WATER, SANITATION, HYGIENE & HEALTH STUDIES PROJECT

Aga Khan Health Service Northern Areas & Chitral

Sixth Progress Report

July to December 1995

WATER, SANITATION, HYGIENE & HEALTH STUDIES PROJECT

Aga Khan Health Service Northern Areas & Chitral

Sixth Progress Report

July to December 1995

INTRODUCTION

This report covers the period July to December 1995. A major achievement which took up a lot of senior staff time was the development of the proposal for AKDN implementation, entitled the "Water and Sanitation Extension Programme" (WASEP). A one day staff workshop was held in August and two consultations were convened with the Project Advisory Committee in September and October to receive their comments. The final version of the proposal was submitted to AKF Pakistan in November for sharing with prospective donors and initial feedback has been highly complimentary.

Finalization of this document signifies the attainment of one of the major objectives of the Water, Sanitation, Hygiene and Health Studies Project which commenced its activities in 1993. Next year marks the final year of the WSHHSP during which the research activities will be consolidated and completed. Also it is hoped to begin making preparations in 1996 for commencing implementation of WASEP in 1997 subject to final approval and securement of funding.

In the months of October, November and December prior to the departure of the two expatriate anthropologists, there were several periods of intensive writing. Three major reports were completed - the Musaffa evaluation and Issue Papers 5 and 6 - but in spite of valiant efforts and help with English grammar corrections from VSOs working with AKES, several important reports have become seriously behind schedule (see Annex A for list of reports). Completion of these outstanding writing tasks to the high standard set by earlier reports will be a major burden in the coming year during which there is a busy programme of field work.

Another notable achievement during the period under review has been the rapid progress with the construction of two full-scale experimental water filtration systems at Oshikhandaas and Murtaza Abad. This work began in September and by the end of the year when activities had to stop due to cold weather, the physical progress was 80% and 90% respectively.

It is impossible to summarize all the activities of the Project in this introduction but one or two others are selected as follows to give a broader picture.

The microbiological examination of the contents of composting latrines took place in October as planned and some surprising results were obtained (see text). Also the handwashing study was extended which has helped to highlight the benefit of using soap. The participatory health education training programme which was tried out experimentally with 14 LHVs was completed satisfactorily. At the December LHV workshop the participants were very enthusiastic and they requested that this training should be continued and extended to others.

Administrative matters

To overcome the problem of day to day supervision of construction at the experimental water treatment sites, a grade one staff member was temporarily assigned as construction supervisor. His position was filled by the temporary appointment of a watchman. The salary of the watchman at Chitral office was also adjusted by WSHHSP on request of AKHS and an additional driver was appointed in Gilgit on a temporary basis due to another driver's extended sick leave.

Vehicle operation and maintenance costs continued to exceed the budgeted figure during quarters three and four. An analysis of these costs shows that the second-hand vehicles have been twice as expensive to run compared to the new vehicles provided at the start of the Project.

Consultants and staff training

Two consultancies took place as planned in the period under review. Mr.Jorge Latorre from CINARA Columbia, made his first visit in July to assist with process design for the experimental treatment of drinking water. He is expected to make two more visits in 1996. Mr.Tony Moody, Laboratory Manager at the Department of Clinical Parasitology, London Hospital for Tropical Diseases visited in October. His main task was to train the Project microbiologists for carrying out field investigations into the health aspects of sanitation systems. A follow-up visit is contemplated for 1996 to assist with a proposed case-control correlation study.

Workshops and conferences

In July two of the Project's engineering staff participated in a follow-up training course organized for LBRDD by the World Bank RWSG. In the final test they achieved first and second positions.

In September a paper was presented at the 2nd AKU Annual National Symposium in Karachi. Subsequently an article was written for the AKHS International Newsletter No.60 published in October.

The second WSHHSP Annual Workshop was held in Islamabad in late October and a praiseworthy achievement was the finalization of the workshop report before returning to Gilgit. This event was followed by a two day meeting of the National Reference Group organised by the community management research project staff.

At a workshop on Environmental Awareness organised by AKRSP for the Serena Hotel staff, the Project microbiologists gave a presentation which was appreciated because it provided useful information about micro-organisms and practical advice about hygiene.

Other workshops attended by staff included the annual LHV workshop, training workshops on gender and participatory rural appraisal and a focus group meeting of the World Bank RWSG Programme.

Visitors and advice

In late June the Project gave a briefing to the Ambassador of Japan, his wife and the First Secretary. During the second half of the year other visitors included Dr.Afroze Sherali Chairperson of AKHSP, Det Prozetsky consultant to AKHS, Dr.Bichmann and Klaus Gihr from KfW and briefly Dr.Hugh Annett from the AKDN Secretariat at Aiglemont .

Local organizations that have approached the Project for advice include the Marafie Foundation, the Al Sabah Welfare Trust and the Khunjerab Student Welfare Federation. The former is interested in sanitation and hygiene education for Baltistan. However, for the time being the Project has decided to continue testing ideas for Balti-latrine improvement and to give advice when the results of microbiological testing are available. KSWF approached the Project for advice about construction of a latrine for tourists at the remote Khunjerab Top 4,300 metres elevation. Unfortunately lack of funds and inexperience of construction led to a disappointing result. This lesson reinforces the conclusion that appropriate skills and reliable supervision are needed to achieve satisfactory construction quality however simple the new structure may be.

SANITATION INVESTIGATIONS

i) Microbiological examination of composting latrines

The seven experimental twin pit compost (TPC) latrines in Gilgit region have been in use since 1994. In all cases the first pit, after being filled, was kept closed for a period of seven to twelve months. The purpose of examining the contents of these latrines was to assess the success of the decomposition process from a pathogen destruction point of view. A consultant on parasitology from the Hospital for Tropical Diseases (HTD) in London directed the microbiologists in undertaking the tests. During the consultant's visit in October samples from six of the latrines were collected and analysed in the Gilgit laboratory. Additional samples were taken from a traditional latrine and from fresh faeces. The following parameters were assessed:

- Immediate odour on opening the compost chamber
- Presence of flies
- Temperature of the centre of the pile
- Appearance of the compost
- Number of *Ascaris lumbricoides* ova per gram
- Number of viable *Ascaris lumbricoides* ova per gram
- pH
- Moisture content
- Bacteriological examination for faecal coliforms

One of the expectations of the trial latrines was that a high degree of pathogen destruction would be achieved by a combination of the composting process and a 12 months retention time. Although the initial results of these trials show that total pathogen destruction is not achieved, there is a substantial reduction in the pathogen load. This can be seen in Table 1 by comparing the percentage of viable *Ascaris* ova from the top, middle and bottom samples with the control samples which shows a 70 to 80 percent die off. The existence of viable *Ascaris* ova in the centre of the pile shows that the temperature inside the pit had not risen above 55°C. This means that actual aerobic composting which can attain higher temperatures had not occurred.

