Approved by

Director of “BAKHVI Hydro Power” LLC

Z. Chubinidze _____

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Emergency / Crisis Management Plan

In accordance with ISO 14001/ISO 45001

SOP – 004-10

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“Bakhvi Hydro Power” LLC

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Contents

1. Preamble

Health and safety (OHS) requirements of environmental management and workspace of "Bakhvi Hydro Power" Ltd correspond to the requirements of International Standards ISO 45001, ISO 14001 and the Applicable Laws of Georgia. Ecology and labor protection and technical security services carry out procedures corresponding to international standards related to risk management in order to prevent the following to the organization:

- Industrial injuries - accidents, damages - towards environment, personnel, contractor and customer health and life;
- Dangers caused due to the unqualified staff, negligence and lack of consideration - towards the organization.

2. Aim

This document describes a procedure carried out by ecology, labor protection and technical security services of Bakhvi Hydro Power Ltd and includes compulsory rules of conduct for all staff and visitors.

The aim of the services is to protect people's life and health in emergency situations through appropriate actions, reduce the risk impact to humans and the environment, carry out control measures for prevention and/or reduction of hazard to the acceptable extent.

3. Scope

This instruction is mandatory for all employees of "Bakhvi Hydro Power" Ltd, who carry out their activities in the field of OHSMS and EMS management systems.

4. Terms and abbreviations used

The terms used in this instruction are in conformity with the terms and definitions given in the standards.

5. Management of emergency crisis situations

The aim of the procedure of emergency situation management of "Bakhvi Hydro Power" is to establish and define guidelines for the staff in order to ensure rational, coordinated and efficient management of activity of the personnel involved in the process of response and

liquidation of any technogenic breakdowns and incidents as well as other emergency situations and provide personnel, population and environmental safety.

Objectives of emergency situations management include the following:

- Determination of the expected hazards during the planned activity providing for specific features;
- Determination of the staff of response groups to each type of emergency situation, equipment, action plan in emergency situations and responsibilities;
- Internal and external communication - determination of communication system, their sequence, means and methods of communication and ensuring the transmission of information on emergency situations;
- Enforcement of domestic resources instantly and mobilization of additional resources according to established rule in case of necessity and determination of the relevant procedures;
- Ensuring the functionality of the organizational system of response to emergency situations;
- Ensuring compliance with the requirements of legislative, normative and industrial security regulations in the process of response to emergency situations.

Emergency management procedure is in line with the requirements of the laws of Georgia and subordinate normative acts.

The HPP's emergency crisis management procedure includes:

1. Reviewing of potential dangers in HPP operation process;
2. Determined preventive measures;
3. Procedures of response to emergency crisis situations.

The instruction describes the necessary conditions of action for the personnel and responsible persons who meet the emergency-crisis situation at the moment of the work. The established rules of conduct help staff to reduce the impact of the established case to the environment and the health and life of the personnel.

6. Types of potential / expected emergency situations in the process of HPP exploitation

Considering the specificity of the planned activity, the following types of breakdowns and emergency situations are expected during HPP operation:

- Breakdown of headwork, including dam;
- Emergency situations related to breakdown of other hydroelectric structures of HPP, including: derivation system, pressure pipeline and other facilities;
- Fire / explosion;
- Spillage of hazardous substances, including oil products;
- Personnel injuries and incidents related to their health safety;
- Traffic accidents;
- Emergency situations caused due to natural disaster (marginal weather conditions, landslide, earthquake, flooding, etc.).

It should be noted that the above mentioned emergency situations may be a concomitant process and the development of one type of emergency situation may lead to another kind of failure.

6.1 Emergency breakdown of HPP headwork

Breakdown of the headwork (dam, water intake, sedimentation tank) may be caused by:

- Anthropogenic: errors made in design,
- Failure to comply with the legislative norms and violation of the terms of exploitation,
- Nonprofessionalism, incompetence and indifference of personnel,
- Military actions, terrorist acts;
- Natural disasters: earthquake, landslides and others.

Accompanying processes of headwork damage can be:

- Activation of geodynamic processes: intensive erosion in the lower and upper pool of the dam, collapse of the banks, deformation of Bakhvistskali river bed and riverside grove;
- Submergence and flooding of territories (both in upper and lower pool);
- Cases related to health and safety of personnel or population.

It should be noted that operation of the headwork of "Bakhvi Hydro Power" is not connected with significant difficulties. This significantly reduces the emergency breakdown of the headwork as well as the possible consequences caused due to the accident.

6.2 Emergency breakdown of hydraulic facilities

During exploitation of HPP it is important to consider the risks as follow:

- Diversion canal,
- Head-pond,
- Pressure pipeline and
- Breakdowns of hydro turbines.

Breakdown on hydraulic structures can be identified in the following ways:

- Breakdown of filtration stability of individual sections of hydraulic structures;
- Breakdown of stability of structures;
- Failure and malfunction of technological equipment and mechanisms.

The risks of damaging the hydraulic structures and the development of further adverse events are somewhat diminished by the fact that the diversion system is mainly represented by a closed channel (aqueduct) and the pressure pipeline is located under the ground. Therefore, probability of impact of anthropogenic and natural factors to it is little. The risks of the development of these types of situations are increased by the complex climatic and geological conditions of the district.

