geology and Mines). A total of 17 wells were completed and most of these were provided with handpumps. The mission was able to visit most of the wells except those drilled in Deren sum (there were 5 wells in Deren sum, 4 in Yarmag, 4 in Tsogt sum and 4 in Tseel sum). More wells should have been completed, but there were delays in the delivery of the rig and other materials; naturally some bores did not produce the required quality or were dry (at least three such cases).

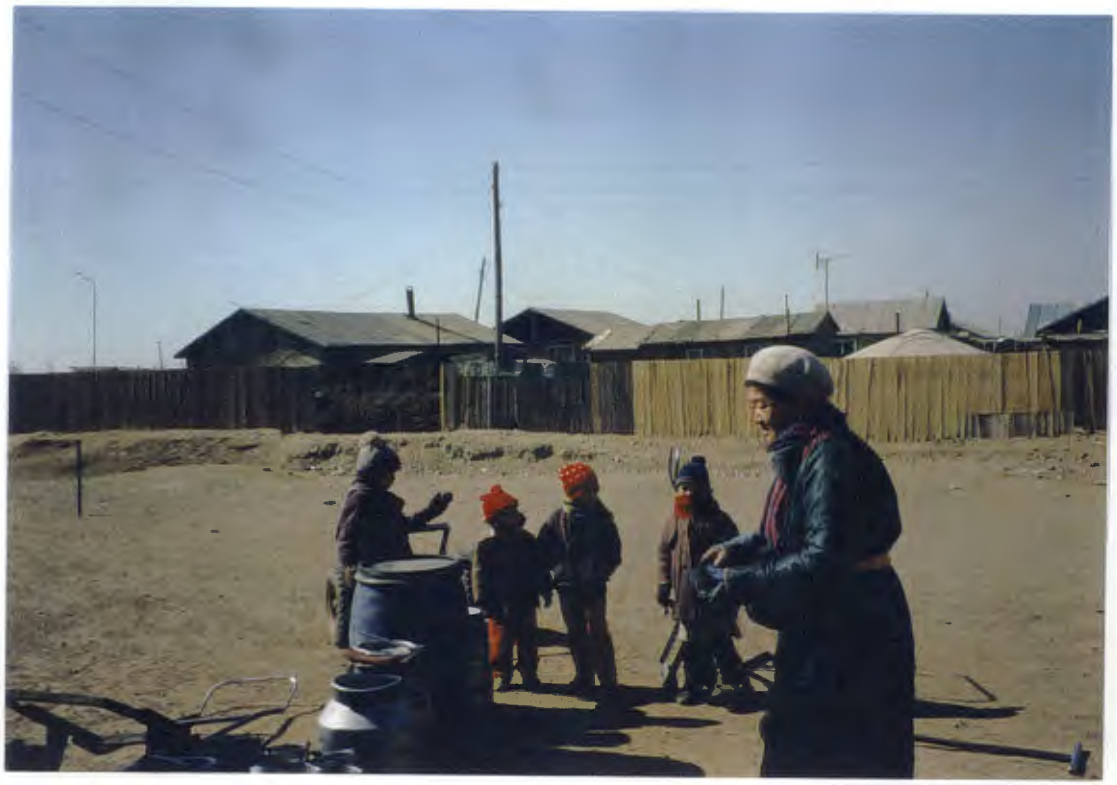
The planned output for sanitation did not give very precise details; however, it would appear that the project did not make significant changes in either the design of latrines or in increased numbers (only a few were built and not all were provided with fly screen for the ventilation pipes). The health/hygiene education, training and workshops were successfully carried out and the methodology was eventually adapted to local understanding. Materials and manuals were produced in the Mongolian language. Unfortunately, logistical and mobilization difficulties made the timing of water supply improvements to be somewhat detached from the public awareness/education work.

Several minor components such as formulation of water quality standards and demonstration of appropriate treatment facilities do not appear to have been well defined and were perhaps not feasible. It would be very difficult to operate treatment facilities in rural areas and in urban areas chlorinating facilities already exist. Supply of chemicals to such plants can be difficult and they may wish to consider alternatives (e.g. electrolysis of brine); however, the future project may provide technical literature but material and equipment supply would probably require funding from a separate project. The project may also provide information and advice on water quality standards, but the final responsibility for any changes in these rests with the government.

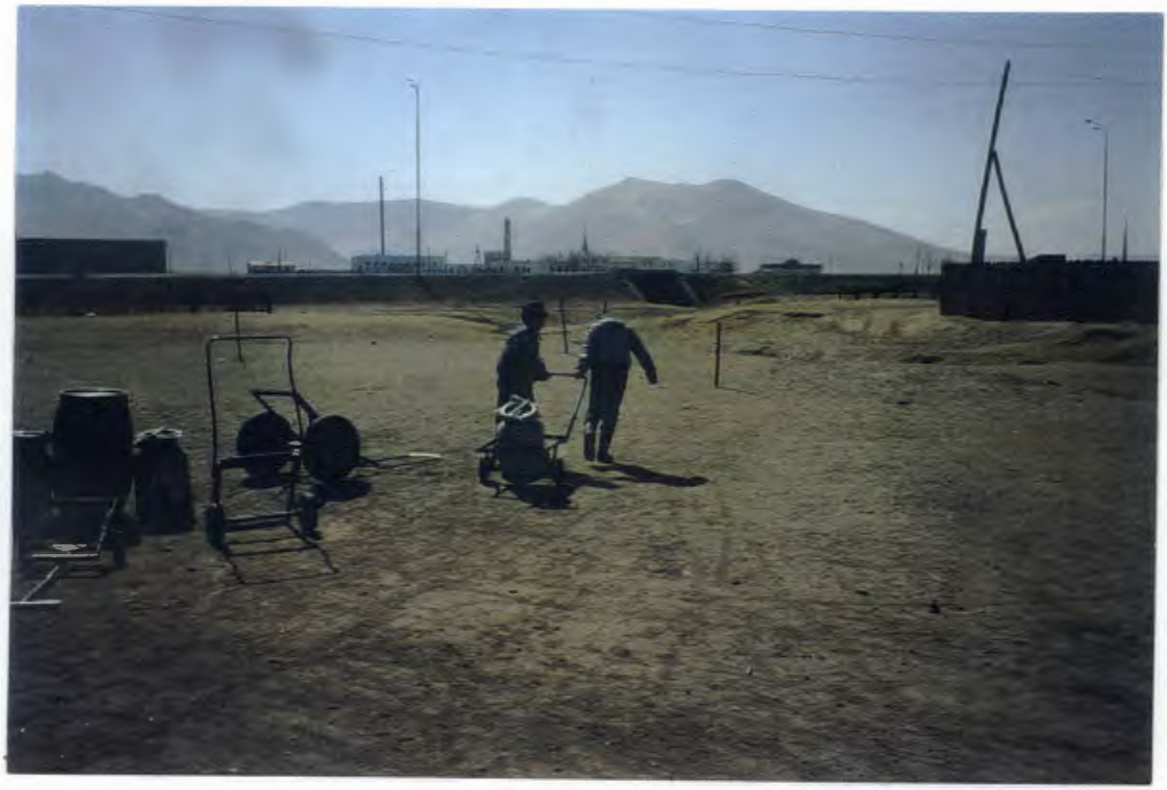
Section 5: FIELD VISITS

Yarmag Ger Area:

Only one of the 4 handpump wells in this area was being operated during the visit. It was very busy with many children coming to collect water in small containers or in 40 liter barrels which fit into small push carts. They are charged Tg. 10 per 40 liter barrel. Some people come by car and carry water away in containers in the trunk. Water delivered by tanker truck to the house costs 60% more (i.e., Tg 16 per 40 liters).