The results show an interesting relationship between the moisture content and the non-viability of the *Ascaris* ova. In most cases a moisture level of less than 15 percent resulted in a significant decrease in the viability of the ova (a report "Microbiological Examination of Twin Pit Composting Latrines" is available and a paper is being prepared for publication). Contrary to expectations, it appears that the TPC latrines in Gilgit region have achieved pathogen inactivation more by a process of drying than by high temperature composting. The use of dry earth as a cleansing and covering material favours the former process which may also be assisted by the vent pipe and the separate ablution place. Compared to the contents of traditional Chukans the contents of the TPC latrines were generally found odourless - a major improvement from the owners' point of view especially when it comes to emptying. Considering people's initial satisfaction with the system, it is planned to continue work in 1996 in two villages in the Gilgit region on a slightly larger scale. Efforts will be made to reduce costs and to optimize the desiccation process for converting faecal material into safe and profitable fertilizer.

In October, using the skills taught to them by the consultant parasitologist, the microbiologists began an intensive examination of six Chaqsas in Baltistan - the traditional composting latrine used by most families in that region. These are single chamber systems the contents of which are removed at different intervals for use as a highly valued fertilizer and soil conditioner. It was expected that the practice of

adding large amounts of organic materials such as animal shed manure and leaves would result in more efficient composting than is the case in Gilgit district. Table 2 shows the results of the first sampling of latrine contents in October. The data show that partial pathogen destruction is achieved and that in the drier latrines (Thogmo # 6 and Khardu # 3) it is significantly greater than in the wetter ones. The fact that faecal coliforms have survived indicates that like the TPC latrines in Gilgit region thermophylic decomposition has not occurred inside the chamber. It would appear that the retention time combined with dryness are again the main factors affecting pathogen destruction. It is planned to continue this study by sampling the same latrines at the time of emptying, heaping and spreading the manure on the fields in the spring of 1996 after which a preliminary report will be finalized.

During the consultant's visit the microbiologists carried out field trials for the Royal Institute of Technology, Stockholm to evaluate the efficacy the *Ortho-nitrophenyl-beta-glactopyranoside* (ONPG) test, a new technique being developed by them for rapid detection of coliform organisms from night soil. Three organizations out of six managed to complete the trials according to the instructions and the WSHHSP results were found to be the only ones worth interpreting.

The report on the indepth study of Balti-latrines carried out earlier was finalized in November (WSHHSP Issue Paper # 5: The Balti-latrine, a socio-technical study of traditional sanitation systems in Baltistan). The final chapter of this report concludes that improvement of the existing sanitation systems is a practical and realistic target. Recommendations are made for improving the management of latrines that tend to be wet and for more careful hygiene concerning the use and handling of the manure. Ideas for technical improvements are also suggested for trial in 1996.

ii) Ventilated dry pit latrines

Eleven families in four high altitude villages in Chitral have constructed their experimental latrines and started using them. Two families have not yet completed their latrines. By replacing the GI sheet roof used in the ten earlier latrines, with a traditional mud-timber roof, a saving of about Rs. 1,000 was made which brings down the average (total) construction cost to Rs. 3,000. In both phases of the trials the owners' share is about 70 percent but staff have reported that the participating families thought that the subsidy level from the Project was too little. During periodic visits made by the staff to the earlier constructed latrines the owners reported that these systems are in regular use by men and women, both young and old. Families have not complained of any problems. Their initial worries about small children falling through the squat hole appear to have diminished as they have become accustomed to using the latrine. In Ghizer, the trial introduction of the latrine with six families has been slow to progress and none had been completed by the end of the year.

Based on the monitoring results and the feed-back from villagers the Project is now in a position to recommend the dry pit latrine as a practical option for Upper Chitral and Ghizer.

Table 1: Microbiological sampling results from the TPC latrines in Gilgit region

Village	House #	Sampling Point	Appearance	Odour/ flies	# of Ascaris/ gram	% Viability	% Moisture content	pH
Misgar	1	Top	Hard	Nil/Nil	80	25	9	7.1
		Middle	Hard	Nil/Nil	120	1	23	7.1
		Bottom	Hard	Nil/Nil	1000	55	73	8.4
		Edge	Hard	Nil/Nil	2840	71	57	7.48
	Control	Fresh	Soft	+ + +	600	71	63	
Misgar	2	Top	Hard	Nil/Nil	240	40	33	7.1
		Middle	Hard	Nil/Nil	560	5	41.5	7.8
		Bottom	Hard	Nil/Nil	1960	20	37	8.0
		Edge	Hard	Nil/Nil	2640	100	34.5	7.9
	Control	Fresh	Soft	+ + +	800	75	42.5	
Karimabad	1	Left	Hard	Nil/Nil	240	0	9	7.5
		Centre	Hard	Nil/Nil	760	50	2	8.4
		Right	Hard	Nil/Nil	40	87	25.5	7.6
	Control	Fresh	Soft	+ + +	1280	100	74.8	7.6
	Black	Fresh	Soft	+ + +	2200	65		6.67
	Control	Common Pit		+ + +	246	50		8.30
Oshikhandas	1	Top	Hard/dry	Nil/Nil	280	0	18	7.06
		Middle	Hard/dry	Nil/Nil	40	0	22	7.83
		Bottom	Hard/dry	Nil/Nil	210	17	20	8.1
		Edge	Hard/dry	Nil/Nil	120	66		
		Fresh	Hard/dry	Nil/Nil				
	2	Top	Hard/dry	Nil/Nil	160	40	2	8.03
		Middle	Hard/dry	Nil/Nil	160	5	13	7.0
		Bottom	Hard/dry	Nil/Nil	1760	20	10.5	6.63
	3	Top	Hard/dry	Nil/Nil	160	60	2.5	7.37
		Middle	Hard/dry	Nil/Nil	40	0	19	6.60
		Bottom	Hard/dry	Nil/Nil	160	25	24.5	6.75

Table 2: Microbiological sampling results from traditional Chaqsas in Baltistan

Village	Latrine #	Sampling Point	# of E.coli/gram Total	# of Ascaris/gram		% Viability	% Moisture content
				Total	Viable		
Ranga Pa Ragiayul	1	Top	TNTC	350	350	100	85
		Middle	TNTC	300	300	100	43
		Bottom	4020	1305	1305	90	30
		Side		900	900	100	41
	2	Top	TNTC	400	400	100	64
		Middle	TNTC	150	150	100	33
		Bottom	TNTC	600	516	86	50
	Control	Fresh		600	600	100	78
Khar Ku	3	Top	2300	100	100	100	73
		Middle	75	150	150	33	26
		Bottom	0	NIL	Nil	-	17
		Side		NIL	Nil	-	20
	Control	Fresh		100	100	100	72
	4	Top	TNTC	100	100	100	69
		Middle	18020	550	550	100	33
		Bottom	23375	500	206	41	35
		Side		850	722	85	80
Thogmu	5	Top	TNTC	100	100	100	63
		Middle	875	3300	1450	44	30
		Bottom	445	1550	356	23	25
		Side		250	50	20	33
	Control	Fresh		2400	2304	96	76
	6A	Top	TNTC	NIL	NIL	NIL	67
		Middle	8750	300	48	16.6	20
		Bottom	0	150	0	0	13
		Side		450	247	55	64
	6B	Top		150	150	100	43
		Middle		450	396	88	28
		Bottom		500	50	10	26

iii) Simple sanitation options

In the third quarter of the year a start was made with the preparation of a manual describing simple sanitation options for economically poor families. The manual provides straight-forward instructions and drawings about very low cost latrines. It aims to help field staff and activists be in a better position to motivate or to advise families trying to improve their sanitation. An orientation and planning workshop on sanitation for the AKHS senior staff scheduled for December had to be postponed to January 1996. Workshops for AKHS staff in Ghizer and Chitral are planned for spring 1996 to introduce and explain the simple sanitation systems and to field test the manual.