6.3 **Fire/explosion**

There are the risks of fire and explosion in the process of operation of HPP. Major factor of causing the breakdown can be anthropogenic, namely:

- Personal indifference and violation of safety rules,
- Violation of the rules for storage and usage of oil products, oils and other easily flammable / explosive materials, etc.
- Natural disaster (eg. earthquake) that can cause explosion and fire.

Separate facilities of HPP infrastructure are located in the vicinity of thick forests. Consequently, there are the risks of landscape fires.

Taking into consideration fire and explosion risks, sensitive areas include the sites of power plant and other objects and warehouses of easily flammable and explosive materials.

Fire/explosion is expected mainly in the area of the HPP and sub-station. Fire/explosion may be accompanied by the processes as follow:

- Activation of geodynamic processes: landslide, erosion, underground spaces, demolition of ceilings and walls;
- Volley emission / spillage of hazardous substances;

- Personnel or population injuries and the cases related to their health security;
- In case of heavy landscape fire there are risks of activation of geodynamic processes.

6.4 **Volley of hazardous substances, including oil products**

Emergency situation during HPP operation may be caused by the failure of the equipment, malfunction of oil-containing plants and mechanisms and seal failure of the storage container, which can cause spillage and speading of hazardous substances in soil and water.

During operation there are high risks in the following areas:

- Substation areas (spillage and distribution of transformer oils);
- HPP building (spillage and distribution of turbine oils in the discharge water);
- Warehouses of oils, oil products and other hazardous substances.

Accompanying processes of the breakdown may be:

- Fire / explosion;
- Poisoning of the staff or population

6.5. Staff injuries, health security risks

In addition to incidents related to other emergency situations, the staff injuries may be related to:

- Incidents related to heavy techniques / machines;
- Sudden collapse of ceiling or walls in underground areas;
- Fall from a height;
- Poisoning with the used chemical substances;
- Current rash while working in the vicinity of the equipment under the voltage or within the plant.

6.6 Traffic accidents

When driving to the roads of public use and access roads, it is expected:

- Collision with vehicles, real estate or cattle of local population;
- Collision with local population;
- Collission with objects of local infrastructure;
- Due to the complex relief and climatic conditions, there are the risks of fall out of vehicles and machinery in the river ravine.

Intensive transport operations are not underway in HPP operation process, therefore the risk of car accidents is not high at this stage.

Possible consequences of the accident are the following:

- Fire / explosion;
- Staff or population injuries and the cases related to their health security.

6.7. Natural emergency situations

Appropriate, timely and balanced response to the natural emergency situations in the process of the planned activity will be of great importance, since the natural disasters can become a provocative factor of any of the above-mentioned emergency situations. The risks of activation of natural disasters in the complex geological and climatic zones are high enough.

7. Major preventive actions for emergency situations

Preventive actions for breakdown of **the headwork** are the following:

- Exploitation of the headwork by supervision of the skilled and professional specialists, taking into consideration international standards and practices;
- Training and testing of operative personnel with regard to safe operation of the heawork;
- Organization of monitoring works for the head unit, namely: technical condition of culverts, washer and their adjusting panels, as well as sediment accumulation in depositing tank and periodic washing.

Preventive actions for damaging **hydraulic facilities** include the following:

- Conducting fundamental scientific researches for hydraulic facilities;
- Improving professional level of personnel and training special staff in the field of natural calamities and technogenic disasters;
- Protecting safety standards, correcting engineering solutions as necessary at all stages of operation;
- Organizing monitoring works on technical condition of aqueducts provided on the diversion channel, as well as sedimentation and periodic wash.
- Ensuring protection of pressure pipeline and hydraulic units.

Preventive actions of fire/explosion:

- Periodic training and testing of personnel on fire prevention issues;

- Storage of easily flammable and explosive substances in safe areas. Arrangement of appropriate warning signs at their locations;
- Compliance with fire-prevention standards and availability of firefight equipment in the areas with high risk;
- Electrical safety protection, arrangement of lightning arresters at the plant and control of their functionality;
- Arrangement of susceptible detectors to the smoke in the HPP building at the operation stage, which will deliver the sound signal as soon as fire is formed.
- Unintentionally scattered fire-hazardous, highly inflammable substances should be carefully collected and placed in the wastes box. The places where inflammable substances were remained or scattered should be cleansed carefully until the waste is finally removed.
- For the prevention of landscape fires (forest fires), it is necessary to store/use highly inflammable and explosive materials far from thick woods. Such places should be maximally cleaned from grassy and bushy plants.

Preventive actions **for spillage of hazardous substances:**

- Strict supervision over compliance with storage and use of oil products and chemical substances. the Suitability of storage containers should be tested prior to storage;
- Suspension of works / operation of mechanisms and making of repairing activities immediately upon revealling slightest leakage of the substances in order to avoid larger scales of incident.