CARETAKER COLLECTING WATER FEES IN YARMAG GER AREA



GOING HOME WITH WATER FROM A HANDPUMP IN YARMAG GER AREA

The caretaker was a woman pensioner. She collects about Tg 17,000 per month. (About 2/3 of the this goes for the caretaker's salary and the balance for the electric light in the pump house and for minor repairs. This handpump installation was modified to raise the pump so that the water containers could fit under the spout. Furthermore a rubber pipe is used to carry the water out of the pump house to the collection area immediately in front.

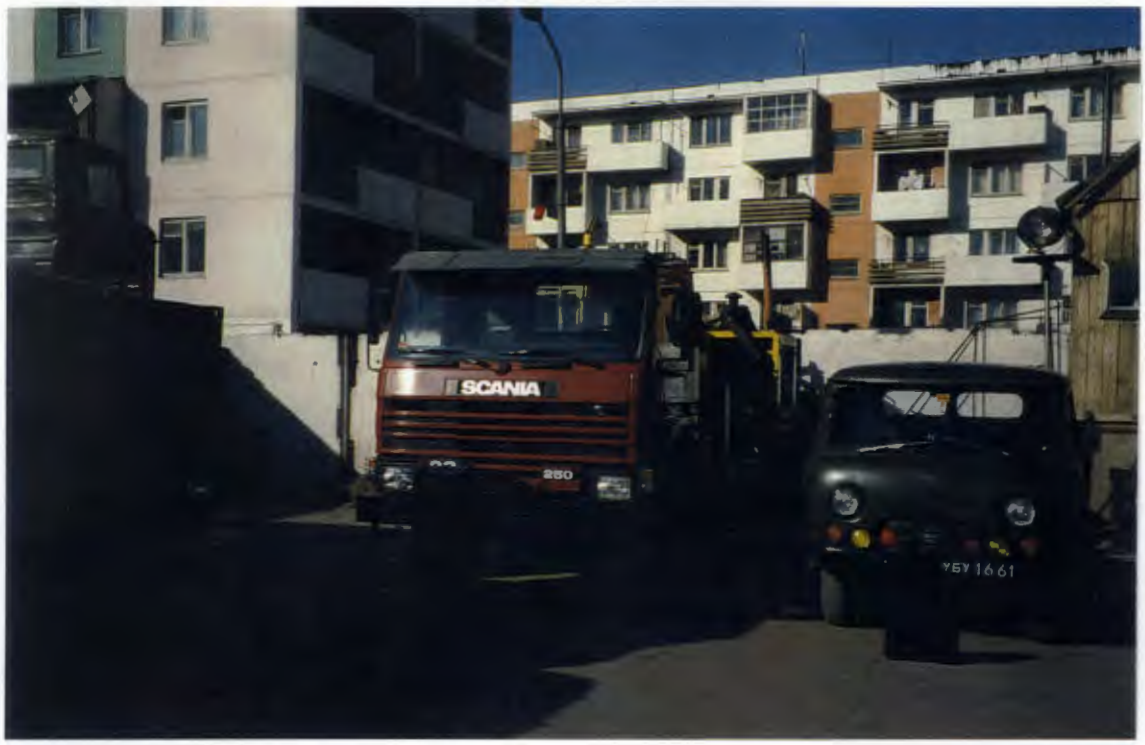
The water table has fallen in the area and so one of the pumps must have its cylinder lowered in order to keep it submerged. Another handpump well is not finished because cold weather prevented the casting of concrete for its base, platform and drainage. The last pump house was locked on the day of the visit.

One household had built a latrine with a vent pipe and they appreciated this feature. They informed that the biggest problem for latrine construction was the escalating prices of timber, metal and cement.

The overall impression was that there is a strong demand for water and sanitation. The project needs to attend to the overall quality and timeliness of construction. Special care is needed to see that handpumps are free of defects, are mounted vertically on proper platform with adequate drainage. The outlet design should be modified to suit the heights of the local containers, otherwise, a standard retrofit outlet and flexible hose could be provided.

Drilling Yard:

The Aquadrill 50 and its trailer mounted compressor were stored in the yard near to a residential area. Although adequate as a storage area (for the pilot project), the access to the yard is by narrow lane and the buildings were small and too low for the rig to enter for maintenance or for repairs requiring the use of an overhead crane. Larger facilities are common in the industrial area of Ulaanbaatar and might be considered if expanded operations are constrained by the present site.



AQUADRILL RIG IN YARD NEAR RESIDENTIAL AREA (ULAANBAATAR)

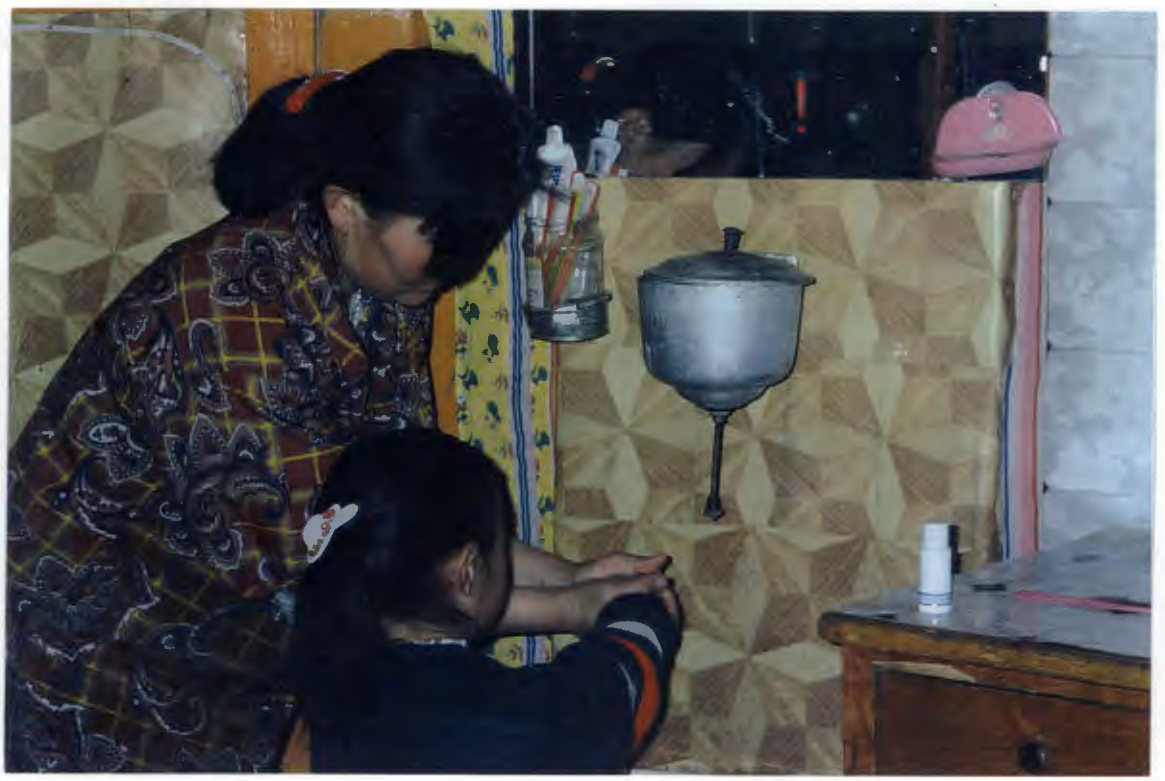
Gobi Altai Aimag:

The provincial government expressed its strong support to the project and requested that if possible, it be extended to include the northwestern area of the aimag (Khukh-morit, Byayan-uul sums) where difficulties have been encountered due to both water quality (hard) and to drilling problems (loose sand and collapsing formations).

Many water-well pumps in the province have gone out of order and the lack of fuel and impossibility to obtain spares for obsolete pumps mean that there is a strong demand for handpumps. There is also a concern that some standard be set to keep pollution (e.g. from latrines) from entering wells. Methods and materials are needed for drilling and well casing/screening which will prevent collapsing and/or entry of sand into the well.

With regard to training the province had sent about 15 people to Deren sum and to the capital for training. They suggested that more training be done in the province as this would be cheaper than sending people elsewhere. They also preferred the training to coincide more closely with the constructions and pump installation work.

In traveling to the project site at Tsogt Sum the mission passed Naran bag and Biger sum. Naran bag has about 30 families and a small school. It gets water from a nearby river. Biger sum has a well with a petrol engine pump which is managed by the local sum committee (similar facilities can be found in several other sums). An artesian well on the road to Biger sum was slowly flowing and freezing.



WATER SAVING DEVICE FOR HAND WASHING IN A GER (TSOGT SUM)

Tsogt Sum:

The first well here was drilled to a depth of 62 meters by the rotary method in sand and gravel near the river. It serves the bath house which is only in use in warmer weather. This well is conveniently located for the bath house and the heating system's boiler, but it is too hard for drinking. Its closeness to the river also makes it subject to pollution.

The second well was drilled to a depth of 64 meters in granite. It is somewhat affected by permafrost. Even though the rising main has a small drain 3 meters below the surface, this handpump still freezes up. The drain to prevent freezing may be functioning properly but water is sometimes freezing in the long outlet hose. The authorities plan to build a pump house to protect the pump and possibly install a stove as well. Despite the frost problem, the water from this well is not as hard as the others and is used by the school and for drinking water. It was drilled by the DTH hammer in hard rock.

The third and fourth wells were drilled to over 100 meters depth in metamorphic rock and give rather hard water. Therefore they tend to be used more for laundry and washing. Despite the depths of these wells most of the pump cylinders are installed at about 27 meter as this is adequate to be submerged for the drawdown associated with the handpump discharge.

The doctor from the local hospital says that hygiene has improved as a result of the projects and the availability of water in the sum center. Soap is available in all the local shops, but some people find it expensive. In some of the Gobi areas people use a salt bush for washing clothes (in the museum it was identified as 'Hochuur' sanguisorba officinalis).

In an open meeting the question of payment for water was discussed. The value of water to the people depends to a large extent on how hard it is. They would be willing to pay for a conveniently located fresh water well, but would not like to contribute in advance for a well to be drilled which might produce undrinkable water. There is no objection to paying for spare parts and, if water quality is good, a regular assessment would be accepted.

Two demonstration latrines were funded by the local sum committee. They did not have black paint or screen for the vent pipes. The project paid for training and accommodation of trainees. The sum center staff echoed the aimag officials in calling for more training to be organized at the local level rather than spending money to take people to distant venues for training.

The people stressed the importance of saving fuel and energy. Clearly the handpump solution is seen and favored as an energy saver. They also stressed that water borne diseases often come in the summer when people leave the sum center and find water for themselves and their animals in the mountains. Therefore, a more comprehensive project would have to deal with development of safe and reliable water points for warm season use.

Tseel Sum:

This sum center was established about 100 years ago on the site of an old monastery. The temperatures range from -30° C in winter to + 25°C in summer. The children of the sum attend school in the center during the winter. Prior to the project only one dug well provided fresh water (even the river is highly mineralized); therefore, water supply was such a problem that they even considered moving the sum center to another location.

CARRYING WATER HOME IN TSEEL SUM

The project drilled 6 wells and installed handpump on 4 of these wells near the sum center. The successful wells ranged from 17 to 32 meters in depth; whereas, the 2 unsuccessful were 60 and 116 meters. The handpumps cylinders were set at depth from 9 to 21 meters. The shallowest well delivers the freshest water and this is preferred for drinking. Another well is marginal in water quality and so its used by some for drinking and some washing. The remaining two wells provide hard water and are mainly used for washing.

Families pay Tg 200 per month for use of the handpumps; however, those who cannot afford this are exempted. The care taker is paid Tg 15,000 per month and the balance of the money is retained for spare parts and repairs.

Pump houses have been built on 3 of the wells, but the 4th one is near the center of the town and used by so many that it was left in the open. During the coldest days of winter (-30°) this pump in the open froze but those with pump house did not. They concluded from this that in general it is best to have a pump house. They also have demarcated an area around the pump which they plan to fence off (to keep cattle out) and to plant trees around it.

As in Tsogt sum, the people in Tseel sum also emphasized that the local economy requires people to move into the mountain to pasture their animals in the summer. They make use of streams and shallow wells. A local water lifting device called "Hovoo" is made from an inner tube and a wooden pole. There is strong interest in cheap low-lift pumps with high discharge for summer use. The sum governor was in Urumchi, China and tried to buy parts for the handpumps but was not able to obtain any. The only spare parts in stock at the sum center are 1 chain and 1 plunger washer.

In total this sum had 21 drilled wells and 55 dug wells. Some of these depended on engines which they now cannot use for lack of fuel and/or spare parts. Water also was taken to outlying areas by 7 tanker trucks (paid for by the cattle cooperative office), but this is now only possible with 1 truck which used only in emergency situations. As a result of all these changes, many drilled wells are not in use, but dug wells are more in use.

The sum built a VIP latrine as part of the project's activities, but the vent did not get screen. Nevertheless the latrine is well kept and ashes are put in the pit to prevent fly breeding. The hospital had good latrines with electric lights and a small latrine kept in good condition for use by children. The major problem for latrine construction is the hard rock at or near the surface. This means they either have to build up the latrine above ground level or excavate rock with tools or explosives

The health officials feel that the project has made a big impact on health and hygiene. The people appreciate the fact that water is available whenever they need it. The water users committee is headed by the doctor and includes 3 woman and 4 men. They have a plan to keep the town clean and to keep drainage or ice from accumulating around pumps. Now that health and hygiene is improving in the sum center, they would like to tackle these problems in some of the bags where there is more hygiene related disease (e.g. Buren Bag and Darestei Bag).