iv) Correlation study in Oshikhandaas

The purpose of this case control correlation study which will build on earlier diarrhoeal and dysentery research carried out by AKHS in Oshikhandaas, is to check the hypothesis that the major cause of diarrhoea in the under-ten age group is faecally contaminated drinking water. If the hypothesis is proved incorrect it is hoped that the study will highlight other interventions which if implemented together with safer sanitation will achieve greater impact on improving health status. A proposal to carry out this study in June - August 1996 has been developed with the help of AKHS and the parasitologist who assisted the evaluation of the composting latrines in October 1995. A visit by the same consultant is anticipated in June to ensure that this activity gets off to a good start.

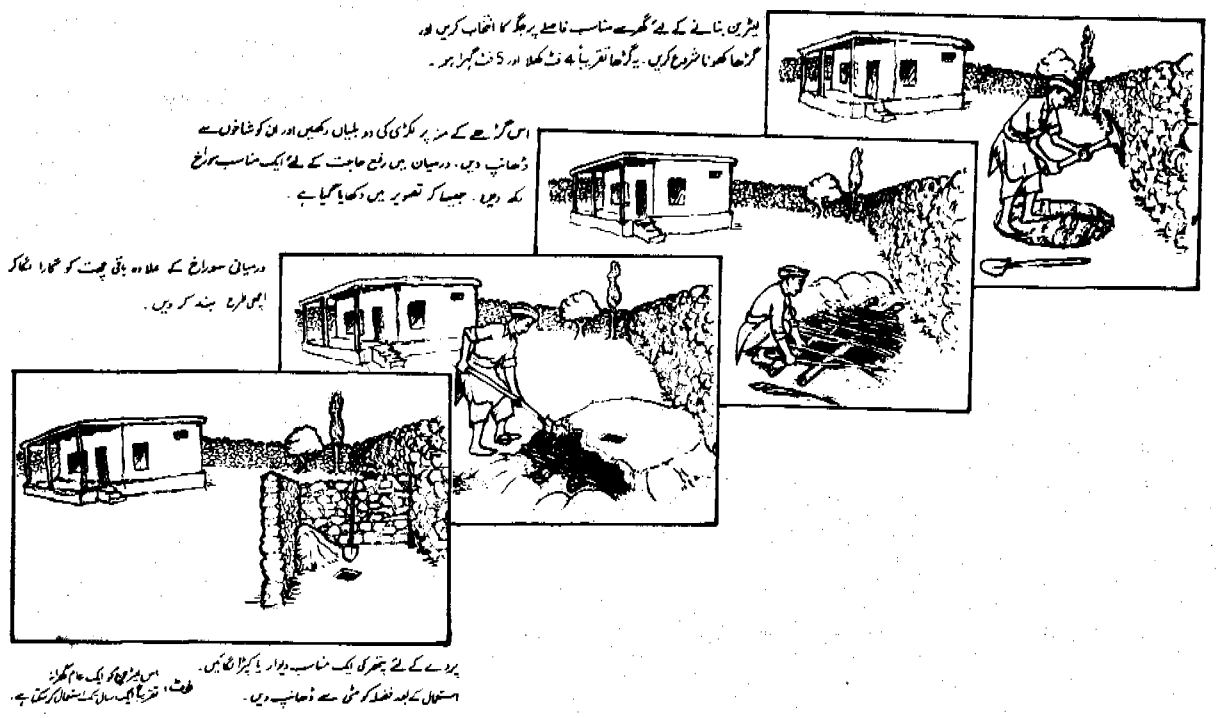


Figure 1: Illustration from the manual on simple sanitation options; the simple pit latrine

DRINKING WATER SUPPLY: APPLIED RESEARCH

i) Trial improvement of traditional water pits

Seven traditional water pits in four villages were chosen for these trials. The improvement details were finalized in discussions with the owners and users in order to include their ideas. It was agreed that the most practical change was to improve the unhygienic collection practices by modifying the pit *superstructure*.

Microbiological testing of the pit water before making the improvements was carried out from mid-May to mid-July. The results confirmed the findings of the earlier seasonal water quality study that contamination levels are generally much higher than that of the channel water at the time of filling the water pits. Data from one of the pits in Jalalabad village is presented in Figure 2. It shows a ten-fold increase in contamination between the time of filling the pit in the early morning and the noon samples. The high contamination of the pit water is mainly attributed to the unhygienic collection practices whereby spillage runs back into the pit during fetching water and in other cases people step down into the pit when the water level becomes low.

For the improvement work, the owners provided un-skilled labour and local materials, whereas the cement, skilled mason and transportation of materials was the Project's responsibility. The neighbours who rely on other family's water pits generally showed little interest in helping with the modifications, which resulted in cancellation of the plans to improve some pits and delay of work in others. The average cost of the trial improvements was approximately Rs. 5,000 divided roughly equally between the household and the Project.

Monitoring of the improved pits shows a decrease in the order of contamination in some cases. For example it can be seen from the post-improvement data for the same pit in Figure 2, the ten-fold increase has been reduced to three-fold. Even so, the bacteriological quality of the water is still not satisfactory for drinking purposes. Monitoring will be continued in 1996 to obtain a clearer picture of the effect of these improvements and to make future recommendations. A preliminary report about this activity is in preparation.

ii) Spring protection

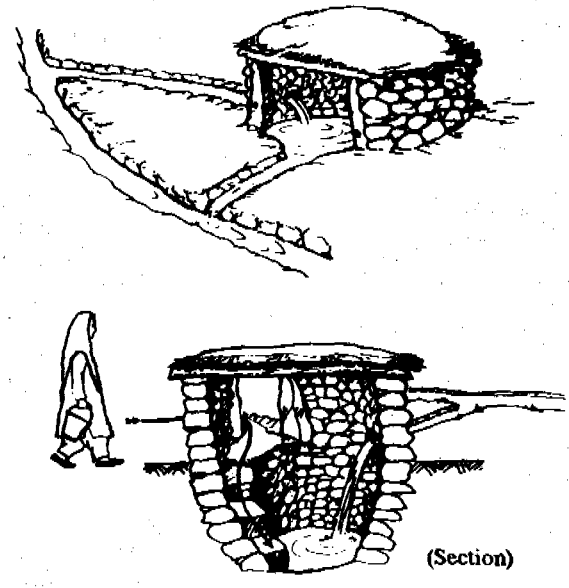
Five sanitary spring protection works have been completed with two communities in Chitral and two in Gilgit and Baltistan. Two of the projects in Chitral and Baltistan also included small piped distribution systems. Generally it took more than the expected time to complete the construction work. Only Painde, a small village of 8 households in the Shigar valley of Baltistan, completed their system on time. Internal disputes in the selected villages in Chitral were the main cause for delay, and in Gilgit the selected community gave priority to other activities. A conclusion from this experience is that in order to ensure good quality and timely completion of construction jobs like building latrines, modifying water-pits and protecting springs, more efficient motivation and supervision will be required.

