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Environmental Services

Assessment of the Environmental and Social Compliance of the Vorotan Hydropower Cascade, Armenia

Health and Safety Regulatory Compliance Assessment Report

Final Version

FICHTNER

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1	03.11.2015	Final Health and Safety Assessment Report	Paulsch/Back	von Büren
2	03.12.2015	Second Final Health and Safety Assessment Report	Paulsch/Back	von Büren

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1. Executive Summary

In August 2015, ContourGlobal Hydro Cascade CJSC acquired Vorotan Complex of Hydroelectric Power Stations CJSC. ContourGlobal contracted FICHTNER, Stuttgart to prepare an Assessment of the Environmental and Social Compliance of the Vorotan Hydropower Cascade, including a Health and Safety Regulatory Compliance Assessment Report, an Environmental Liability Assessment Report, a Hazardous Substances Assessment Report and a Gap Analysis Report.

1.1 Legal Framework

The main legal acts of the Republic of Armenia (RA) concerning Labor Relationships including Occupational Health and Safety (OHS) are as follows:

- RA Constitution
- RA Labor Code (2004)
- RA Law on Renumeration (2003)
- RA Government Decree N201-N (2007): schedule features of work and rest for workers of power supply sector.
- RA Government Decree N1223-N (2005): workers that can be involved in works with 24 hours working day
- RA Government Decree N1698-N (2010): heavy, harmful, especially heavy and especially harmful productions, works, professions and positions.

1.2 Project Description

The Vorotan Complex of Hydroelectric Power Stations is a complex of three hydroelectric power stations (Spandaryan, Shamb, and Tatev HPPs) with an overall capacity of 404.2 MW and an average annual power generation of 1.16 billion kWh. The Vorotan Cascade is among the main power generation complexes in Armenia, providing both peak and base load generation, and performing grid stabilization services. The complex is located in the eastern part of Syunik region of the Republic of Armenia, some 240 km to the south-east of Yerevan. Vorotan Cascade is located at the Vorotan River. It is comprised of four reservoirs (Spandaryan, Angeghakot, Tolors, and Shamb/Tatev Reservoirs), the Tatev Daily Regulation Reservoir, and the named Hydropower Plants.

The Cascade has a total head of 1,223 m. The design of the Vorotan Cascade began in 1954, construction started in 1961. In 1970 the first power station, Tatev HPP, was put into operation, followed by Shamb HPP in 1978 and Spandaryan HPP in 1989.

1.3 Basic Documents

The Health and Safety Regulatory Compliance Assessment Report is based on the following reports:

- Norplan (2013): ContourGlobal Vorotan Cascade of Hydropower Plants - Technical, Environmental and Hydrological Due Diligence. March 2013.
- ContourGlobal (2013): Occupational Health and Safety Visit Report – Armenia, Vorotan Cascade. January 2013.
- Norplan (2013): ContourGlobal Vorotan Cascade of Hydropower Plants – Dam Stability Assessments / Flood hydrology Assessment and risk of overtopping of embankment dams. September 2013.
- Mead & Hunt / Sargent & Lundy (2013): Vorotan Cascade Hydroelectric Power Plants - Technical Due Diligence Review Report, Rev. 3. Prepared for OPIC and ContourGlobal. November 2013.
- IFC (2015): Vorotan Hydros - Environmental & Social Review Summary (published online).

ContourGlobal Hydro Cascade CJSC provided examples of Employment Agreements in three categories as well as necessary permits regarding Water Use and Operation Permission, granted by the Public Services Regulating Committee.

1.4 Field Investigation, Observed Gaps, and Measures

1.4.1 Methodology

The field survey was conducted from 28th September to 2nd October 2015 by two Fichtner Health, Safety and Environmental (HSE) Specialists partly together with a Health and Safety Specialist and an Environmental Specialist from ContourGlobal. Mr. Artsrun Mirzatunyan attended the field survey as representative of the government of RA. During this site visit, installations like dam sites, power houses, water outlets etc. were inspected and relevant authorities were consulted. Attention was turned to health, safety and environmental (HSE) relevant aspects.

Outcome of the field survey is a list of measures to solve the most obvious problems related to health, safety and environmental aspects. The implementation of all listed measures is directed to fulfill Armenian legal requirements. This is also true for compliance with IFC Performance Standards, World Bank EHS Guidelines, etc.

Where possible, single cost estimates are given; in other parts estimated lump sums have been calculated. These cost estimates (lump sum prices) also include all measures not being listed in detail. In order to cover other uncertainties, which might come up during the rehabilitation works, a high percentage of miscellaneous/contingencies (30%) was taken.

The catalogue of measures was developed to raise the HSE standards being applied and bring them as close as possible to an internationally acceptable level. This also includes the compliance with Armenian standards.

Because of the tight time frame a real bill of quantities for all needed measures during this field survey was not performed. For the HSE Specialists it was also not possible to assess the general quality of buildings and structures, e.g. the quality of concrete and in which extent the buildings or parts of building are dilapidated in a sense that the proposed measures cannot be implemented because of principal structural (statical) problems. For assessment of the quality of equipment, technical installations and electrical devices see the Consultancy Services for the Rehabilitation of the Vorotan Cascade Hydropower Plants, Fichtner 2012.

The costs were calculated under the precondition that local workforces are used as much as possible. These local workforces shall be trained by international ContourGlobal staff how to perform needed rehabilitation works (e.g. not to patch but replace equipment if needed). In addition, where possible, needed equipment shall be purchased in Armenia or from neighboring countries.

Some of the measures as the purchase of new PPE for the staff are already on the way but the costs are also given within these reports as agreed. The same applies for some of the rehabilitation measures e.g. at HPP Shamb and HPP Tatev main buildings which are already included in the Consultancy Services for the Rehabilitation of the Vorotan Cascade Hydropower Plants, Fichtner 2012.

1.4.2 Water reservoirs

Main gaps observed at the Water Reservoirs / Dam Sites include:

- Poor condition of Personal Protective Equipment (PPE)
- Poor condition of firefighting equipment
- Poor condition of workers' buildings (including lack of proper sanitary installations, deficient supply of drinking water, lack of adequate heating and air condition, bad electric installations, etc.)
- Lack of first aid equipment
- Lack of lifesaving equipment (boat, rings, etc.)
- Lack of rockfall protection
- Poor condition of handrails, stairs and other installations.

Recommended actions include:

- Provide new PPE (including safety shoes, helmets, lamps, working garment, work gloves, safety glasses, etc.)
- Provide new firefighting equipment
- Refurbish workers' buildings (including provision of sanitary installations, Small Waste Water Treatment Plants, secure drinking water

supply, provision of heating and air condition, refurbishment of electric installations, etc.)
- Provide first aid boxes at each building
- Provide lifesaving equipment (including aluminum rowboat, rings)
- Install rockfall protection, where necessary
- Refurbish handrails, stairs, etc. where necessary.

At Tatev Daily Regulation Reservoir, where no refurbishment works have been done since its construction about 40 years ago, it is urgently recommended to prepare a stability analysis of the whole reservoir. It is also suggested to rehabilitate all technical installations as well as buildings.

Concerning Public Health and Safety, it is recommended to install fences around the property of ContourGlobal and to install a swimming barrier on the water surface at the end of ContourGlobal's property to prevent unauthorized entry. Warning signs shall be set up around the reservoirs, especially in and near to villages. An alarm system (e.g. siren) shall be installed, in order to inform local people about high water output from the reservoir.

1.4.3 Hydropower plants

Main gaps observed at the HPPs include:

- Poor condition of Personal Protective Equipment
- Poor condition of firefighting equipment
- Lack of first aid equipment and defibrillators
- Lack of rockfall protection
- Mostly inadequate number and condition of sanitary installations
- Poor supply with drinking water
- Lack of adequate heating and air condition
- Bad electric installations
- Lack of heating and cooling devices
- Lack of kitchen area
- Rotating machinery without guarding
- Lack of warning signs
- Lack of emergency evacuation procedure and signs
- Bad condition of fire alarm and sprinkler systems
- Bad condition of firefighting systems at substations
- Inadequate storage of hazardous substances and dangerous items like gas cylinders
- Poor condition of ventilation system especially at battery rooms.

Recommended actions include:

- Provide new PPE (including safety shoes, helmets, lamps, working garment, work gloves, safety glasses, protection against high voltage, ear plugs, eyewash solution, etc.) according to working places
- Provide new firefighting equipment

- Provide first aid boxes and defibrillators (one at each HPP)
- Install rockfall protection, where necessary
- Provide adequate toilets / bathrooms separately for men and women
- Provide secure drinking water supply
- Provide adequate heating and air condition
- Refurbish dangerous electric installations
- Install guarding at rotating machineries
- Install warning signs (e.g. to use PPE, high voltage, confined spaces, etc.)
- Implement emergency evacuation procedure and install emergency signs
- Install new fire alarm and sprinkler systems in all rooms
- Install new or refurbish existing firefighting system at substations
- Provide adequate storage areas for hazardous substances and dangerous items like gas cylinders
- Install new ventilation systems especially at battery rooms.

Due to the high levels of noise and vibration at some parts of the HPPs, it is recommended to prepare noise and vibration assessment reports by external experts including proposals of mitigation measures.

1.4.4 Main office building at Goris

In the garages / warehouses of the main office of ContourGlobal Hydro Cascade in Goris several items (including hazardous substances, gas cylinders, etc.) are stored in inadequate conditions. Storage areas have to be refurbished and ventilated and stored items have to be segregated.

1.4.5 Over ground pressure pipes / irrigation outlets

All areas for pressure pipes running over ground shall be fenced in order to prevent unauthorized access to the pipes as well as any possibilities of accidents for local population.

There are several outlets constructed along the pipes for irrigation purposes, some of them are gravity driven others need a pumping station. While two of these outlets also have small buildings, all other outlets are simply blanked with metal plugs or manually operated valves. Technical devices in these buildings as well as some of the other outlets are in quite bad condition and need refurbishment.

1.4.6 Water use by local population

In general, this eastern part of Armenia is not short of water. Nevertheless, for agricultural purposes water is taken from the Vorotan River downstream of Spandaryan Reservoir. Water is directly taken from the reservoirs, e.g. Tolors Reservoir or from the Daily Regulation Reservoir for HPP Tatev, and from the outlets constructed along the pipes.

The water release for irrigation purposes between water users / water users associations and Vorotan Cascade is regulated by contracts. The water

associations submit plans for water needs to Vorotan Cascade and based on these plans the water is released.

Main concerns expressed during discussions with members of the water associations and heads of communities were that irrigation channels (not in ownership of ContourGlobal) are partly in a very bad condition and a significant amount of taken water is lost by leakages; the outlets (in ownership of ContourGlobal) are partly in bad condition and need improvement measures; flooding occurred at Uyts community due to high water release from Tolors Reservoir.

It is recommended to inform local communities in advance of high water release from reservoirs by an alarm system (siren). Furthermore communities shall be informed far in advance, if reservoirs are emptied for rehabilitation purposes, as in this case irrigation water will not be available.

1.4.7 Concerns of NGOs

All concerns expressed by NGOs are out of the scope of this report. However, it is recommended to conduct awareness campaigns in villages near to Water Reservoirs regarding the dangers of reservoirs (swimming, slippery ground, etc.) and to set up warning signs (e.g. no swimming, private property, etc.) in order to prevent any accidents.

1.4.8 Employment agreements

The Employment Agreements for employees of ContourGlobal Hydro Cascade CJSC reflect the requirements of the current Armenian legislation. However some recommendations are given as mentioned by a national legal expert.

In case that ContourGlobal decides to conduct a collective dismissal of workers as part of the future optimization of workforce for the cascade, ContourGlobal shall prepare a retrenchment plan.

ContourGlobal shall establish a grievance mechanism for employees of the cascade, either through provisions of the internal grievance mechanism in collective agreements or through introducing another transparent and reliable process.

1.5 Institutional Framework and Necessities

In order to implement an HSE Management System (HSEMS) an HSE officer responsible for Health, Safety and Environmental issues at the entire Vorotan Cascade shall be employed. This HSE officer shall be experienced in Hazardous Waste Management and will be responsible for monitoring the functionality and condition of all equipment and installations corresponding to Health, Safety and Environmental issues, training of workers and performing public awareness campaigns in villages located near to the Water Reservoirs. He will be responsible for the permanent on-site

monitoring of implementation of the measures outlined in this study and shall work in close cooperation with the external internationally experienced auditor (see below).

Regular trainings of staff shall be conducted by the HSE officer including special requirements at dam sites or in HPPs. These trainings shall include different H&S aspects (e.g. working in high voltage areas, at height and in confined spaces, first aid, location of nearest medic/hospital, use of PPE, use of lifesaving equipment at dam sites, use of firefighting equipment, safe use of tools, management of Small Waste Water Treatment Plants, etc.) as well as environmental issues.

The HSE officer will be responsible for regular monitoring of functionality and condition of all installations at Vorotan Cascade regarding H&S (e.g. sanitary facilities, Small Waste Water Treatment Plants, supply and quality of drinking water, firefighting equipment, lifesaving equipment at dam sites, noise level in HPPs, etc.) as well as environmental issues. Furthermore yearly health checks have to be provided to all staff.

The HSE officer will also be responsible for conducting awareness campaigns in villages near to Water Reservoirs especially regarding danger of reservoirs (swimming, slippery ground, meaning of swimming barrier near to dam sites, etc.), function and meaning of a siren at the reservoirs, and dangers of using poisonous substances for fishing. Local people shall also be informed far in advance, if reservoirs are emptied for rehabilitation purposes, as in this case irrigation water will not be available.

External training of employees by an international expert regarding firefighting and specialized first aid training shall be conducted.

A specialized fully equipped rescue vehicle of international standard shall be provided for the entire Vorotan Cascade; including training of an internal rescue team.

For medical surveillance and regular monitoring of first aid boxes at all installations of the Vorotan Cascade a medic (e.g. from Goris) shall be contracted.

Implementation of the proposed measures shall be monitored by an internationally experienced external auditor. Audits shall be performed four times per year for a period of two years.

1.6 Summary of Costs

Costs for external training of employees by an international expert regarding firefighting and specialized first aid training will be approx. 15,000 USD for two weeks' training.

Costs for a specialized fully equipped rescue vehicle of international standard, including training will be approx. 200,000 USD.

Cost for implementation of proposed measures in **Health and Safety Regulatory Compliance Assessment Report** (including external training and rescue vehicle):	**2,245,300 USD**
+ 30 % contingency:	**2,918,890 USD**
Costs summed up from Health and Safety Regulatory Compliance Assessment Report, Environmental Liability Assessment Report, and Hazardous Substances Assessment Report	**4,683,640 USD**
Total costs including external monitoring over a period of two years	**4,783,640 USD**

Costs for employment of an HSE officer will be about 25,000 USD per year (including costs for the use of cars and infrastructure of ContourGlobal Hydro Cascade CJSC).

Costs of contract for medical surveillance to be provided by a medic from Goris for the entire Vorotan Cascade will be about 1,800 USD per year.

The implementation of all listed measures is directed to fulfill Armenian legal requirements. This is also true for compliance with IFC Performance Standards, World Bank EHS Guidelines, etc.

2. Introduction

In August 2015, ContourGlobal Hydro Cascade CJSC acquired Vorotan Complex of Hydroelectric Power Stations CJSC. ContourGlobal contracted FICHTNER, Stuttgart to prepare an Assessment of the Environmental and Social Compliance of the Vorotan Hydropower Cascade, including a Health and Safety Regulatory Compliance Assessment Report, an Environmental Liability Assessment Report, a Hazardous Substances Assessment Report and a Gap Analysis Report.

