



*Safety during
kahriz renovation*



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IOM International Organization for Migration

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Safety is a vital issue

Dear kankans,

Kankan profession is very different from others. It is a very ancient profession. Kankans have for the past 2000 years helped hundreds of generations and millions of people through facilitating their access to water in most arid regions of the world. Life can only survive where there is water. Your profession is very important and deserves much recognition.

Kankan profession is also very risky and these risks are different than breaking of a nail or getting backache due to spending a lot of time sitting in an armchair. Kankans work in deep and dark wells where some of the risks involve collapsing of such wells and tunnels, lack of oxygen or poisonous snakes. These risks should not worry us; rather we should be aware of them, be in control and develop our skills so that we can minimize such dangers.

Kankan profession requires courage, intelligence and a healthy body with instincts to feel dangerous situations. A good kankan is also a responsible one, since he knows that his and his colleagues' lives depend on him and he is obliged to protect his co-workers.

In this profession, it is important to observe rules of the workplace. Hence, these rules are there for your personal safety and life. A professional in this business should also keep his loved ones, spouse, children and parents in mind. How would they feel if you are involved in an unfortunate accident? You should also be considerate of your colleagues. You are a team and each one of you is responsible for other workers' lives. It is a business of responsibility and trust among colleagues. No one would wish to be responsible for an accident which would hurt their colleagues. Let's just imagine: what if a wheel operator lifting you from the well somehow loses control of the wheel for a moment. What would happen?

Easily, you should be considerate of your village. Wouldn't one human life be more "expensive" in exchange of renovation of a kahriz? There is also a good proverb: "Caution is an honor for a hero." It is for this reason that we prepared this handbook: to protect you, to raise your awareness of the rules for you to observe and respect them and work in a safe environment.

International Organization for Migration



Main safety hazards in Kahriz renovation

1. Health of kankans
2. Recruitment of casual workers with lack of skills and training
3. Lack of previously conducted researches on kahrizes
4. Untidy workplace
5. Malfunctional equipment and tools
6. Not wearing uniforms
7. Unauthorized communication
8. Not using reinforcement in enlarged wells
9. Starting work without daily check up of the equipment and tools
10. Starting work without daily check up of the equipment and tools
11. Unauthorized use of tools and equipment
12. Unsupported entrance to and exit from wells
13. Unsafe lowering and lifting of weigh
14. Inattentiveness of wheel operators
15. Lack of lighting in tunnels and wells
16. Water leakages to tunnels form surface
17. Hazardous gases accumulated in clogged tunnels
18. Water flows which have been blocked in tunnels
19. Plasticized volume of soil
20. Dangerous animals and insects in hollow spaces among rocks
21. Working in enlarged tunnels and wells
22. Movement of vehicles over tunnels during work process
23. Active subartesian wells over tunnels during work process
24. Electric hazards during use of modern equipment
25. Consumption of alcohol during work
26. Lack of necessary medical kit

Observance of rules is obligatory in all fields operated by IOM.

A considerate person observes rules on his/her own

Main safety rules

Safety means – uniform, medical kit, communication

Uniform

Since ancient periods, kankans have used special uniforms during their work. These uniforms consisted of light and sturdy protective uniforms made of fabric and also special protective clothes and gears.

Currently kankan groups use special sets of uniforms and protective gears during renovation-rehabilitation activities. These uniforms and gears are light, flexible and are characterized by other advantageous distinctions. They help protect kankans from accidents and injuries:

1. Simple and warm overalls
2. Water resistant overalls
3. Fabric hats
4. Helmets
5. Short rubber boots (up to knees)
6. Long rubber boots (up to waist)
7. Rubber half-overalls
8. Rubber overalls
9. Simple fabric gloves
10. Rubber gloves
11. Safety belts
12. Respirators
13. Special gloves

Medical kits

Kankan groups maintain medical kits with themselves during work process. Medical kits include necessary drugs and tools for provision of first aid in field conditions.

Communications

It is necessary for kankan groups to maintain phone connection during work process. Kankans are provided with a phonebook which contains contact information of nearest healthcare facilities and other service agencies. Furthermore, it is advised to maintain a vehicle near workplaces. In deeper wells, corded field phones are utilized.



Safety issues


Safety issues of kankans involved in kahriz renovation / rehabilitation should be addressed from a security point of view. Kankans involved in kahriz renovation / rehabilitation should be healthy without serious health concerns. In particular, eyesight and hearing abilities should be adequate. Problems with heart, blood and venereal diseases, lungs and respiration system, ailing kidneys make this kind of profession impossible. It should be considered that kankans spend most of their working hours in tunnels which are not adequately aired, in humid conditions and most of the time with their feet in water. Fitness of kankans should also be evaluated. For instance, some people fear heights which could cause unfortunate accidents. Physical fitness of kankans should also be adequate. For instance, very tall and overweight people would find it very difficult to work in these conditions.

During renovation / rehabilitation activities, kankans must go through medical check ups and maintain relevant documentation.

Vigilance

Vigilance is an extremely important quality in kankans. Kankans should be very attentive from the first step – initial assessment of wells and tunnels through completion of renovation / rehabilitation. They should be very attentive during initial assessment of wells and tunnels. It is very dangerous to go into wells, lower parts of which have enlarged without security ropes. Especially, vigilance should be observed during work in tunnels.

“Vigilance should be one of the main qualities of kankans!”



Starting from the moment of entering the well on the first time, all details should be attentively examined and remembered while taking notes. In cases when renovation activities have not been started yet or when there is only one kankan in the tunnel, it should be inadmissible to move any objects around, to move stone laying, to move soil layers or to unblock clogged volume of water.

During initial technical assessment, at least 2-3 workers should be involved. Working in a completely quiet environment, these workers should position themselves in certain distances from each other in tunnels. Results of the review should not be discussed in tunnels. In tunnels, notes should be taken on a notebook and the results should be discussed on the surface.