The pre-implementation water quality sampling confirmed contamination of the spring sites in Chitral and Baltistan. Samples taken at the collection point in Painde before protection showed contamination of more than 700 *E.coli*/100 ml. After protection, three sampling visits showed zero contamination and one showed only 2 *E.coli*/100 ml. The post-implementation sampling at the other sites will be conducted in 1996 in the summer months when the faecal contamination of the water sources is highest.

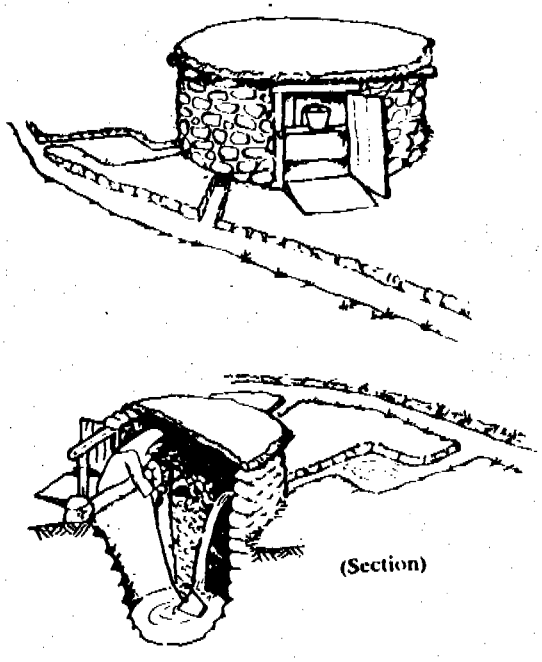
Before improvement

Sampling week	# of E–coli/100 ml		A
	Morning	Noon	
1	117	1573	+ 13
2	237	275	+ 1.2
3	337	619	+ 1.8
4	5	793	+ 159
5	25	948	+ 38
6	79	650	+ 8
7	115	798	+ 7

A= + Increasing order, – decreasing order



After improvement



Sampling week	# of E–coli/100 ml		A
	Morning	Noon	
1	530	933	+ 1.76
2	600	4666	+ 7.8
3	563	275	–2
4	387	746	+ 1.9
5	203	478	+ 2.35
6	547	663	+ 1.2

A= + Increasing order, – decreasing order

Figure 2: Traditional water pit in Jalalabad before and after improvement

iii) Water and sanitation inventory

The data collection and data entry for the water and sanitation inventory was completed in Baltistan in July and in Chitral and Gilgit in December, bringing the total inventory to 877 villages. Data entry was done by the same staff who visited the villages so that errors would be minimized. The specially designed software package developed by a local consultant programmer enables the data base to be easily updated and analysed. In the fourth quarter a start was made with data analysis and with preparing the report. This document is now scheduled to be finalized by the end of the first quarter of 1996.

iv) AKRSP water supply schemes and the Social Action Programme

In July staff participated in the dialogue process for the implementation of water and sanitation projects in three villages selected by AKRSP in Astore. A technical survey and design for two water supply systems and a needs assessment for a sanitation project were carried out. It is proposed that two of the AKRSP schemes in Astore will be implemented with the full involvement of the WSHHSP in 1996 which will be an opportunity for staff to gain experience in all phases of project implementation. Respective roles and responsibilities have been tentatively discussed.

After a promising start in the first half of the year with the LBRDD-AKRSP/WSHHSP partnership for implementing the SAP water and sanitation component, progress has been slow. This has been caused partly by initial coordination constraints between the different parties and partly by internal obstacles. Out of the planned 14 schemes for 1994-95, 7 schemes were initiated and the dialogue process completed. The proposal to establish a Rural Water Supply and Sanitation Cell within LBRDD is still going through the decision making procedure and it now seems likely that approval will be given in 1996.

To enhance the efficacy of collaboration the respective roles and responsibilities of WSHHSP and AKRSP field staff have been discussed during joint meetings. Also the future collaboration of AKRSP and WSHHSP in the SAP implementation was reviewed. Until now the WSHHSP has assisted with the development of participatory methods for planning water supply implementation and has helped with training for surveying and designing schemes. The Project aims to continue to give support to LBRDD in coordination with AKRSP in those areas where it has competency and capacity to do so. As described in the WASEP Proposal increased involvement of Project staff in such activities will enable them to gain skills and confidence in implementation which is a necessary preparation for WASEP.

v) Community management research project

From July to September indepth studies were carried out in the four research communities of Hoto and Ghaziabad in Baltistan and Hasis and Pakora in Ghizer district. Village profiles were completed and the history of the village and its water supply scheme was documented. PRA tools were used with male and female groups and individuals to identify problems in the management of the water supply system. The problems were prioritized by the community and analysed to establish the causes. The problem solving strategies used by the communities were also identified and new methods for problem solving were pre-tested in one community.

In September the coordinator from the International Water and Sanitation Centre (IRC) visited Gilgit. During her visit the diagnosis phase was reviewed and a monitoring system was prepared. The coordinator visited Pakora with the research team who used a cause and effect analysis exercise to examine the problems previously identified by the community. At the end of the visit a presentation was made for the senior staff of the local AKDN institutions.

During the problem analysis exercise the villagers of Pakora suggested forming a committee to work with the research team. This idea was agreed and subsequently two of the other communities have formed community research teams. A two day workshop was organized in December for the male community research teams of Pakora and Hasis.

During the period under review individuals and institutions were approached for forming a National Reference Group. Selection was done according to agreed criteria and 11 nominations from 9 institutions were received. The first meeting of the NRG was convened in Islamabad in November with the following objectives:

- To introduce the project
- To explain the diagnosis phase
- To get feed-back and share experience
- To clarify expectations and the role of the NRG

An unexpected outcome of the meeting was a proposal to make the NRG into an official national forum for the rural water and sanitation sector. A report on this meeting has been circulated to the members and the event was covered by two national newspapers.

Figure 3: Community research teams participating in the workshop.

