*Lessons learned from the use of aquaprivy sanitation units in Khmer holding centres in Thailand, 1979 – 1982**

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INTRODUCTION

A conventional aquaprivy consists of a squat plate with a drop-pipe making a water seal directly into a small septic tank underneath. Anaerobic digestion of the faecal material takes place in the tank, and excess effluent is drained off into a nearby seepaway (also called 'soakage pit'). To function properly, the septic tank must be water-tight, and the water seal where the pipe empties into the tank must be maintained. The sludge which accumulates in the septic tank after the partial breakdown of the faecal matter must be periodically removed. During the normal use of a family-sized tank, desludging will be necessary only every few years (Kalbermatten *et al.*, 1980). Variations on the aquaprivy include the self-topping or sullage aquaprivy which can accept household waste-water, and the sewered aquaprivy where effluent flows directly into a sewage system.

In theory, the aquaprivy meets technical criteria for an excreta disposal system not requiring excessively high inputs of technology, money or water. When properly maintained, surface soil and water are protected from contamination, and there should be minimal nuisance from flies and odour (Wagner and Lanoix, 1958).

In practice, however, the aquaprivy has not always been successfully employed. In most cases, this is because the water seal was not maintained when insufficient water was introduced into the tank on a regular basis. This may have occurred where water supply was not located close enough to the aquaprivy, or where there was reluctance, for cultural reasons, to carry water into the toilet (Iwugo, 1981). When the water seal is not maintained, mosquitoes and flies breed in the privy creating a health hazard, and odour becomes a problem. In other cases, disposal of the liquid effluent into the soil failed, so that the seepaway required frequent mechanical emptying. Strategies to achieve this task have not always been adequate (McGarry, 1977). The drop-pipe may also become clogged where solid materials are used for anal cleansing.

Aquaprivies were invented in India in the early 1900s (Williams, 1924). They have subsequently been used in many countries in Asia and their application appears to be successful on that continent (McGarry, 1977). Aquaprivies have been installed in several African countries including Botswana, Nigeria, Tanzania and Zimbabwe, with mixed results (Iwugo, 1981). In one African nation, the building of aquaprivies has been banned because of some of the problems outlined above. Some aquaprivies were constructed in the West Indies in the 1950s and 1960s, with good public acceptance (Sebastian and Buchanan, 1965). Aquaprivies appear to have been used most satisfactorily where water is used for anal cleansing, daily washing of the toilet bowl is practiced, and soil is sufficiently permeable to absorb all effluent.

Recently, authors have recommended against the aquaprivy as a viable sanitation option in most situations because there are technically superior systems available at a lower cost (Kalbermatten *et al.*, 1980). In addition, although the aquaprivy was previously considered a viable intermediate technology option, the necessity of relatively frequent and regular maintenance not required by many other excreta disposal systems has led to some questioning of its suitability for developing countries.

AQUAPRIVIES IN DISASTER AND REFUGEE RELIEF

Aquaprivies were first used in Palestine refugee camps in the Middle East as communal facilities (Wagner and Lanoix, 1958). While regarded as fairly successful (Assar, 1971), the brick construction of the original tank design meant that a relatively long time was required to make them operational in large numbers. Although aquaprivies were installed on a small scale using brick and other materials including ferrocement in Bengali refugee camps in India in 1971 and later in camps for displaced persons in Bangladesh, an appropriate, rapid construction design was not found. The idea of using them in other disaster or refugee situations languished until recently.

Aquaprivies were adopted for use in the holding centres for Kampuchean refugees in Thailand, which were established following the Vietnamese overthrow of the Kampuchean government in 1979. In contrast to the flurry of evaluative research which accompanied the design and installation of the Oxfam "Bengal loo' in refugee camps for Bengalis in India in 1971—1972 (Ressler, 1977; Lloyd and

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Daniel, 1978), the unit used in the Khmer holding centres in Thailand has not been evaluated previously.

The purpose of the present paper is to document the lessons learned concerning the Thai aquaprivies after over 2 years of field operation. In order to collect detailed information, all camp sanitarians working in Khmer holding centers during March and April, 1982, were asked to complete a questionnaire which was subsequently supplemented by an extensive on-site visit and interview.

AQUAPRIVIES IN KHMER HOLDING CENTRES IN THAILAND

Policy. From October, 1979, displaced Khmers who had been massing on the Kampuchean-Thai border were placed under the jurisdiction of the Royal Thai Army and relocated away from the border in holding centres, pending resettlement or repatriation. Six centres were opened at short notice from October, 1979 to August, 1980, and their combined official population peaked at approximately 163,000 in mid-June, 1980.