As a result of the MON/93/005 project activities in Tseel sum the local community has undertaken many measures for care of their environment and for the water pumps and latrines. However they still hope to be able to better serve outlying rural areas, plant trees around the perimeter of the water points, increase the number of latrines, increase the their stock of spare parts and, if possible, build a capacity to do simple water quality testing. They hope in the future to find more fresh water and/or be able to treat hard water.

Khaliun Sum:

The mission made an unscheduled stop here to obtain petrol on the way to Gobi Altai. In discussions with the sum governor, the main problem is in keeping the diesel engine running for electricity supply. For water there is a spring about 5 km away, but this freezes in the winter. There is also a borehole near the spring which is used for cattle watering. Drilling near the town would probably be in a loose sand and gravel formation. If a pipeline were to be put down it must be below the frost level. About 200 families live in the sum center for the entire year and some more families come to winter there.

Gobi Altai City:

This aimag center has requested help from Japan for the water supply. It depends on 4 wells located about 7 km from the town. No chlorine is now used but it was provided in the past. The water supply board for the city is in charge of system. A visit was paid to the ger area. Water is delivered by tanker truck once every other day. A typical family gets 80 to 100 liters for 2 days. This costs 40 cents per liter which comes to Tg 16 for the typical 40 liter container. The town's water supply board gets a subsidy from the central government. Without the subsidy they would have to charge about Tg 1.00 per liter (i. e. a 150% increase).

A visit was paid to the Water Development Board in Gobi Altai. This Board used to be under the old Ministry of Water Development and was responsible for all rural water supply and did drilling of irrigation and water supply wells as well as maintains and repairs Now the Board is under the Ministry of Food and Agriculture but their staff has been reduced from 220 to about 30 people. They have several auger rigs capable of augering to a maximum depth of 50 meters. They have trucks but no smaller vehicles. Previously their activities were subsidized by the central government and they also received payment from agricultural cooperatives for their work on water points for cattle and/or irrigation. A few sums still find budget and order the board to drill wells or do repair work.

They have lost touch with the overall state of rural systems; however, they are planning some investigations to define the scope of the problem and state of repair of rural wells. On a national basis the Ministry of Food and Agriculture subsequently suggested that about 5,000 rural wells may be out of order of a total of about 40,000 rural wells or water points. About 50% of the wells are shallow (augered or dug wells) and the rest would be drilled and cased wells. One major problem is that many of the pumps and parts are no longer produced. The Ministry also estimated that about 40 new wells are drilled by their boards (compared to about 800 in former times) and that repairs now number about 80 wells per year (compared to a previous figure of about 2,000 per year).

Organizational Arrangements for Operation and Maintenance:

In the past the maintenance and repair of rural water supplies was done by the Water Development Board from the aimag center. Now the scope of work and resources of these boards has been greatly reduced. Any calls for assistance would entail resources which must be found by either the aimag governor or his counterpart at the sum level. The Water Development Boards no longer have staff at the sum level.

The MON/93/005 project did not involve these boards; therefore, it is not clear what role, if any, they could play in supporting handpump repair. In the event of need for help, a sum governor could contact the aimag governor's office and this message could be relayed to the project office in MONNAA. The future project must consider how best to support operation, maintenance and repair. Clearly the sum centers should be as self-sufficient as possible, but they need to know whether to contact the local aimag or Ulaanbaatar for problems beyond their coping ability. Accordingly, the project must decide on any capacity building inputs to be directed to the aimag and sum levels.

If poor ger area communities at an aimag center are participating in the project's activities, it will be necessary to build operation, maintenance and repair capacity at the aimag level. On the other hand, if only a few outlying sums are participating (and not the aimag center), the project's decentralized capacity building would focus on the sum level.

Health Education:

In discussions of this with participants at the sum level the response received by the mission was that initially the participants were not used to the participatory approach and felt some of the visual aids were simplistic and for people with a lower level of hygiene and sanitation awareness. Apparently this was rectified in later stages of the training. Nevertheless, the mission felt that it would be worth considering in the next project to involve aimag and sum level personal in KAP studies regarding hygiene water and sanitation. Such studies should be rigorous enough so as to guide the following training and implementation activities. It could also be designed to provide feedback on the best means of improving sanitation facilities and their utilization.

Water Quality Monitoring:

Detailed studies were carried out in all of the project areas regarding the chemical composition of the water and the field testing kit was very much appreciated. The results of bacteriological testing were not readily available. In the future project additional portable kits will be needed. All new wells are to be tested for both chemical and bacteriological quality. It is not economical to routinely tests every rural water point; however, tests will be needed whenever questions arise regarding the siting of wells in situations where latrines and/or other sources of pollution appear to be a hazard. The test results will be useful in delineation of a zone of protection around each well and in the design of other protection measures (e.g.. well sealing, pump platforms and drainage channels).

Water Utilization:

Many reports indicate that water utilization is as low as 5-6 liters per capita per day. Where water supply has been improved this goes up to at least 10 liters per capita per day. The mission feels that some of the figures on water usage may be low because some people report drinking water separately from other domestic users such as washing and laundering. In many cases different water points are used for these. For example drinking may be obtained in summer from a spring and washing water from a river or stream. Also in areas where the ground water is hard people may go to a distant well for drinking water but use a closer hard-water well for washing. In winter minor hand and face washing is done with snow. It appears that water utilization increases whenever a convenient freshwater supply is built. Therefore, unless KAP studies indicate a need for promotion of greater water consumption, this may occur naturally. It should be kept in mind that Mongolia is very cold during most of the year and people do not need as much water as in a hot climate. Where fuel is available for heating homes and for hot water, the wintertime use would doubtless increase.

Well Construction:

The new drilling equipment made it possible to complete wells in hard rock within a very short period of time; however, logistical and mobilization problems prevented the equipment from being used to anywhere near its full capacity. It is essential to have firm procedures to ensure adequate sealing of the wells against infiltration of polluted surface water. This can be achieved in the future project by means of provision of training and materials for effective grouting practices and by construction of better platforms and drainage. Where pump houses are provided these should take the improved platform and drainage requirements into account when designing the dimensions of the pump houses.

The mission had several discussions with drilling experts regarding the constructions of wells in sandy formations where the hole tends to collapse during drilling. This might pose a problem in the north-west part of Gobi-Altai aimag (Khukh-morit sum).The general solution is to place the casing as soon as possible and as close to the drilling bit as possible. This requires careful attention by the drilling crew. Although simultaneous casing devices are available in the market, procurement would not be justified unless a large number of wells would need to be drilled in very difficult formations. Special casing is also required when using such devices.

Community Participation/Response:

From the field visits it was evident that there was a very strong and positive response to the project. This was however, slightly modified in the case where the well water was found to be very hard. The mission discussed issues of payment for water collected from the handpumps. Each community was doing it slightly differently. In the ger area of Ulaanbaatar they were

charging Tg 8 to 10 tug for filling 40 liters container at the well. Water delivery to the house by tanker was Tg 16 for 40 liters.