DRINKING WATER QUALITY: RESEARCH AND DEVELOPMENT

i) Full-scale water treatment trials

Encouraged by the results of the pilot study in Danyore, activities to finalize the selection of villages for full-scale experimentation gathered pace in August. In Japuke village which had been tentatively selected in May, the pre-implementation sampling showed no significant problems with water quality from both a bacteriological and turbidity point of view. Consequently this site was dropped.

In the Hunza valley, out of the five shortlisted villages mentioned in the previous Progress Report, Murtaza Abad Paeen was finally selected on the basis of the poor water quality, villagers' exceptional motivation, and their willingness to agree with the terms and conditions of collaboration. The village is comprised of 132 households. It has a VO and two WOs, that have been participating in various activities with AKRSP in the past including establishment of a pipe irrigation system and a fruit orchard. Murtaza Abad Paeen is famous for its apples which are a significant source of income for many families.

The source of water for both irrigation and drinking for Murtaza Abad is the Hassan Abad nullah, which is one of the many highly turbid sources in the Hunza valley. In 1994 the village was granted a water supply project by the LBRDD. Unfortunately, the project was left incomplete due to shortage of pipe which affected about 30 households in one part of the village. This problem led the villagers into dispute. The possibility of being involved in the water treatment research was seen by the villagers as an opportunity for re-organizing to solve their problem. The villagers have formed a Water and Sanitation Committee from representatives and other activists of the VO which has been given full responsibility for organizing implementation and management of the project. Three alternative sites were proposed by the Committee for the location of the water treatment plant.

A series of meetings was also held with the more diverse and less unified community of Oshikhandaas to discuss plans for modifying their existing AKHB WFUs. It was decided that a modified plant will be designed to serve the population presently covered by WFU1 and WFU2, a total of about 350 households. During the initial meetings the community was briefed about the proposed modifications which virtually amount to constructing a totally new system. It was not un-expected that the community demanded complete assistance from the Project because they had already contributed to the construction of the WFUs. This demand was accepted as being reasonable. There were other serious problems to be overcome like the procurement of extra land for the new plant since the owner was dis-satisfied with his past experience. Secondly, about 100 households supposed to be served by WFU2 were not connected with pipes. They were in disagreement with the idea of any further work on the WFUs until pipe connections are arranged. These and several other smaller issues were resolved to most peoples' satisfaction by village committees and working groups who also acted effectively in motivating the community.

The visit of the consultant from CINARA Columbia took place as planned in July. A few days were lost due to travel problems but with enthusiasm and dedication it was possible to achieve the consultancy objectives. Instead of coming up with his own blue-print solutions the consultant and the Project Engineer worked together on the development of the designs for Murtaza Abad and Oshikhandaas. In this way the Project Engineer increased his understanding and capability for process design gaining from the knowledge provided by CINARA's experience, and was able to finalize the designs after the consultant's departure.

For both Murtaza Abad and Oshikhandaas, a combination of sedimentation tank (ST) and a three staged up-flow roughing filter (URF) was agreed for pre-treatment, followed by slow sand filtration (SSF) for final bacteriological treatment. The Murtaza Abad system also includes a water storage reservoir. It was decided to first build and monitor the pre-treatment components over the high turbidity season in order to assess the need for building the SSF at each site in 1996. The water source in Oshikhandaas was monitored throughout the year to determine variation in turbidity and microbiological contamination. The highest monthly average turbidity occurred from May to August reaching 1,950 TUs in July. Bacteriological contamination levels generally remained below 500 *E.coli*/100 ml. The details of the design parameters for the two sites are shown in Table.

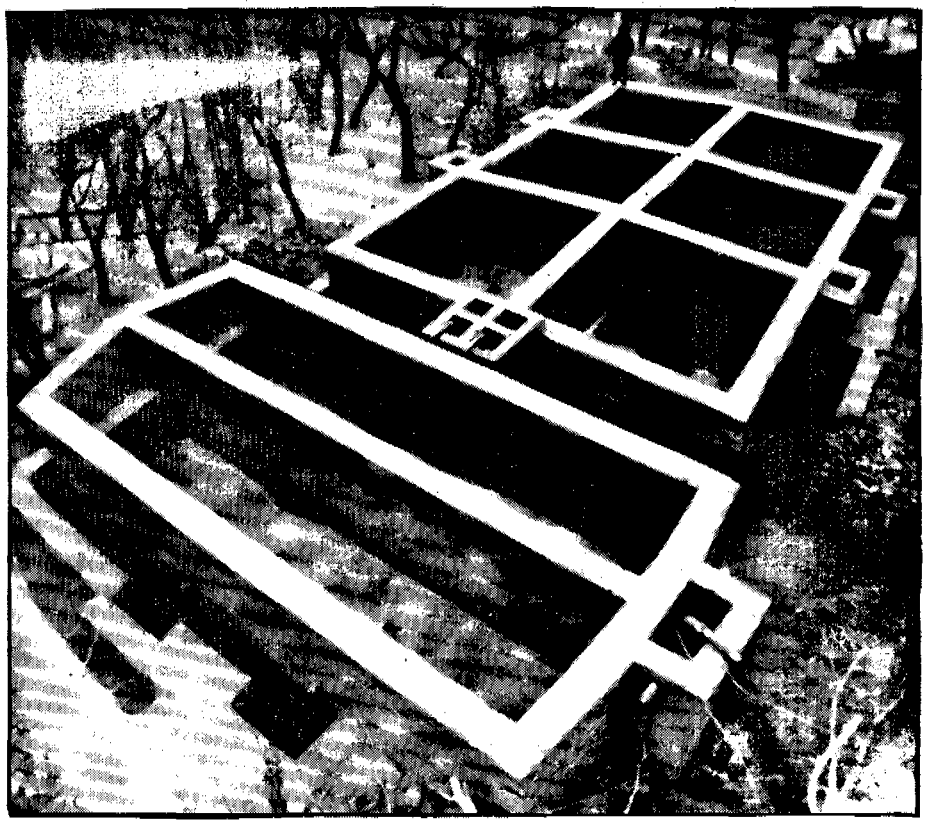
Construction work at both sites was initiated in mid-September. By the end of the year Oshikhandaas system was 95 percent completed, and at Murtaza Abad about 80 percent was finished when activities had to be suspended in the last week of November due to extreme cold. Stone masonry, cement mortar and plaster were used for construction at both sites. The pipe work at both plants was completed with the assistance of one of the AKHB's plumber. The need for roofing the systems will be assessed during the coming year.