Preventive actions **for traumatism / injury of personnel:**

- Personnel training and testing from time to time on labor safety issues;
- Equipping personnel with individual protection tools;
- Using protective glasses and respirators;
- Enclosing the dangerous zones and setting up the illuminated signs well-visible at night;
- Entrance into the ditches with inclination of more than 1.8 m must be equipped with a ladder of no less than 0.6 m width and handrails of 1,0 m high;

- When working at height, personnel must be insured with special ropes and safety belts;
- Placing medical boxes at appropriate locations;
- Placing appropriate warning signs as well as lighting for safety in hazardous areas:

- Safety illumination should ensure minimal lighting of the working surface within 5% of the normal rate of lighting and at least 2 luxes inside the building and 1 lux the outer perimeter;
- Availability of appropriate evacuation posters / evacuation emergency lighting in closed areas (mainly in HPP building):
- Emergency lighting of evacuation should be placed on the top of each exit, on the top of the stairs, on each bend;
- Evacuation lighting should provide minimal lighting of the main exits, floor or paths and stairs: in the fields of 0.5 lux in the storages and 0,2 lux at the open area.
- Training of special staff to monitor the level of safety standards at workplaces and providing violations of safety standards.

Preventive actions of **traffic accidents**:

- Any vehicle should undergo technical inspection before strating operation. It is especially important to check the brakes.
- Selection of optimal routes and limitation of speeds of movement (running speed at workplace should not exceed 10 km / h to the straight road and 5 km / h to the by-roads).
- Works of excavators, cranes and other vehicles and machinery are prohibited under any voltage, power transmission lines.
- Movement and parking of machinery and vehicles are prohibited in the collapse prism zone. Systematic surveillance must be provided for sustainability of the hillsides of pit. In case of detection of clefts, the unsustainable mass must be collapsed;
- Improvement of temporary and permanent roads and maintenance of their technical condition;
- Arrangement of warning, prohibitory and indicative road signs on motorways;
- Arrangement of "lying policemen" in the most dangerous areas;
- Arrangement of borders at the dangerous sections of motorways;

- While movement of special and oversized machinery, the machinery should be accompanied by specially equipped technique and trained professional staff (flag-bearer).

Equipment necessary for responding to the breakdown

Standard equipment for emergency response should be considered at the relevant areas with high risks of breakdowns in the HPP exploitation process, in particular:

Personal protection tools:

- Helmets;
- Protective glasses;
- Overalls
- High visibility vests;
- Waterproof high- heeled boots;
- Special footwear;
- Gloves;
- Protective belt;
- Acoustic protection headphones;

also,

- Fire-fighting equipment:
- Standard fire-extinguisher;
- Buckets, sand, shovels and so on;
- Properly equipped fire-extinguishers;

Emergency medical service equipment - standard medical boxes;

Spill elimination equipment:

- Long-lasting polyethylene bags;
- Absorption pads;
- Gloves;
- Buckets;
- Polyethylene lens.

Required qualification and instruction for the personnel

Entire staff must undergo evaluation training. Documents of registration of personnel retraining should be kept in the company's office.

Periodically, each system of responsding to accident should be tested, the gained experience should be fixed and weak links should be eliminated in "SOP-004-01" (the same must be done in case if the incident is realized).

8. Response to emergency situations

8.1 Response to the breakdown of headworks.

In case of detecting any breakdown/failure of the headwork, strategic actions of the operator include the following:

- To study the type and cause of the breakdown visually, analyze the situation, determine the associated breakdown processes and the approximate length (level);
- To provide competent personnel, head of the power plant or other superior person with the relevant information;
- To ask competent personnel at the site of incident to carry out immediate primary preventive actions (eg regulation of panels) in such a way that their health and safety will not be endangered;
- To take appropriate ordinances from the chief engineer or other officials;
- In case of receipt of appropriate instructions, to open or close water- channeling panels in sequential manner and launch the reservoir discharging process as soon as necessary through water-discharging panels of the dam or a washing panel;
- To wait for the decisions of emergency/crisis situations management group and act in accordance with these decisions.

In case of damaging of the head unit, strategic actions of the chief engineer include the following:

- To get detailed information from the operator in charge;
- To provide information to the members of the emergency/crisis management team, the HPP operator company and 112 if necessary;
- In case of a serious breakdown, to warn population by means of a sound signal or telephone call;
- In case of anticipated flooding, in order to provide security to issue relevant orders without delay for the personnel in charge in "Bakhvi-3" HPP.

- In case of a serious breakdown to determine potential flood zones and their extents in the lower pool together with the emergency / crisis management team and 112 and to organize the work to be done in these areas;
- To support 112 and external assisting resources, liquidation of the accident and salvage operations if necessary;
- To take part in the elimination of the breakdown or outcomes of the breakdown.
- To repare an appropriate report on the breakdown and transmit it to HPP operator company;

Strategic actions of the head of the emergency / crisis situations management group are the following:

- To get detailed information from the informer;
- To identify the flood zones and their length in the lower pool with the Chief Engineer and 112;
- To mobilize the internal resources of HPP (vehicle, machinery, etc.);
- In case of a serious breakdown, members of the emergency / crisis management team should look over the populated areas in the lower pool and inform directly to the population about the expected natural disaster using a voice intensifier (or a phone);
- Together with 112 to assist the population in urgent and safe evacuation in case of a serious breakdown;
- To take part in elimination process of the breakdown or outcomes thereof.

8.2 Response to the breakdown of other hydraulic construction

A person who detects damage to hydraulic structures must immediately notify the control panel operator about the incident and provide him with detailed information about the damaged area. He/she must carry out further actions in accordance with the directions of the superior person.