An area of considerable concern to the Regional Office of the United Nations High Commissioner for Refugees (UNHCR), which is responsible for all material assistance to the refugees, was that of sanitation. In the two holding centres opened in 1979, Sa Kaeo and Khao I Dang, trench latrines and cistern toilets were installed respectively, but a series of problems were encountered. It was found that hygiene was poor, flies were abundant, and excessive maintenance was needed. The cisterns required frequent pumping, and the latrines filled with water (it was rainy season), their pit-walls collapsed, and they had to be rebuilt frequently at new locations.

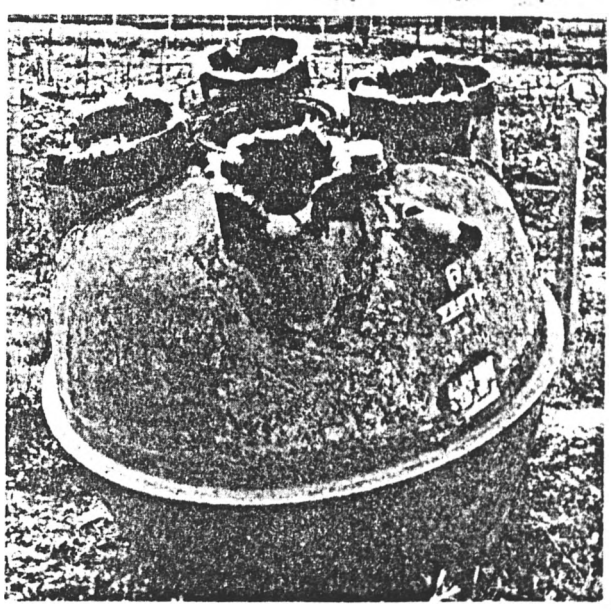
Officials at UNHCR, assisted by engineering consultants, searched for a superior alternative sanitation system for subsequent holding centres. An engineer who had been involved in the design and use of pre-fabricated aquaprivies in Bangladesh was seconded from CONCERN to UNHCR during 1979. He developed plans for a fibreglass prototype with a Thai industrial manufacturer, Premier Products, and the engineering team recommended adoption of the innovation. A number of planning criteria were established in order to take into account the need for low per capita cost, low water availability in some areas, fast installation, limited maintenance and repair capacity, cultural acceptability, high utilization rates, and mobility for possible eventual relocation.

UNHCR formally adopted the aquaprivy in early 1980 to take care of the sanitation needs of all five holding centres subsequently set up (including Sa Kaeo II, built after Sa Kaeo I flooded and was abandoned). A financial agreement was reached with Premier Products and approximately 1,000 units were eventually supplied. After the completion of the last holding centres, the CONCERN engineer remained in Thailand, but no resources were committed specifically to either the short-term assessment of aquaprivies' performance or to the long-term evaluation of the overall effectiveness of the sanitation system of which they formed the principal component.

Design, installation and utilization. The "Zeptik" unit manufactured by Premier incorporates all the standard design concepts of an aquaprivy mentioned above. The Zeptik unit is novel because it is constructed from fibreglass-reinforced plastic (Fig. 1); it is therefore transportable between construction and installation, non-corrosive, durable and may be relocated. Premier designed two models, but UNHCR only installed the larger KS40 model, with a total volume of 4 m^3 designed for use by 80 persons. Each unit is equipped with four squat plates (Fig. 2).

An integrated site plan for Khmer holding centres constructed in 1980 was drawn up by an engineering consultant to UNHCR. The site plan incorporated current theoretical considerations concerning the integration of refugee camp site services into a community-oriented housing layout, divided into "quads." The general plan adopted for the camp construction of Kab Cherng, Kamput "new" camp, Mairut "new" camp, Phanat Nikhom and Sa Kaeo II is illustrated in Fig. 3. Walking distances to the toilets from the most distant houses in the quad varied according to the precise ground plan selected, but never exceeded 50 m.

In Khao I Dang, a few aquaprivies were installed for use in the smaller of the two camp hospitals, and were connected to a single large septic tank originally incorporating a sand filter. In the other five camps, aquaprivies with individual seepaway systems incorporating contrete-ring underground tanks and four-cubicle toilet sheds of standard design were constructed in almost all quads (Fig. 4).



Khao I Dang **Photo: Robin Biellik (1982)**

Fig. 1. Zeptik aquaprivy unit — model KS40, capacity 4 m^3, showing detail of effluent discharge pipe, central man-hole and squat plate arrangement (the plates themselves have been removed), and fibreglass-reinforced plastic construction. .