Site	Plant capacity (lit/sec)	Surface loading/filtration rate (m/h) ST	URFs	SSF	supply/capita (l/day)	Design period (yrs)
Murtaza Abad	1.5	0.30 (L:W :: 4:1)	0.40	0.15	70	10
Oshikhandaas	3.0	0.46 (L:W :: 5:1)	0.46	0.17	55	10

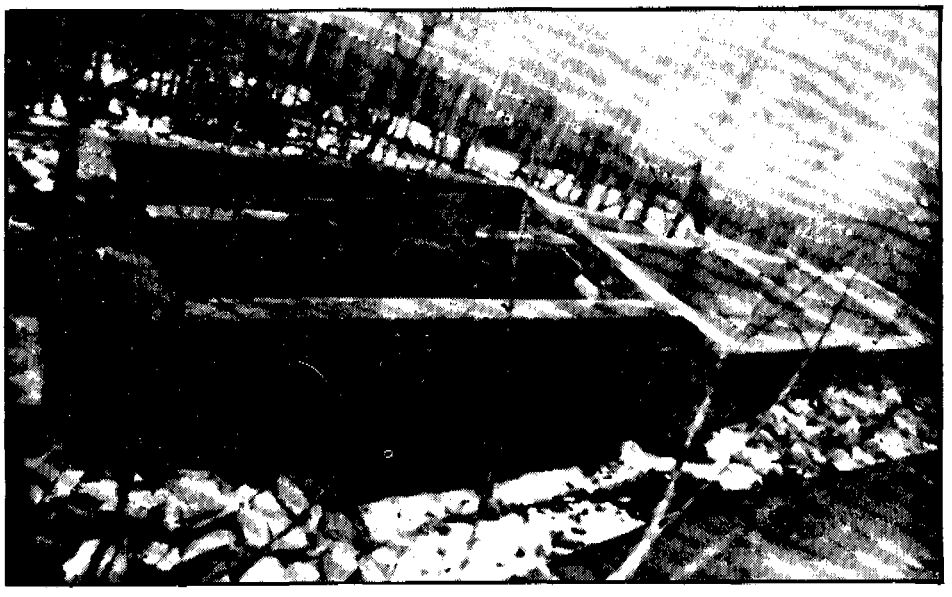
Table 3: Design parameters of the water filtration plants in Murtaza Abad and Oshikhandaas

For routine cleaning of the filters a simple fast-opening valve of 6 inch diameter has been designed. This is a modified version of the Colombian design. The prototype was manufactured at the NAPWD mechanical workshop in Gilgit and after testing and finalizing the design, the 28 valves required were fabricated in Lahore for economy. The cost worked out to Rs. 800 per valve compared to Rs. 4,500 for an acceptable commercial product.

Table 4 shows the cost per household, cost per capita and cost per unit area of construction for different scenarios of plant completion at Oshikhandaas. About 20 percent of the total cost was spent on the un-skilled labour during the first phase of construction.



The Oshikhandaas plant



The Murtaza Abad plant

Figure 4: Views of the full-scale water filtration systems in Oshikhandaas and Murtaza Abad.

	Total cost (Rs.)	Cost/h.hold (Rs.)	Cost/capita (Rs.)	Cost/ft² (Rs.)
1. Pre-treatment	650,000	1,850	230	280
2. Pre-treatment + SSF*	925,000	2,640	330	240

* estimated

Note: US $ 1 = Pak. Rs. 34

Table 4: Cost per household, per capita and per unit area of construction for water filtration plant in Oshikhandaas.

The expenditure in Murtaza Abad came to approximately Rs. 450,000 by the year end. This includes Rs. 82,600 which was contributed by the community for un-skilled labour, taxes for gravel and sand, and for the cost of land purchase. The cost also includes HDPE pipe worth of about Rs. 20,000 which was provided by LBRDD free of cost as a contribution to the system improvements. This pipe was laid between the channel intake and the plant inlet.

The construction work in Murtaza Abad is scheduled to be resumed in mid-March 1996 and is estimated to need another month to complete. The Oshikhandaas plant should be ready to begin operating by the end of March after filling the filters with the gravel-media, which is being collected and prepared. Both plants will be closely monitored during the coming year to help optimize design parameters for future systems. The second visit of the CINARA consultant is planned for June-July and a third visit is tentatively set for November.

ii) Water quality investigations

The weekly sampling in two villages in Gilgit, Chitral and Baltistan regions will be completed in February 1996 in order to provide a full year's picture. The report on this work and the earlier seasonal water sampling activity is now due to be completed by March, 1996.

iii) Household water disinfection

The report on the Musaffa water decontamination bag was finalized in December after completing some limited spot checks of regular users in Gilgit town. The report concluded that the manufacturer's claim that the bag will decontaminate water of unspecified quality in three minutes is totally misleading. The WSHHSP advises that the bag is quite unsuitable for treating turbid water and that for clear water a contact time of four hours is recommended.

Based on the report findings, appropriate user messages were developed and agreed with AKHB. The result consists of a series of coloured pictures with step-by-step user's instructions and additional information about the qualities of the bag. The design was handed over to AKHB who organized the printing in Karachi (see Annex B). The initial idea was to print the message as a leaflet on small size paper but the final result is bigger. After discussion it was decided to use this as a poster and to prepare a low-cost version of the leaflet that will be provided with every new bag.

HYGIENE BEHAVIOUR AND KAP STUDIES

i) KAP survey

A questionnaire for a Knowledge, Attitude and Practice (KAP) survey was developed and pre-tested in the fist half of the year. Data collection took place in July. 600 respondents were included in the survey, living in 30 villages in Baltistan, Gilgit and Chitral. A computer programme facilitated data entry without delay. In late August the data were analysed and the findings were incorporated in the Hygiene Behaviour Issue Paper.

One of the aims of the KAP survey was to help develop a tool that can be used for an intervention evaluation of WASEP. The idea is to carry out a KAP survey to establish benchmark figures that will allow WASEP to later evaluate the impact of its interventions. A separate report on the KAP survey is planned for the first quarter of 1996. It will present and discuss the 1995 results and propose a modified questonnaire for future use.

ii) Hygiene behaviour report

In the fourth quarter Issue Paper 6 was finalized which combines the results of quantitive and qualitative studies of hygiene behaviour that have been carried out over the past two years. It incorporates the results of the various research techniques used in the domestic observation studies in 1994, the results of the KAP survey and of the microbiological study of handwashing. Besides describing hygiene behaviour related to personal hygiene, the household environment and domestic water management, the report provides data about villagers' awareness of disease transmission routes. Each of the eight chapters of the report concludes with an analysis of the behaviours described in the chapter. A special feature of the report is the final analytical chapter in which the target hygiene behaviours for WASEP are selected. Based on these target behaviours appropriate health and hygiene messages are recommended for WASEP.

iii) Handwashing study

In the period under review the small study of the efficacy of handwashing continued. Volunteers were asked to rinse their hands in Ringers solution. Initially one group did this without washing their hands and the people in the other group were asked to first wash their hands with water. At a later stage of the study a group of people were asked to wash their hands with water and soap. Washing hands with flour was not tested. Although people found it an acceptable agent for occasionally washing hands they consider it too expensive to use routinely. The Ringers solution was subsequently checked by the microbiologists for faecal contamination. In total it took about 3 person days to test 20 people. The hands of another 80 people were tested in the final quarter of the year.