Activities of the operator of a control panel during the breakdown of hydraulic structures include the following:

Immediately upon receiving detailed information about the breakdown / failure, to analyze the situation, determine the possible associated processes and the approximate extent (level) of the breakdown;

- To require the personnel at the site of incident, the informer or the competent staff to carry out primary preventive actions (to block, open, discharge facility panels etc.), to as to safe their health and safety;
- To provide Chief Engineer, competent personnel and 112 with information about the accident if required;

Activities of the Chief Engineer during the breakdown of hydraulic facilities:

- To provide competent personnel and 112 with information about the breakdown if required;
- To require competent personnel to lock protective valves of hydroturbines;
- To require competent personnel to regulate front locks of turbine in order to avoid hydraulic hazards and in this way to discharge water from the chamber directly into the lower pool;
- To arrive at the place of incident and lead the liquidation actions.

If the size of the breakdown belongs to the second and the third level, reaction should take place in the following strategy:

- To notify population in the lower pool through a sound signal or telephone;
- To notify 112;
- To discontinue all works, disconnect mechanisms in the appropriate sequence and suspend operation of HPP;
- To regulate water culvert panels to withdraw water from the accident zone;
- To remove machinery from dangerous zones so as not to endanger their health and safety;
- To remove employees from the dangerous zones for health;
- To render assistance to 112 and external resources in liquidation of the accident and salvage operations if needed;
- To ensure liquidation actions for the consequences after the incident (for example, restoration / to clean damaged, flooded, silted sections, to eliminate erosive processes, carry out recultivation works, etc.);
- To prepare the report and deliver it to the HPP operator company.

8.3 **Response to a fire**

Strategic actions of the **Chief Engineer** in case of fire:

- Collection of detailed information about the location of the seat of fire, the nearby / stored equipment, machinery and substances and the other;
- Informing staff and 112;
- Arrival at the site of the incident and evaluation of situation, analysing the risks and assessement of the extent of fire (I, II or III level);
- Instructing the competent personnel to apply fire-fighting equipment;
- Control and management of activities of the personnel.

Strategic actions of **Labor Security (OHS) Officer** in case of fire:

- Informaion delivery to 112;
- Control and management of activities of internal personnel before arrival of 112 (after that the staff is managed by the fire brigade commander);
- Facilitation of the actions of fire brigade (special equipment that may not be available at the area of incident may become necessary, etc.);

In case of a **landscape fire**, 112 should be notified and evacuation of population should take place.

Strategic actions of fire or smoke detecting person the personal working in nearby areas:

- Termination of all activities at the workplace, except for safety actions;
- Removal of equipment and other machinery from places where there is a possibility to spread the fire. Electrical devices should be disconnected from the circuit;

General requirements in case of fire:

Fight to a fire, if:

- You have undergone an appropriate training
- Do not put yourself in danger
- Use an appropriate type of fire-extinguisher
- Leave the building immediately and go to the place of gathering.

Upon hearing the fire alarm siren:

- Turn off all electrical appliance

- Close the windows
- Follow the evacuation route
- Go to the place of meeting and close the door behind you
- Follow the instructions of fire security specialist
- Do not go back to the premises
- Do not leave the place of gathering until you receive the appropriate instructions.

Never do the following when fire alarm is activated:

- Do not go to the upper floors or enter another room
- Do not enter the area where you hear the alarm sound
- Do not carry bags and other big items
- Do not stop at the entrance of the building
- Do not try to drive a car in the yard
- Do not close the exit route for fire-fighting vehicle

Do the following if a fire is heavy and it is difficult to approach the seal of fire, there are any fire-threatening or explosive-dangerous areas / substances located nearby,:

- Leave the dangerous zone;
- Do not open windows and doors;
- When evacuating, act according to the instructions of the evacuation scheme / evacuation poster;
- If you have to cross the smoky closed space, bend forward because the air is the cleanest at the floor, cover the nose and mouth with the wet tissue;
- If you are unable to evacuate due to the inflamed exit, call rescuer loudly;
- Give an announcement about the accident to the Chief Engineer / control panel Operator;
- Wait for a fire brigade and give them detailed information about the causes of a fire and the situation in the vicinity of the fire;

- If a fire is not heavy, it is easy to reach the seat of the fire and the approach to it does not threaten your health and there are some risks of spreading fire in the neighboring territories, act as follows:
  - Deliver information about the accident to the labor protection officer,

  - Find the closest fire stand and supply the necessary fire fighting equipment (fire-extinguisher, axe, crow, bucket, etc.);

- Try to extinguish the fire by fire-extingusher, according to the instructions presented on the fire-extinguisher;
- If there is no fire stand, use sand or water to liquidate the fire or cover the less flammable thick cloth;
- In case if there are electrical installations involved in the circuit near the seat of the fire, the use of water is inadmissible;
- If the fire is in the closed space, do not ventilate the room (except for special needs) because the fresh air makes it more effective to burn and increase the size of fire.