In Tsogt sum each family was supposed to pay but because the water from most wells was considered to be hard and because one caretaker looked after all the handpumps and was already on salary, they did not see the need to pay. However, they are willing to pay for the spare parts when they are needed. In Tseel sum each family pays Tg 200 per month for the use of the handpump in the area; however, those too poor to pay are exempted.

Urban Ger Areas:

There is a great demand for these areas to be served by handpumps; however, many of these areas will eventually be covered by the expansion of urban piped water systems. For example, the IBRD Urban Services Project for Ulaanbaatar is planning to provide piped water supply to kiosks in most ger areas of the capital. Some these areas will not be reached by the planned pipe system; therefore, supply by either handpump or tanker truck could be investigated (these areas include Bayanzurkh, Amgalan, Tsagaankhuaran, Ulaankhuaran, Uliastai, 100 Ail, 6 Buudal, 21st Apartment). The AsDB has signed an aid-memoir concerning upgrading of services in three aimags of the western region (Bayan-Ulgii, Khovd and Uvs aimag centers). Japan has been requested to assist Gobi-Altai city with water supply for the town and its ger areas. There may be delays in planning and implementing of these proposed projects; furthermore, some of these may not come to fruition. Therefore, the future project may have to cater for areas not covered by these other programs and fill gaps that appear when definitive urban projects are ready.

Section 6: DRILLING, FACILITIES AND EQUIPMENT

Much of the equipment came through the SWECO managed BITS component. The report of SWECO team visit of April 22 to May 22 contains many valuable lessons. The findings and recommendations of the mission on these and other inputs are given below.

Steel pipe has been used throughout for well casing. The screens are made of perforated steel pipe which is then wound with wire. Aggressive ground water has not been a problem in water wells and this is understood to be due to the frequent occurrence of relatively hard water, the neutral or higher pH and the low ambient temperatures. However good quality casing pipe and screens must be imported for the future project. Adequate storage space must be provided to stockpile such inputs. There are good reasons to consider using PVC casing and screening below the frost line (say below 12 meters); this could save about 60% on costs and PVC will not corrode.

The Aquadrill (model 50) was more than adequate to the tasks; however, there have been some problems with the mounting of the compressor on a trailer which was not ideal for the road and off-road travel required. It appears that the trailer was jolting rather sharply up and down behind the truck and some damage was caused to its load. The project wants to have a two-truck arrangement and proposes to procure a truck made in Russia for this purpose (even a used truck might be adequate, if in good enough condition). A water tanker truck was also requested for the project; however, this would be needed for drilling by the mud-rotary method and the local contractors can arrange for this. The Aquadrill 50 should be programmed to concentrate on drilling in hard rock by the use of the down-the-hole (DTH) hammer. If any further rig procurement is done, it is recommended that this be a lighter rig with a single-truck arrangement.

Office, laboratory, storage and workshop space will need to be reviewed in as the next phase gets under way. Some of these facilities are only marginally adequate at present. When

more staff and equipment come, there will have to be adjustments. Additional covered workshop space and storage for casing, screening, handpumps, etc. will be required.

The office equipment provided in the first phase was only marginally adequate at best. No photocopier was provided. The next phase should plan to provide updated computer, printer and photocopier. Another point to note is that it is necessary to involve several offices which can not easily share equipment (e.g. Ministry of Energy, Geology and Mining, Geologic Institute, Drilling Company etc.). It is also necessary to have extra copies of manuals and parts catalogues for all electrical and mechanical equipment (with a master copy in the project office).

Section 7: HANDPUMP ISSUES

The mission noted the reports that there had been some lack of consistent quality in some of the handpumps imported from Urumchi. The project should arrange for qualified inspection such as that of the Crown Agents. The project has also experienced difficulties in communicating with the factory at Urumchi. During the course of the field visits several officials mentioned their attempts to procure from the factory, but even the expense and time of personal visits has not resulted in successful procurement. It is recommended that in the future batches of at least 50 pumps be procured and shipped to Mongolia in container loads.

At the present time (April 1996) India Mark III pumps would cost US$ 250 per pump set CIF Tianjan, China based on a container load of 50 pumps each complete with 21 meters of 65mm rising main pipe, 21 meters of connecting rods (both pipe and rod coming in 3 meter lengths) and seamless couplers. In comparison the equivalent handpumps FOB Urumchi, China cost US$394 per pump (when delivered to the border south of Gobi Altai the cost is more than US$ 500 per pump). One should add about 5 per cent for the cost of inspection, and the cost of shipping the container load by rail from Tianjan or Urumchi to Ulaanbaatar must also be added. As the project could save as much as US$ 10,000 per container load of pumps from India, it is worth serious consideration as a source of supply in the next phase.

The need for a higher and longer outlet pipe, to suit the size of water containers in use, has been noted. The project needs to make the threaded connections, as recommended by SWECO, or specify this when ordering pumps. The procurement of quick release hoses (as used in irrigation systems) in sufficient quantity for all of the installations should also be considered.

There is a strong desire to produce pumps in the country because of logistical and procurement difficulties with imported pumps. There have also been problems with motorized pumps which are no longer in production and thus impossible to supply with parts. Nevertheless it has been more economical for the project to import and stock spares and this will continue to be the case in the future. There should be no reason to discourage local production of fast-moving spares such as plunger seals provided they are up to the required standard and that this is not too costly to the project.

The project provided only deep-well handpumps and this was appropriate for most of the wells encountered (a couple of the wells in Tseel Sum had still water levels of about 5 meters down). In the next phase there is a desire on the part of UNDP to respond to the obvious demand for assistance in shallow and dug-well areas for a safe and convenient way to pump water for drinking and other domestic uses. The next phase of the project should consider this with a view of making this one of the available options to poor communities and vulnerable groups. However this would have to have a trial phase in which tests are conducted to see what is best suited. If a simple enough pump is chosen and if demand is high enough, this might be given further consideration for local production or assembly of components. A visit was paid to the "URAN" company in Ulaanbaatar which is a concern of the Ministry of Food and Agriculture. They have made low-

lift chain pumps, a shallow well suction pump, wind generators and have the capacity and interest to assist in trying out and adapting shallow well designs to suit local conditions.

The question of pump houses was the subject of discussion in the sum centers in Gobi Altai aimag visited by the mission. The Deputy Governor of the aimag was strongly in favor of each pump being protected in this way from th elements and from misuse or damage. In Tseel sum the local authorities conducted an experiment by building pump houses for three of their four pumps. They found that there was less problem of freezing in those handpumps enclosed in a small house; furthermore, in case of freezing it is much easier to warm up the enclosed pumps and one pump house had a stove built in it for this.

Although the construction of pump houses need not be mandatory, the project needs to develop minimum standards for door and ceiling heights. As noted by SWECO, a shutter in the roof is needed to allow lifting of rising main pipe and rods. Construction of the floor should also not be allowed to damage the well platform, drainage or the sanitary seal around the well casing. Local variations will occur in terms of building materials and the option of no pump house at all should also remain. The project must insist that the pumps are accessible for most daylight hours; however, some local discretion regarding the degree of security and the duties/rewards for caretakers must be allowed.