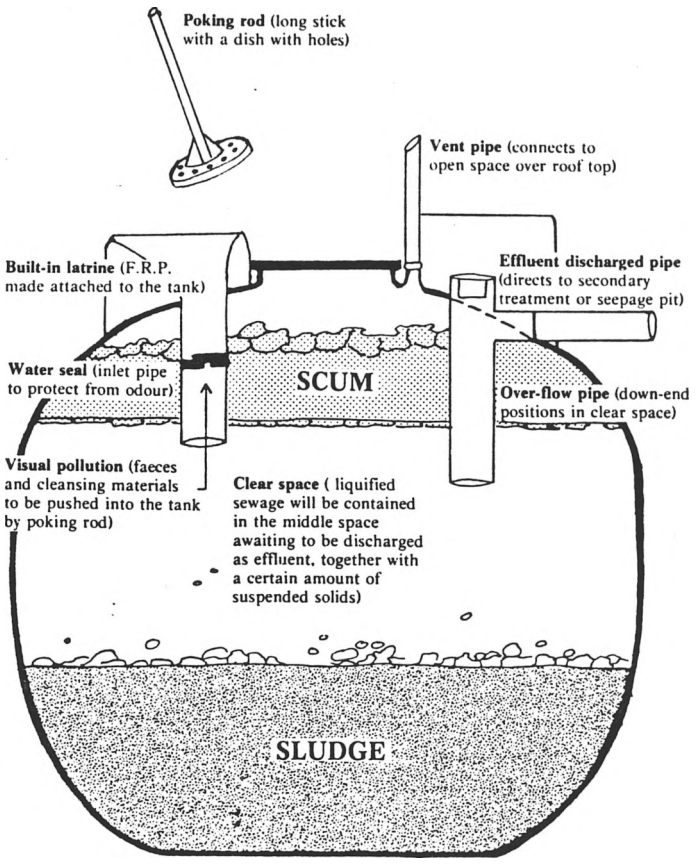


Fig. 2. Inside of Zeptic aquaprivy unit.

The Zeptik KS40 was designed to serve no more than 80 persons and to require desludging when the unit was half-full with faecal solids. Assuming that on average each individual produces 300 cm^3 solids per day, the aquaprivy would reach half-full (2 m^3) after $2/(0.0003 \times 80) = 83$ days, or a little less than 3 months. UNHCR provided each holding centre with one to three pump trucks with which to mechanically desludge the toilets, and transfer the sludge into sedimentation/oxidation ponds at a short distance from each camp (Fig. 5).

The overall distribution of aquaprivies in all Khmer holding centres was ascertained as of February, 1982 (see Table 1). Investigation revealed that a total of 979 units were installed, with a total of 3,916 individual squat plates.

Based on average refugee populations, each aquaprivy served $23 \times 4 = 92$ persons, very close to the design capacity of 80. It was recognized, however, that toilet usage exceeded this average during the months when holding centre populations peaked. Aquaprivy utilization exceeded design capacity by at least 80% in Mairut in May, 1981 (mid-month population 21,380), by at least 25% in Phanat Nikhom in the same month (21,556), and by at least 45% in Sa Kaeo II in December, 1980 (36,434). Unfortunately, average daily utilization rates were not measured systematically in the holding centres.

In August 1980, U.S.$1,291 was budgeted for the installation of each complete Zeptik unit (see Table 2).

TECHNICAL ASSESSMENT

On the positive side, it should be stressed that all of the broad features incorporated into the design of the Zeptik unit functioned as intended.

The precise location of each aquaprivy was clearly critical. The Zeptik Instruction Handbook advised that soil percolation tests be undertaken *before* site selection was completed, although camp site selection decisions are notoriously subject to strong political constraints. The Handbook presented alternative designs for seepaways under adverse environmental conditions.

Table 1. Distribution of aquaprivy sanitation units in Khmer holding centres in Thailand

Holding centre	Opened	Closed	Aquaprivy units*			Other squat plates	Average mid-month population, all months	Average usage, all toilets (refugees/plate)
			Number	Coverage	Squat plates			
Kab Cherng	Aug. 1980	Dec. 1981	90	all quads	360	0	6 664	19
Kamput 'new' camp	July 1980	—	229	all quads	916	19	14,692	16
Khao I Dang	Nov. 1979	—	7	Hospital B	28	2239	71,990	32
Mairut 'new' camp	Jan. 1980	Dec. 1981	148	all quads	592	0	10,901	18
Phanat Nikhom	July 1980	—	191	all quads	764	116	13,606	15
Sa Kaeo II	July 1980	—	314	all quads	1256	25	29,034	23
Total			979		3916	2399	143,785	23

*Data as of February 1982.