*“Kankan, you should observe
quietness while
working in tunnels”*



Sensing danger

It is an important quality in kankans to sense danger beforehand during renovation work and to prepare for such dangers. This quality depends on a kankan's vigilance, experience and skills. It requires attentive conduct of the first and other assessment activities, surface evaluation, and a comprehensive appraisal of the results. The chief kankan and master kankan should examine the work area on a daily basis before the work starts. Sensing danger in advance requires careful attention to certain processes and factors in kahrizes. Most common factors are as below:

- Debris from wells and tunnel ceiling (“asmana”)
- Debris from tunnels in which construction is not being conducted
- Excessive dampness of tunnel walls (lack of durability in soil structure)
- Noises in tunnels (rustling, babbling and etc)
- Water leakages from tunnel ceiling and broken slabs
- Water flowing over collapsed debris in tunnels (blocked volume of water)

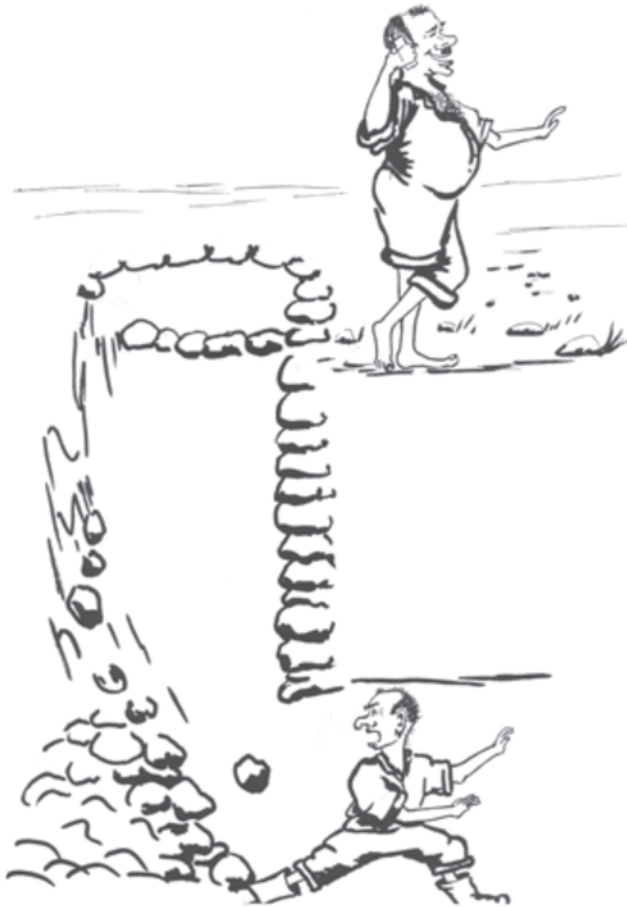
All these cases are indications of potential hazards and they should be carefully examined and work can only be resumed after preventive measures have been taken.

Coordination and communication

Adequate coordination of renovation work and establishment of communication among kankans are very important. Accidents are inevitable when work is not adequately coordinated and when communication is not properly established.

Coordination should also be adequately established among the renovation team. Sites which have not been chosen per standards or starting work without reinforcement measures can result in accidents. Furthermore, uncoordinated manner in which wheel operators and workers in wells and tunnels work, can result in accidents. Adequate coordination also requires efficient communication as well.

Organization of the workplace



Establishment of a safe work environment in kahriz renovation starts with organization of the workspace. Adequately positioned tools and equipment around the well and orderly work environment facilitates renovation work. Organization of the workspace is primarily the responsibility of renovation / rehabilitation team. In order to start, undue substances, waste materials, rocks and clods should be removed from the well exit point area. The equipment to be used should be positioned in a way which would not cause hazards.

In order to store work tools, as well as the uniforms, kankan tents or temporary shelters should be constructed. These shelters are also important for kankans to rest during breaks. A medical kit kept in normal conditions should be stored in such shelters. During hot weather, it is also important to construct an umbrella for the wheel operator. Ensuring safe work environment for the whole team, is directly dependent on wheel operators' performance. To this end, the wheel should be adequately fixed, be reliable, and stable. The umbrella should not create an obstacle for the wheel operator to perform his duties. One other important provision is that the wheel operator should be able to provide necessary tools for workers in tunnels and wells, as well as communication tools in cases of accident.



Daily attention should be paid to maintaining the above described work environment through renovation / rehabilitation process. Hence, at the end of each day, the well area should be cleaned of the excavated soil and silt; the rope on the wheel should be stored in place and the well exit point must be closed. The tools should be cleaned and stored in the shelter.

“Kankan, a tidy work environment is the basis of safety.”





Checking tools and equipment

The first task of a kahriz renovation team in an adequately organized workplace is to check tools and equipment to be used during the renovation process.

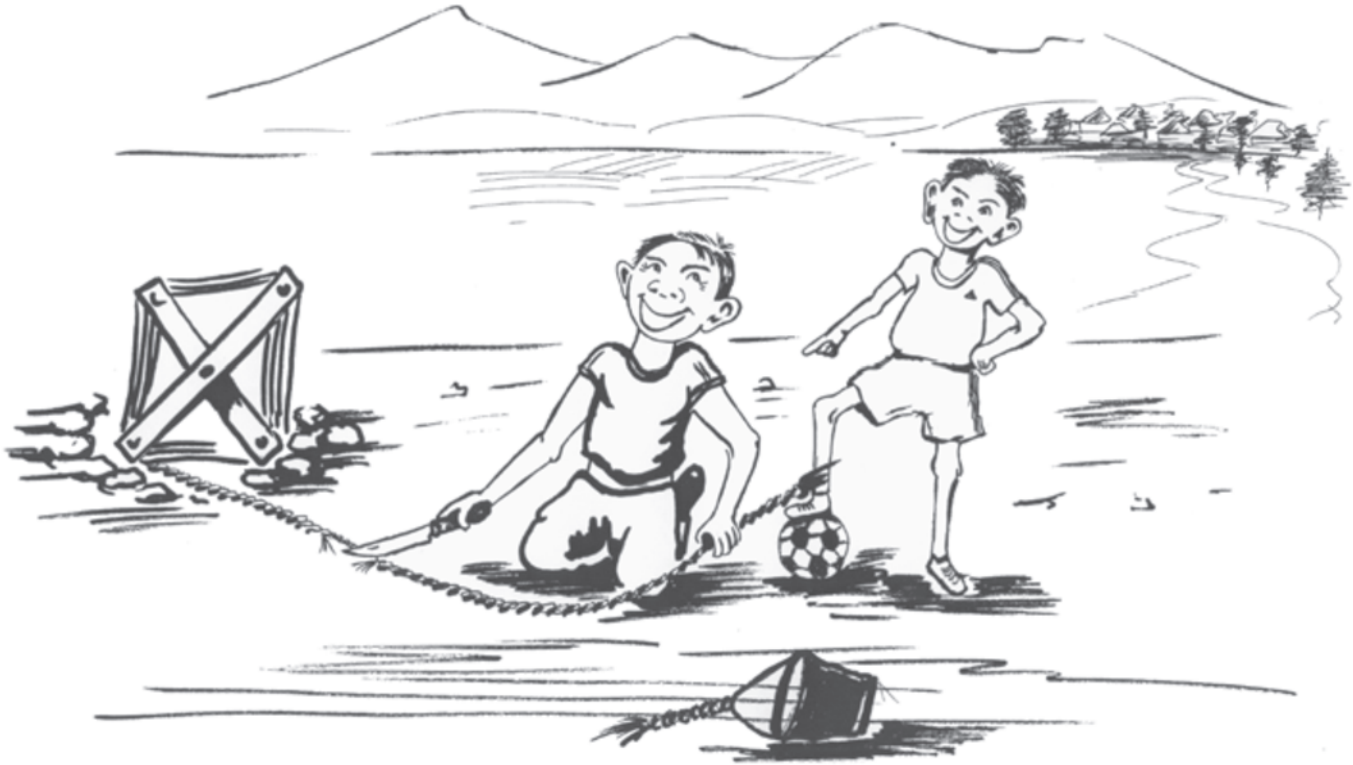
“Kankan, do not start work without checking tools and equipment”