8.4 Response to explosion

Actions of the personnel operating near the explosion area:

- Termination of all activities at work sites, except for safety measures;;
- Surveillance of the explosion site and adjacent territories from the distance, analyzing the situation and determining the following circumstances:
- Number and identity of injured people as a result of the explosion;
- Reason of causing the explosion;
- Are there other explosive or highly inflammable areas or substances in the vicinity of the area? Accordingly, is there a risk of re-explosion or fire?
- Whether there are the risks of collapse of walls or ceilings as well as other risks, which make additional threat to human health (if there is an explosion within the diversion tunnels, check the walls and ceilings whether there is a leakage of large amount of water).
- If there is a recurrence of explosion, collapse of walls and other risks that threaten your health, then:
- Leave the dangerous zone without delay;

- Give notification about the explosion to the chief engineer / operator of control board;
- Wait for 112 and give them detailed information about the causes of the explosion and the situation arount it;

If the approach to the explosion does not threaten your health, moreover there is also a fact of injury of other persons and there are risks of further development of the accident:

- Deliver information about the explosion to the chief engineer / control board operator;
- Find the nearest fire stand and provide fire safety equipment and personal protection tools;
- Get closer to the place of incident and remove the substances from the dangerous zone that makes a risk of re-explosion;
- Help the injured person according to the relevant scheme;
- When approaching the place of incident, try not to be between the hazardous zone and a wall.

Activities of the control board operator in case of explosion:

- Collection of detailed information about present/stored equipment, machinery, substances and etc, near the place of explosion.
- Delivery information to the other personnel and 112 if neccessary;
- Arrival to the place of incident and surveillance of the situation, analyzing the risks and assessment of the presumable scale of the explosion (I, II or III level). Forecasting of further development of the accident;
- All personnel are requested to mobilize fire-extinguish equipment and vehicles on the site and use when necessary;
- Control and management of activities of the personnel.

Actions of the chief engineer in case of explosion:

- To control and manage personnel actions before the rescue service arrives;
- In case of need, to require the service personnel to isolate the explosive zone from other sensitive zones by means of solid materials (concrete slabs, etc.);
- To promote actions of rescue brigade (non-existent special equipment and etc may become necessary);

- After finishing the incident to conduct elimination actions of accidental consequences (restoration of damaged areas, clearing territories from ruins, preventive measures of erosive processes etc.) along with the OSH / EMS Manager;
- To prepare the report and deliver it to the HPP operator company.

8.4 **Response to spillage of hazardous substances**

In case of spilling of oil products, whole staff of "Bakhvi-3" HPP acts in accordance with the instruction about spillage of dangerous substances: SOP- 003-04.

8.5 Response to the incident of injury of personnel and their health security

Principal action of a person who detected an injured is to inspect the place of accident, clear up the situation, ensure safety, provide first medical aid and call for medical assistance in case of need. If necessary, before the ambulance arrives, the first aid should be made in accordance with the strategy of the first aid stated in the following paragraphs. Prior to the first aid it is necessary to assess the situation and determine if there is any danger while getting closer to the injured person.

8.5.1 First aid during a fracture

There are two types of fracture, the opened and closed fracture of the bone:

The opened fracture is characterized by the disturbance of integrity of the skin coating. At this time there is a wound and bleeding in the injured area. The risk of infection is high when the open fracture. **If opened fracture:**

- Call the rescuer without delay in order to immobilize the damaged part of the body until you process the wound;
- Cover the wound with a clean patch and press to stop bleeding. Do not press the broken bone fragments directly;
- Without touching the wound by fingers, carefully cover the damaged area with clean cloth from the top and fix it with bandaging;
- If the broken bone fragments appear in the wound, place a soft tissue around the bone fragments so as the fabric not to touch it and the bandage don't compress the bone fragments. Place the bandage so as not to disturb the blood circulation below the bandage;

- Hold the broken bone immobilization as well as when closed fracture;
- Check out the pulse, capillary filling and sensitivity every 10 minutes under the bandage.
- We have a closed fracture if the integrity of the skin is not disbalanced in the damaged area. At this time bleeding and edema is revealed in the affected area.

If closed fracture:

- Ask the injured person to feel calm and fix the damaged part of the body by hand above and below the fracture before immobilization (fixation);
- Place the damaged part of the body to undamaged part for a good fixation. If the fracture is on the hand, fix it by means of the triangular bandage. If the fracture is on the foot, fix the damaged leg on the other. Make the knots from the side of undamaged foot.
- Check out the pulse, sensitivity and capillary filling every 10 minutes below the bandage. If blood circulation or sensitivity is decreased, loosen a bandage.

8.5.2 First aid during wounds and bleeding

There are three types of bleeding:

- Blood is little. At this time the risk of infection is greater:
- Wash off the wound by any colorless fluid suitable to drink;
- Apply a clean cloth for bandaging;
- There is a lot of blood. At this time there is a risk of blood loss:
- Cover the wound with some layers of cloth and make a pressure bandage;
- If the blood is still leaking, dress the cloth around the wound again (do not remove blood soaked cloth) and press the bloodstream area;
- Blood splatters from the wound like a fountain. At this time the blood is lost very quickly. In order to avoid this, the arterial projection area (at the top of the wound) should be trimmed with finger (or fingers). Areas of pressure on the artery: lower third of the shoulder and the upper third of the thigh.