3. Legal Framework

This chapter lists and describes the relevant national legal framework concerning Labor Relationships including Occupational Health and Safety (OHS), within which the study is carried out.

Following independence in 1991, the environmental legislation of the Republic of Armenia (RA) was reviewed, with the aim of developing a more comprehensive state policy towards ecological protection and sustainable use. Until today, a number of national laws of RA were implemented to regulate the protection of the environment.

The main legal acts are as follows:

- RA Constitution
- RA Labor Code (2004)
- RA Law on Renumeration (2003)
- RA Government Decree N201-N (2007): schedule features of work and rest for workers of power supply sector
- RA Government Decree N1223-N (2005): workers that can be involved in works with 24 hours working day
- RA Government Decree N1698-N (2010): heavy, harmful, especially heavy and especially harmful productions, works, professions and positions.

More details of the main legal acts concerning Labor Relationships and Occupational Health and Safety are given in Section 9.1 (Appendix I).

For comparison of the national legislation of the Republic of Armenia with international regulations see the referring Gap Analysis Report.

4. Project Description

In August 2015, ContourGlobal Hydro Cascade CJSC acquired Vorotan Complex of Hydroelectric Power Stations CJSC. Vorotan Complex of Hydroelectric Power Stations (CHPS) is a complex of three hydroelectric power stations with an overall capacity of 404.2 MW and an average annual power generation of 1.16 billion kWh. The Vorotan Cascade is among the main power generation complexes in Armenia, providing both peak and base load generation, and performing grid stabilization services. The complex is located in the eastern part of Syunik region of the Republic of Armenia, some 240 km to the south-east of Yerevan (see Map 1).

Map 1: Location of the Vorotan Complex of HPS in the Republic of Armenia

The Cascade has a total head of 1,223 m. The design of the Vorotan CHPS began in 1954, construction started in 1961. In 1970 the first power station, Tatev HPP, was put into operation, followed by Shamb HPP in 1978 and Spandaryan HPP in 1989.

Vorotan CHPS is located at the Vorotan River. It is comprised of four reservoirs and one Daily Regulation Reservoir (see Figure 1). The Spandaryan Reservoir is the upper reservoir of the cascade. Highest water level is at 2,063 m a.s.l.; minimum water level is 2,030 m. The water is directed through an 8.1 km long pressure tunnel and a 2.17 km long penstock to Spandaryan HPP. The discharge from Spandaryan HPP and water from Vorotan River is retained by Angeghakot dam forming the Angeghakot Reservoir. Highest water level is at 1,677.4 m a.s.l.; minimum water level is 1,664.5 m. Water flows from this reservoir via a 10.5 km long gravity fed tunnel to the Tolors Reservoir, which is also fed by the Sisian

and Ayri Rivers. Highest water level is at 1,651.5 m a.s.l.; minimum water level is 1,625.5 m. From the Tolors Reservoir, the water is supplied to the Shamb HPP via a 6.9 km long pressure tunnel and a penstock of 1.26 km in length. Below the Shamb HPP is the Shamb Reservoir (also named Tatev Reservoir) which is also fed by water from Laradzor River. Highest water level is at 1,335.4 m a.s.l.; minimum water level is 1,333.8 m. From this reservoir water flows through an 18.4 km long gravity fed tunnel to the Daily Regulation Reservoir of the Tatev HPP, from where the water is directed to Tatev HPP via a 1,900 m long pressure penstock.

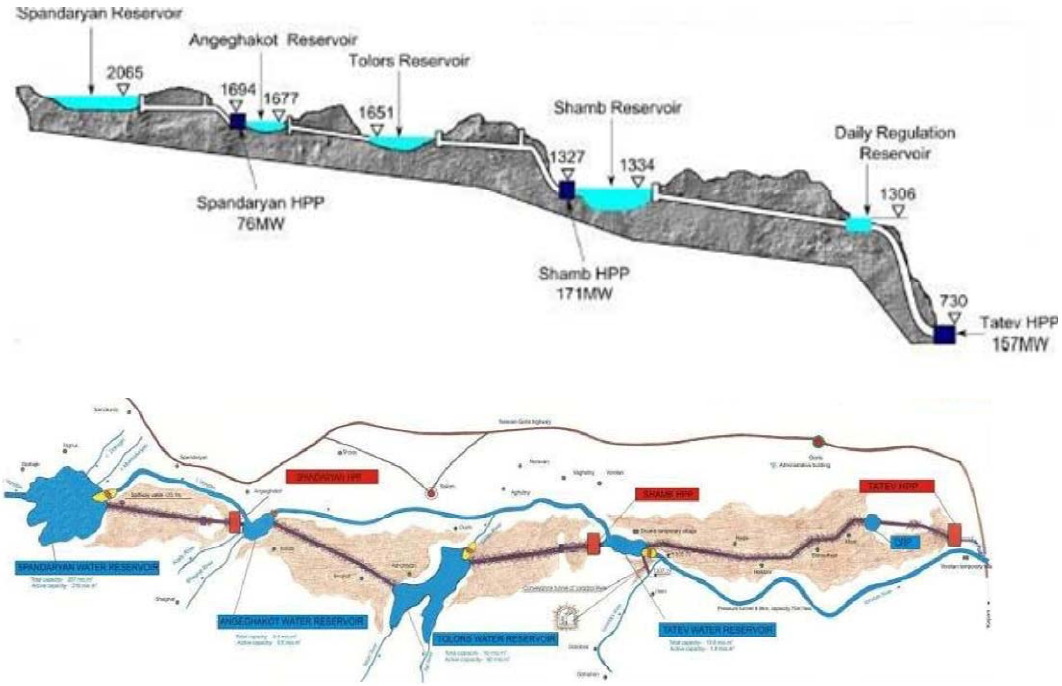


Figure 1: Design of the Vorotan Complex of HPS

The principal characteristics of the three hydroelectric power plants are given in Table 1:

Table 1: Principal characteristics of the HPPs of Vorotan Cascade

Hydroelectric Power Plant (HPP)	Rated Capacity [MW]	Number and Capacity of Units [MW]	Turbine	Water storage [mill. m^3] total / live	Design Head [m]
Spandaryan	76	2 x 38.0	Francis	257 / 218	300
Shamb	171	2 x 85.5	Francis	96 / 80	267
Tatev	157.2	3 x 52.4	Pelton	13.6 / 1.8	552

The power plants of the Vorotan CHPS are connected by 220 kV lines to the main substation Shinuhayr near Goris, except for Tatev which is connected at 110 kV voltage level. Beside this, HPP Shamb and HPP Spandaryan are connected by loop circuits to the 220 kV line between the substations Shinuhayr and Eghegnadzor. From Shinuhayr two 220 kV transmission lines leave to Meghri substation interconnecting to the Iranian grid.

5. Basic Documents

The Norplan (2013)[1] due diligence report included a ContourGlobal's OHS visit report from 2013[2]. This report comes to the following conclusions: The safety level in Vorotan Cascade covers only the legal requirements of the Republic of Armenia. The employees' safety culture is at a low level and use of Personal Protective Equipment (PPE) is substandard. Control on the firefighting requirements and High Risk Facilities (pressure vessels and lifting equipment) is exercised completely by governmental bodies, which makes the control extremely reduced. The manual tools and equipment as well as the PPE are comparatively outdated. However, the cascade personnel consist of good and technically competent professionals, who know in detail the equipment and the hazards associated with it.

Dam safety regarding dam stability as well as flood hydrology and risk of overtopping of embankment dams was reviewed by independent experts (Norplan[3], Sargent & Lundy / Mead & Hunt[4]) in 2013. The overall conclusion was that there are no obvious and immediate safety concerns.

An Environmental and Social Action Plan was set up in the IFC Environmental & Social Review Summary (2015)[5] with the following tasks:

- ContourGlobal will establish an Environmental and Social Management System (ESMS) covering the ContourGlobal Hydrocascade (CJSC) by applying the Contour Global's corporate E&S management system. Specific elements to be established will include: (i) Management plans and procedures governing aspects such as waste management, pollution prevention, monitoring water release; (ii) Appropriate E&S team; (iii) Dam safety emergency preparedness and response programs; (iv) Stakeholder engagement plan incorporating a community grievance mechanism; (v) E&S monitoring program.
- ContourGlobal will (i) commission an additional baseline environmental study, including a soil and groundwater investigation for the cascade, and more detailed investigation in the field of safety, and (ii) finalize the initial E&S improvement programs to implement.
- In case ContourGlobal decides to conduct a collective dismissal of workers as part of the optimization of workforce for the cascade, ContourGlobal shall prepare a retrenchment plan in line with IFC Performance Standard 2.

[1] Norplan (2013): ContourGlobal Vorotan Cascade of Hydropower Plants - Technical, Environmental and Hydrological Due Diligence. March 2013.
[2] ContourGlobal (2013): Occupational Health and Safety Visit Report – Armenia, Vorotan Cascade. January 2013.
[3] Norplan (2013): ContourGlobal Vorotan Cascade of Hydropower Plants – Dam Stability Assessments / Flood hydrology Assessment and risk of overtopping of embankment dams. September 2013.
[4] Mead & Hunt / Sargent & Lundy (2013): Vorotan Cascade Hydroelectric Power Plants - Technical Due Diligence Review Report, Rev. 3. Prepared for OPIC and ContourGlobal. November 2013.
[5] IFC (2015): Vorotan Hydros - Environmental & Social Review Summary (published online)

- ContourGlobal will establish a grievance mechanism for employees of the cascade, either through provisions of the internal grievance mechanism in collective agreements or introducing another transparent and reliable process.
- ContourGlobal will establish a detailed health and safety conditions improvement plan with due dates and responsible persons for the cascade.
- ContourGlobal will review the recommendations on dam safety made by Norplan and Sargent & Lundy / Mead & Hunt and prioritize areas of further study and investment to improve dam safety.

ContourGlobal Hydro Cascade CJSC provided examples of Employment Agreements in three categories (shift work, hazardous work, 5-day schedule work) as well as necessary permits regarding Water Use and Operation Permission, granted by the Public Services Regulating Committee.

6. Field Investigation, Observed Gaps, and Measures

6.1 Methodology

The field survey was conducted from 28th September to 2nd October 2015 by two Fichtner Health, Safety and Environmental (HSE) Specialists partly together with a Health and Safety Specialist and an Environmental Specialist from ContourGlobal. Mr. Artsrun Mirzatunyan attended the field survey as representative of the government of RA. During this site visit, installations like dam sites, power houses, water outlets etc. were inspected and relevant authorities were consulted (see Record of Meetings in Section 9.2 – Appendix II). Attention was turned to health, safety and environmental (HSE) relevant aspects. Also, a catalogue of measures was developed to raise the HSE standards being applied and bring them as close as possible to an internationally acceptable level. This also includes the compliance with national, Armenian, standards.

Because of the tight time frame a real bill of quantities for all needed measures during this field survey was not performed. For the HSE Specialists it was also not possible to assess the general quality of buildings and structures, e.g. the quality of concrete and in which extent the buildings or parts of building are dilapidated in a sense that the proposed measures cannot be implemented because of principal structural (statical) problems. For assessment of the quality of equipment, technical installations and electrical devices see the Consultancy Services for the Rehabilitation of the Vorotan Cascade Hydropower Plants, Fichtner 2012.

Outcome of the field survey is a list of measures to solve the most obvious problems related to health, safety and environmental aspects. The implementation of all listed measures is directed to fulfill Armenian legal requirements. This is also true for compliance with IFC Performance Standards, World Bank EHS Guidelines, etc.

Where possible, single cost estimates are given; in other parts estimated lump sums have been calculated. These lump sums are based on the vast experience that Fichtner's Engineering Specialists have gained during decades in many developing countries. Further they rely on findings and observations that Fichtner's Engineering Specialists obtained during a project in 2003 "Substitution to the Nuclear Power through the Development of the Hydropower Capacity of Armenia" (EUROPEAID/112946/C/SV/AM) and during Consultancy Services for the Rehabilitation of the Vorotan Cascade Hydropower Plants in 2012. These cost estimates (lump sum prices) also include all measures not being listed in detail. In order to cover other uncertainties, which might come up during the rehabilitation works, a high percentage of miscellaneous/contingencies (30%) was taken.

The costs were calculated under the precondition that local workforces are used as much as possible. These local workforces shall be trained by international ContourGlobal staff how to perform needed rehabilitation works (e.g. not to patch but replace equipment if needed).

In addition, where possible, needed equipment shall be purchased in Armenia or from neighboring countries.

Some of the measures as the purchase of new PPE for the staff are already on the way but the costs are also given within these reports as agreed. The same applies for some of the rehabilitation measures e.g. at HPP Shamb and HPP Tatev main buildings which are already included in the Consultancy Services for the Rehabilitation of the Vorotan Cascade Hydropower Plants, Fichtner 2012.

Overview maps and detailed maps of Water Reservoirs and HPPs of the Vorotan Cascade, based on high resolution (0.5 m) satellite pictures, are given in Section 9.3 (Appendix III).