First of all, durability and firmness of wheels should be checked and rope on such wheels should be examined thoroughly. Wheels should be rolled without load to check their normal spin quality and then they should be tested with some weight. Only after these tests, kankans may be lowered into wells. The same check up should be followed with electrically operated and also automated wheels. Furthermore, power supply lines, source area should be checked in electrically operated wheels and oil and fuel reserve should be ensured in automated wheels.

“Kankan, adequate conditions of tools and equipment ensures your safety and comfort.”

After that, buckets or containers (“dol”) and their handles should be tested. Following this, sharpness of excavation tools must be checked. These tools and their handles should be checked for potential cracks as well. Kankans should not enter tunnels before checking lighting devices. Only tools and equipment which have been checked and repaired can be considered to be ready for use.

“Kankan, do not start work before checking tools and equipment!”



Preliminary assessment of wells and tunnels – potential cases

After checking tools and equipment, kankans should conduct a preliminary assessment of wells and tunnels before work. These checks should be conducted on a daily basis, before starting work.

“Chief Kankan, do not start work before preliminary assessment of wells and tunnels!”

When going into wells, kankans should examine wells and stone laying situation. The tunnels should also be examined in the same manner. The level of water in tunnels, dampness of walls and erosion of soil structure should be observed. In tunnels which have been fastened with walls stone laying situation, cracks on tunnel ceilings and potential alteration in tunnel walls should be checked and noted. Further, ventilation of the air in tunnels should be ensured in tunnels. To this end, candles could be used as well.

“Master Kankan, do not start work before providing instructions for workers.”

The results of assessment should be discussed on the surface and potential cases should be identified. Work can only start after safety measures have been taken for safety purposes.

Working in wells

Wells are structures with particular functions: entering kahriz tunnels, tunnel entrances, carrying necessary tools to tunnels and extracting certain materials. In order to ensure safe work environment in wells, certain rules must strictly be observed.

Wheel operators carry an immense responsibility for safe conduct of renovation / rehabilitation in wells. Durability of wheels, durability of its components, horizontal positioning, smooth operation and their stability should be ensured. During lifting or lowering weigh, operators should avoid contact with walls. The ropes which are used for lifting or lowering weigh can be operated with a 15-20 sm interval. Wheels must be positioned in a stable position to prevent displacement.

*“Wheel operator, be attentive,
you are responsible
for the safety
of everyone else.”*

First of all, lowering and lifting kankans to wells requires a lot of concentration. The wheel operator must ensure that the kankan is ready to be lowered before he can start. During lowering kankans, wheel operators must be assisted by another worker. Lifting kankans from wells must follow the same procedure. The wheel operator's assistant should assist kankan to get out of the well.

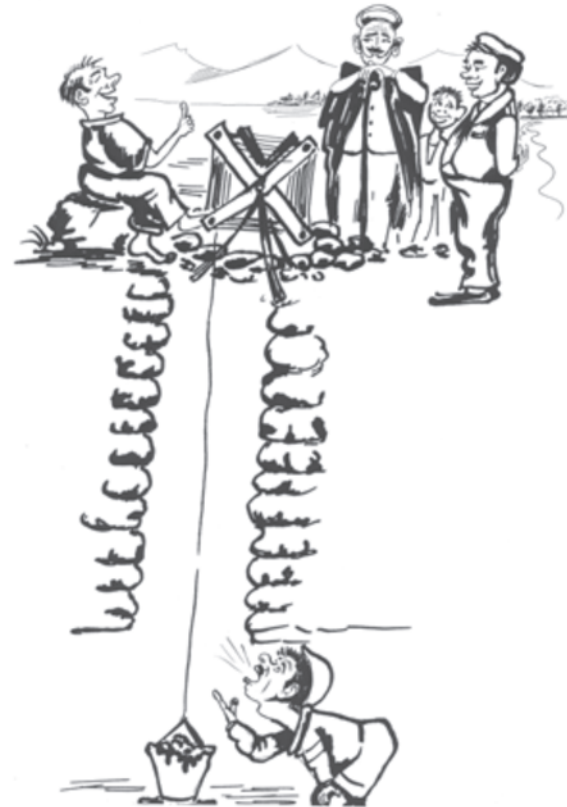
During lifting or lowering weigh, the wheel operator must wait for a signal from the kankan at the bottom of the well, so that that he is not positioned under the weigh.