The quality and timeliness of handpump installation and platform construction may require extra attention. One pump under installation in a ger area was not installed vertically and pumps have been installed without complete platforms and drains. There will have to be good training and support given to installation crews so that they can do a good job and keep up with the increased work proposed for the next phase.

Section 8: GEOPHYSICAL INPUTS

SWECO supplied two types. The local staff prefer the electrical resistivity type (Slingram) to the WADI. However, as work is done in various parts of country and different teams need the equipment from time to time; it will be better if they have at least three resistivity sets so that work at several sites can go on at the same time. In the new project work will be needed in several aimags, it would also be good to have several sets of water level measuring equipment. Staff from units working with the equipment should have a brief training which could be organized locally.

The WADI is not in use because of the inadequate very low frequency (VLF) signal; it is understood to have been returned to Sweden. The resistivity equipment seems to be appropriate but needs to be shared by too many units. The low level of computer capacity in these units creates a big constraint to data analysis and timely reporting of hydrogeological results. Most of the staff doing this work have many other duties, but if the work increases in the next phase, this will require more geophysical and hydrogeological input. (See photo of VIP latrine in Harmang Ger Area next page.)

Section 9: SANITATION AND PERMAFROST

Very few latrines were built (only about 2 in each location) during the field visits we found that most of these had no fly screens. It appears that there were no materials inputs from the project for latrine construction. In the future project consideration should be given to supplying at least the fly screen. This would enable the vent to function properly. Although flies are not a problem during cold weather, they are a big problem in many areas during the summer.

VIP LATRINE IN YARMAG GER AREA

The future project should also try to develop light weight floor slabs which are also easy to clean. The project should liaze with others in the country such as the Urban Services Rehabilitation Project on this issue. During the field visits we noticed that several schools and hospitals had built small scale latrines for children and this should be encouraged because they are safer and more convenient for small children. In hard rock areas the project can try a design which is raised with alternating twin pits.

In the areas visited permafrost was not causing a problem in the demonstration latrines. Nevertheless permafrost imposes restrictions on the depth of the pits both because of the difficulties in excavation of frozen material and because the low temperature will delay or prevent the decomposition of the wastes. Therefore the pits need to be shallower and changed more frequently (alternating twin pit latrines may be considered especially for use by larger families or by institutions). Better ventilation will also allow the temperature in the pits to rise faster during warm weather and thus enhance the normal process of decomposition.

In other parts of the world (e.g. Alaska) sanitation in permafrost areas is handled in several ways such as: a conservancy method (using plastic or metal containers and trucks) or by insulating conventional sewer pipes from the cold ground (plus the provision of heating/ventilation to control freezing). None of these methods appear to be appropriate for this project; however, they may have some application in one of the urban rehabilitation projects. Therefore it may be of interest to obtain further details of the methods and materials being utilized for storing, transporting and treating wastes in other permafrost affected urban and peri-urban areas. The problem also impacts on water supply pipelines and requires selection of materials to withstand freezing and may require special equipment to place pipes below the permafrost (e.g. by jacking or horizontal boring)

Section 10: FUTURE PROJECT

Strategy:

The pilot project has created awareness of the need for improved hygiene coupled with water supply and sanitation . It has demonstrated success in raising awareness through its health education and training activities. The wells in hard rock and the handpumps installed have convinced decision makers that this is a viable low-cost solution. The combination of all this appears to be capable of generating behavioral change and an increased usage of water.

The new project can build on this strategy both by taking it to new areas and expanding into areas near the pilot project. The use of knowledge, attitude and practice (KAP) studies and technical adaptations in areas of spring or shallow ground water will be the means of dealing with different climate and cultural condition that will be encountered in the future project. As a matter of policy the project will seek to build capacity at the sum (and in some cases aimag) level to fully participate in planning, building, operating and maintaining their own water, sanitation and training systems. The project can also assist local production of cup leathers and any other fast moving spares that can be produced with available materials and skills. The project will build capacity of the central authorities to more efficiently coordinate inputs of materials and services needed to support an expanding program.

This project can take advantage of the interest and enthusiasm generated by the previous project. The project needs a full-time manager with adequate authority to coordinate the inputs of the various ministries and company units as well as to overcome the logistic and procurement problems noted in the first project. The project has an opportunity to use the information from the Poverty Alleviation Program to identify vulnerable groups needing water; furthermore, a water window can be opened in the PAP which already has a public works component provided

wherever the community select this as their top priority. Collaboration with UNICEF on methods and results of the KAP studies would be advantageous wherever they are working in the same/similar aimags (possibly in Khentii and Dund-gobi).

Another advantage of the KAP studies is that this will serve to design the most appropriate health education and water and sanitation inputs. The future project can benefit people in various situations much better if it can offer a wider range of options (e.g. shallow wells, new boreholes with handpumps, handpumps as replacement for defunct engine pumps, spring protection and appropriate sanitation design/incentives). There is considerable capacity in the health units at the sum and higher levels to undertake such work and this can be engaged in the next phase particularly where the project enters new areas.

An important factor to keep in mind concerning Mongolia is that the economic changes taking place have resulted in increases in the numbers of poor and vulnerable people in the country. This is more pronounced in the rural areas and near rural sum/bag centers. Several projects are being prepared for improving urban water and sanitation services including peri-urban ger areas (e.g. IBRD in Ulaanbaatar; AsDB in three western region aimag centers - namely Bayan-Ulgii, Hovgsol-Moron, Khovd and Uvs; and Japan in Gobi-Altai aimag center); however, there will still be some ger areas which cannot be served from the extended urban systems. Also some of these urban services projects may suffer delays or not proceed to fruition. Therefore the future project should have some capacity assist to in such areas.

Action Plan:

The future project can plan to provide about 50 new or upgraded handpump wells per year. There is clearly demand for this in the country However the project cannot respond to all the increased demand at once. Therefore it will limit itself to the existing aimags and bring only one new aimag per year (or at most two aimags per year). These new areas will be the focus of KAP studies to determine the needs and the best methods of assisting with health education, water supply and sanitation. Various latrine construction materials for vent screens, floor plates, etc. will also be tried in order to find more convenient, economical and popular product for wider promotion and use.

In order to make the most of the project's drilling capacity, as many as possible of the new wells should be in hard rock areas. Where new wells are needed in loose formations, the rotary drilling rig companies in the country can be contracted to drill such wells. Where drilled wells already exist, but lack pumps or engines, the project can install its deep-well handpumps. For planning purposes, the project may drill 20 to 30 new wells per year in hard rock, 5 to 10 new wells through rotary drilling contracts and the balance would be handpumps installed on existing drilled wells. In addition to this, some adaptation/experimentation will be done with shallow well handpumps on dug wells or shallow bores; these may number 5 or 10 but could be increased if economical and in demand. A few spring improvements and protections may also be attempted along with short delivery lines.

Because of logistical problem encountered in the previous project, the new project will seek to procure as many handpumps well casings, screens, drilling spares and expendables as possible by container load for delivery by rail. Computing, geophysical and laboratory equipment will be ordered in lots for delivery by air freight.