6.2 Water Reservoirs

6.2.1 Spandaryan reservoir

At Spandaryan Reservoir the following gaps regarding Occupational Health and Safety (OHS) have been observed (Table 2):

Table 2: OHS gaps observed at Spandaryan Reservoir, proposed measures and prices

Observed OHS Gaps	Proposed Measure	Estimated price
Distance to next paramedic / hospital	Next paramedic and small clinic approx. 9 km away	---
No first aid boxes in place	Provide first aid box at each building	800 USD (4 x 200 USD)
PPE for workers to be renewed	Provide PPE (including safety shoes, helmets, lamps, working garment, work gloves, safety glasses, etc.)	2,500 USD (500 USD per person)
Due to dam location it is very cold in winter and strong winds occur	Provide workers with additional warm clothing	500 USD (100 USD per person)
Ladders used are dangerous and inadequate (Photo 6)	Provide new construction ladder	200 USD
No lifesaving equipment and no boat at dam site	Provide lifesaving equipment (rings, aluminum rowboat with equipment) at dam site	2,000 USD
No warning signs in place/ villagers unaware of potential dangers	Set up warning signs around the reservoir in and near to villages (e.g. no swimming, slippery ground, etc.) and at entrance of ContourGlobal property (e.g. private property, etc.)	500 USD
No fences around property of ContourGlobal	Fence property of ContourGlobal in order to prevent unauthorized entry; length approx. 2,500 m	25,000 USD (10 USD / m)
No barrier on water surface marking property of ContourGlobal	Install swimming barrier on water surface at end of ContourGlobal property to prevent unauthorized entry (see Map 3); length approx. 350 m	6,000 USD

Observed OHS Gaps	Proposed Measure	Estimated price
Dam has no balustrade or wall on downstream side (Photo 1)[6]	Construct balustrade or wall also on downstream side for security reasons (approx. 300 m)	15,000 USD
Rocks fall on access road and near to workers' building every spring after heavy rains (Photo 2)	Install rockfall protection system above access road and workers' building	
Stairs and handrail down to water level measurement devices damaged by falling rocks (Photo 3)	Rehabilitate stairs and handrail	
No alarm system in place for high water release	Install alarm system (e.g. siren) in order to inform local people about high water release.	
Traffic safety	Install speed restriction signs, road marking, pedestrian walkways, etc.	
At workers' building (see Map 3)		
No adequate sanitary facilities / no sewage treatment (Photo 4 and Photo 5)	Provide toilet as well as bathroom with hand wash basin and shower according to IFC / EBRD Guidance Note[7]	2,000 USD
	Provide Small Waste Water Treatment Plant	9,000 USD
Supply with drinking water is not regular and sometimes of bad quality	Secure drinking water supply according to IFC / EBRD Guidance Note (e.g. by connection of pipeline to village or spring)	15,000 USD
Old inadequate furnishings	Provide adequate furnishings at workers' building	5,000 USD
Dangerous and inadequate heating system; no air condition	Provide adequate heating system (e.g. electric radiators) and air condition system	
	Collect currently used asbestos containing heaters and store safely at nearest HPP	
Dangerous electric installations	Refurbish electric installations and provide reliable power supply	
Inside and outside illumination insufficient	Provide adequate inside as well as outside illumination	
No cooking and cooling facilities	Provide electric heating plates for preparation of meals and a refrigerator	
Firefighting equipment not adequate	Provide new firefighting equipment	
At intake control building (see Photo 7 and Map 3)		
Handrails are missing	Install handrails	3,000 USD
	Install warning signs	
Inside and outside illumination insufficient	Provide adequate inside and outside illumination	

[6] For general Dam Safety see Norplan (2013): Dam Stability Assessment and Mead & Hunt / Sargent & Lundy (2013): Technical Due Diligence Review Report
[7] see IFC / EBRD Guidance Note on Workers' Accommodation (2009)

Observed OHS Gaps	Proposed Measure	Estimated price
Firefighting equipment not adequate	Provide new firefighting equipment	(see above)
At transformer building (see Photo 8 and Map 3)		
Dangerous electric installations	Refurbish electric installations and provide reliable power supply	5,000 USD
Inside and outside illumination insufficient	Provide adequate inside as well as outside illumination	
Firefighting equipment not adequate	Provide new firefighting equipment (including CO_2 fire extinguishers)	
At outlet control building (see Photo 9 and Map 3)		
Dangerous electric installations	Refurbish electric installations and provide reliable power supply	3,000 USD
Inside and outside illumination insufficient	Provide adequate inside as well as outside illumination	
Firefighting equipment not adequate	Provide new firefighting equipment	
Dangerous outside ladder at outlet control building (Photo 10)	Install new outside ladder at outlet control building	

Photo 1: No handrail or wall at downstream side of dam

Photo 2: Rocks above access road to be secured by nets

Photo 3: Stairs and handrails damaged by falling rocks

Photo 4: Shower at workers' building

Photo 5: Pit latrine

Photo 6: Self-made construction used as ladder

Photo 7: Intake control building

Photo 8: Transformer building

Photo 9: Outlet control building

Photo 10: Dangerous ladder outside outlet control building

6.2.2 Angeghakot reservoir

At Angeghakot Reservoir the following gaps regarding OHS have been observed (Table 3):

Table 3: OHS gaps observed at Angeghakot Reservoir, proposed measures and prices

Observed OHS Gaps	Proposed Measure	Estimated price
Distance to next paramedic / hospital	Next paramedic and small clinic approx. 8 km away	---
No first aid boxes in place	Provide first aid box at each building	400 USD (2 x 200 USD)
PPE for workers to be renewed	Provide PPE (including safety shoes, helmets, lamps, working garment, work gloves, safety glasses, etc.)	3,500 USD (500 USD per person)
Ladders used are inadequate	Provide new construction ladder	200 USD
No lifesaving equipment and no boat at dam site	Provide lifesaving equipment (rings, aluminum rowboat with equipment) at dam site	2,000 USD
No warning signs in place/ villagers unaware of potential dangers	Set up warning signs around the reservoir in and near to villages (e.g. no swimming, slippery ground, etc.) and at entrance of ContourGlobal property (e.g. private property, etc.)	500 USD
No fences around property of ContourGlobal	Fence property of ContourGlobal in order to prevent unauthorized entry; length approx. 1,000 m	10,000 USD (10 USD / m)
No barrier on water surface marking property of ContourGlobal	Install swimming barrier on water surface at end of ContourGlobal property to prevent unauthorized entry (see Map 6); length approx. 100 m	1,500 USD (15 USD per meter)
Material of dam's concrete walls is crumbling (Photo 11)[6]	It is recommended to refurbish concrete wall especially above stairs and tunnel entrance	14,000 USD
Handrails at dam are broken (Photo 12)	Refurbish handrails (approx. 150 m)	
Rocks fall on access road and near to workers' building every spring after heavy rains (Photo 13 and Photo 14)	Install rockfall protection system above access road and workers' building	
Handrails and entrance gate are in bad condition (Photo 15 and Photo 16)	Replace entrance gate and repair handrails	
Stairs and handrail down to tunnel are broken and unsafe (Photo 17)	Refurbish stairs and handrails	
No alarm system in place for high water release	Install alarm system (e.g. siren) in order to inform local people about high water release	
Traffic safety	Install speed restriction signs, road marking, pedestrian walkways, etc.	

Observed OHS Gaps	Proposed Measure	Estimated price
At workers' building including transformer room below (see Photo 14 and Map 6)		
No adequate sanitary facilities / no sewage treatment	Provide toilet as well as bathroom with hand wash basin and shower according to IFC / EBRD Guidance Note	2,000 USD
	Provide Small Waste Water Treatment Plant	9,000 USD
Insufficient supply with drinking water	Secure drinking water supply according to IFC / EBRD Guidance Note (e.g. by connection of pipeline to next village or spring)	20,000 USD
Old inadequate furnishings (Photo 18)	Provide adequate furnishings at workers' building	5,000 USD
Dangerous and inadequate heating system (Photo 19); no air condition	Provide adequate heating system (e.g. electric radiators) and air condition system	
	Collect currently used asbestos containing heaters and store safely at nearest HPP	
Dangerous electric installations	Refurbish electric installations and provide reliable power supply	
Inside and outside illumination insufficient	Provide adequate as well as outside illumination	
No cooking and cooling facilities	Provide electric heating plates for preparation of meals and a refrigerator	
Firefighting equipment not adequate (Photo 20)	Provide new firefighting equipment (including CO_2 fire extinguishers)	
At intake control building (see Map 6)		
Inside and outside illumination insufficient	Provide adequate inside as well as outside illumination	3,000 USD
Firefighting equipment not adequate	Provide new firefighting equipment	
Metal sheets below building for intake regulation are very weak and unsafe (Photo 21)	Install stronger sheets in order to prevent accidents	
Devices for weight measurement are out of order, especially the warning indicator (Photo 22)	Refurbish measurement devices	
For cleaning of intake workers climb down ladder and clean intake with an iron hook	Install mechanical cleaning device at intake (see also Environmental Liability Report for installing of fish diversion screens including cleaning device)	See Environmental Liability Report
At tunnel below dam (see Photo 11 and Map 6)		
In tunnel below dam (gallery) no illumination and unsafe conditions (Photo 23)	Rehabilitation measures as safe stairs and handrails.	1,000 USD
	If one person has to enter the tunnel a second person shall stay outside to secure the first person. The person entering the tunnel shall use PPE including oxygen mask.	

Photo 11: Concrete wall of dam damaged; tunnel entrance

Photo 12: Handrails at dam are broken

Photo 13: Rocks above access road

Photo 14: Rocks above workers' building

Photo 15: Handrails near gate broken

Photo 16: Entrance gate in bad condition

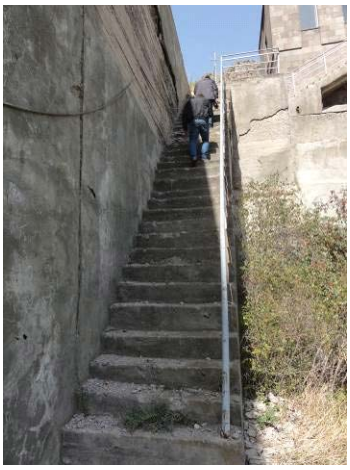


Photo 17: Stairs and handrail to tunnel damaged

Photo 18: Old furnishing in workers' building

Photo 19: Unsafe heating device

Photo 20: Missing firefighting equipment

Photo 21: Weak and unsafe metal sheets

Photo 22: Weight measurement device out of order

Photo 23: No illumination in tunnel (gallery)

6.2.3 Tolors reservoir

At Tolors Reservoir the following gaps regarding OHS have been observed (Table 4):

Table 4: OHS gaps observed at Tolors Reservoir, proposed measures and prices

Observed OHS Gaps	Proposed Measure	Estimated price
Distance to next paramedic / hospital	Next paramedic and next hospital approx. 6 km away (in Sisian)	---
No first aid boxes in place	Provide first aid box at each building	400 USD (2 x 200 USD)
PPE for workers to be renewed	Provide PPE (including safety shoes, helmets, lamps, working garment, work gloves, safety glasses, etc.)	3,500 USD (500 USD per person)
Ladders used are inadequate	Provide new construction ladder	200 USD
No lifesaving equipment and no boat at dam site	Provide lifesaving equipment (rings, aluminum rowboat with equipment) at dam site	2,000 USD
No warning signs in place/ villagers unaware of potential dangers	Set up warning signs around the reservoir in and near to villages (e.g. no swimming, slippery ground, etc.) and at entrance of ContourGlobal property (e.g. private property, etc.)	500 USD
Fence around the site is broken in some places; no fences around whole property of ContourGlobal	Fence property of ContourGlobal in order to prevent unauthorized entry; length aprrox 1,800 m	18,000 USD (10 USD / m)
No barrier on water surface marking property of ContourGlobal	Install swimming barrier on water surface at end of ContourGlobal property to prevent unauthorized entry (Photo 24 and see Map 8); length approx. 400 m	6,000 USD (15 USD per meter)
Dam has no balustrade or wall on downstream side (Photo 25)[6]	Construct balustrade or wall also on downstream side for security reasons (approx. 180 m)	5,000 USD

Observed OHS Gaps	Proposed Measure	Estimated price
No alarm system in place for high water output	Install alarm system (e.g. siren) in order to inform local people about high water output.	(see above)
Traffic safety	Install speed restriction signs, road marking, pedestrian walkways, etc.	
At workers' building including unused transformer room below (see)		
No adequate sanitary facilities / no sewage treatment	Provide toilet as well as bathroom with hand wash basin and shower according to IFC / EBRD Guidance Note	2,000 USD
	Provide Small Waste Water Treatment Plant	9,000 USD
No drinking water supply	Secure drinking water supply according to IFC / EBRD Guidance Note (e.g. by connection of pipeline to next village or spring)	12,000 USD
Old inadequate furnishings	Provide adequate furnishings at workers' building	5,000 USD
Dangerous and inadequate heating system (Photo 26); no air condition	Provide adequate heating system (e.g. electric radiators) and air condition system	
	Collect currently used asbestos containing heaters and store safely at nearest HPP	
Dangerous electric installations	Refurbish electric installations and provide reliable power supply	
Inside and outside illumination insufficient (Photo 27)	Provide adequate inside as well as outside illumination	
No cooking and cooling facilities	Provide electric heating plates for preparation of meals and a refrigerator	
Firefighting equipment not adequate	Provide new firefighting equipment (including CO_2 fire extinguishers)	
At intake control building (see Map 8)		
Inside and outside illumination insufficient	Provide adequate inside as well as outside illumination	3,000 USD
Firefighting equipment not adequate	Provide new firefighting equipment	
Handrails in unsafe condition (Photo 28)	Refurbish handrails	
Unsafe self-repaired stairs and handrails (Photo 29)	Refurbish stairs and handrails	

Photo 24: Fishermen in boat near to dam

Photo 25: No wall or balustrade on downstream side of dam

Photo 26: Unsafe heating device

Photo 27: Outside illumination not working

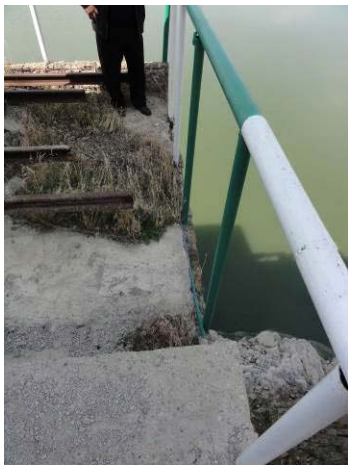


Photo 28: Unsafe handrails especially at intake control building

Photo 29: Self-repaired unsafe stairs and handrails at intake control building

6.2.4 Shamb/Tatev Reservoir

At Shamb/Tatev Reservoir the following gaps regarding OHS have been observed (Table 5):

Table 5: OHS gaps observed at Shamb/Tatev Reservoir, proposed measures and prices

Observed OHS Gaps	Proposed Measure	Estimated price
Distance to next paramedic / hospital	Next paramedic approx. 9 km away; next hospital approx. 12 km away (in Sisian)	---
No first aid boxes in place	Provide first aid box at each building	400 USD (2 x 200 USD)
PPE for workers to be renewed	Provide PPE (including safety shoes, helmets, lamps, working garment, work gloves, safety glasses, etc.)	2,500 USD (500 USD per person)
Ladders used are inadequate	Provide new construction ladder	200 USD
No lifesaving equipment and no boat at dam site	Provide lifesaving equipment (rings, aluminum rowboat with equipment) at dam site	2,000 USD
No warning signs in place/ villagers unaware of potential dangers	Set up warning signs around the reservoir in and near to villages (e.g. no swimming, slippery ground, etc.) and at entrance of ContourGlobal property (e.g. private property, etc.)	500 USD
Fence along access road is broken in some places; no fences around whole property of ContourGlobal	Fence property of ContourGlobal in order to prevent unauthorized entry; length approx. 1,000 m	10,000 USD (10 USD / m)
No barrier on water surface marking property of ContourGlobal	Install swimming barrier on water surface at end of ContourGlobal property to prevent unauthorized entry (see Map 11); length approx. 130 m	2,000 USD (15 USD per meter)
Dam has no balustrade or wall on downstream side (Photo 30)[6]	Construct balustrade or wall also on downstream side for security reasons (approx. 110 m)	15,000 USD
Handrails at dangerous overflow installation not very safe (Photo 31)	Refurbish handrails at overflow installation	
Rocks fall on access road and near to workers' building every spring after heavy rains (Photo 32 and Photo 33)	Install rockfall protection system above access road and workers' building	
No alarm system in place for high water release	Install alarm system (e.g. siren) in order to inform local people about high water release.	
Traffic safety	Install speed restriction signs, road marking, pedestrian walkways, etc.	
At workers' building including transformer room (see Map 11)		
No adequate sanitary facilities / no sewage treatment	Provide toilet as well as bathroom with hand wash basin and shower according to IFC / EBRD Guidance Note	2,000 USD

Observed OHS Gaps	Proposed Measure	Estimated price
(see above)	Provide Small Waste Water Treatment Plant	9,000 USD
No drinking water supply	Secure drinking water supply according to IFC / EBRD Guidance Note (e.g. by connection of pipeline to next village or spring)	14,000 USD
Old inadequate furnishings	Provide adequate furnishings at workers' building	5,000 USD
Dangerous and inadequate heating system (Photo 34); no air condition	Provide adequate heating system (e.g. electric radiators) and air condition system	
	Collect currently used asbestos containing heaters and store safely at nearest HPP	
Dangerous electric installations	Refurbish electric installations and provide reliable power supply	
Inside and outside illumination insufficient	Provide adequate inside as well as outside illumination	
No cooking and cooling facilities	Provide electric heating plates for preparation of meals and a refrigerator	
Firefighting equipment not adequate	Provide new firefighting equipment (including CO_2 fire extinguishers)	
At intake control building (see Map 11)		
Inside and outside illumination insufficient	Provide adequate inside as well as outside illumination	3,000 USD
Firefighting equipment not adequate	Provide new firefighting equipment	
Grids below intake regulation building broken and unsafe (Photo 35)	Refurbish grids under intake regulation building	
Ladders to enter building are unsafe	Provide new stairs and handrails to enter building	