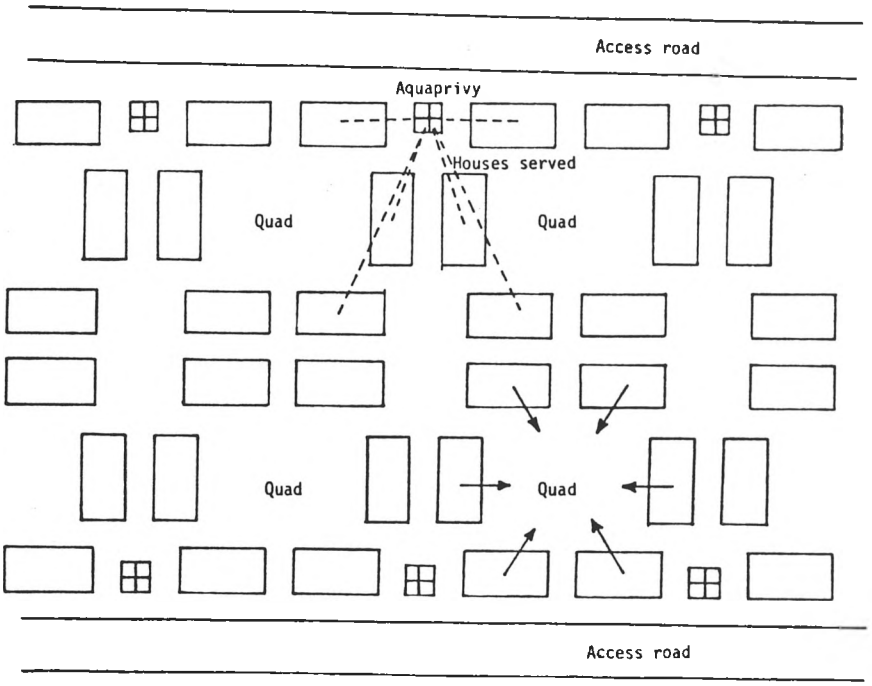
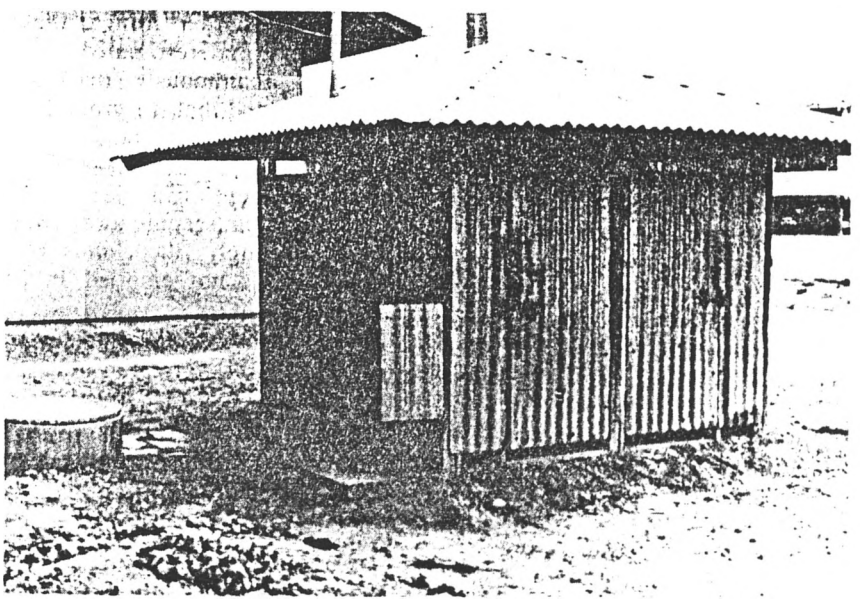


Fig. 3. Generalized integrated site-plan adopted in the construction of five Khmer holding centers in Thailand in 1980. Taken from a drawing by Justin Killkullen for KC Engineering.



Phanat Nikhom **Photo: Robin Biellik (1982)**

Fig. 4. Four toilet aquaprivy shed with urinal modification, showing use of locks on the doors, and an air-drying space between floors and walls.

Table 2. Zeptik aquaprivy budget*

Materials	Total cost (U.S.$)
Aquaprivy unit	900.00
Seepaway	
pipe	33.75
rings and mortar	42.50
Toilet shed	
lumber, corrugated steel, nails	315.00
Total	1291.25

*Taken from a formal proposal to install 40 aquaprivies in Mairut holding centre, August 1980. Unfortunately, no more costing details were available; labour costs were not estimated, and it is not clear if prices included on-site delivery.

The aquaprivies installed in Khmer holding centres were satisfactorily utilized by an average of 92 persons, slightly more than the 80 design capacity. The units generally did not require desludging more than once every 2 to 3 months, which also confirms design assumptions.

The Khmers found aquaprivy use acceptable, and the agencies that maintained them found them workable Especially where the use of individual locks and keys on toilet doors established family privacy, the quad residents were observed to maintain high standards of cleanliness inside the toilet sheds. Public toilets were usually cleaned daily by a trained refugee sanitary worker.