A preliminary analysis of the results shows that washing with water alone does help reduce the amount of E.coli on hands but the effect is dramatically improved by the use of soap. One of the results indicates that drying hands on a Chaddor (a woman's shawl) or towel can result in a substantial increase in contamination of the hands. If time and resources permit, tests on the effect of drying hands with a towel or chaddor will be carried out in 1996. Verification would be useful because a video has been produced by AKHSP Health Education Department in which handwashing with soap and drying with a towel are emphasized. The final results of this study will be reported in an Issue Paper to be produced in the first quarter of 1996.

COMMUNICATION

i) Participatory health education training

In the third quarter of the year the final activities of the LHV training programme for participatory health education were carried out. One three day workshop was given in Karimabad and another in Chatorkhand. During the workshops 14 of the original 16 participating LHVs each selected a common health problem of the community they are working in. They were asked to develop an interesting story line with drawings for giving a participatory health education session on their chosen theme. The graphic designer was present during the workshop to work with the LHVs on preparing the drawings.

By following this process the LHVs learned to define problems that are important to villagers, to transform a problem into an interesting story and to translate a story into pictures for a participatory health education session. The LHVs also learned to pre-test the drawings and they became aware of the complexities and the amount of effort needed to develop effective materials.

As a result of the workshop six illustrated story lines with locally appropriate messages were produced. On the last morning the LHVs used their materials in participatory sessions in a nearby community. As in all the earlier workshops and follow-ups the LHVs were enthusiastic about the training and they enjoyed making and using their own materials. With their newly gained skills they are now in a better position to develop their own stories independently or with the help of AKHS HESU. It is hoped that with encouragement from the HESU coordinator they will continue to use the participatory methods in the future.

At the annual LHV workshop in December the participatory health education training programme was formally concluded. For the final presentation of participatory health education to the other LHVs a short video film was made in cooperation with the AKHS videographer. This 15 minute video explains the methodology using the example of problem and positive story lines and it shows a session in action in Oshikhandaas.

During the workshop the 14 participants were asked to fill in an evaluation form. The results were presented by one of the LHVs and turned out to be very positive. The LHVs were very satisfied with the training and most of them said they had continued to incorporate their new skills in their daily work. However, they also expressed concern about the future. They believed that training of more girls would be required in Gilgit and particularly in Chitral. This would help to make participatory health education more sustainable. They also requested follow-up in the future. At the close of the workshop the GM of AKHS distributed certificates to the LHVs who participated successfully in the training programme.

ii) Health Education Support Unit (HESU)

This Unit which is an integral part of AKHS was established in the first half of the year and arrangements are being made for the coordinator to be joined by the WSHHSP artist. The coordinator (a LHV supervisor who attended a 3 month course on Health Education and Promotion at the Liverpool School of Tropical Medicine in 1994) will be responsible for training and motivating personnel that carry out health promotion activities and the artist will assist the development of innovative ideas for health education. Both individuals were involved with the participatory health education training. The strong links with the WSHHSP are expected to be maintained in the future.

iii) Production of health education materials

During 1994 and 1995 the WSHHSP has developed and field tested a variety of illustrations and health education materials. Through these activities the Project has gained considerable experience with different sets of pictures and story lines. After pre-testing and making numerous modifications some of these materials were thought to be appropriate for distribution on a larger scale. Up until now the Project has been working with prototypes that were drawn and hand-coloured by the artist.

Two different approaches are being tried out for the provision of pictorial materials. The first involves distributing photocopies of materials developed with the help of the local artist. These are then coloured by the AKHS field staff who will use them in their work. During the training in Participatory Health Education a first group of LHVs has been trained to produce attractive materials in this manner. Good quality pencil boxes were provided to enable colouring in the field.

A second approach for reaching a larger audience is through the provision of printed materials. Towards the end of the year the possibilities for four-colour printing were assessed down country. Thr Project selected a printing press in Rawalpindi that offered good quality work at a reasonable price. For an initial trial four different types of health education materials have been printed.

One of the innovative materials the Project has developed is a Folding Card which consists of a set of four or five pictures on the front and five or six pictures on the back of laminated paper that is folded into a 7x7 inch "booklet". The first folding card set explains why washing hands after using a latrine is a good practice. A second folding card explains the need to keep water storage containers clean. Both are practices that were selected as target behaviours in the Hygiene Behaviour Paper.

The Sanitation Promotion Package consists of a folder with 10 laminated picture cards with a size of 15x12 inches. This set will be used to explain to villagers why it is a good idea to have a latrine. Mainly practical (non-health) reasons such as privacy, smell and comfort are illustrated to promote the construction and use of latrines.

The "Family Package" is a series of 16 laminated picture cards of 11x9 inches in a folder which will be used in a participatory manner to explain the proper use and management of the improved dry pit latrine to families who have chosen to construct this option.

The "Instruction Card" consists of four small pictures on a rectangular poster 24x6 inches that will be handed over to families with an improved pit latrine. It can be hung inside the latrine to remind the occupant about its correct use.

The final products look attractive and the quality of the card and the colours exceeds the Project's expectations. If the field staff and their audience are satisfied with the results more materials will be printed in 1996.

ANNEX A

LIST OF REPORTS & PAPERS PRODUCED BY THE WSHHS PROJECT

First Progress Report September 1992 to February 1993
Second Progress Report March to July 1993
Third Progress Report August 1993 to January 1994
Fourth Progress Report January 1994 to December 1994
Fifth Progress Report January to June 1995
Sixth Progress Report July to December 1995

WSHHS Project Proposal July 1994 to December 1996

Water and Sanitation Extension Programme (WASEP):a proposal for AKDN implementation. Nov.1995

Position Paper 1: Water, Sanitation, Hygiene and Health: Upper Chitral. Sept.1993
Position Paper 2: Water, Sanitation, Hygiene and Health: Lower Chitral. Oct.1993
Position Paper 3: Water, Sanitation, Hygiene and Health: Baltistan. 1994
Position Paper 4: Water, Sanitation, Hygiene and Health: Hunza & Nagar. 1994

Issue Paper 1 : Chlorination campaign for cholera struck area and experiments to check residual chlorine levels & the efficiency of bleaching powder.
Issue Paper 2: Pit latrines as a sanitation option in Chitral District. Dec.1993
Issue Paper 3: The pour-flush latrine for guests only? A socio-cultural perspective on the pour-flush latrine in Chitral. Dec.1993
Issue Paper 4: Self-help rural water supply schemes: lessons learned from the Northern Areas of Pakistan. 1994
Issue Paper 5: The Balti-latrine: a socio-technical study of traditional sanitation systems in Baltistan. Nov. 1995
Issue Paper 6: Hygiene Behaviour in north Pakistan: the results of a quantitative and qualitative study. Dec. 1995

WSHHSP topical message page for AKRSP's Dahi Tanzeem magazine:

Issue 2 : Protection of drinking water from dust, dirt and germs
Issue 3 : Practical measures for avoiding cholera
Issue 4 : Do's and don'ts about eating fresh fruit
Issue 5 : How to stop the spread of cholera
Issue 6 : Avoiding skin infections