Photo 30: No wall or balustrade on downstream side of dam

Photo 31: Unsafe handrails at dangerous overflow installation

Photo 32: Rocks above access road

Photo 33: Rocks above workers' building

Photo 34: Unsafe heating device

Photo 35: Grids below intake control building

6.2.5 Daily Regulation Reservoir of Tatev HPP

It has to be mentioned that at the Daily Regulation Reservoir no refurbishment works have been done since its construction about 40 years ago. Concrete walls of the reservoir and probably also the bottom of the reservoir are leaking (see Photo 36). Parts of the concrete walls of the reservoir are breaking off (see Photo 37). Thus, it is urgently recommended to prepare a stability analysis of the whole reservoir. It is also recommended to rehabilitate all technical installations as well as buildings. In Table 6 only the worst observed gaps regarding OHS are given:

Table 6: OHS gaps observed at Daily Regulation Reservoir, proposed measures and prices

Observed OHS Gaps	Proposed Measure	Estimated price
Distance to next paramedic / hospital	Next paramedic approx. 2 km away; next hospital approx. 15 km) away (in Goris)	---
No first aid boxes in place	Provide first aid box at each building	600 USD (3 x 200 USD)
PPE for workers to be renewed	Provide PPE (including safety shoes, helmets, lamps, working garment, work gloves, safety glasses, etc.)	2,500 USD (500 USD per person)
Ladders used are inadequate	Provide new construction ladder	200 USD
No lifesaving equipment	Provide lifesaving equipment	500 USD

Observed OHS Gaps	Proposed Measure	Estimated price
No warning signs in place	Set up warning signs at entrance of ContourGlobal property (e.g. private property, etc.)	500 USD
	Install warning signs for workers at especially dangerous sites	
Fence around property of ContourGlobal broken in some parts	Fence property of ContourGlobal in order to prevent unauthorized entry; length approx. 700 m	7,000 USD (10 USD / m)
Most of the handrails are unsafe as the concrete they are fixed in is breaking (Photo 38)	Refurbish all handrails	5,000 USD
Stairs are unsafe and some are badly broken (e.g. at intake regulation building) (Photo 39 and Photo 40)	Refurbish all stairs	
Traffic safety	Install speed restriction signs, road marking, etc.	
At workers' building (see Map 13)		
No adequate sanitary facilities / no sewage treatment	Provide toilet as well as bathroom with hand wash basin and shower according to IFC / EBRD Guidance Note	2,000 USD
	Provide Small Waste Water Treatment Plant	9,000 USD
No drinking water supply	Secure drinking water supply according to IFC / EBRD Guidance Note (e.g. by connection of pipeline to next village or spring)	Included in costs given for Tatev HPP
Old inadequate furnishings	Provide adequate furnishings at workers' building	5,000 USD
Dangerous and inadequate heating system; no air condition	Provide adequate heating system (e.g. electric radiators) and air condition system	
	Collect currently used asbestos containing heaters and store safely at nearest HPP	
Dangerous electric installations (Photo 41)	Refurbish electric installations and provide reliable power supply	
Inside and outside illumination insufficient	Provide adequate inside as well as outside illumination	
No cooking and cooling facilities	Provide electric heating plates for preparation of meals and a refrigerator	
Firefighting equipment not adequate	Provide new firefighting equipment	


Photo 36: Water leakages at the reservoir walls


Photo 37: Parts of the concrete walls are breaking off

Photo 38: Fixing of handrails is breaking

Photo 39: Unsafe and broken stairs and handrails

Photo 40: Unsafe and broken stairs and handrails

Photo 41: Unsafe electrical installations

6.3 Hydropower Plants

6.3.1 Spandaryan HPP

At Spandaryan HPP the following gaps regarding OHS have been observed (Table 7):

Table 7: OHS gaps observed at Spandaryan HPP, proposed measures and prices

Observed OHS Gaps	Proposed Measure	Estimated price
Distance to next paramedic / hospital	Next paramedic and small clinic approx. 5 km away from HPP	---
No first aid boxes in place	Provide first aid boxes at all buildings	1,000 USD (5 units)
No defibrillators in place	Provide a defibrillator	1,200 USD
High noise levels in parts of HPP	Prepare noise assessment report by an external expert (including consideration of WorldBank / IFC EHS Guidelines; indicating zonation of high noise level areas; proposal of noise damming measures; PPE; signing, etc.)	25,000 USD (for all HPPs)
	Provide noise level measurement device at ContourGlobal for monitoring purposes	100 USD (for all HPPs)
	Provide sound insulation or acoustic barriers (enclosures) around high noisy rotating equipment. Unit rate for enclosure panels are: USD 100 - 150 per m^2 (panels; thickness 55 mm; with noise reduction of approx. 30 dB A). Enclosure around turbine on turbine floor and cover of generator on generator floor (approx. 300 m² per unit)	90,000 USD
High level of vibration in some parts of HPP	Prepare vibration assessment report by an external expert (including zonation of high vibration levels; proposal of measures; etc.)	25,000 USD (for all HPPs)

Observed OHS Gaps	Proposed Measure	Estimated price
PPE for workers to be renewed	Provide PPE (including safety shoes, helmets, lamps, working garment, work gloves, safety glasses, protection against high voltage, ear plugs, eyewash solution, etc.) according to working places	12,000 USD (500 USD per person)
Danger from hot works	Provide mobile welding screens and fire blankets during hot works	1,000 USD
Not enough warning signs installed	Install warning signs (e.g. wearing of PPE; high voltage; confined spaces; etc.)	500 USD
Explosive atmospheres	Provide handheld gas tracer with calibration device to be used inside confined spaces and battery rooms	5,000 USD
Work at confined spaces	Close confined space, if possible	1,000 USD
	Sign confined spaces, install illumination, and have a second person nearby when working in confined spaces in order to get help, if necessary	
Lack of visitors' safety guides in English	Provide visitors' safety guides in Armenian and English languages and give visitors a safety introduction	HSE officer / Chief of HPP
Oil leakages from different machineries and installations	Until refurbishment works of machinery and installations stop leaking if possible and collect all leaking oil for reuse or adequate disposal.	Done by staff
Crane in machine hall is due to inspection by Nov 2015, but there is still no contract with government agencies for inspection	Sign contract with government agencies as soon as possible and implement needed inspection.	Administration of ContourGlobal
Air tanks needed to be checked in June 2015 but no contract with government agencies exists (Photo 42)	Sign contract with government agencies as soon as possible and implement needed inspection.	Administration of ContourGlobal
Portable ladders are substandard.	Provide new portable ladders. Portable industrial type ladders: 200 - 500 USD per ladder.	4,000 USD (10 ladders)
No scaffolding available.	Provide new scaffolding. Approx. unit rate 1,500 - 2,000 USD per 100m². Estimated required total scaffolding: 500m².	10,000 ÙSD
Minibus for transportation of workers is in a technically unsafe condition	Provide minibus for workers' transportation in a technically safe condition	20,000 USD
No driver licensed for transportation of people with the minibus was available for two weeks	Train and license additional driver(s) for driving the minibus	HSE officer
Outside the buildings there is a 6 kV cable inside an asbestos pipe (Photo 43)	Due to dangers from asbestos this pipe should not be touched during rehabilitation works.	----

Observed OHS Gaps	Proposed Measure	Estimated price
Retaining wall outside the buildings against falling rocks is not high and long enough (Photo 44)	Extend retaining wall in both directions and also in height.	10,000 USD
Danger of fire due to barbecue placed and fire wood stored near to oil refinery station	Move firewood and barbecue to a safe area	Done by staff
At main HPP building		
There is a lack of guarding from rotating machinery	Install handrails around rotating parts of machinery	250,000 USD[8]
No emergency evacuation procedure and signs in place	Implement emergency evacuation procedure and install emergency exit signs	
Old inadequate furnishings in restrooms	Provide adequate furnishings	
Dangerous and inadequate heating systems; no air condition	Provide adequate heating systems (e.g. electric radiators) and air condition system	
Old furnishing in guest room and refrigerator out of order (Photo 45)	Provide new furnishing and new refrigerator for guest room	
Dangerous electric installations (including light switches)	Refurbish all dangerous electric installations	
Inside and outside illumination insufficient	Provide adequate inside and outside illumination	
No adequate cooking / cooling facilities	Provide electric heating plates for preparation of meals and refrigerators, if possible in a special kitchen / dining room	
Traffic safety inside and outside the HPP	Install speed restriction signs, road marking, pedestrian walkways, etc.	
Firefighting equipment in bad condition (e.g. “new” hoses are of bad quality and leaking, not enough fire extinguishers, etc.). A fire in August 2014 was very hard to fight with inadequate equipment.	Provide adequate number and type of fire extinguishers at all buildings	
Fire alarm and sprinkler systems in all rooms have to be rehabilitated (Photo 46)	Install new fire alarm and sprinkler systems in all rooms	
Fire stopping cable insulation	Install fire stopping insulation where cable routes go through walls	

[8] Measures are partly covered by the current rehabilitation project, see:
Fichtner (2012): Consultancy Services for the Rehabilitation of the Vorotan Cascade Hydropower Plants – Engineering Design Report, November 2012

Observed OHS Gaps	Proposed Measure	Estimated price
No or inadequate spill absorbent material near oil filled installations and in battery rooms	Provide adequate spill absorbent material near to oil filled installations and in battery rooms	(see above)
Currently used lead batteries filled with electrolyte may be a danger to workers	Change currently used batteries with dry-type batteries (for storage of old batteries see Hazardous Substances Assessment)	
Floor in battery rooms is not acid proof and in some cases broken (Photo 47)	Install acid-proof floor in battery rooms and place batteries in a collection pan or on a bunded floor to avoid any spills	
Floor around electrical equipment in control room is made of wood	It is recommended to refurbish floor using fireproof material	
Ventilation of battery room is not working (Photo 48)	Install new ventilation system for battery room.	
Some of the electrical devices are open on the back side and can easily be touched (Photo 49).	Close and secure all electrical devices in order to avoid accidents.	
Welded handrails in machine hall have to be refurbished (Photo 50)	Install new handrails in place of welded ones	
Some tools in tool room are very unsafe (without worker's protection) (Photo 51)	Provide safe tools with worker's protection	
Distillated water is filled into glass bottle with broken bottle neck – danger of injuries (Photo 52)	Provide new glass bottles for distillated water	
At substation		
Some cable ducts at substation broken (holes)	Refurbish cable ducts	20,000 USD
Handrails and concrete behind main building unsafe	Refurbish handrails	
Firefighting system for transformers and substation needs rehabilitation (Photo 53); sprinkler system at transformers is in place but only working, if enough water is available.	Rehabilitation of whole firefighting system urgently needed.	
	Intakes for water about 50 cm above ground of outlet channel (Photo 54). This has to be lowered to ensure water supply at any time.	
	Enlarge, enforce and strengthen fire wall between transformers	Costs are covered by the current rehabilitation project[8]
Substandard working platforms to work on HV equipment and HV lines	Provide a MEWP (movable elevated working platform) for work at height.	50,000 USD

Observed OHS Gaps	Proposed Measure	Estimated price
At oil refinery station and storage building		
Dangerous electrics; insufficient illumination	Refurbish dangerous electric installations and inside / outside illumination at storage building and at oil refinery station	15,000 USD
Firefighting equipment in bad condition	Provide adequate number and type of fire extinguishers at storage and oil refinery buildings	
Fire alarm and sprinkler systems in all rooms have to be rehabilitated.	Install new fire alarm and sprinkler systems in all rooms	
No emergency evacuation procedure and signs in place	Implement emergency evacuation procedure and install emergency exit signs	
No or inadequate spill absorbent material	Provide adequate spill absorbent material	

Photo 42: Air tanks due for check in June 2015

Photo 43: 6 kV cable mantled with asbestos

Photo 44: Retaining wall against falling rocks to be extended to both sides and in height

Photo 45: Old refrigerator in guest room

Photo 46: Fire alarm system not working

Photo 47: Floor in battery room broken and not acid proof

Photo 48: Ventilation system of battery room not working

Photo 49: Open backside of electric devices

Photo 50: Unsafe welded handrails

Photo 51: Dangerous tools without workers' protection

Photo 52: Glass bottle with broken bottleneck used for distillated water

Photo 53: Installations of firefighting system are very old and need refurbishment

Photo 54: Water intake for firefighting system about 50 cm above ground of outlet channel

6.3.2 Shamb HPP

At Shamb HPP the following gaps regarding OHS have been observed (Table 8):

Table 8: OHS gaps observed at Shamb HPP, proposed measures and prices

Observed OHS Gaps	Proposed Measure	Estimated price
Distance to next paramedic / hospital	Next paramedic approx. 6 km away; next hospital approx. 8 km away from HPP	---
First aid boxes badly equipped (Photo 55)	Provide first aid boxes at all buildings	1,000 USD (5 units)
No defibrillators in place	Provide a defibrillator	1,200 USD
Insufficient supply with drinking water	Secure drinking water supply according to IFC / EBRD Guidance Note (e.g. by connection of pipeline to village or spring)	50,000 USD
High level of vibration in some parts of HPP	Prepare vibration assessment report by an external expert (including zonation of high vibration levels; proposal of measures; etc.)	Costs see Table 7

Observed OHS Gaps	Proposed Measure	Estimated price
High noise levels in parts of HPP	Prepare noise assessment report by an external expert (including consideration of WorldBank / IFC EHS Guidelines; indicating zonation of high noise level areas; proposal of noise damming measures; PPE; signing, etc.)	Costs see Table 7
	Provide noise level measurement device at ContourGlobal for monitoring purposes	Costs see Table 7
	Provide sound insulation or acoustic barriers (enclosures) around high noisy rotating equipment. Unit rate for enclosure panels are: USD 100 - 150 per m^2 (panels; thickness 55 mm; with noise reduction of approx. 30 dB A). Enclosure around turbine on turbine floor and cover of generator on generator floor (approx. 300 m² per unit)	90,000 USD
PPE for workers to be renewed	Provide PPE (including safety shoes, helmets, lamps, working garment, work gloves, safety glasses, protection against high voltage, ear plugs, eyewash solution, etc.) according to working places	13,000 USD (500 USD per person)
Danger from hot works	Provide mobile welding screens and fire blankets during hot works	1,000 USD
Not enough warning signs installed	Install warning signs (e.g. wearing of PPE; high voltage; confined spaces; etc.)	500 USD
Explosive atmospheres	Provide handheld gas tracer with calibration device to be used inside confined spaces and battery rooms	5,000 USD
Work at confined spaces	Close confined space, if possible	1,000 USD
	Sign confined spaces, install illumination, and have a second person nearby when working in confined spaces in order to get help, if necessary	
Lack of visitors' safety guides in English	Provide visitors' safety guides in Armenian and English languages and give visitors a safety introduction	HSE officer / Chief of HPP
Oil leakages from different machineries and installations	Until refurbishment works of machinery and installations stop leaking if possible and collect all leaking oil for reuse or adequate disposal.	Done by staff
Tripping hazard in machine hall (Photo 56)	Remove tripping hazard	Done by staff
Crane in machine hall has to be revised but there is no contract with government agencies for inspection	Sign contract with government agencies as soon as possible and implement inspection.	Administration of ContourGlobal
Portable ladders are substandard.	Provide new portable ladders. Portable industrial type ladders: 200 - 500 USD per ladder.	4,000 USD (10 ladders)
No scaffolding available.	Provide new scaffolding. Approx. unit rate 1,500 - 2,000 USD per 100m². Estimated required total scaffolding: 500m².	10,000 ÙSD