Table 3. Urinal modification budget*

	Item cost	Total cost (U.S.$)
Materials		
2 urinal stands	1.25	2.50
1 urinal slab	2.25	2.25
1 urinal tank	2.25	2.25
2 wing walls	1.90	3.80
0.03 m^3 sand	5.00	0.15
0.02 bag cement	3.25	0.05
Labour		
2.4 man-days labour	0.50	1.20
Supervision/technical support	—	2.42
Contingencies		
Fuel, equipment repair, parts	(10%)	1.46
Total		$ 16.10

*Taken from a formal proposal to install urinals on all aquaprivies in Phanat Nikhom holding centre, September 1981.

The water seal and extended gas vent-pipe system definately provided a relatively odourless environment around the aquaprivics. The problem of adult male urination on the exterior of the toilet sheds, which resulted in corrosion of the corrugated steel walls and excessive odours, was resolved by the addition, at first in Phanat Nikhom, of urinals. The modification was costed in September 1981, at about U.S.$16 per unit (see Table 3).

The sanitarians interviewed pointed out that the anaerobic digestion of faecal material in the aquaprivies was very vigorous, and large quantities of gas were generated (and vented partially at the squat plates, in addition to the pipe outlet). Fermentation was considered to be facilitated by the massive water dilution which is intrinsic to the unit's design.

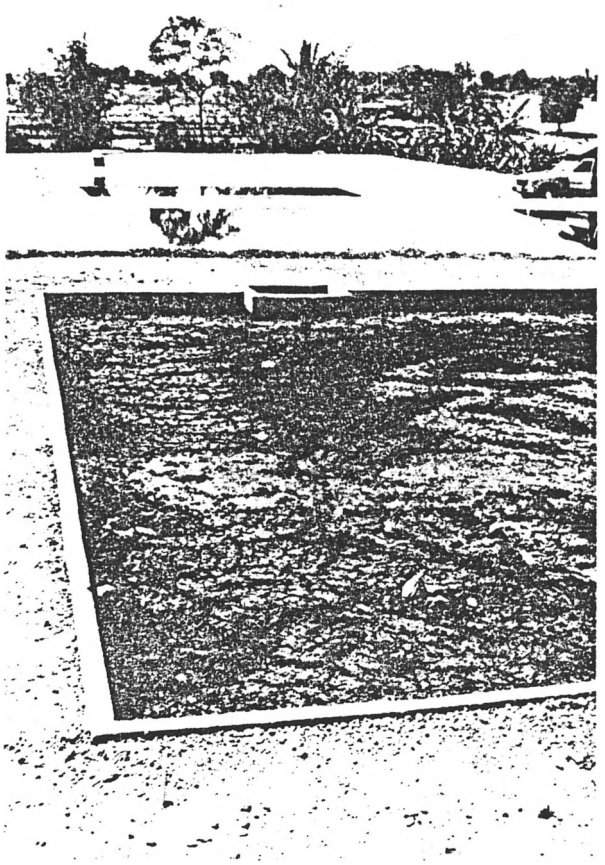
On the negative side, it was found that in general each aquaprivy required an average of approximately 300 l. of water per day for all purposes (see Table 4). One of the basic planning justifications for the unit was the understanding that large quantities of water were not needed, as is the case with some alternative systems such as the Oxfam "Bengal loo." This assumption proved to be completely false.

Seepaway design. A policy error was committed in the choice of design selected for final effluent treatment and disposal in Khmer holding centres. Approximately 0.5 to 1.0 m beneath the surface of the flat ground in most of the two provinces where the Khmer holding centres are located is a stratum of dense plastic clay frequently over 10 m thick. This land floods during the rainy season and is suitable for rice paddy agriculture.

Although soil percolation tests are clearly recommended in the Zeptik Instruction Handbook, the need for selecting seepaway design according to the results of percolation tests was grossly underestimated. The sanitarians interviewed reported unanimously that the soils were relatively impervious and that the groundwater table was high during the rainy season in all holding camps. Each aquaprivy was estimated to generate 300—500 l. aqueous effluent per day by displacement (urine, faecal matter and flushing water), but rather than seeping away from the system as intended, the tank simply filled, thus backing up fluid into the aquaprivy. If not emptied in time, the effluent would

Table 4. Water requirements for normal operation of Zeptik aquaprivy units, Thailand

Purpose	Quantity (l.)	Frequency
Refilling after complete desludging	3000	every 3 months
"Flushing" and refilling after pumping seepaway tank	200	every 5 days
Clean-up	40	daily
"Flushing" upon use (92 users × 2 l./person/day, minimum)	180	daily
Average total daily requirement, all purposes	300	



Phanat Nikhom **Photo: Robin Biellik (1982)**

Fig. 5. Sedimentation/oxidation ponds for final treatment and disposal of sludge and effluent collected by pump-trucks.

ultimately overflow at the open point of lowest elevation.