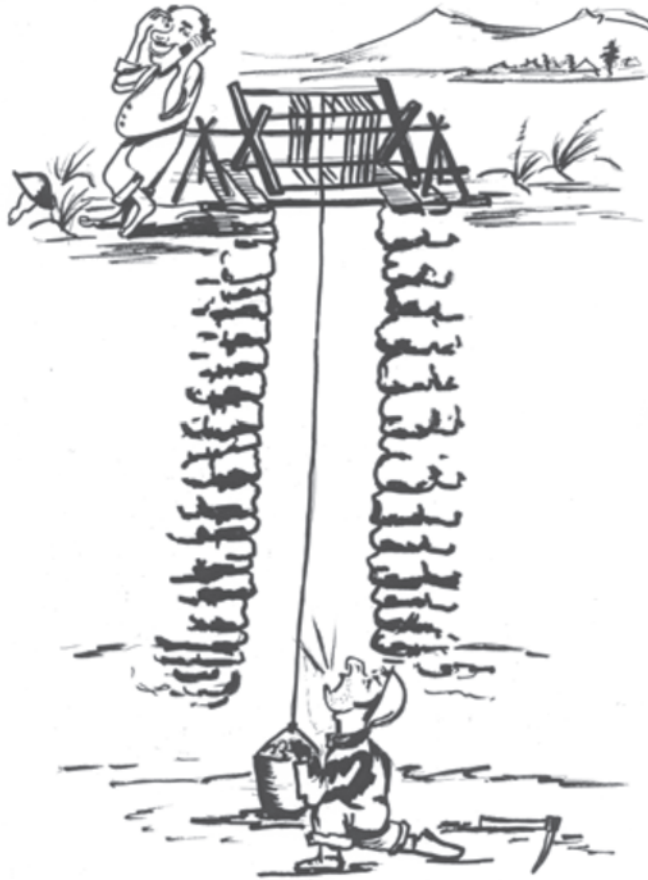
*“Wheel operator, do not operate
the wheel before getting
the signal to do so.”*



When the lifted weigh reaches well exit point, the wheel should be locked and the weigh be taken off the rope. During lifting and lowering weigh, only special containers should be used. It is very unsafe to lift or lower items (tools, slabs, rocks and etc) when they are directly tied to the rope. Wheel operators must be attentive to signals coming from the well, avoid engaging in conversations with other people in the vicinity, keep focused on his work, and maintain a quiet work environment around the well.

“Kankan, do not take the weigh off the rope before positioning it arway from well exit point.”





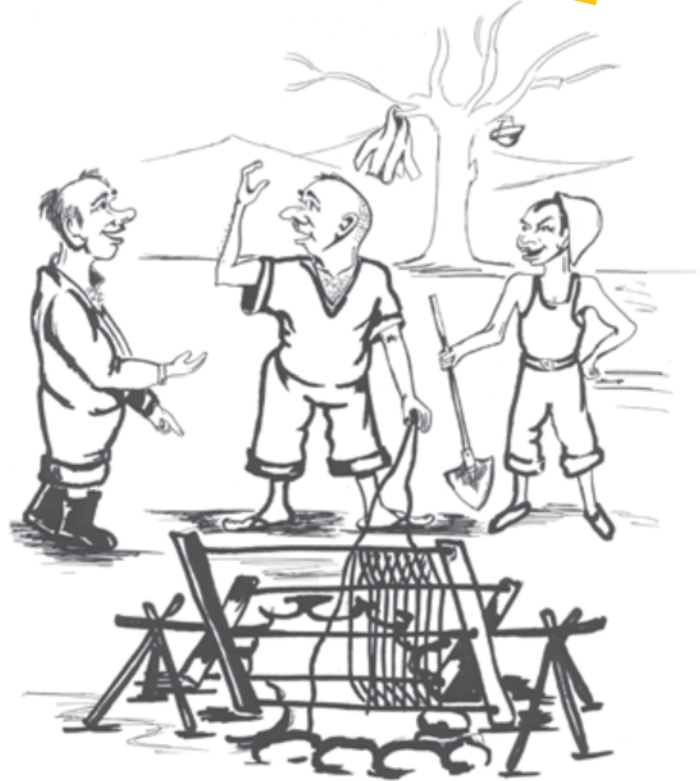
*“Wheel operator,
all your attention must be focused on the well.”*

Responsibilities of workers in wells and tunnels

These workers must wear all components of the uniform and use security belts when going into wells.

It is obligatory to use a security belt when going into wells. When kankan enters the well, he should inspect walls and stone laying. In doing so, he should displace layers and rocks which are likely to fall and let them land at the bottom of the well. If the stone laying in wells are completely unreliable, all stone laying must be displaced and taken out of the well to be able to continue work in such area. The kankan who works at the bottom of the well must use tunnels as shelters when weighs are being lifted or lowered. In deeper wells or when there are no tunnels, kankans must carve out shelters (0, 3 – 0, 5 m) for themselves in such areas to use when weigh is being lifted or lowered. In addition, kankans and wheel operators must maintain a previously agreed upon communication signals. Such communication must be in the form of short and concrete signals. When lifting rocks or other materials from wells, they should not be tied to ropes. Only special containers must be used for this purpose.

“Kankan, do not enter wells without your uniform.”





*“Kankan,
using security belt is
for your own safety.”*



“Kankan, the security belt is your second line of insurance.”