Observed OHS Gaps	Proposed Measure	Estimated price
Not enough toilets / bathrooms for workers	Provide adequate toilets / bathrooms separately for men and women according to IFC / EBRD Guidance Note[7]	5,000 USD
Rocks falling down besides the building especially after heavy rain (Photo 57)	Install rockfall protection	10,000 USD
Substandard working platforms to work on HV equipment and HV lines	Provide a MEWP (movable elevated working platform) for work at height.	50,000 USD
At main HPP building		
There is a lack of guarding from rotating machinery	Install handrails around rotating parts of machinery	250,000 USD[8]
No emergency evacuation procedure and signs in place	Implement emergency evacuation procedure and install emergency exit signs	
Dangerous and inadequate heating systems; no air condition	Provide adequate heating systems (e.g. electric radiators) and air condition system	
Dangerous electric installations (Photo 58)	Refurbish all dangerous electric installations	
Inside and outside illumination insufficient	Provide adequate inside and outside illumination	
No adequate cooking / cooling facilities	Provide electric heating plates for preparation of meals and refrigerators, if possible in a special kitchen / dining room	
Firefighting equipment in bad condition	Provide adequate number and type of fire extinguishers at all buildings	
Fire alarm and sprinkler systems in all rooms have to be rehabilitated (Photo 59)	Install new fire alarm and sprinkler systems in all rooms	
Fire stopping cable insulation	Install fire stopping insulation where cable routes go through walls	
No or inadequate spill absorbent material near oil filled installations and in battery rooms	Provide adequate spill absorbent material near to oil filled installations and in battery rooms	
Currently used lead batteries filled with electrolyte may be a danger to workers	Change currently used batteries with dry-type batteries (for storage of old batteries see Hazardous Substances Assessment)	
Unsafe fixing of battery connections	Refurbish battery connections	
Floor in battery rooms is not acid proof	Install acid-proof floor in battery rooms and place batteries in a collection pan or on a bunded floor to avoid any spills	
Floor around electrical equipment in control room is made of wood	It is recommended to refurbish floor using fireproof material	

Observed OHS Gaps	Proposed Measure	Estimated price
Holes in the floor of restroom (Photo 60)	Repair floor	(see above)
Old inadequate furnishings in restrooms (Photo 61)	Provide adequate furnishings	
Ventilation of battery room is not working	Install new ventilation system for battery room.	
Some of the electrical devices are open on the back side and can easily be touched (Photo 62)	Close and secure all electrical devices in order to avoid accidents.	
Traffic safety inside and outside the HPP	Install speed restriction signs, road marking, pedestrian walkways, etc.	
Firefighting system at transformers	Enlarge, enforce and strengthen fire wall between transformers	
At oil refinery station		
Dangerous electrics; insufficient illumination	Refurbish dangerous electric installations and inside / outside illumination at storage building and at oil refinery station	10,000 USD
Firefighting equipment in bad condition	Provide adequate number and type of fire extinguishers at storage and oil refinery buildings	
Fire alarm and sprinkler systems in all rooms have to be rehabilitated.	Install new fire alarm and sprinkler systems in all rooms	
No emergency evacuation procedure and signs in place	Implement emergency evacuation procedure and install emergency exit signs	
No or inadequate spill absorbent material	Provide adequate spill absorbent material	

Photo 55: Badly equipped first aid box

Photo 56: Tripping hazard in machine hall

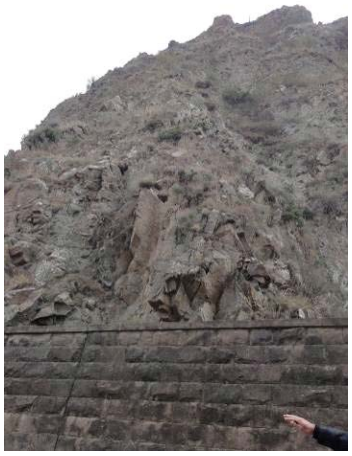


Photo 57: Rocks besides the building

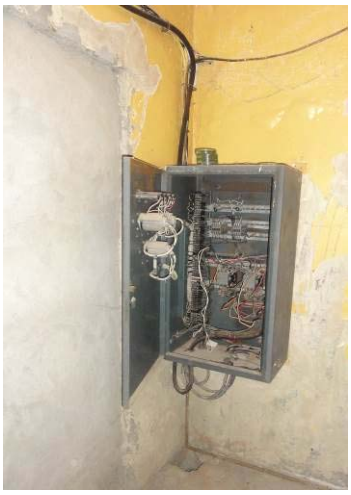


Photo 58: Unsafe electric installations

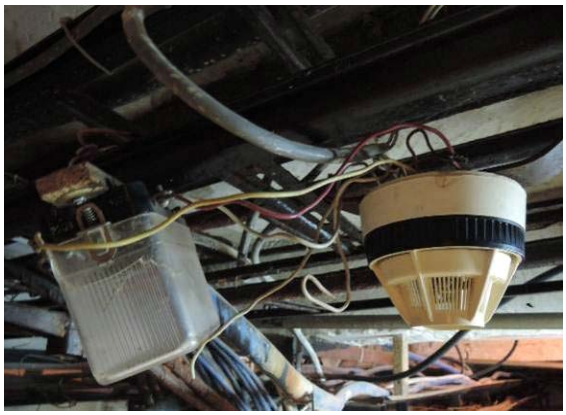


Photo 59: Fire alarm system in bad condition

Photo 60: Holes in floor in restroom

Photo 61: Old furnishing in restrooms

Photo 62: Unsecure electrical devices

6.3.3 Tatev HPP

At Tatev HPP the following gaps regarding OHS have been observed (Table 9):

Table 9: OHS Gaps observed at Tatev HPP, proposed measures and prices

Observed OHS Gaps	Proposed Measure	Estimated price
Distance to next paramedic / hospital	Next paramedic approx. 1 km away; next hospital approx. 15 km) away (in Goris)	---
First aid boxes badly equipped	Provide first aid boxes at all buildings	1,000 USD (5 units)
No defibrillators in place	Provide a defibrillator	1,200 USD
Poisonous snakes found outside but also inside the buildings up to the highest floor	As the very expensive antidote may only be injected by medics and because it is not sure if an antidote adapted to local snake species is available, it is recommended to install snake deterring electrical devices in soil around HPP site and / or use snake deterring powder	1,000 USD for first implementation Deterring powder included in operational costs
Insufficient supply with drinking water	Secure drinking water supply according to IFC / EBRD Guidance Note (e.g. by connection of pipeline to village or spring)	95,000 USD (including also Daily Regulation Reservoir)
High noise levels in parts of HPP	Prepare noise assessment report by an external expert (including consideration of WorldBank / IFC EHS Guidelines; indicating zonation of high noise level areas; proposal of noise damming measures; PPE; signing, etc.)	Costs see Table 7
	Provide noise level measurement device at ContourGlobal for monitoring purposes	Costs see Table 7
	Provide sound insulation or acoustic barriers (enclosures) around high noisy rotating equipment. Unit rate for enclosure panels are: USD 100 - 150 per m^2 (panels; thickness 55 mm; with noise reduction of approx. 30 dB A). Enclosure around turbine on turbine floor and cover of generator on generator floor (approx. 300 m^2 per unit)	135,000 USD
High level of vibration in some parts of HPP	Prepare vibration assessment report by an external expert (including zonation of high vibration levels; proposal of measures; etc.)	Costs see Table 7
PPE for workers to be renewed	Provide PPE (including safety shoes, helmets, lamps, working garment, work gloves, safety glasses, protection against high voltage, ear plugs, eyewash solution, etc.) according to working places	17,500 USD (500 USD per person)
Danger from hot works	Provide mobile welding screens and fire blankets during hot works	1,000 USD
Not enough warning signs installed	Install warning signs (e.g. wearing of PPE; high voltage; confined spaces; etc.)	500 USD
Explosive atmospheres	Provide handheld gas tracer with calibration device to be used inside confined spaces and battery rooms	5,000 USD

Observed OHS Gaps	Proposed Measure	Estimated price
Work at confined spaces	Close confined space, if possible	1,000 USD
	Sign confined spaces, install illumination, and have a second person nearby when working in confined spaces in order to get help, if necessary	
Rocks falling down besides the building especially after heavy rain (Photo 63)	Install rockfall protection	10,000 USD
Lack of visitors' safety guides in English	Provide visitors' safety guides in Armenian and English languages and give visitors a safety introduction	HSE officer / Chief of HPP
Oil leakages from different machineries and installations. Some of them fixed with wooden wedges (Photo 65)	Until refurbishment works of machinery and installations stop leaking if possible and collect all leaking oil for reuse or adequate disposal.	Done by staff
Portable ladders are substandard. (Photo 68).	Provide new portable ladders. Portable industrial type ladders: 200 - 500 USD per ladder.	4,000 USD (10 ladders)
No scaffolding available.	Provide new scaffolding. Approx. unit rate 1,500 - 2,000 USD per 100m². Estimated required total scaffolding: 500m².	10,000 ÙSD
Not enough toilets / bathrooms; no sanitary facilities for women	Provide adequate toilets / bathrooms separately for men and women according to IFC / EBRD Guidance Note[7]	5,000 USD
Substandard working platforms to work on HV equipment and HV lines	Provide a MEWP (movable elevated working platform) for work at height.	50,000 USD
At main HPP building		
There is a lack of guarding from rotating machinery (Photo 66)	Install handrails around rotating parts of machinery	250,000 USD[8]
No emergency evacuation procedure and signs in place	Implement emergency evacuation procedure and install emergency exit signs	
Dangerous and inadequate heating systems; no air condition	Provide adequate heating systems (e.g. electric radiators) and air condition system	
Dangerous electric installations (Photo 67)	Refurbish all dangerous electric installations	
Inside and outside illumination insufficient	Provide adequate inside and outside illumination	
No adequate cooking / cooling facilities	Provide electric heating plates for preparation of meals and refrigerators, if possible in a special kitchen / dining room	
Firefighting equipment in bad condition	Provide adequate number and type of fire extinguishers at all buildings	
Fire alarm and sprinkler systems in all rooms have to be rehabilitated.	Install new fire alarm and sprinkler systems in all rooms	

Observed OHS Gaps	Proposed Measure	Estimated price
No or inadequate spill absorbent material near oil filled installations and in battery rooms	Provide adequate spill absorbent material near to oil filled installations and in battery rooms	(see above)
Currently used lead batteries filled with electrolyte may be a danger to workers	Change currently used batteries with dry-type batteries (for storage of old batteries see Hazardous Substances Assessment)	
Mixing of electrolyte in old bath tub (Photo 69)		
Hermetic door, which was opened during refurbishment, is not hermetic anymore	Refurbish hermetic door to avoid water leakages	
Cable insulations are in parts very bad and not fire safe	Refurbish cable insulations and install fire stopping insulation where cable routes go through walls	
Filled gas cylinders not safely stored (Photo 70)	Store gas cylinders safely in special area	
Floor in battery rooms is not acid proof	Install acid-proof floor in battery rooms and place batteries in a collection pan or on a bunded floor to avoid any spills	
Floor around electrical equipment in control room is made of wood and covered with carpets (Photo 71).	It is recommended to refurbish floor using fireproof material	
Old inadequate furnishings in restrooms	Provide adequate furnishings	
Ventilation of battery room and adjacent rooms used for preparation of electrolyte is not working	Install new ventilation system	
Some of the electrical devices are open on the back side and can easily be touched	Close and secure all electrical devices in order to avoid accidents.	
Traffic safety inside and outside the HPP	Install speed restriction signs, road marking, pedestrian walkways, etc.	
Transformer fire walls do not reach the main building walls (Photo 64)	Enlarge, enforce and strengthen fire walls between transformers	
At other buildings (Photo 72 and Photo 73)		
Dangerous electrics; insufficient illumination	Refurbish dangerous electric installations and inside / outside illumination at storage building and at oil refinery station	25,000 USD
Firefighting equipment in bad condition	Provide adequate number and type of fire extinguishers at storage and oil refinery buildings	
Fire alarm and sprinkler systems in all rooms have to be rehabilitated.	Install new fire alarm and sprinkler systems in all rooms	

Observed OHS Gaps	Proposed Measure	Estimated price
No emergency evacuation procedure and signs in place	Implement emergency evacuation procedure and install emergency exit signs	(see above)
No or inadequate spill absorbent material	Provide adequate spill absorbent material	
Oil storage area has no lightning arrestor	Install lightning arrestor at oil storage area	

Photo 63: Rocks falling down regularly to HPP site after heavy rain

Photo 64: Transformer fire walls do not reach the building walls

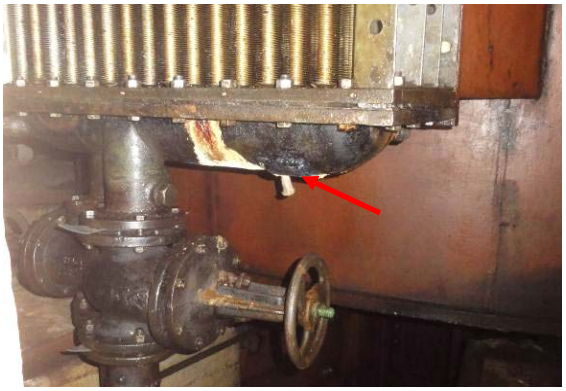


Photo 65: Oil leakages fixed with wooden wedges

Photo 66: Lack of guarding at rotating machinery

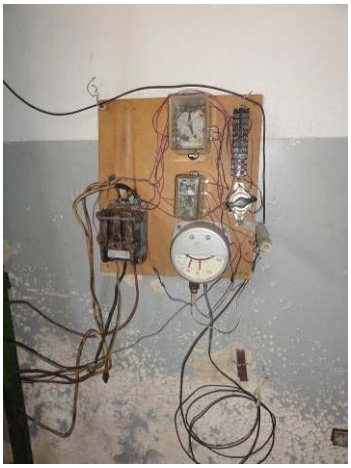


Photo 67: Unsafe electric installations

Photo 68: Unsafe device for working at height

Photo 69: Old bath tub used for mixing electrolyte

Photo 70: Gas cylinders (some of them filled) not safely stored

Photo 71: Wooden floor and carpets in control room

Photo 72: Storage building

Photo 73: Oil refinery station

6.4 Main Office Building at Goris

In the garages / warehouses of the main office of ContourGlobal Hydro Cascade in Goris the following gaps regarding OHS have been observed (Table 10):

Table 10: OHS gaps observed at main office of ContourGlobal Hydro Cascade in Goris, proposed measures and prices

Observed OHS Gaps	Proposed Measure	Estimated price
Gas cylinders are not secured (Photo 74).	Provide safe storage for gas cylinders	4,000 USD (for storage of hazardous waste see Hazardous Substances Assessment)
Inadequate storage of hazardous substances (Photo 75)	Provide safe storage area for hazardous substances (concreted and bunded floor)	
	Label hazardous substances accordingly	
No ventilation inside the garages	Install ventilation system, as hazardous substances are stored inside	
Firefighting equipment in bad condition	Provide adequate number and type of fire extinguishers	(see above)
Toilet is in poor condition	Rehabilitate toilet	

Photo 74: Gas cylinders not safely stored

Photo 75: Oil, gasoline and other substances stored without labelling in rooms without any ventilation

6.5 Over Ground Pressure Pipes / Irrigation Outlets

All pressure pipes running over ground shall be fenced in order to prevent unauthorized access to the pipes as well as any possibilities of accidents for local population (see Table 11).