The rule of application of tourniquet is the following:

- Tourniquet is applied only in extreme cases because it often causes irreversible injuries;
- Tourniquet is applied above the wound;
- The place of application of tourniquet must be covered with clothes. If the place of wound is naked, clean cloth should be placed under the tourniquet;

- The first bandage should be tighten (it should be hold firm as far as possible), then the tourniquet is stretched and is added to the wound area 3-4 times (ropes, belt and other can be used instead of the tourniquet);
- Application of tourniquet is used for one hour in winter and two hours in summer. Then it must be loosen for 5-10 minutes and put it a bit above the original place;
- Check whether the procedure of application of tourniquet is correct, if the tourniquet is applied in the right way pulse is not palpated;

What we don't do:

- Do not put your hand in the wound;
- Do not remove anything from the wound. If a foreign body appears from the wound, try to fix maximally (make a bandage around the foreign body).
- Internal bleeding is an injury that is difficult to identify. Suspect on internal bleeding when signs of shock are reported after the injury, but there is no visible loss of blood.

Internal bleeding:

- Lay down the injured person on back and lift the legs up;
- Remove the tight clothes on the neck, chest, waist;
- Do not allow the injured person to eat, take a medicine and drink. If the injured person is in conscious and feels strong thirst, getting wet his/her lips;
- Keep the injured person warm - cover the blanket or tissue;
- Check pulse, breathing and awareness every 10 minutes. If the injured person is fainted, place it in a safe condition.

8.5.3 First aid during burn

Burn can be developed by hot subjects or steam exhaust (thermal burns), chemical substances on the skin (chemical burn), electricity exposure (electrical burn). In order to be able to do the first aid during burns, we need to determine the degree of burn, depending on the depth and area of the damage (in what part of the body surface the injury spreads).

First aid measures **during burn** are the following:

- Inhalation of smoke is dangerous when burning, so if the room is smoked and it can not be ventilated quickly, move the injured person to a safe place on a fresh air;
- If the clothes of the injured person is burning, do not move the body, pour water to the body (in case of electric burns, water is not permitted with the equipment switched on the circuit);

- If you can not use water, cover the body with non-synthetic material;
- It is necessary to start cooling of the burnt area immediately with cold water (if the burn is of the I and II degree put your hand at the running water for 10-15 minutes, if the burn is of the III and IV degree put it on a clean wet cloth and then put it in the dead water);
- Remove clothes from any damaged area and any other subject that can prevent blood circulation. Do not remove the particles of clothing that are in the damaged area;
- Cover the damaged area with sterile bandage. This will reduce probability of infection;
- When burns take place you may inbreathe hot gases, which causes burning of respiratory tracts. If the injured person has a difficult snoring breathing, burn of the face or neck, burn of hairy cover of the face and nose, swelling of the mouth and lips, difficulty in swelling, hoarse voice - suspect about the burning of respiratory tracts and wait for the medical service;
- Before coming medical service check your breath and pulse constantly, be ready for the resuscitation.
- Removal of the particles of the clothes is not allowed during burns, as this can deep the damage;
- You can not break integrity of bubbles, as the skin cover is damaged and there is the favorable conditions for infection in the body;
- Do not use ointments, lotions, oils for processing the injured area;

In case of chemical burn **don't allow** treatment of the damaged area neutralazing solutions. For example the burn caused by alkaline can not be treated with acidic.

8.5.4 First aid in case of electric injury

There are three types of electric injury:

An electric injury caused by high voltage current. The damage caused by high voltage current is deadly in most cases. At this time severe burns develop. Because of the strong contracting of muscles, the affected people often will be thrown over a long distance leading to the development of severe injuries (fractures). If electric injury is casued due to **high voltage current**:

- You can not get close to the injured person until electricity is turned off and if necessary, you isolation is made. Maintain a safe distance of 18 meters radius. Do not allow other eyewitnesses to approach the injured person;

- After receiving electric injury, as soon as you approach to the injured person, open the airways without pulling the head back , moving the lower jaw ahead;
- Check the breath and circulatory signs. Be ready for the reanimation measures;
- If the injured person is unconscious but he/she breathes, place him/her in a safe conditation;
- Exercise first aid in case of burns and other injuries.

Electric injury caused by **low voltage current.**

Electric injury caused by low voltage current can cause serious damage and even the death. Often this type of electric injury is conditioned by damaged switches, electric wiring and equipment. The risk of getting the electric injury increases sharply when touching the wet floor or touching the damaged electric wires.

In case of injury caused by low-voltage electric current:

- Do not touch the injured person if he/she in in contact with the electric power source;
- Do not use metal items for removing the source of electric power;
- If you can, stop the power supply (turn off the power switch).
- If you are unable to do this, turn off electrical equipment from power source;
- If you can not turn off the power, stand at the dry isolating item (for example, wooden boards, rubber or plastics, books or newspapers;
- Remove the body of the injured person from the power supply through a broom, a wooden stick, a chair. It is possible to move the injured person's body from the power source or vice versa if it is more convenient to move the power source itself;
- Without touching the injured person's body, put the string around his/her feet or the shoulders and remove the power source;
- In extreme cases, hold the dry cloth of the injured person and remove it from the power source;
- If the injured person is unconscious, open the airways, check breath and pulse;
- If the injured person is unconscious, he/she has breathing and pulse, place his/her in a safe condition. Cool down the burned areas and bandaging;
- If after electric injury the injured person does not have visible damage feels well, advise hism/her to rest.