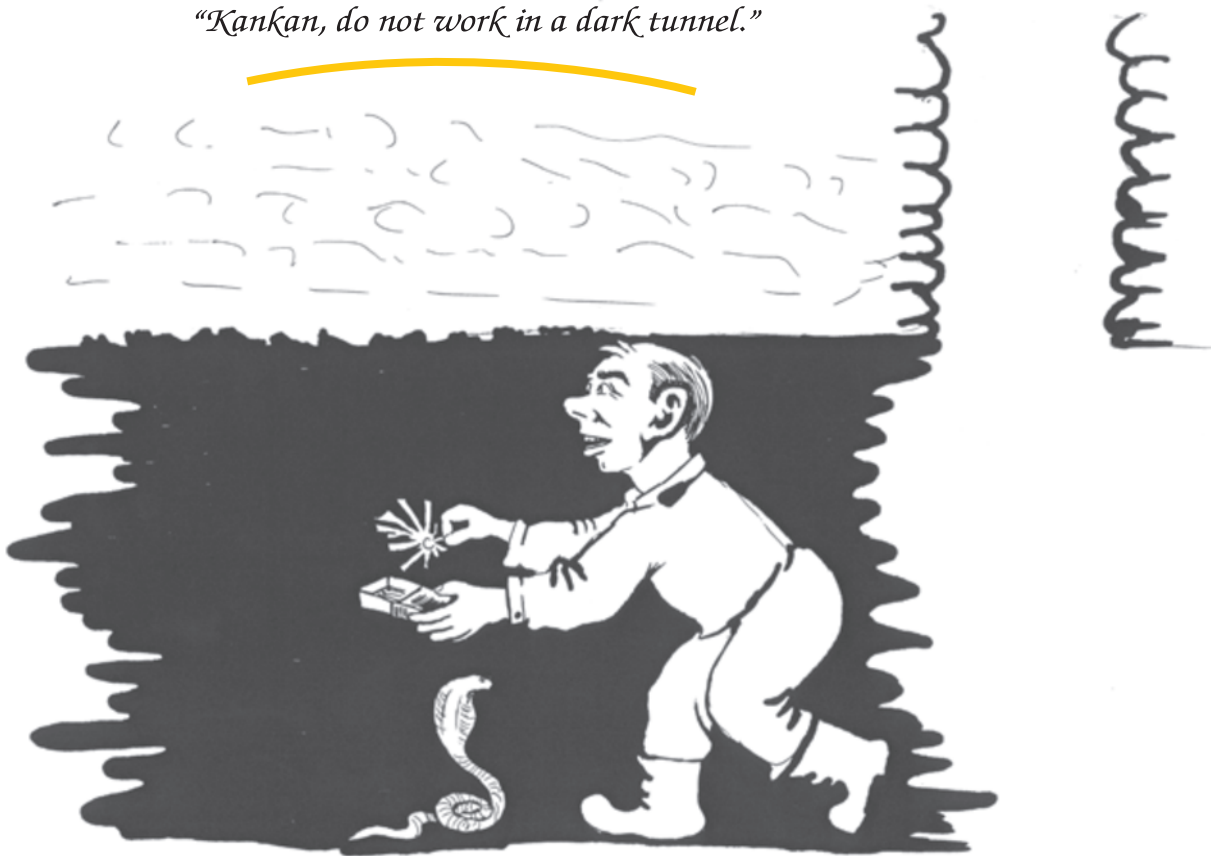


During work in tunnels

During work in preliminarily examined normal tunnels, the first thing is to ensure proper lighting. In order to ensure adequate positioning of lighting devices, they should be fastened to walls or ceilings in tunnels. These devices must provide light towards the work area. The distance between devices must be arranged in a way that the work area is provided with equal amount of light. In corners, lighting devices must be positioned in consideration of both directions.

After adequate lighting is ensured, planned work can be carried out. During work in tunnels, it is safer to communicate with short and previously agreed upon signals, rather than talking aloud or for extended periods.

"Kankan, do not work in a dark tunnel."



Responsibilities of the chief kankans

As a person who is accountable for a safe conduct of renovation / rehabilitation work, the chief kankan must control the entire work process and supervise all new activities. In order to ensure safe operation, he should regularly give instructions to his workers.

Responsibilities of master kankans

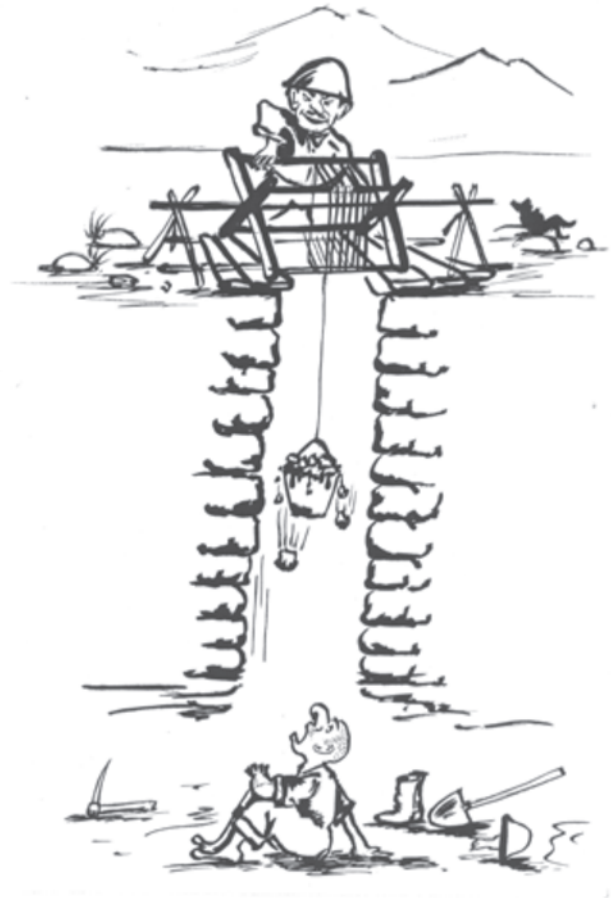
The master kankan, who plays the main role in renovation / rehabilitation work, is directly responsible for safe conduct of work for tunnel workers (“laꞤꞤmbar”) and haulers (“dolkeꞤ”). The master kankan starts working by himself and per instructions of the chief kankan. After ensuring safety, he can be assisted by tunnel workers and haulers. Dismantling and constructing walls must directly be carried out by master kankans. Mistakes made during such work can lead to unfortunate accidents later on (collapse of tunnel walls or ceilings).



Responsibilities of tunnel workers

Tunnel workers work in the areas of cleaning and excavation of tunnels, per instructions provided by master kankans. When confronted by unusual situations (changes in water level in tunnels, hollow spaces and etc), tunnel workers must immediately stop work and inform master kankans. They should not displace walls in tunnels and in general, be attentive to all details during their work.

*“Tunnel workers,
do not touch bases of tunnel walls.”*



Responsibilities of haulers

When carrying buckets or containers through tunnels, haulers must be attentive not to touch or displace tunnel walls. They should also care not to dislodge weigh during lifting process. Haulers must ensure carrying received materials (rocks, slabs) without dropping them and without creating hazardous situations for themselves. As a person with regular contact with the wheel operator, the hauler must inform them on the situation in the work area in tunnels.

*“Hauler, do not stand
under weigh.”*



Safety in collapsed and enlarged wells

During work in collapsed and enlarged wells, it is important to be more careful and to strictly observe safety rules. Collapsed wells must be carefully examined from the surface and if possible, from tunnels and causes of collapse must be identified.