Table 11: OHS gaps at over ground pressure pipes

Observed OHS Gaps	Proposed Measure	Estimated price
Over ground pressure pipe between Spandaryan Reservoir and Spandaryan HPP (Photo 76).	Fence pipe on both sides to avoid any damages and accidents (approx. 1,200 m)	12,000 USD (10 USD per meter)
Over ground pressure pipe between Daily Regulation Reservoir and Tatev HPP (Photo 77).	Fence pipe on both sides to avoid any damages and accidents (approx. 1,200 m)	12,000 USD (10 USD per meter)

Photo 76: Over ground pipe between Spandaryan Reservoir and Spandaryan HPP

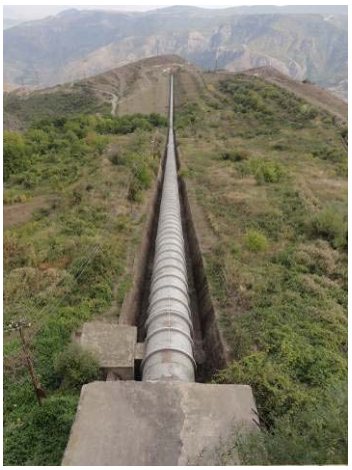


Photo 77: Over ground pipe between Daily Regulation Reservoir and Tatev HPP

There are several outlets constructed along the pipes for irrigation purposes, some of them are gravity driven, others need a pumping station. While two of these outlets also have small buildings (one downstream of Spandaryan and one downstream of Tolors Reservoirs), all other outlets are simply blanked with metal plugs or manually operated valves. Technical devices in these buildings (Photo 78 and Photo 79) as well as some of the other outlets are in quite bad condition and need refurbishment (see Table 12).

Table 12: OHS gaps at irrigation outlets

Observed OHS Gaps	Proposed Measure	Estimated price
Bad condition of water outlets including buildings and technical equipment.	Refurbish water outlets including buildings and technical equipment.	15,000 USD

Photo 78: Building at outlet downstream of Spandaryan Reservoir

Photo 79: Technical equipment needs refurbishment

6.6 Water Use by Local Population

In general, this eastern part of Armenia is not short of water. Nevertheless, for agricultural purposes water is taken from the Vorotan River downstream of Spandaryan Reservoir. There are several outlets constructed along the pipes, some of them are gravity driven others need a pumping station. In addition, water is directly taken from the reservoirs e.g. Tolors Reservoir or from the Daily Regulation Reservoir for HPP Tatev.

The water release for irrigation purposes between water users / water users associations and Vorotan Cascade is regulated by contracts. The water associations submit plans for water needs to Vorotan Cascade and based on these plans the water is released.

During the consultations with water user associations complaints have never been raised. The amount of water has always been sufficient. Only at Shinuhayr outlet, which is pump driven, it is reported that at least 6 m^3 water flow in the pipe is needed, so that the pumps are able to extract the necessary irrigation water. This was not always the case in the past.

During discussions with members of the water associations three issues came up with direct or indirect relevance for ContourGlobal Hydro Cascade CJSC as owner of the Vorotan Cascade:

- The outlets are partly in bad condition and need also improvement measures (in ownership of ContourGlobal).
- In future, the demand of irrigation water will increase significantly, especially if new agricultural land is developed. For example, ‘Sisian Water Users Association’ using about 110 l/s from Tolors Reservoir at the moment expects to need 830 l/s in future when the related infrastructure is implanted.
- The irrigation channels (not in ownership of ContourGlobal) are partly in a very bad condition and a significant amount of taken water is lost by

leakages. A better maintained channel system would save this water and consequently less water would have to be taken from the system.

The Head of Uyts Community, which is located near to Tolors Water Reservoir (see Map 7), reported that the amount of irrigation water from Tolors Reservoir is enough for irrigation purposes; on the other hand, there is no distribution system installed to irrigate the more than 1,000 ha of community agricultural land. However, the infrastructure for irrigation is not in the property of ContourGlobal Hydro Cascade.

About ten years ago, a high amount of water released from the Tolors Reservoir flooded private assets at Uyts Community, washed out the river banks and destroyed a bridge over the Sisian River. It has to be mentioned that the private assets had been built in an unsuitable area and the bridge was not adapted to high water flow. However, as the high water was part of normal operation of the Vorotan Cascade it is recommended to inform local communities in advance of high water release by an alarm system (siren). Furthermore, communities shall be informed far in advance, if reservoirs are emptied for rehabilitation purposes, as in this case irrigation water will not be available.

6.7 Concerns of NGOs

During discussions at Aarhus Center Yerevan, who gathered information from the local Aarhus Center in Kapan and other NGOs, the following concerns were expressed:

- People fear an increase of power supply tariffs due to selling the Vorotan Cascade to ContourGlobal;
- The Amulsar Mining Project (located upstream of Spandaryan Reservoir) plans to use water from Vorotan River. The outflow could be poisonous, influencing ecosystems and species of Vorotan River as well as local people downstream;
- Water shall be taken from Vorotan River (150 – 170 million m³ per year) to flow to Sevan Lake (from 2017); the channel was already constructed. Will there still be enough water left in Vorotan River for using in HPPs and simultaneously maintaining the Ecological Flow?;
- When the level of Tolors Reservoir rises agricultural land and grazing land is flooded; however people know, that this land should not be used;
- Cold winds blowing from the reservoirs destroy blossoms of fruit trees;
- Some years ago some people drowned in Tolors Reservoir, probably due to the very slippery ground of the Reservoir.

All these concerns are not part of the scope of this report but shall be outlined here. However, it is recommended to conduct awareness campaigns in villages near to the Water Reservoirs regarding the danger of these reservoirs (swimming, slippery ground, etc.) and to set up warning signs (e.g. no swimming, private property, etc.) in order to prevent any accidents.

6.8 Employment Agreements

Provided Employment Agreements for employees of ContourGlobal Hydro Cascade CJSC reflect the requirements of the current Armenian legislation. However, in Table 13 some recommendations are given as mentioned by a national legal expert.

Table 13: Recommendations regarding Employment Agreements for employees of ContourGlobal Hydro Cascade CJSC

Employment Agreement	Recommendation
Paragraph 2.1 envisages that: "The Employee shall perform his/her employment duties at Syunik, ---, ***as well as everywhere in the territory of Armenia, where the Employee will be assigned to perform his/her job***."	**The place of obligations provision (workplace) shall be specified correctly.** Of course, the employer has the right to ask an employee to provide its obligation from outside of the workplace. But this is another case and shall be documented as a business trip.
Paragraph 2.2 is in conflict with Labor Code unless the shift schedule is agreed with the employer in accordance to RA Labor Code, because shift schedule is considered to be an essential provision of the Labor Agreement (relationships) and must be agreed preliminarily with employee.	Paragraph 2.2 shall be at least amended and the **frame of shift schedule shall be specified by the Labor Agreement.**
Paragraph 2.3 envisages that: "***The Employer can revise the Internal Disciplinary Rules occasionally***."	Such changes are considered to be changes of the essential provisions of the agreement (relationship). Hence, **such changes must be agreed preliminarily with employee**. If employee rejects such changes then that rejection may beget termination of the agreement.
Paragraph 5.1 envisages that: "***The Employer pays the Employee a supplementary payment at the amount of AMD ---- (-----) for the performance of some job responsibilities***".	That provision may beget conflict with Article 188 *Remuneration of Work in case of Increased Content of Work*, according to which "***If the employer increases values of the work then the employee will be paid in accordance of the increased volume of the work***." Hence, provision of the fixed amount for additional or increased works is not correct. Each case of additional work shall be evaluated accordingly.
Paragraph 5.9 envisages that: "***The idleness arising out of force majeure circumstances, as well as idleness occurred due to fault of the Employee and the period of the strike declared by the Employee is not subject to payment, if it is not provided otherwise by the RA legislation***."	Actually, it is not correct to envisage such right of employer regarding **period of the strike**. Labor Code envisages such right, but Labor Code envisages also the case of negotiation of employer and employee for partial payments of employees within period of the strike. Hence, such right (on non-payment) may be applied only after such negotiation **within the period of the strike**. Hence, the direct provision of such right of the employer within Labor Agreement will have deterring effect to organize or participate in strikes. Such obstacle may be considered to be breach of human rights (rights of employee) to organize strikes, which is guaranteed by RA

Employment Agreement	Recommendation
	Constitution as well as International Agreements.
Paragraph 8.2 envisages that: "***An employee who disagrees with the changing of the working conditions, cease or termination of the Agreement on the Employer's initiative, shall be entitled to apply to the court within one month from the day of receipt of the appropriate document***."	Here, instead of the word "**document**" shall be mentioned "**legal act**". According to RA legislation as well Labor Code, not any document of the employer on termination of the relationship is issue for court hearing. Here, just the **legal act** on termination of the labor relationship must be disputed at the court.
Paragraph 3.3.1 (of "EC template GC" sample) envisages that an employee "***takes material responsibility***".	Translation seems not correct. The Armenian version of the agreement deals with "***the full material liability of the employee***". It is not enough just to mention at Labor Agreement about full material liability of the employee. Hence, a **separate agreement on full material liability** must be signed by parties as well. Only after that agreement, full material liability may be applied.
Paragraph 5.1 (of "EC template GC" sample) envisages: "***Taking into consideration that the work envisaged by this Agreement is deemed heavy and/or hazardous or specifically heavy and/or specifically hazardous, the Employer shall pay to Employee supplement at 50 per cent of the monthly (rate) salary***".	Work cannot be considered simultaneously as **heavy and/or hazardous** or **specifically heavy and/or specifically hazardous**. RA Government Decree N 1698-N (dated on 2nd December, 2010) adopted 2 different lists of the professions. One of it provides **list of heavy and/or hazardous professions**. Another one provides **list of specifically heavy and/or specifically hazardous** professions. Meantime, RA Labor Code (Article 183) envisages **2 different additional payments** for above-mentioned 2 different types of professions. Accordingly, the following is provided: 1) 30 per cent of the monthly (rate) salary – regarding heavy and/or hazardous professions; 2) 50 per cent of the monthly (rate) salary - regarding specifically heavy and/or specifically hazardous professions. Hence, **professions shall be clearly specified** and **different approaches regarding additional payments shall be adopted** in that regard.

Currently about 200 people are employed at ContourGlobal Hydro Cascade CJSC. In case that ContourGlobal decides to conduct a collective dismissal of workers as part of the future optimization of workforce for the cascade, ContourGlobal shall prepare a retrenchment plan.

ContourGlobal Hydro Cascade CJSC shall establish a grievance mechanism for employees of the cascade, either through provisions of the internal grievance mechanism in collective agreements or through introducing another transparent and reliable process.

7. Institutional Framework and Necessities

A Security and Operation Department is already established at ContourGlobal Hydro Cascade CJSC. Based on the Environmental and Social Action Plan set up in the IFC Environmental and Social Review Summary (2015), ContourGlobal shall set up a detailed Health and Safety conditions improvement plan including due dates and responsible persons. An Occupational Health and Safety Policy has to be implemented.

In order to implement an HSE Management System (HSEMS) an HSE officer responsible for Health, Safety and Environmental issues at the entire Vorotan Cascade shall be employed. This HSE officer shall be experienced in Hazardous Waste Management and will be responsible for monitoring the functionality and condition of all equipment and installations corresponding to Health, Safety and Environmental issues, training of workers and perform public awareness campaigns in villages located near to the Water Reservoirs. He will be responsible for the permanent on-site monitoring of implementation of the measures outlined in this study and shall work in close cooperation with the external internationally experienced auditor.

Regular trainings of staff shall be conducted by the HSE officer including special requirements at dam sites or in HPPs. These trainings shall include different H&S aspects (e.g. working in high voltage areas, at height and in confined spaces, first aid, location of nearest medic/hospital, use of PPE, use of lifesaving equipment at dam sites, use of firefighting equipment, safe use of tools, operation of Small Waste Water Treatment Plants, etc.) as well as environmental issues (see Environmental Liability Assessment).

The HSE officer will be responsible for regular monitoring of functionality and condition of all installations at Vorotan Cascade regarding H&S (e.g. sanitary facilities, Small Waste Water Treatment Plants, supply and quality of drinking water, firefighting equipment, lifesaving equipment at dam sites, noise level in HPPs, etc.) as well as environmental issues (see Environmental Liability Assessment). Furthermore yearly health checks have to be provided to all staff.

The HSE officer will also be responsible for conducting awareness campaigns in villages near to water reservoirs especially regarding danger of reservoirs (swimming, slippery ground, meaning of swimming barrier near to dam sites, etc.), function and meaning of siren at the reservoirs, and dangers of using poisonous substances for fishing. Local people shall also be informed far in advance, if reservoirs will be emptied for rehabilitation purposes, as in this case irrigation water will not be available.

External training of employees by an international expert regarding firefighting and specialized first aid training shall be conducted.

A specialized fully equipped rescue vehicle of international standard shall be provided for the entire Vorotan Cascade; including training of an internal rescue team.

For medical surveillance and regular monitoring of first aid boxes at all installations of the Vorotan Cascade a medic (e.g. from Goris) shall be contracted.

Implementation of the measures proposed in Chapter 6 shall be monitored by an internationally experienced external auditor. Audits shall be performed four times per year for a period of two years.

8. Summary of Costs

Costs for external training of employees by an international expert regarding firefighting and specialized first aid training will be approx. 15,000 USD for two weeks' training.

Costs for a specialized fully equipped rescue vehicle of international standard, including training will be approx. 200,000 USD.

Cost for implementation of proposed measures in **Health and Safety Regulatory Compliance Assessment Report** (including external training and rescue vehicle):	**2,245,300 USD**
+ 30 % contingency:	**2,918,890 USD**
Costs summed up from Health and Safety Regulatory Compliance Assessment Report, Environmental Liability Assessment Report, and Hazardous Substances Assessment Report	**4,683,640 USD**
Total costs including external monitoring over a period of two years	**4,783,640 USD**

Costs for employment of an HSE officer will be about 25,000 USD per year (including costs for the use of cars and infrastructure of ContourGlobal Hydro Cascade CJSC).

Costs of contract for medical surveillance to be provided by a medic from Goris for the entire Vorotan Cascade will be about 1,800 USD per year.

The implementation of all listed measures in Chapter 6 is directed to fulfill Armenian legal requirements. This is also true for compliance with IFC Performance Standards, World Bank EHS Guidelines, etc.