Electric injury caused by **lightning/thunder**

During the electric injury caused by lightning, there is frequent the various trauma, burns, damage of face and eyes. Sometimes lightning may cause sudden death. Quickly transfer the injured person from the place of accident and excercise the first aid as during the different type of electric injury.

8.5.5 Response to the damage caused by traffic accidents

The following strategic actions are required to carry out in case of traffic accident:

- Stop vehicle / machinery;
- Transfer information to relevant services (patrol police, emergency medical service);
- If there is no danger to human health and there are no risks to provoke other emergency situations (such as collision of other vehicles, fire, fuel spills, etc.), then:
- Get out of the vehicle / machinery or go away the place of incident and keep the safe distance;
- Wait for the patrol police / rescue team.

If additional hazards exist, act as follows:

- Get out of the vehicle / machinery or go away the place of incident and keep the safe distance;
- In case of fires and fuel spills, act in accordance with the response strategy specified in the relevant sub-sections;
- In case if human's health is endangered, do not try to move the body.
- If the injured person lies to the carriageway, cover him/her with any cloth and mark the place of accident in order to see it from a distance;
- Remove all the things that might make difficult to breath (belt, scarf);
- Provide first aid to the injured person in accordance with first aid strategy stated in the relevant sub-sections (though remember that extra movement of the injured person may endanger his / her health much more).

8.5.6 Response to the natural emergency situation

Response to an earthquake

Response to the earthquake shall start upon feeling of its first shock, if the earthquake is weak, stay wherever you are, do not panic. After that the staff feels safe, he / she is obliged to act on the following strategy:

- The incident shall be reported to the personnel on duty at the headwork of the power plant and request to regulate locking panels as requested;
- Request all personnel to stop HPP hydro turbines in the proper sequence during operation of all construction equipment and mechanisms;

Prior to coming of rescue team, the liquidation actions of the earthquake outcomes are led by the Chief Engineer / Control Panel Operator with the following strategies:

- To bring the injured persons from the ruins and save those who have fallen into semi-ruined or inflamed houses;
- To liquidate and eliminate the breakdowns of those energy and technological lines that endanger the people's lives;
- To take highly inflammable and explosive substances from dangerous zones;
- To inspect buildings and hydraulic facilities and check their technical condition;
- To demolish or reinforce the damaged buildings and hydroelectric structures in hazardous conditions;
- While carrying out rescue works, it is not permitted to go above the ruins, entering demolished buildings, if not necessary, to stay close to them if there is a danger of further fall down.
- When entering strong smoky and blocked buildings, it is necessary to attaché the rope over the waist, the free end of which whould be hold by the person standing at the entrance of the building;
- In the process of rescue and liquidation works, individual protection means should be used.

Response to torrent, landslide, inundation, sudden flooding

Personnel who are near the natural disaster should act according to the following strategies:

- In case of danger, immediately conduct evacuation from the dangerous zone;
- The route of evacuation should not go through the bed of torrent rivers;
- Immediately upon emerging the signs of danger move to a raised area;
- It is not allowed to enter the river bed after the first wave of torrent. It can be followed by the second one;
- Move around so as not to cross the torrent bed;
- It is dangerous to stay in the premises if it is located near the collapsed shore or the ground is washed down in part.

- When the personnel feel safe, he / she is obliged to act on the following strategy:
- The incident will be reported to the personnel on duty at the headwork of the HPP and request to regulate locking panels:

In case of necessity, request the whole personnel to switch off all installations and mechanisms as well as HPP hydro-turbines during operation in the proper sequence;

Before the rescue brigade is appeared, liquidation actions of outcomes of the natural disaster are headed by the head of the HPP with the following strategy:

- Take out the staff from dangerous zones;
- Take out higly inflammable and explosive substances from dangerous zones;
- Temporary restoration of damaged roads and bridges by bulldozers and excavators in a short period of time;
- Emergency and rehabilitation works including arrangement of explosive milling; (especially along the water intake, diversion system, along the location of substations);
- Regulation of the water flow in the river, cleaning, deepening and repairing the riverbed;
- Strictly define the route of driving techniques used in liquidation measures and prohibit their movement on steep slopes and other dangerous zones;
- Inspect buildings and hydraulic facilities and check their technical condition;
- Demolish or reinforce the damaged buildings and hydroelectric structures in hazardous conditions;
- In the process of rescue and liquidation works, individual protection means should be used.

9. The rule of action of personnel in case of industrial injury

Phase #	Course of the process	Description	Indication
1	R/person First aid EMS/OHS officers Providing information to the Director EMS/OHS officers /R/person Call for medical assistance EMS/OHS officers Manage evacuation process of	Object / Office Manager delivers information about staff injury to the personnel in charge in the issues of primary medical aid and labor safety officers.	Crisis situations plan F-SOP-004-10A-01 – with phone numbers is specified

Phase #	Course of the process	Description	Indication
2		In case of moderate and severe damage, all employees are obliged to call the emergency medical aid brigade immediately	The fact is registered in the "log of incidents" F-MI-06D-01
3		EMS / OHS Officers make reports about the facts to the Director	Ascertainment of the reason caused the accident
4		For analysis of danger EMS / OHS Officers use risk assessment techniques, described in the main procedure MI-06	In case of technical problem the director obliges technical personnel to plan and conduct technical works
5		EMS / OHS Officers work on prevention of the danger or reduce it to the acceptable level.	Conducting unscheduled instruction, warning personnel with signatures and placing illustrative material at a high risk area.
6		EMS / OHS-managers provide the instruction according to which the staff works to reduce hazard	Technical staff gives information to EMS / OHS-Managers on the activities to be conducted
		EMS / OSH-Managers determine the need for pictograms	

Object/office manager
EMS / OHS Officers and Responsible Personnel in the first aid issues, shall be informed about damage of environment / personnel

10. **Expected scopes of incident**

Considering the expected accident, resources of incident liquidation and legislative requirements during HPP operation, accidents and emergency situations are divided in

accordance with 3 basic levels of reaction. The description of emergency situations by levels, indicating the appropriate response, is provided in the table.