Several causes might involve the following:

- Accumulation of water at the bottom of the well
- Leakages of surface water into wells
- Movement of heavy vehicles over wells
- Collapse of walls in wells

Safety and preventive measures must be taken before work can proceed in such wells. If possible, accumulated water must be released. After these procedures have been completed, work in such wells must be ceased for 2-3 days in order to prevent further collapses. At the end of this period, the collapse area must be fastened with stone laying and beams.

“Kankan, do not start work before fastening collapsed wells with stone laying and beams”



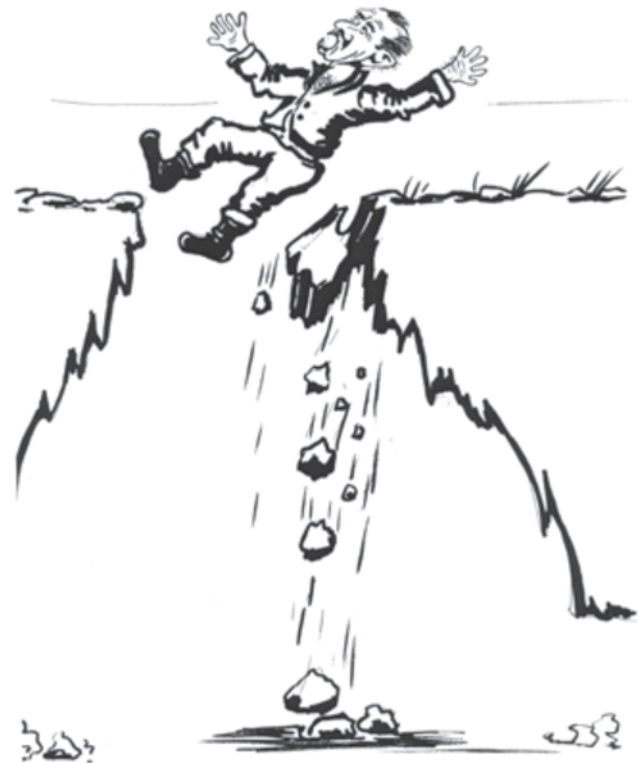
The beams in such structures must exceed by at least one meter beyond the collapse point. Top of the collapse area must completely be sealed with wooden sheets and only a 0,8 square meter space must be reserved for further work. It is imperative to use an insurance belt in collapsed wells. The insurance belt must firmly be fastened away from the collapse area and be connected to the kankan. In order to decrease further collapses, all materials and rocks must be withdrawn from the workspace. Sometimes a loose rock gets covered with soil and from the surface, it gives an impression that as if the whole well is blocked, whereas there usually remains a hollow space underneath such formations at certain heights in wells. Hence, kankans must be extremely careful when confronted by such formations. Withdrawal of rocks from wells must be reinforced with insurance ropes.

Work in enlarged wells can only start after the safety is ensured. Enlarged wells generally fall into two categories:

- Enlarged from top
- Enlarged from bottom

Work in first type of wells is not as dangerous as in the second type. It is possible to clean such wells through construction of safety ensured stone laying and beams. However, more safety measures must be taken when working in second type of wells. Standing or working on top of such wells must be avoided.

*“Kankan, do not approach enlarged wells
without preliminary examination”*




Safety when working in tunnels filled with water and in blocked tunnels

Even if the exit point of a well is 1 meter in diameter, it might have collapsed and enlarged just beyond half a meter through the well. In other words, even if the exit point seems sound, a light weight can cause a complete collapse and the kankan would run the risk of falling into the collapsed well. In such cases, the diameter of these enlargements might range between 2-8 meters. Such collapses would also block water flow and thus, cause accumulation of a volume of water at the bottom of the well and in upstream tunnels. As in collapsed wells, water must be released if possible and work in this area must be ceased for 2-3 days afterwards. This period is for letting wet structures to dry or fall. When work resumes, layers with potential disintegration risks are removed and only after these procedures, the well can be fastened with stone laying and beams for work to start.

Work in such tunnels is more dangerous, since pressurized volume of water can be accumulated in tunnels and if released in one attempt, this can create a vital danger for the kankan working therein. Water in these tunnels can only be released and blocked tunnels be freed through special methods. First of all, the situation must be examined and assessed. After measures are taken against potential accidents, work can be started. It should be kept in mind that if a volume of blocked water has been there for extended periods, tunnels might have also collapsed and enlarged. In other words, the volume of water could be much larger than estimations.

*“Kankan, do not attempt to unblock
clogged tunnels in one attempt”*







Safety during construction of new tunnels and wells

In order to start unblocking of tunnels, the area between the blocked area and the next upstream well must be examined. If this distance is long and the tunnel is situated not far below the surface, excavation of a new well near the blocked area would enable kankans to perform unblocking in safer manner. After this well is excavated, the kankan can start unblocking work. Kankan should work through the blocked area from “top to bottom,” which enables him to avoid potential dangers involved. During this procedure, kankan must keep the rope fastened to his belt, provided that it does not make it difficult for kankan to work. Work must immediately be stopped when confronted by damp soil. After this point, using thin rods kankan should make a small hole in the blocked area close to ceiling of tunnel for water to flow out and exit the well. If the volume of water is not released through this hole after 2-3 days, kankans perform further excavation through the damp area and make another hole for water to flow out. Blocked water is released in such manner.

If it is not possible to release the water in blocked tunnels or to clean the collapsed area, a new transfer tunnel can be excavated 6-7 meters away from the concerned area and the collapsed tunnel is sealed with stone laying from both ends.

When kankans excavate new tunnels and wells, the first thing they should consider is the structure of soil on the site. If the structure is softer and runs a collapse risk, the work must be accompanied through reinforcements. When excavating transfer tunnels, new transfer wells are excavated. After this procedure, functional tunnels are connected through this well. It is very important to be concentrated when connecting transfer tunnels with downstream tunnels. Due to incorrect planning, the transfer tunnels might cross collapsed tunnels. To this end, collapsed area must be marked and avoided. As kankans get closer to collapse areas, excavation must be conducted with utmost care. If kankans are confronted by damp soil, they should use iron rods to connect tunnels.