9. Appendix

9.1 Appendix I: Expert Report regarding Armenian Legislation

In Armenia, the labor relationships are regulated by Constitution of Republic of Armenia (A), International agreements, RA Labor Code and other legal acts. Meantime, RA Constitution has supreme legal force and the norms thereof shall apply directly. The laws shall conform to the Constitution. Other legal acts shall conform to the Constitution and the laws. The International treaties shall come into force only after being ratified or approved. The international treaties are a constituent part of the legal system of RA. The normative legal acts shall be adopted on the basis of the Constitution and laws and for the purpose of the ensuring their implementation.

9.1.1 RA constitution

Article 32 of RA Constitution prohibits compulsory employment and stipulates rights for everyone:

- to choose occupation,
- for fair remuneration in the amount no less than the minimum set by the law,
- for working conditions in compliance with the safety and hygiene requirements.

Meantime, the same article of the Constitution underlines rights for employees. Accordingly, employees have the right to strike for the protection of their economic, social and employment interests. Striking procedure and limitations must be prescribed by the law. The Constitution eliminates possibility for permanent employment of the children under the age of 16. The procedure and conditions for their hiring to temporary job shall be defined by the law.

Article 35 of the Constitution envisages special protection for maternity. Particularly, dismissal of an employee for any reason of maternity is prohibited. Every pregnant and given birth woman has right for paid maternity and parental leave.

Improvement of working conditions and maintenance of the employment are basic subjects for the state within RA Constitution (Article 48).

9.1.2 International treaties

Regarding the project, it should be mentioned that Armenia ratified the following International treaties:

The Convention on Equal Remuneration for Men and Women Workers

As a member of the Convention, Armenia obliged to maintain the principle of equal remuneration for men and women workers for work of equal value.

The Convention on Discrimination in Respect of Employment and Occupation

As a member of the Convention, Armenia obliged to maintain the principle of elimination of discrimination based on race, color, sex, religion, political opinion, national extraction or social origin, which has the effect of nullifying or impairing equality of opportunity or treatment in employment or occupation.

Also discrimination includes any distinction, exclusion or preference which has the effect of nullifying or impairing equality of opportunity or treatment in employment or occupation.

Meantime, the distinction, exclusion or preference in respect of a particular job based on the inherent requirements thereof shall not be deemed to be discrimination.

The Convention on Labor Administration

As a member of the Convention, Armenia has a right to delegate or entrust regulation of certain labor issues to non-governmental organizations, particularly employers 'and workers' organizations, as well as to appropriate, employers 'and workers' representatives.

Also, as a member state, Armenia is obliged to maintain conditions for provision of events dedicated for consultations, cooperation and negotiations between state administration bodies and representative organizations of employers and employees.

The state authorized labor administrative bodies shall, as appropriate, be responsible for or contribute to the preparation, administration, co-ordination, checking and review of national labor policy, and be the instrument within the ambit of public administration for the preparation and implementation of laws and regulations giving effect thereto.

To the extent compatible with national laws and regulations and national practice, the competent bodies within the system of labor administration shall contribute to the preparation of national policy concerning international labor affairs, participate in the representation of the state with respect to such affairs and contribute to the preparation of measures to be taken at the national level with respect thereto.

The Convention on Worst Forms of Child Labor

As a member of the Convention, Armenia is obliged to take effective measures to secure the prohibition and elimination of the worst forms of child labor as a matter of urgency. Here, the child is considered to be a person under the age of 18. The term "The worst forms of child labor" includes, inter alia, a work which, by its nature or the circumstances in which it is carried out, is likely to harm the health, safety or morals of children".

The Convention on the Forced Labor

As a member of the Convention, Armenia is obliged to eliminate forced or compulsory labor in all its forms. The term "Forced or compulsory labor" mean all work or service which is exacted from any person under the menace of any penalty and for which the said person has not offered himself voluntarily.

However, the work will not be considered as forced or compulsory if such work is provided as a military service or it is a part of the normal civic obligations of the citizens of a fully self-governing country; or that work is a consequence of a conviction in a court of law; or the work or service exacted in cases of emergency, that is to say, in the event of war or of a calamity or threatened calamity; or the work is a minor communal services of a kind which, being performed by the members of the community in the direct interest of the said community.

The competent state authorized body shall not impose or permit the imposition of forced or compulsory labor for the benefit of private individuals, companies or associations.

No concession granted to private individuals, companies or associations shall involve any form of forced or compulsory labor for the production or the collection of products which such private individuals, companies or associations utilize or in which they trade. Also, representatives of the state authorized bodies cannot force any individual to work for private entities or individuals, companies or associations.

The Convention on Labor Inspection

The functions of the system of labor inspection is supposed:

- to secure the enforcement of the legal provisions relating to conditions of work and the protection of workers while engaged in their work, such as provisions relating to hours, wages, safety, health and welfare, the employment of children and young persons, and other connected matters, in so far as such provisions are enforceable by labor inspectors;
- to supply technical information and advice to employers and workers concerning the most effective means of complying with the legal provisions;

- to bring to the notice of the competent authority defects or abuses not specifically covered by existing legal provisions.

Labor inspectors provided with proper credentials shall be empowered:

- to enter freely and without previous notice at any hour of the day or night any workplace liable to inspection;
- to enter by day any premises which they may have reasonable cause to believe to be liable to inspection; and
- to carry out any examination, test or enquiry which they may consider necessary in order to satisfy themselves that the legal provisions are being strictly observed, and in particular
- to interrogate, alone or in the presence of witnesses, the employer or the staff of the undertaking on any matters concerning the application of the legal provisions;
- to require the production of any books, registers or other documents the keeping of which is prescribed by national laws or regulations relating to conditions of work, in order to see that they are in conformity with the legal provisions, and to copy such documents or make extracts from them.

Before inspection visit, inspectors shall notify the employer or his representative of their presence, unless they consider that such a notification may be prejudicial to the performance of their duties.

It is supposed that labor inspectors are empowered to take steps with a view to remedying defects observed in plant; layout or working methods which they may have reasonable cause to believe constitute a threat to the health or safety of the workers. In that regards, inspectors shall be empowered, subject to any right of appeal to a judicial or administrative authority which may be provided by law, to make or to have made orders requiring:

- such alterations to the installation or plant, to be carried out within a specified time limit, as may be necessary to secure compliance with the legal provisions relating to the health or safety of the workers; or
- measures with immediate executory force in the event of imminent danger to the health or safety of the workers.

The Convention on Abolition of Forced Labor

As a member of the Convention, Armenia is obliged to eliminate using of any form of forced or compulsory labor, inter alia, as a method of mobilizing and using labor for purposes of economic development; as a means of labor discipline; as a punishment for having participated in strikes; as a means of racial, social, national or religious discrimination.

The Convention on Tripartite Consultation (International Labor Standards)

As a member of the Convention, Armenia is obliged to operate procedures which ensure effective consultations, between representatives of the government, of employers and of workers, with respect to the matters concerning the activities of the International Labor Organization.

9.1.3 RA Labor code and collective agreements

RA Labor Code regulates collective and individual working relations, defines the bases for the establishment, modification and termination of these relations and the order for their realizations, rights, obligations and responsibilities of subjects of the labor relations, as well as conditions for the providing of security and maintenance of the health of employees. The specific features for regulating particular spheres of labor relations may be determined by other laws.

Meantime, the employer may adopt internal and individual legal acts, which are the part of the labor legislation. Internal and individual legal acts of an employer shall be adopted in the form of orders or executive orders and in cases prescribed by the legislation. Internal legal acts envisage provisions on, internal disciplinary rules, work (shift) and rest timetables (schedules) of the employer (company) as well as employees' overtime work and duties. In its turn, individual legal acts are aimed to regulate individual relationships with particular employee and (or) group of employees. If internal and individual legal acts contain provisions that are less favorable than the conditions prescribed for the employees by labor legislation and other regulatory legal acts containing norms of labor law, such acts or the relevant parts thereof shall have no legal effect.

In the same manner, collective agreements and employment agreements may not contain such conditions that deteriorate the state of employees as compared with the workplace conditions laid down by the labor legislation and other regulatory legal acts containing norms of labor law. Where the conditions laid down by collective agreements or employment contracts contradict the Labor Code, the laws and other regulatory legal acts, these conditions shall have

Collective Agreement

Collective agreement regulates employment relations between employees and Employers. It is a voluntary agreement concluded in writing between employer (representative of employer) and representatives of employees or association of employers and trade union. Collective agreements are bilateral, except for the collective agreement being concluded with the participation of the Government of the Republic of Armenia, which is trilateral.

Collective agreements may be of the following levels:

- collective agreement concluded on national level;
- collective agreement concluded on branch and territorial level;
- collective agreement concluded on the level of the company or a separated (structural) subdivision thereof.

Provisions of national, branch and territorial collective agreements shall apply to employees of such companies the employers whereof, within the validity period of the agreement, are members of the Association of Employers having concluded an agreement. The contents and structure of national, branch and territorial collective agreements shall be determined by parties to an agreement.

The following may be defined by the **national collective agreement**:

- additional measures ensuring safety and hygiene of work;
- additional guarantees for employment;
- additional social and employment guarantees deemed necessary by parties;
- procedure for receiving information on the implementation of the collective
- agreement and for exercising control over it.

The following may be defined by **branch and territorial collective agreements**:

- conditions of remuneration for work, regulation mechanisms of remuneration for
- work taking into consideration the level of inflation and increase in prices;
- conditions of employment;
- working and rest time (including provision of leaves and their duration);
- procedure and conditions of reduction in the number of employees, guarantees in
- case of reductions;
- safety and hygiene conditions of work;
- conditions for ecological safety of the production and health care of employees;
- conditions for acquiring profession, raising qualification and re-qualification of
- employees;
- guarantees and compensations deemed necessary by parties;
- procedure for receiving information on the implementation of collective agreement
- and for exercising control and supervision over it;
- liability for failure to implement the collective agreement;
- in case of collective labor disputes, the procedure and time limits for filing of claims
- by employees and employers;

- measures of social partnership aimed at avoiding collective disputes, strikes;
- other issues, upon agreement of the parties.

The parties to a collective agreement of the company are the group of employees of the company, who are represented an employee of that company, and the employer, which is represented by authorized person. The parties of the collective agreement of the company shall lay down provisions, which are not regulated by labor legislation, other regulatory legal acts or national, branch and territorial collective agreements. Also, provisions of the collective agreement of the company should not envisage worse condition for employees then the conditions provided by labor legislation, other regulatory legal acts or national, branch and territorial collective agreements.

Workplace discipline and material liability

The employee shall be obliged to perform in good faith the obligations assumed by the Labor Agreement; follow the internal disciplinary rules, observe workplace discipline of the employer (company); meet the specified labor standards; follow the requirements for labor safety and security; treat the properties of the employer and other employees in good faith, as well as notify the employer immediately about a danger causing a threat to the life and health of persons and the protection of the employer's property. In its turn, the employer shall be obliged to:

- provide the employee with a work specified in the agreement and organize his or her labor;
- pay the salary of the employee within the envisaged time limit and in the specified amount;
- provide the employee with paid and unpaid leave in the prescribed manner;
- ensure safe workplace conditions;
- when accepting for employment and during the work, introduce the employee to the internal disciplinary rules of the company (employer), the requirements for labor safety and fire-prevention security;
- discharge other obligations provided for by law, other legal acts, by collective agreement and Labor Agreement.

The workplace discipline shall be the rules of conduct established by the labor legislation, other regulatory legal acts containing norms of the labor law, by collective agreement and Labor Agreement, by internal legal acts of the employer, which is mandatory for all employees. The internal disciplinary rules (internal legal act of the employer) of the company shall regulate the procedure of accepting for employment and dismissal of employees, the fundamental rights, obligations and liability of the parties to the employment contract, the working regime, the time for rest, the measures for encouragement and disciplinary liability being applied to employees, as well as other issues relating to employment relations.
The employer may promote employees for performing employment duties in good faith. Meantime, the employer has the right to implement

disciplinary penalties in case of violation of workplace discipline by the employee.

Material liability arises when one party (employer or employee) of the Labor Agreement causes damage to another party through failure to fulfil or by improper fulfilment of his or her obligations.

Material liability of an employer emerges when:

- the employee not insured from accidents at work and from occupational diseases has contracted an occupational disease, has been maimed or has died;
- the damage has been caused as a result of loss, elimination of property or becoming unfit for use;
- other violations of the property rights of employees or other persons have been committed.

The employee shall be obliged to compensate for the material damage caused to the employer, which has emerged:

- as a result of destruction or loss of property of the employer;
- as a result of allowing surcharge of materials;
- in cases of compensation of the employer for damage caused to other persons during performance of employment duties on the part of the employee;
- due to expenses made as a result of destruction of property belonging to the employer;
- as a result of improper maintenance of material assets;
- as a result of intentionally not taking measures to prevent the issuing of low-quality products, confiscating material or monetary assets.

The employee shall be obliged to compensate the employer for the damage caused fully, but not more than the amount of employee's average salary for three months. However, the employee shall be obliged to compensate for material damage caused to the employer fully, if:

- the damage has been caused intentionally,
- the damage has been caused as a result of a criminal activity of the employee;
- an agreement on full material liability was signed with the employee;
- the damage has been caused as a result of the loss of tools, devices, special clothes and individual or collective safety measures provided to him or her for work, as well as the loss of materials, semi-finished products or products;
- the damage has been caused in a way or with a property, in the case of which full liability for property is defined by law;
- the damage has been caused under the influence of alcoholic drinks, narcotics or psychotropic substances.

Safety and health of employees

The employer shall be obliged to maintain the health and safety of the employees.

Taking into consideration the level of danger of production for employees, the employer shall include within the company a qualified service for ensuring the safety of employees and maintaining their health, or shall personally carry out that function. Also, the employer shall be obliged to ensure normal employment conditions in order for employees to be able to perform the labor standards. These conditions are: due operation of mechanisms and equipment; timely provision of technical documents; employment conditions, which are secure and harmless for health (adherence to safety norms and rules, adequate lighting, heating, air conditioning, ensuring that the noise, radiation, vibration and other dangerous factors with negative impact on the health of the employee do not exceed the set minimum level) and etc. The mandatory conditions for safety and healthcare with regard to production of different means of labor and the procedures for assessment of their compatibility shall be set by technical standards and other regulatory legal acts.

The employer shall be obliged to adopt internal legal acts on ensuring the safety and healthcare of employees. The work must be organized in accordance with the requirements in regulatory legal acts on safety assurance and healthcare of employees.

Employees who may be subject to occupational risks at the workplace shall, before being accepted for employment and during the employment, periodically, undergo medical examination in accordance with the medical examination schedule approved by the employer. Employees whose occupational risk is due to use of dangerous substances during work shall be subject to periodic medical examination at the workplace within the same company or in case of changing the work. Employees working at night and on shift must undergo pre-entry medical examination and periodic medical examinations in the course of employment, according to the medical examination schedule approved by the employer. In that regard, the employer shall be obliged to approve the list of the employees who are subject to mandatory medical examination, and reach an agreement with the health organization on the schedule for medical examinations. Employees shall be notified about the schedule of medical examinations by their signature. Mandatory medical examination shall be conducted at working hours, at the expense of the employer. The list of professions and works subject to preliminary and periodic mandatory medical examination as well as the procedure for conducting medical examination are defined by RA Government.

In accordance with the procedure prescribed by regulatory legal acts on ensuring the safety and healthcare of employees within the company, sanitary and personal hygiene rooms or corresponding separated places (sinks, showers, bathrooms) shall be furnished for rest, dressing and keeping clothes, shoes and observing individual safety measures.