Future Coverage:

An important factor to keep in mind concerning Mongolia is that the economic changes taking place have resulted in increases in the numbers of poor and vulnerable people in the country. This is more pronounced in the rural areas and near rural sum/bag centers. Several

projects are being prepared for improving urban water and sanitation services including peri-urban ger areas (e.g. IBRD in Ulaanbaatar; AsDB in three western region aimag centers - namely Bayan-Ulgii, Hovgsol-Moron, Khovd and Uvs; and Japan in Gobi-Altai aimag center); however, there will still be some ger areas which cannot be served from the extended urban systems. Also some of these urban services projects may suffer delays or not proceed to fruition. Therefore the future project should have some capacity assist to in such areas.

There were logistic and procurement problems noted in the first phase. Availability of essential components for an improved design and appropriate social marketing will serve to stimulate improved sanitation. The project has an opportunity to use the information from the Poverty Alleviation Program to identify vulnerable groups needing water, sanitation and health education; furthermore, a window can be opened in the PAP for this purpose. Another point to note is that the project has the best equipment for drilling in hard rock; therefore, as much as 40% to 50% of the sites should be in such areas (other formations would be drilled by the available mud rotary or auger rigs and there may also be some dug wells).

The project must continue to provide support to those aimags (Dund-gobi and Gobi-Altai) and sums involving in the first phase. Furthermore, there are other sums in these aimags which require assistance (e.g. Khukh-morit, Bayan-uul and Khaliun sum in Gobi-Altai aimag). During the course of the next three years it should be possible to work in additional 3-5 aimags (Khentii, Sukhbaatar and Tuv have been mentioned along with the two previous ones). Clearly Sukhbaatar aimag in the south-east is in a water scarce area where poor people face considerable difficulty in obtaining safe water and consequently suffer from health problems associated with lack of water/proper hygiene. Khentii aimag is in the north-east and has been selected by UNICEF for an intensive program of immunization, CDD, ARI, nutrition, safe motherhood and health infrastructure (they will be also doing similar work in Dund-gobi, Dorn-gobi, Uvurkhangai, Bulgan and Selenge aimags).

The project could provide about 50 deep well handpumps per year. It is harder the number of shallow well handpumps and spring protections because these components would be the subject of adaptation/experimentation; however, the project can procure 3 to 4 different types of shallow well pumps. The decision on which design to use and a number of suitable sites could be taken during the first year. The number of handpumps mentioned above assumes that some of the wells will be drilled by other equipment already in the country. There are many engine pump installations where spare parts are not even made anymore.

Drilling Costs in Difficult Areas:

The mission met with the "ASMAT" Company in Gobi-Altai to discuss their experience in the aimag and to consider what could be required if the project were to engage such a company to drill in Khukh-morit and Bayan-uul sums. Assuming that the wells would be 60 to 80 m in depth, an approximate cost or about US$7,000 per well was estimated. This is based on the use of mud-rotary drilling equipment which they have in the aimag center. Fuel cost is 18% of the total, transport is 9%, and the rest of the cost is for salaries and expendable bits, pipe, drilling mud, etc. The company also has a competent hydrogeologist who could be engaged, if necessary, for specific investigations. The cost for drilling in hard rock areas where fresh water is closer to the surface could be as low as US$2,000 per well. Shallow dug-wells could be much less.

The question of coping with the problems of collapsing formations was raised. The main solution to this is to place casing as close as possible to the drilling bit. This is accomplished in several ways. In conventional drilling the practice of quickly sequencing drilling and the placement of casing (known as drill and drive) has been effective in gravel and boulder formations. Several simultaneous casing devices are available on the market. Some casing

drivers hammer and vibrate the casing from the top. Other devices such as ODEX drive from down the hole by means of a special bit and drive shoe. This requires that the casing be of the right dimensions and fine tolerances as well as being seamless.

Study Tour:

The proposed study tour to India should be planned to be as comprehensive as possible. It could cover all aspects of community management of rural water supply and sanitation. The community role in planning, construction, operation and maintenance would be demonstrated and explained. Other aspects of interest would include health education, site investigation, drilling techniques and local production of pumps and equipment. Procurement procedures, quality control and inspection should also be covered. A small group of three or four professionals closely involved with the project should be selected to go on this tour. The timing must be in fall or winter (i.e. from mid September to mid April); otherwise, it would be inconvenient for both the hosts and the participants if this were attempted during the monsoon or during the late April budget period. During the study tour the group can explore the possibility of using resource persons from India to lead training courses in Mongolia on particular subjects (e.g. community management of projects, health education, geophysical investigation, drilling techniques, etc.). This would be cost effective for topics for which many more participants would benefit than can be afforded in an external course or tour.

RECOMMENDATIONS FOR THE FUTURE PROJECT

1. The project needs to located at an appropriated high level within the implementing agency (e.g. within the Deputy minister's Office in the Ministry of Infrastructure and Development) and also given due high consideration by the National Development Board and the Project Steering Committee.

2. The project needs a full-time manager with requisite language skills and knowledge of UN procedures and regulations; the counterpart staffing will have increased demands placed on their time as the activities accelerate.

3. The project will also need: a UNV and/or an associate expert, if possible about three national UNVs (for work in the most active aimags), an administrative assistant, a secretary, and a driver (as well as short-term consultants, trainers, etc.); additional counterpart staff will also be needed.

4. The project will need an office of several rooms with up-to-date communications and other office equipment (computers, printer, copier, etc.).

5. The organizational and staffing arrangements for counterpart staff funded by the government, need to be clarified as those written into the previous project document appear to have changed considerably.

6. The project will endeavor to provide a greater range of technical options than in the past and involve a variety of poor/vulnerable communities.

7. Two important sector institutions which should be fully informed and involved in the project's oversight are the Ministry of Nature & Environment and the Ministry of Food and Agriculture.

8. Capacity for maintenance and repair of water supply systems needs to be built at the sum level (and in some cases at the aimag centers).

9. Additional water testing equipment is needed for use by health and hydrogeological staff both in the laboratory and in the field; training may need to be organized for this and adequate laboratory facilities provided by units concerned.

10. Studies on KAP involving local health staff (and in collaboration with others doing similar work, such as UNICEF) will be used as needed to define heath education and other related project inputs.

11. Effective grouting and sealing of wells should be taught and practiced in all the project's wells whether in rural or urban ger areas and whether drilled by the project's rig or by others (e.g. by contractor).

12. In urban areas the project must liaze closely with other projects dealing with upgrading of urban services to avoid gaps or overlapping and to keep abreast of technical developments, standards, etc.

13. Adequate quantities of handpumps, casing, screening and other supplies must be procured in advance of field activities and properly stored and accounted (this will require more space than presently allotted).

14. Procurement of handpumps requires proper inspection (preferably by Crown Agents as they have staff familiar with the pumps being used by the project) and India may also be considered as a source of supply because it has a well established and competitive industry (to keep unit costs low orders should be for container loads of about 50 pumps each).

15. Modifications to the handpump outlet, to suit local water container dimensions, will have to be made by retrofits or negotiated with the supplier (Arun Mudgal may be able to advise and assist in this matter).