“Kankan, stop work when you discover water leakage in tunnel.”



Water leakages and safety in tunnels

Despite the source area, water leakages to kahriz tunnels during renovation process could be dangerous. Such leakages might originate from irrigation in rural areas and from water or sewage lines in urban settings. In both cases, sunken areas or accumulation of water on the surface can frequently be observed. While working in tunnels, work must immediately be stopped once such leakages are detected.

Leakage areas and potential causes must be identified through examination from the surface. After that, water flows on the surface must be stopped in the vicinity of kahriz tunnels. Coverage of this area should be ensured for 1, 5 equivalents of the depth of kahriz wells. For instance, let's say the depth of a kahriz well is 10 meters. In this case, 15 meters to both directions should be freed of surface flows. Underground renovation activities can only be resumed after this procedure.

Preventive measures against collapse and sunken structures

Kankans should feel the sturdiness of soil during initial contact. They should be able to tell if the soil structure is sturdy or if it has altered. Experienced kankans can easily assess the sturdiness of soil structures through intervention with a bore hammer or a spade and assess whether it is safe to work with that particular type of soil structure. Through this procedure, they can also assess the necessity of preliminary preventive measures.

Firstly, kankan must ensure his own safety. Only after that he can take preventive measures such as fastening of walls or stone laying. Before renovation activities start, flow of surface water must be stopped along with kahriz line.

*“Kankan, do not try
to unblock a clogged
tunnel in one attempt”*



Protection from reptiles and dangerous insects

During renovation, ceilings and walls of tunnels must be examined for dampness and compared with previous conditions. Experienced kankans can tell if there is a volume of accumulated water ahead through feeling the soil structure in tunnels. Blocked water in kahriz tunnels results in pressurized water flows. Depending on the level of water sources or filtration quality of soil, the amount of water in tunnels could raise and this might result in a collapse or flood. Continuing work in such areas can result in fatal accidents.

Physical and mechanical properties of soil structure in tunnel ceilings plasticize due to extended periods of being in contact with water. After water is released from such areas, these structures tend to collapse due to their increased weight and altered structure. Therefore, it is strictly prohibited to start renovation work immediately after releasing water in such tunnels. At this stage, a 2-3 day break must be taken to allow for drying of tunnels and wells. Cleaning such tunnels must be conducted along with reinforcement measures and stone laying where appropriate. Work in these areas must be conducted by master kankans under supervision of chief kankans.

As we know, kahriz tunnels and wells are places where some reptiles and dangerous insects dwell. Therefore, such reptiles and insects are commonplace during kahriz renovation, especially through summer. Scorpions and different rodents can be found in stone laying in wells. In tunnels however, different types of snakes can be frequent.

Therefore, it is dangerous to work in tunnels and wells without uniforms. Furthermore, kankans should be familiar with ways of handling such reptiles and maintain a medical kit at all times.

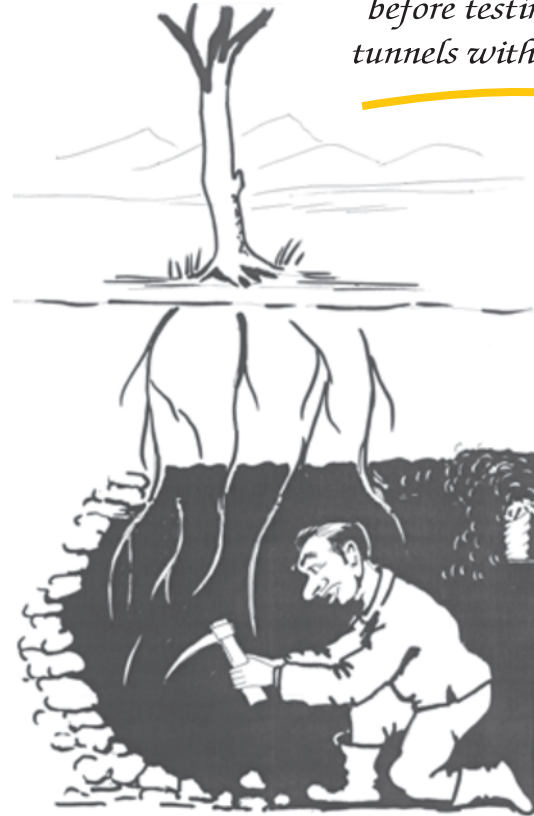


Protection from dangerous gases

Dangerous gases in kahriz tunnels can mainly evolve due to two reasons. The first reason can be originated from trees above tunnels. Roots of such trees (especially walnuts) extend to tunnels which may block them and emit dangerous gases. The second cause is related with leakages of sewage water into tunnels. In both cases, such gases are dangerous for health of kankans.

What should kankans do in such cases and protect themselves from dangerous gases? First of all, potential cases must be tested through lighting candles in tunnels. If there are gases, candles will go out. If gases are detected in tunnels or wells, work must immediately be stopped and necessary measures must be taken. The first measure is to open downstream wells to provide ventilation in tunnels. If necessary, a new well can also be excavated. After fresh air is ensured, work may be resumed. It is imperative to use respirators in such tunnels. Work in such tunnels must be conducted through short intervals. In these circumstances, kankans should take turns to work and take breaks after short intervals of work. They should also use abundant dairy products in their diet during this time. Kankans should immediately leave tunnels when they feel fatigued, short of breath or headache. It is strictly prohibited to work by oneself in such tunnels.