WSHHSP Briefing Notes:

No 1: High density polyethylene (HDPE) pipe for drinking water supplies
No 2: Checklist for Social Action Programme (SAP) dialogues
No 3: Essential messages with regard to the Musaffa bag
No 4: WSHHSP inputs to the Social Action Programme

Water quality situation in Gilgit Town: a preliminary survey. 1994

Interim report on the evaluation of the Musaffa water filter bag. 1994

The Musaffa water decontamination bag: an assessment of its efficacy for household water-treatment in north Pakistan. Dec.1995

Second technical workshop for the engineers of LBRDD. April 1994

Report on microbiological examination of twin pit compost latrines after one years closure. Oct. 1995

Visit of the WSHHSP to Nagar and the follow-up in Gilgit, August 1993 cholera outbreak
Cholera Control Campaign 1993: the use of radio messages in health education
40 minute radio drama recording in Burushashki
25 minute radio drama recording in Shina

Composting sanitation studies and applied research. Paper for presented at the second SANRES workshop, Mexico City. Nov. 1994

Note on the study tour to Nepal. March 1995

Report on the second WSHHSP annual workshop: from WSHHSP to WASEP. Nov.1995

The use of story cards in participatory health education in north Pakistan. Paper presented at the second national AKU symposium, Karachi. Sept.1995

Participatory action research: the role of communities in the management of improved rural water supplies. Four six-monthly progress reports, for the International Water & Sanitation Centre (IRC) 1994 -1996

Pakistan country overview of community management experience of RWSS. Oct. 1994

Village case study of community managed RWSS in Nomal. Oct. 1994

Report on the first National Reference Group workshop held in Islamabad in November 1995

Report on the second regional workshop (Nepal and Pakistan) held in Islamabad in January 1996

Proceedings of a community research teams workshop. March 1996

Revised March 1996

REPORTS IN PREPARATION

Issue Paper 7: Knowledge, Attitude and Practice Survey: an intervention evaluation tool

Issue Paper 8: A water and sanitation inventory of 880 villages in north Pakistan

Issue Paper 9: Water quality studies in 100 villages of north Pakistan

Issue Paper 10: An acceptability assessment of improved dry pit latrines for water scarce areas

Issue Paper 11: An assessment of the health risks of Balti-latrine compost

Issue Paper 12: Results and recommendations of a handwashing study

Preliminary report on improvement of traditional water pits

Preliminary report on the trial introduction of twin pit composting latrines in the Northern Areas

Communication plan for WASEP

Manual on participatory health education

Manual on low-cost sanitation options

REPORTS PLANNED

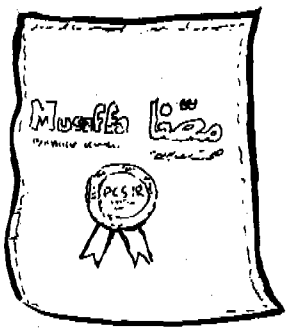
Concept paper for a sanitation strategy

Concept paper for a strategy for community-based rehabilitation of drinking water supply schemes

Sanitation guidelines and construction manual

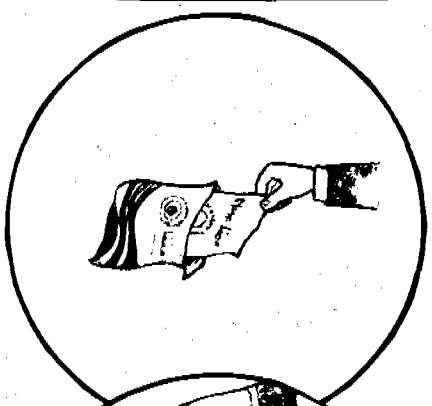
Preliminary report on community water filtration research and development

ANNEX B

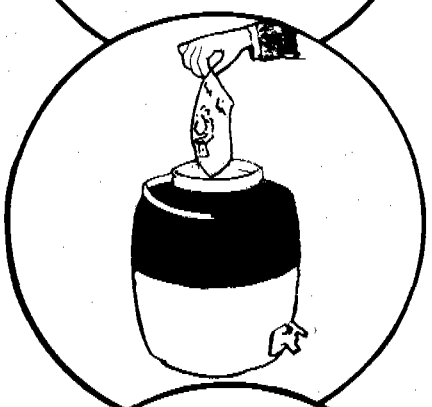


مُصفّا بیگ

پینے کے پانی میں موجود صحت کے لئے نقصان دہ جراثیم کو ختم کرتا ہے



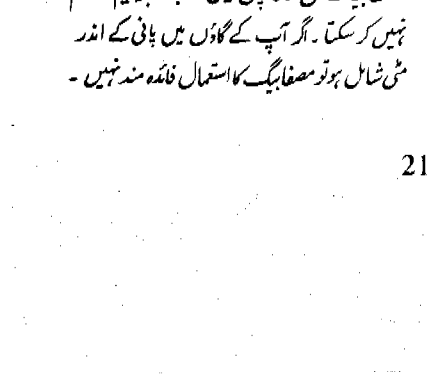
○ مُصفّا بیگ کو استعمال کرنے کیلئے پلاسٹک کی تھیلی سے نِکال دیں



○ مُصفّا بیگ کو پانی کے کولر، دیگچہ یا کِسی بھی بَرتن کی تہہ میں رکھیں اور اِس برتن میں 12 لیٹر سے زِیادہ پانی نہ ڈالیں (درمیانہ سائز کا کولر)

○ یہ پانی 4 گھنٹے بعد پینے کے لئے استعمال کریں۔

○ کولر، دیگچی یا کِسی اور بَرتن کو دھوتے وقت مُصفّا بیگ کو صاف جگہ پر رکھیں۔



○ مُصفّا بیگ کی بہتر کارکردگی کے لئے ضروری ہے کہ اِسے مہینے میں صرف ایک دفعہ دھولیں۔

ایک مُصفّا بیگ 6 ماہ تک اِستعمال کر سکتے ہیں یہ گرمی اور سردی دونوں موسموں کے لئے برابر کا مفید ہے

نوٹ :-
مصفا بیگ مٹی والا پانی میں موجود جراثیم کو ختم نہیں کر سکتا۔ اگر آپ کے گاؤں میں پانی کے اندر مٹی شامل ہو تو مصفا بیگ کا استعمال فائدہ مند نہیں۔

1996 is the final year of the Water, Sanitation, Hygiene & Health Studies Project. Our aim this year is to consolidate the different research activities and to begin making preparations for the implementation of the proposed Water and Sanitation Extension Programme. If you have any questions or comments on the Progress Report or if you would like to receive any of the documents listed in Annex A, please do not hesitate to contact us. Thank you for your interest in our work.

Yours sincerely,

John Collett

John Collett
Project Director.
c/o Aga Khan Health Service, Domiyal Link Road, Gilgit, Pakistan.
Phone: (0572) 2958 **Fax: (0572) 2559**