16. Adding of technical options such as shallow wells, spring protections and other low cost designs for water and sanitation is needed but will require some adaptation and experimentation to find satisfactory solutions.

17. Additional equipment for obtaining and analyzing geophysical and hydrogeological data will be needed; and all such equipment (as well as all mechanical equipment) should be ordered with enough operation manuals and parts lists so that each main user has a set and the project has a master set.

18. The project needs to continue to work in the two present aimags and plan to work in about 3 to 5 additional ones (e.g. Khentii, Sukhbaatar, Tuv and possibly others).

19. The increased number of handpump water points in the new project will put increased demands on the handpump installation crews; therefore, their training and supervision/support will be crucial to the success of the project.

20. Training and study tours need to focus on operational staff; in order to involve as many as possible, it will be necessary to keep costs down and carry out most of this in-country or even at aimag/sum level.

21. The project needs to review standards and/or guidelines for the water points and sanitation it is promoting; furthermore, it should assist the professionals in government working on issues such as water quality standards by providing advice and relevant reference materials.

Annex 1: Terms of Reference

This assignment is being undertaken with two linked objectives in mind ; (I to carry out a strategic evaluation of Project MON/93/005 in order to provide input and direction for preparing the new project document, and; ii) to prepare, with participation of key Mongolian and ESA stakeholders a complete draft project document for the second water supply and sanitation project for the poor in ger settlements. The assignment will be undertaken be a team of two consultants, preferably in March, and no later than April, 1996, for each of whom specific terms of reference are outlined below:

Duration of assignment - 3 weeks

Scope of work - The evaluator will have lead responsibility for assessing the technical and logistical aspects of project MON/93/005, giving particular attention to the lessons learned and described in the consultants' reports prepared for the most recent Project Triparite Review that was held in October, 1995. The evaluation will entail the following activities:

Comprehensive review of all project reports and related documentation, with particular attention to hydrological and geophysical investigations and methodologies used, technical training and institutional capacity development, well drilling and hand pump instlation construction of sanitation facilities, equipment procurement, and any other issues that are relevant to the design of the second project. In particular, attention will be given to implications with regard to project design of different drilling methods that are needed for hard crystalline and sedimentary strata;

Interview and work closely with Government and MON/93/005 staff in assessing the technical aspects of the project;

Field visits to the MON/93/005 sites in Altai Region in order to assess what has been most and least successful and also to possible areas for implementing the second project in rural areas;

Field visits to peri-urban project locations near to Ulaanbaatar for a similar, comparative assessment;

In close collaboration with Mongolian Govt. counterpartrs, identify and prioritize coverage, technical skills developmment, and procurement objectives for the second project;

Draft a strategy and action plan, including inputs required and a budget, for meeting these objectives within the proposed three year duration of the second project.

Annex 2

LIST OF PERSONS MET BY THE MISSION

Government of Mongolia

Ms. Tsegmed Davaadulam, Senior Expert, Cabinet Secretariat, Government of Mongolia

National Development Board

Mr. Chimeddorjiin Ganzorig, Director General, Department of Economic Cooperation
Ms. Damba Baasankhuu, officer, Department of Economic Cooperation
Mr. Ganbold, Director General, Department of Macro Economy Policy
Mr. T. Naranmandakh, Expert, Department of Technology and Investment

Ministry of Infrastructure and Development

Mr. Shagdar Sonomdagva, Head, Department of Economic Cooperation Department
Mr. Dondovin Munkhbaatar, Senior Engineer, Department of Architecture, Urban Development, Housing and Public Services
Ms. Bayarmaa, officer, Department of Economic Cooperation

Ministry of Energy, Geology and Mining

Mr. Oidovyn Chuluun, Director General, Department of Geology
Mr. Dashiin Bat-Erdene, Senior Geologist, Department of Geology
Mr. Urtnasan Borchuluun, Senior Hydrogeologist, Department of Geology
Mr. Enkhamgalan. Director, Tsahuur company
Mr. Adiya, Hydrogeologist, Tsahuur company
Ms. Battugs. Drilling Engineer, Tsahuur company
Mr. Namjilin Jadambaa, Director, Institute of Geology and Mineral Resources

Ministry of Health

Mr. Galsan Dashzeveg, Deputy Minister, Associat Professor M.D, Ph. D
Dr. Ts. Sodnompil, Director, Department of Public Health
Dr. Nagnain Saijaa, Deputy Director, National Hygiene Epidemiology Center
Ms. Avirmed Buzmaa, Officer, Department of Public Health
Dr. O. Munkhtuya, Bacteriology Laboratory, National Hygiene Epidemiology Center
Dr. S. Lhagvasuren, Chemical and Food Laboratory, National Hygiene Epidemiology Center

The State Concern of Municipal Economy (MONNAA)

Mr. Natsagdorjiin Baasan, General Director
Mr. Ulugchuugiin Tsedendamba, Chief of Development Policy and Cooperation Department

Ministry of Food and Agriculture

Mr. Lhagva, Officer, Department of Agriculture Policy

Ministry of Nature and the Environment

Mr. Bandi, Officer, Department of Natural Resources

COLLECTING WATER FEES IN YARMAG GER AREA

Gobi-Altai aimag government

Mr. Janchivdorj, Deputy Governor, Aimag Government
Mr. Sayinbuyan Purevdorj, Governor, Tsogt sum
Mr. Chuluunbaatar, Governor, Tseel sum
Mr. Arkhid, Chief of Tseel sum Committee
Ms. A. Amarzaya, Head of Tseel sum Women's Federation

'ASMAT' Company, Gobi-Altai aimag

Mr. Dugarjav, Chief of company
Mt. Tserenpuntsag, Deputy chief
Mr. Dugarjav Nyamdorj, Hydrogeologist

UNDP

Mr. Jan Sweitering, Resident Representative
Ms. Anna Stjarnerklint, Deputy Resident Representative
Ms. Lone Jensen, Programme Officer
Mr. Paul Oquist, UNDP Senior Adviser in Management Development, Cabinet Secretariat, Government of Mongolia

National Poverty Alleviation Programme

Ms. Sodovyn Onon, Director
Mr. Chris Johnstone, Advisor to the Director

UNICEF

Ms. Katherine Hinton, Assistant Representative
Ms. Yukie Mokuo, Assistant Programme officer
Ms. Sanjdorj Tuul, Consultant

Mongolia-Urban Services Rehabilitation Project

Mr. Vladimir Lipsky, Team Leader

Water and Sanitation Project MON/93/005

Ms. Chuluunbaatar Enkhtsetseg, Project Assistant

"URAN" company (Ministry of Food and Agriculture)

Mr. Baldan- Ish, Director
Mr. Erdenebaatar, General Designer

GOING HOME WITH WATER FROM A HANDPUMP IN YARMAG GER AREA

COLLECTING WATER FROM AN ARTESIAN WELL NEAR BIGER SUM

COLLECTING WATER FROM A HANDPUMP IN TSOGT SUM

COLLECTING WATER FROM A HANDPUMP IN TSEEL SUM

CARRYING WATER HOME IN TSEEL SUM

CARRYING WATER HOME IN TSEEL SUM