Description of emergency situations by levels

	Emergency situation		
	level I	level II	level III
Overall	Internal resources are sufficient for liquidation of the accident	External resources and workers are required for liquidation of the accident	Attracting regional or national resources is required for liquidation of the accident
Fire/ explosion	Local fire that does not require any interference and is quickly controlled. Meteorological conditions do not contribute to the rapid spread of fire. There are no other inflammable and explosive sites / warehouses and materials nearby.	Big fire that can be spread quickly due to meteorological conditions. There are other inflammable and explosive sites / warehouses and materials nearby. It is necessary to call the local fire brigade.	Big fire that is rapidly spread. There is a great risk of inflaming nerby areas and inciting other types of emergency situations. It is difficult to approach the area. It is necessary to involve a regional fire service to liquidate the incident.
Landscape fire	Fire has arisen on the site and there is a risk of landscape fires	Low forest fire. It is originated due to burning of coniferous or deciduous shrubbery, alive cover of soil surface (moss, grass), semi-shrubs and closed cover of soil (fallen leaves, branches, tree bark, etc.). i.e. as a result of burning of plants and their wastes at the surface of the land or 1.5 to 2.0 m high from this, the speed of such spread of such fire is not large - 1.0 km / h at strong winds.	High forest fire. Usually arises from low fire. At this time trees are burning entirely. It can also be the fire of the peaks when only the tops of trees are burning, but such fire lasts on for a short time. At this time black smoke and a large amount of heat is excreted, while the fire alum is over 100 m. All possible resources are required for liquidation of such a fire.
Spillage of hazardous substances	Local spills that do not require any interference and may be eliminated by internal resources. There are no risks of spreading of such substances at the large area and contamination of rivers.	Large spills (spill of hazard substances from 0,2 t up to 30 t). There are risks of spreading of substances at the large area and contamination of rivers	Great spill (more than 30 tons). As far as storage and use of especially large amounts of dangerous substances will not occur. The risks of the III level accident are minimal.
Personnel treatment, injury	• One case of traumatism; • Light fracture, bruising; • I degree burn (skin superficial layer injury); • Assistance to injured personnel and liquidation of the incident can be done by internal medical inventory.	• Some cases of traumatism; • Strong fracture - close fracture near the joint; • II degree burn (deep layer injury of skin); • Transfer of injured personnel is required to a local medical institution.	Several cases of traumatism; • Strong fracture - articular fracture and etc; • III and IV degree burn (skin, subcutaneous tissue and muscle damage); • Transfer of injured personnel is required to a regional or Tbilisi medical clinic of appropriate profile.
Traffic accident	There is a damage of equipment, vehicles, infrastructure and invaluable facilities. Human health is not in danger	There is a damage of equipment, vehicles, infrastructure and valuable facilities. Human health is under danger or the second level of traumatism take place	There is a damage of equipment, vehicles, infrastructure of special value or vital facilities. There is a great risk of provoking other types of emergency situations. Human health is aunder danger or there is the third level of traumatism

Natural breakdown	Natural disaster that is seasonally or periodically characterized for the region (heavy rain, snow, flood). It is necessary to carry out some standard measures for security of hydraulic structures, equipment-machinery and human health	Natural disaster size of which is rare for the region. Stability of structures and safety of mechanisms are in danger. It is necessary to eliminate the accident in the shortest period of time to avoid provoking other types of emergency situations. Invovement of supporting resources is required	Particularly dangerous natural disaster, eg earthquake, mud torrent, avalanche, landslide and other things that greatly endanger stability of buildings and safety of equipments and machinery. There are high risks associated with the safety of staff or population. It is necessary to involve regional resources to react the accidents

11. Analysis of efficiency of the process

The analysis of effectiveness of the present process is carried out by the following criteria:

- Qualification level of staff;
- Effectiveness of conducted training / instruction;
- Environmental impact level;
- Number of industrial injuries of personnel;
- Number of inconsistencies identified during inspection;
- Time of shutdown (day / h) due to industrial injuries.

12. Accompanying documents

Note	Title
	Labour Code of Georgia
	Internal regulations of “Bakhvi Hydro Power”
	Instruction programs
F-MI-06D-01	Log of incidents and “near miss”

13. Agreement paper

Developed by	**Date**	**Signature**
Labor Security Manager (OHS)		
EMS Manager		
Agreed with		
Chief engineer		

Annex A

F-SOP-004-10A-01

Emergency Crisis Situation Plan

Risk result	Reaction	Person in charge	Phone number