Further, the soil around many seepaway tanks was inappropriately graded, encouraging the accumulation of surface drainage water during the rainy season, which made it even more difficult for the system to discharge as intended.

The result of the failure of the seepaway design adopted was that the approximately 400 l. of material entering the system daily under normal conditions could be expected to cause the aquaprivies to fill up and overflow after a few days. During the rainy season, water seeping into the tanks from adjacent surface drainage predictably made the situation worse. Since the outset, the pump trucks operated full-time in all holding centres emptying seepaways every 3 to 5 days, in addition to occasionally desludging aquaprivies directly. This has incurred unexpected operating costs. For example, two pump trucks emptied all 191 seepaways in Phanat Nikhom holding centre approximately every 3 days, but only desludged the aquaprivies every 3 months. Restricted operating funds threatened to cut down the frequency of pumping in the period following this study.

In those areas with soils of modest absorbability, deeper seepage beds of gravel under and around the seepaway tanks may improve their function. In Kamput camp, the sanitarian has begun to enlarge some aquaprivy seepaway beds (Fig. 6), but it was not clear if the choice of new dimensions was based on physical data derived from a soil percolation test.

In camps where soil absorbability was poor to very poor, the installation of adequate final effluent treatment and disposal facilities as recommended in the literature, involving central collection to lagoons or raised filter beds has satisfactorily resolved the problem, whilst relegating the role of original seepaways to that of short-term septic holding tanks.

Toilet shed design. A number of design deficiencies were also recorded with respect to the toilet sheds.

At Sa Kaeo II shed roofs were originally constructed without guttering and oriented in such a way as to pour rain-water run-off directly onto the seepaways, which then further compounded the seepaways' failure to discharge effluent into the adjacent soil. It was reported that these roofs have now been rotated.

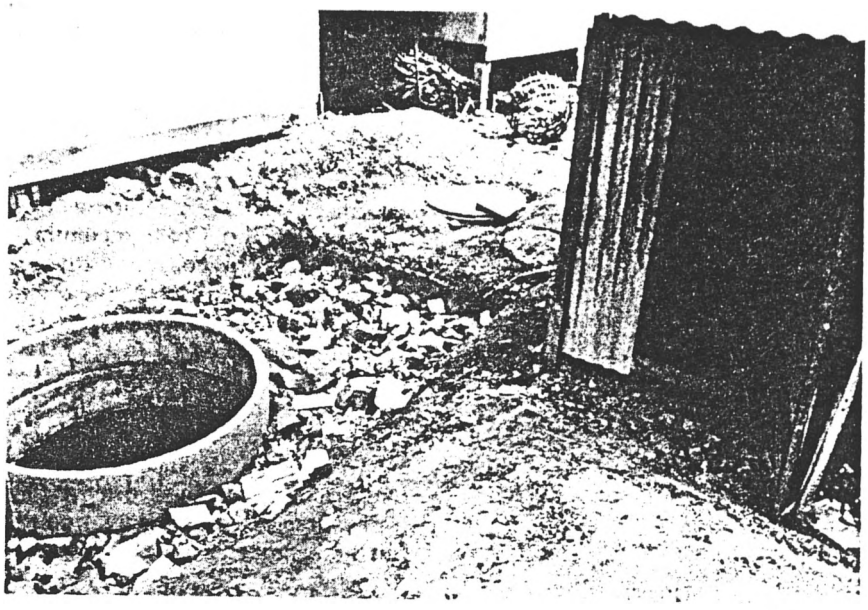
Hygiene inside the toilet sheds was reportedly hampered before concrete floors were installed. It was also observed that where no open space was left at the point where the walls met the floor, algae grew on many damp floors. At Sa Kaeo II, modifications have been made by installing concrete floors and an air-drying space in all toilet sheds.

Dampness and urine had rusted away the bottoms of many of the corrugated steel walls and acidic components of vented gases were observed to seriously corrode roofs in the vicinity of the vent-pipe (see Fig. 7) in Phanat Nikhom holding centre. Alternative roof materials such as thatch or corrugated asbestos have been suggested to resolve this problem, but those materials have their own intrinsic drawbacks.

The gas vent-pipes installed on the outlet at the top of the aquaprivies were designed to incorporate a curve (illustrated in the Zeptic Instruction Handbook). However, the curve frequently clogged with scum (probably introduced into the bottom of the pipe when the aquaprivies became too full). Likewise, the absence of a T-junction on the top of the vent-pipe permitted the entry of rain-water. Where the vent-pipe became clogged, digestion and gas production at each squat plate was greatly increased.