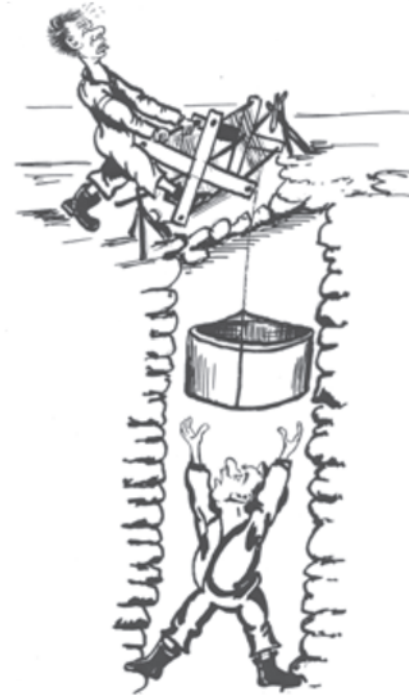
*“Kankan, do not start work
before testing closed
tunnels with candles.”*



Safety during use of new materials and tools

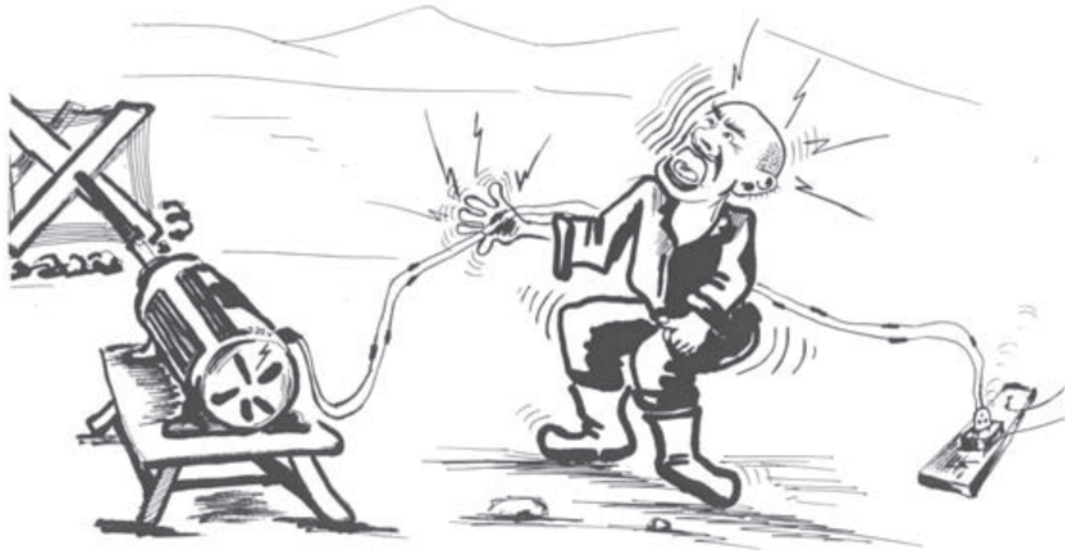
Currently, new materials and tools are being utilized along with traditional equipment in kahriz excavation and rehabilitation. Such materials and tools lessen the amount of burdensome manual labour, facilitate work speed and lengthen durability of structures. Some of these new materials are concrete rings for tunnels and lids for wells. Along with wheels and construction tools used in the past, modern auto and electrically operated wheels, compressors, electrical excavation tools, pumps and lighting devices are used. Considering heaviness of concrete rings, they should be installed through auxiliary means such as ropes, slides or auto cranes. Kankans who work in installing such rings and as well as with iron beams, must use safety belts. At least 3-4 kankans, and if necessary more workers must be involved in construction of such structures. Rings must be tied at three points at the minimum before being lowered into wells. Sides of the rings must be filled with soil before installing other rings. If electrical equipment is used during excavation / renovation work, cords must be further isolated and placed in rubber pipes.

“Kankan, do not install the next concrete ring before filling the sides of the last one with soil.”



Before using electrical or automated wheels, they should be tested without weigh on a daily basis and checked for fuel and oil. A special and sturdy metal support system must be prepared for an electrically operated wheel for the wheel. For automated wheels, a place must be selected away from the well exit point with a place for the wheel operator to sit on.

Metal tripods must be separately fastened and the distance between their arms must be proportional. After sturdiness is tested, automated wheels can be put to use. Both types of equipment must be operated by specially trained kankans. Kankans must wear protective eyewear during excavation of sturdy structures with electrical hammers.



First medical aid and following measures

The most reliable way to ensure safety during kahriz renovation is strict observance of safety rules and proper use of safety tools.

*“Kankan,
increase your mawareness of first
medical aid utensils and rules”*



In cases when these rules are violated and safety gears are used improperly, accidents, injuries, poisoning and other problems are imminent. The first thing to do in such cases is to refer to the contact sheet and inform a local healthcare facility to request help. Until such help is obtained at the site, injured workers must be treated with first aid. Considering that each team possesses a medical kit, each worker must know how to use its contents. It is recommended to test kankans' awareness for their first aid skills. If necessary, use of medical aid kits, including simple and feasible first aid procedures must be taught in workshops.

In general, many people are aware of such first aid. Most common cases in kahriz renovation and first medical aid that kankans should be aware of, could be summarized as below:

- If a worker is injured in any way, he should immediately be taken out of the work area. After the wound is cleaned with alcohol, a temporary bandage should be applied and the kankan must be sent to a healthcare facility.

- If the injured has a broken arm or leg, he should refrain from rapid movements. Injured persons in tunnels should carefully be brought to bottom of wells and after fastening affected part of the body with a straight piece of wood, he should be lifted from the well through a safety belt and taken to a hospital. In more serious conditions, first aid must be provided per doctor's instructions.

- If the affected worker has been poisoned, he should be fed with dairy products. In more serious conditions, first aid must be provided per doctor's instructions.

- If bleeding is observed in cases of deep wounds, bleeding type must be determined. Bleeding occurs in two ways: venous and arterial. Arterial bleeding is more dangerous. In such cases, the injured can lose a lot of blood. During arterial bleeding, the blood is bright red and flows with high pressure. In such cases, the affected part of the body must be tied with a rubber band or a rope 5-10 sm above the wound so that the tissue is not damaged as well. After this procedure, the injured person must immediately be sent to a hospital.

- In accidents involving snakes or scorpions, the affected part of the body must be tied with a rubber band or a rope above the wound so that the poison is isolated from the rest of the body. After this procedure, the injured person must immediately be sent to a hospital.

Notes:

Important contact information

Contact numbers of central hospitals and first aid centers:

Nakhchivan city

Central hospital / emergency care 45 68 72
First aid center 103

Julfa region

Central hospital 46 07 15
First aid center 103

Babak region

Central hospital 41 35 22
First aid center 40 38 04

Sharur region

Central hospital 42 28 11
First aid center 42 28 11

Kangarli region

Central hospital 48 07 02
First aid center

Shahbuz region

Central hospital 43 01 63
First aid center 43 00 03

Ordubad region

Central hospital 47 03 03
First aid center 103