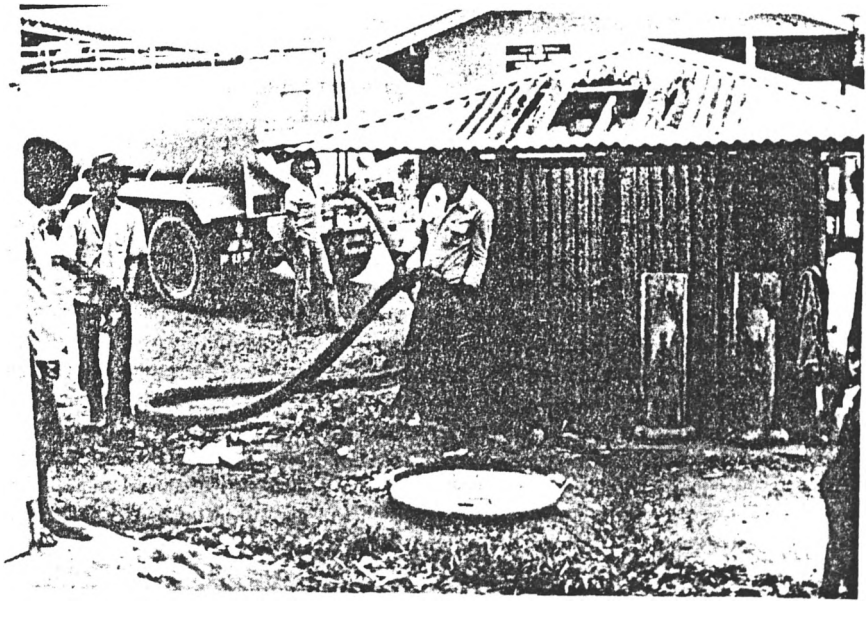
The central man-hole cover of the aquaprivies, which is the preferable opening through which to pump out the sludge, was inaccessible because the toilet sheds' four internal walls intersected immediately above it. Desludging had to be conducted through one of the squat plates instead of the central hole.

Lastly, the plungers made and distributed in most holding centres were too delicate for the job. After repeated exposure to moisture, the cheap wood used to make the plungers rotted, and sooner or later their one-nail construction disintegrated. Without a suitable plunger, hygienic conditions in the squat plates soon deteriorated, clogging occurred, and maggots were reported infesting some units. Attempts to cover the squat plates using wooden lids were not very successful. Like the plungers, the lids



Kamput **Photo: Robin Biellik (1982)**

Fig. 6. Seepaway bed enlargement. Detail of improvements to seepaway beds which may increase effluent discharge into the soil.



Phanat Nikhom **Photo: Robin Biellik (1982)**

Fig. 7. Seepaway pumping operation. Note also the urinal modification, corrosion of the roof around the gas vent-pipe, and corrosion at the base of the walls caused by dampness.

tended to get dirty and eventually broke up due to excessive moisture.

Public education. Many refugees frequently used solid or non-degradable materials for anal cleansing and also to empty the down-pipe, such as paper, plastic, wood, wire and stones, which were then dropped inside the aquaprivy. Some refugees ignored recommendations that toilet paper required separate disposal, preferably by daily burning. Paper and other materials occasionally combined to clog the squat plates and effluent discharge pipes, and generally increased the level of maintenance required. Debris also caused damage and clogging to the pumping equipment when the units were emptied. Clearly public education to emphasize the need for and most practical methods of ensuring hygienic conditions and preventing damage to the squat plates and pumping equipment was not always adequate. However, there was ample evidence that, where sufficient water was available, where refugees had received adequate instruction and encouragement, and where they maintained their own toilets under lock and key, standards of hygiene were perfectly adequate.

CONCLUSIONS

In general the Zeptik aquaprivy unit performed well as a primary sewage treatment facility. Contrary to common belief amongst agency officials, there is no evidence to suggest that the utilization rates of the units remained consistently far in excess of design capacity, except during peak camp population surges. The major deficiencies in the overall sanitation system as originally installed are all related to engineering issues concerning the seepaways and toilet sheds. The construction of lagoons or filter beds for final effluent treatment and disposal and the modification of existing seepaways and toilet sheds have resolved most of these deficiencies. Additional funds were committed to meet these unpredicted costs by UNHCR.

Aquaprivies are suited for use in the humid tropics, but engineers involved in their installation must remain aware of the specific problems intrinsic to that environment. The operation of aquaprivies does appear to require large amounts of water, contrary to planning assumptions in Thailand. Such quantities are often available in the humid tropical regions. The major problem is that these same regions tend to be associated with high water tables, land with minimal slope, and often semi-permeable soils. However, effluent disposal and toilet shed designs that function adequately under these conditions are available in the sanitary engineering literature.

The respondents during the present study frequently expressed the belief that adequate management was the key to the economical uninterrupted operation of the aquaprivies. The sanitarians interviewed agree that the cultural acceptability of these toilets was excellent; adults even used them to urinate, which is not always the case in southeast Asia. A few young children continued to defecate indiscriminantly in the holding centres, but that is not unusual! The aquaprivies owe much of their high acceptability to their close proximity to their users, as well as to good maintenance.

Many respondents criticized both the high cost of the units and the energy-intensive, high technology approach of the Zeptic unit. This objection is valid, although on balance the Zeptic unit is a permanent, recoverable investment when adequately maintained. Pit and trench latrines are cheaper but are usually only good for a year or two at best. Another alternative is the more durable Asian pour-flush toilet connected to an urban-type central sewage collection and disposal system. However, the pour-flush toilet may require even more water than the aquaprivy for its normal operation, and is likewise an expensive system. The high cost of the Zeptik unit is mainly due to the petroleum-based materials from which the unit is made, and there is probably no comparable alternative material that could be used without dropping major design criteria such as fast installation. It is feasible that if aquaprivies were utilized more widely, their mass production might substantially reduce unit costs.

One or two sanitarians suggested that the current frequent pumping of the rapidly-filling seepaways might become acceptable normal practice with aquaprivies. On the contrary, such a policy would ignore the fact that the unit is intended to permit the partial digestion of sewage. If it were to be used permenently as a holding tank with a water seal, it would be cheaper to construct simple cistern toilets. Cisterns of the type in camp-wide use at Khao I Dang holding centre were easier to service since the squat plate is removable, although the undiluted sludge was often difficult to pump. Untreated sewage could then be centrally collected via sewers or pump trucks for transfer in lagoons or mechanical treatment plants. Such a system would require even more technology than the current arrangements.

RECOMMENDATIONS

In sum, the authors feel that the Zeptik aquaprivy unit as used in Khmer holding centres in Thailand is a valuable tool in the refugee camp sanitary engineer's armamentarium. If installed and maintained in the manner originally recommended by its manufacturers, it performs well as a primary sewage treatment facility. However, the following points are critical.

General function and design

- Pay considerable attention to technical design issues related to the overall sanitation system, especially in selecting the method of final effluent treatment and disposal.
- A soil percolation test is a prerequisite to the choice of any system. Indeed a "perk" test is an indispensable prerequisite to camp site selection.
- The aquaprivy requires a considerable amount of water for normal operation. Do not adopt the unit for use in regions of low water availability.
- Make provision for moderate levels of maintenance throughout the working life of the sanitation system.

- Do not exceed the number of users for whom the unit was designed.

Seepaways

- If soil absorbability is poor, if the land has minimal slope, and/or if the ground tends to flood in the rainy season, the small concrete-ring seepaway design employed in Thailand will only serve as a short-term septic holding tank. Select another overall treatment and disposal system.
- Grade the ground around the seepaways so as to reduce flooding with surface drainage water.
- Where appropriate seepaways are installed and frequent pumping is not required, seepaway lids should not routinely require removal. To prevent interference, contour the soil high enough to hide the lids completely underground. Bury effluent discharge pipes between aquaprivies and seepaways to the appropriate depth to avoid damage.

Toilet sheds

- Arrange shed roofs so that run-off is directed away from seepaways.
- Include concrete floors in all toilets, if possible.
- Use materials other than corrugated steel for the construction of walls and roofs, if possible, to avoid corrosion.
- Leave an air-drying space open at the point where the walls meet the floor.
- Arrange the aquaprivy gas vent-pipe in a strictly vertical fashion, and mount a T-junction on top.
- Make provision at the point of intersection of the shed's four internal walls so as to permit free access to the aquaprivy man-hole cover in the centre of the unit.
- Supply durable squat plate plungers and lids which resist moisture and replace them when broken.
- Supply a little disinfectant to the users to permit them to control the breeding of flies and reduce odours around the squat plates.
- Include simple urinal units on each aquaprivy.

Public education and involvement

- Encourage users to take full and equitable responsibility for daily maintenance of the aquaprivy to which they are assigned, calling upon existing community structures for support. Where possible, permit users to lock their assigned toilets.
- Encourage users to maintain high levels of cleanliness in and around the toilet sheds, to use the disinfectant supplied, and to train their children carefully to use the toilet appropriately.
- Instruct users not to drop foreign material (wood, wire, stones, paper or plastic) into the aquaprivy. Include practical instruction on the use of the plunger and the suitable collection and incineration of toilet paper.
- The role of sanitation in the control of communicable disease should form the basis of continuing public health education campaigns throughout the community. Accompany educational sessions by culturally appropriate visual aids such as movies, filmstrips and/or flipcharts, which can be readily obtained from a number of development agencies worldwide.

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