In company where dangerous substances are used, the sanitary and personal hygiene rooms shall be furnished by following the special requirements for the furnishing of such rooms. The requirements for furnishing of sanitary and personal hygiene rooms shall be set by the regulatory legal acts on ensuring the safety and healthcare of employees, taking into consideration the nature of work, the substances used and the number of employees.

The employer may not require from the employee to perform employment duties, if the employee has not undergone operational safety training and/or has not received instructions. The employer shall ensure that the employee seconded to his or her organization assumes his or her employment duties only after being informed about the potential risk factors existing in the organization and after receiving workplace-specific safety instructions.

Guarantees and compensations

An employee studying at a general school, secondary vocational or higher education institution shall be paid for his or her study leave by the employer, in the amount not less than the average daily salary of the employee for each day, in case the employee was sent to receive education by the employer. The employer, at his or her expense where necessary, may organize the professional training of students or persons being accepted for employment within the company, paying the students at least the minimum salary established by law throughout the training.

If the health condition of the employee has deteriorated due to the work performed (employee cannot perform the previous job due to injury, occupational disease and other reasons for deterioration of health) and it is impossible to transfer employee to another work that corresponds to his or her profession, qualification and health state due to lack of a relevant work within the given company, employee shall, in the amount established by legislation, be paid a benefit prior to receiving the opinion of the state Medical and Social Commission of Experts regarding his/ her working capacity. Where the employee has not had insurance for accidents at the workplace and occupational diseases, the employer shall pay compensation for damage after the level of loss of working capacity is determined.

The employees on business trips shall be guaranteed that during the entire period of business trip they shall retain their workplace (position) and the salary. They shall be paid per diem, and the costs relating to the business trip shall be reimbursed. The minimum amount of payments specified above and the payment procedure shall be determined by RA Government.

The monetary demands having arisen as a result of employment relations and related to damage caused to the life or health of the employee shall be compensated by the employer in the manner prescribed by the legislation of RA.

Deductions from salary may be made in the manner and cases defined by law. For the purpose of covering the arrears to the employer, the following deductions or charges from salaries shall be made:

- the advance payment of the salary paid to the employee;
- the excess payments made as a result of mechanical errors of calculation;
- the part of the advance payment provided to an employee for a business trip or a shift to another workplace or for performance of specific tasks, which was not spent and not returned appropriately;
- the amount of compensation for damage caused to an employer by the employee.

Upon the payment of salary, the overall size of deductions and charges shall be calculated in the manner prescribed by law, which cannot exceed fifty percent of the monthly salary of the employee.

Labor Agreement

Labor relationship between an employee and an employer shall arise on the basis of an labor agreement (employment contract) signed in written form within Labor Code, or by issuing an individual legal act on hiring of a person as an employee if there is consent between parties (employer and employee). By essence, the labor agreement (employment contract) and individual legal act on hiring must envisage the same following provisions:

- Date and the place of issuing individual legal act (in case of an agreement - date and the place of signing an agreement);
- first, last and patronymic name of the employee the name (requisite) of employee;
- structural unit (where available);
- date of the first working day;
- position and/or official duties;
- amount of salary and/or the way of determining it and the supplementary and additional payments, bonuses etc;
- validity period of the employment contract (upon necessity);
- agreed probation period and office hours;
- the position and the name of the representative of the employer.

The time period of the Labor Agreement

A Labor Agreement may be signed for:

- an indefinite time limit, where the validity period thereof is not specified, or
- fixed time limit where the validity period thereof is specified by the agreement.

The Labor Agreement can be concluded for a fixed time limit, if the employment relationship may not be determined for an indefinite time limit, taking into account the nature of the work to be performed or the conditions for its completion. To put it differently, if the required work provision has a constant and permanent nature and should be provided every day or month (works provided by accountants, engineers), then the agreement must be signed for an indefinite time limit.

Labor Agreement for a fixed time limit shall also be concluded with an employee:

- performing joint (simultaneous) job;
- performing seasonal works;
- performing temporary works (for a time period of up to two months);
- substituting a temporarily absent employee;
- foreigners, in the period of permission to work or validity period of the right to residence.

The essential conditions of the employment

The essential conditions of the employment are allowed to be changed if production capacity and/or economic and/or technological and/or labor organization conditions are changed. Under labor organization conditions one should understand changing of employee's workplace or works, or amount of remuneration, or privileges, or work schedule, or office hours, or position, or title. Meantime, the employer has a right to transfer the employee from one position to another, in the same workplace, or change the occupation of the employee for one month period, in case of preventing natural disasters, technological accidents, epidemics, accidents, fires and other cases of emergency or urgently eliminating the consequences thereof. Transferring the employee to another work is prohibited if the conditions of the new work are contraindicated with employee's health.

In case of idleness (when the employer, due to production or other objective reasons, fails to provide the employee with the job envisaged by the employment contract), taking into consideration the profession, qualification and health state of the employee, the employer shall have the right to transfer the employee to another work during idleness, upon employee's written consent. Upon employee's written consent the employee may be transferred to another work without taking into account employee's profession and qualification.

Termination of the Labor Agreement

The Labor Agreement is terminated:

- upon consent of the parties;
- in case of expiry of the time period of the agreement;
- upon the initiative of the employee;
- upon the initiative of the employer;
- if the employee is conscripted to compulsory provisional military service;
- in case of an appropriate court decision that is in force;
- if the employee has been deprived of the rights to perform certain activities;
- if the employee is under sixteen, and one of the parents, an adopter or a trustee, a physician carrying out medical control over employee's health or a state labor inspector requires rescission of the labor agreement;
- in case of changing of the essential conditions of employment;

- in case of death of a natural person employer;
- in case of death of the employee,
- if the information on education and/ or qualification and / or health, presented by the employee when being employed, is false;
- based on the results of the probationary period;
- if the employee, when being employed, has concealed the fact of being deprived of the rights to perform certain works.

As was mentioned, parties have the right to terminate the Labor Agreement due to the expiry of the employment contract concluded for a fixed time limit. In that regard, appropriate notification should be submitted by the parties to each other. However, if parties continue labor relationship after the expiration of the time period of enforcement that is provided by the agreement then the Labor Agreement will be considered to be concluded for an indefinite time limit.

An employee has a right to terminate an agreement concluded for an indefinite time limit, as well as the agreement concluded for a fixed time limit before the expiry thereof by notifying the employer thereon in writing at least thirty days in advance if otherwise not envisaged by RA Labor code and/ or collective agreement.

An employer has a right to terminate an agreement concluded for an indefinite time limit, as well as an agreement concluded for a fixed time limit before the end of the validity period, if:

- employer is liquidated;
- the number of employees and/or staff positions is reduced due to the changes in volumes of production and/or economic and/or technological and/or work provision conditions and/or by production needs.
- the employee is not competent for the position held or the work performed;
- the previous employee of that position is reinstated;
- the employee regularly fails to fulfil the obligations envisaged by the employment contract or the internal regulatory rules, without valid excuse;
- the employer has lost confidence towards the employee;
- the employee is in a long-term incapacity for work;
- the employee is found to be under the influence of alcoholic beverages, narcotics or psychotropic substances at the workplace;
- the employee fails to come to work throughout the entire working day (shift) without valid excuse;
- the employee rejects or evades mandatory medical examination;
- the employee is at the age of pension, unless otherwise provided by the employment contract.

Here, the employer shall have the right to terminate the agreement based on the grounds provided for by points 2, 3 and 4 of above-mentioned, where the employer, within its abilities, has offered the employee another work corresponding to employee’s professional competence, qualification, health

state, and where the employee has rejected it. Where the employer does not have an ability to offer another work the agreement shall be terminated without offering other work to the employee.

Termination of the agreement upon the initiative of the employer is prohibited:

- in the time period of temporary incapacity of the employee for work, except for the cases provided by RA Labor Code;
- during the leave of the employee;
- in the case of pregnant women, from the day of submitting a reference to the employer until one month after the maternity leave;
- in the entire period of taking care of the up to a year old child, except for the cases provided for by RA Labor Code;
- after a decision on calling a strike is adopted and during the strike where the employee participates in this strike in the manner prescribed by RA Labor Code;
- during the period of fulfilling the obligations imposed on the employee by state or local self-government bodies, except for the cases provided RA Labor Code.

However, the above-mentioned restrictions are not applicable in case of liquidation of the employer.

Personal data of employee

Within processing of employee's personal, which is information related to the employment relations as well as information related to the particular employee, the employer must maintain the following requirements:

- the processing of personal data of an employee may be carried out exclusively for the purpose of ensuring the fulfilment of the requirements of laws and other regulatory legal acts, supporting the employment, education and promotion of the employees, ensuring the personal security of the employees, supervising the quantity and quality of the work performed and ensuring the integrity of the property;
- while determining the volume and content of personal data being processed the employer shall be guided by RA Constitution, RA Labor Code and other laws;
- all personal data shall be provided by the employee. Where the personal data of the employee can only be received from a third person, the employee shall be required to give his or her written consent. The employer shall be obliged to inform the employee about the purpose of receiving the personal data, possible ways and sources for receiving thereof, as well as about the nature of the personal data to be received and about the consequences where the employee rejects to provide written consent about receipt thereof;
- the employer shall have no right to obtain and process data on the employee's political, religious and other convictions or personal life. In cases directly related to employment relations the employer shall have

the right to obtain and process data on the employee's personal life only upon the employee's written consent;
- the employer shall have no right to obtain and process the employee's personal data on his or her membership to non-governmental associations or his or her activities in trade unions, except for the cases provided for by law;
- while adopting decisions relating the employee, the employer shall have no right to rely only on the personal data received by automated processing or electronic means;
- the lawfulness or protection of the employee's personal data which is ensured by the employer at his or her own expenses in the manner prescribed by law;
- the employees and their representatives by their signature shall become familiarized with legal acts of the employer that define the procedure for processing the personal data, as well as about their rights and obligations in this sphere;
- the employees shall have no right to waive their rights of ensuring confidentiality and protection.

Working time (office hours)

Working time shall be the period when the employee is obliged to perform work envisaged by the Labor Agreement, as well as other equivalent periods. Normal duration of the working time may not exceed 40 hours a week. Daily working time may not exceed 8 working hours, except for the cases provided for by RA Labor Code, law, other legal acts and the collective agreement. The maximum duration of working time, including overtime work, may not exceed 12 hours a day (including the break for rest and meal), and 48 hours - during the week. The duration of the working time for specific categories of workers (specialized energy, gas, heating supply entities, etc.) may amount to 24 hours a day. The average duration of the working time of such workers in a week may not exceed 48 hours, and the rest time between the working days may not be less than 24 hours. The list of such works shall be defined by RA Government.

In that regard RA Government issued Decree N1223-N, dated on 11th August 2005, and adopted the list of special categories of workers that can be involved in works with 24 hours working day. Accordingly, the following list provides some of such position:

- guards
- on duty radio-electronic specialists
- traffic controllers
- on-duty operators
- linear sector workers
- gas transmission and distribution system operators
- specialists of gas-pressure aggregates and settlement services
- specialists of gas emergency repair services
- controllers
- on duty staff substations

- hydropower shift workers
- duty machinists work hydroelectric systems
- engine workers of hydraulic facilities.

The duration of daily working time (including breaks for rest and meal) of an employee working on the basis of two and more employment contracts with a different or the same employer may not exceed 12 hours a day.

Shorter working time shall be set for:

- employees between the ages of fourteen and sixteen — 24 hours a week;
- employees between the ages of sixteen and eighteen — 36 hours a week;
- employees in whose workplace it is impossible, due to technical or other reasons, to reduce the maximum permissible levels of occupational hazards to the level safe for health as defined by legal acts on safety and health at work, the working time shall be set not more than 36 hours a week.

The procedure and conditions for reducing the working time of employees engaged in work related to mental and emotional overpressure shall be prescribed by law, collective agreement or employment contracts.

An incomplete working day or an incomplete working week is set:

- upon the consent of the employee and the employer;
- upon employee's request, related to his or her health state, or based on medical conclusion;
- upon request of a pregnant woman or an employee taking care of a child under the age of one year old;
- upon request of the disabled person, based on medical conclusion;
- upon request of an employee taking care of a sick member of the family, based on medical conclusion, but for not more than 6 months, and not more than half of the working time defined for one day with regard to each day.

Upon consent of the parties, incomplete working time may be defined by reducing the working days of the week or the working day (shift), or applying both at the same time, unless otherwise provided for by the medical conclusion. The incomplete working time may be divided into parts during the working day.

Distribution of (changes in) the working and rest time for each employee during the day, week or reporting period, as well as the beginning and end of the daily work (shift) shall be defined by the internal legal act (disciplinary rules) of the employer (company). The work (shift) schedules shall be approved by the employer or its representative, whereas in cases and in the manner prescribed by the collective agreement it shall be agreed with the party of the collective agreement.

Usually, a five-day working week with two rest days shall be prescribed for the employees. However, at the companies (employers) where, due to the nature of production or other conditions, application of the five-day working week is impossible, a six-day working week with one rest day shall be defined. The specifics of the work and rest regime of employees working in the fields of energy, gas and heat supply spheres, the special features shall be defined by RA Government.

In that regard, RA Government issued Decree N201-N, dated on 01st February 2007, and adopted schedule features of work and rest for workers of power supply, gas supply, and heat supply sectors. According to the mentioned Decree, working and resting regimes of employees of the power supply, heat supply and gas supply sectors workers must be determined taking into account the specificities of those sectors. Also, according to that decree, the beginning and the end of daily work (shift) schedule of energy, gas and heat supply sectors must be regulated and envisaged by the internal rules of the employer. Taking into consideration necessity, the employer may change the shift schedule. Working in two shifts, without having a rest within RA Labor Code, is prohibited.

In companies operating with uninterrupted regime or in case of completion of works of special nature where it is impossible to keep daily or weekly duration of the working time for employees of the given category preconditioned by the specifics of the production (work), summarized calculation of working time shall be allowed, provided that it does not exceed the normal number of working hours in the reporting period (month, quarter, etc.). The duration of the summarized calculated working time may not exceed 6 months.

The procedure for the application of summarized calculation of working time shall be defined by internal disciplinary rules of the company (employer).

Overtime work shall be permitted in the following exceptional cases where:

- the work performed is necessary for the defense of the state, as well as for prevention of natural disasters, technological accidents, epidemics, accidents, fires and other cases of emergency or for elimination of the consequences thereof;
- it is necessary to accomplish the work started and that could not be possibly accomplished during the normal working time due to accidental or unforeseen obstacles and where the termination of the works started may result in the deterioration, destruction of materials or breakdown of equipment;
- the work performed is related to repair or restoration of mechanisms or equipment the breakdown of which has caused interruption of work of a significant number of employees;
- the shift employee has not reported for work that may lead to disruption of continuity of work. In such cases the employer or its representative shall be obliged to take immediate measures for substituting the absent person with another employee;

- works of loading or unloading and other related works are performed for preventing or eliminating the accumulation of freight in delivery and destination points and for prevention of idleness of transportation means, as well as for vacating warehouses of the company;
- there is a necessity for urgent fulfilment of contractual obligations of the employer.

In case it is necessary to engage the employee in overtime work the employer shall be obliged to inform the employee thereon within reasonable period of time, except for the cases provided by RA Labor Code. Meantime, the overtime work, upon request of the employer, shall not exceed 4 hours during two successive days, and 180 hours -during a year.

Any works provided from 22:00 to 06:00 are considered to be “a night time work”. Persons under the age of 18 as well as employees who are not allowed to be employed in night time work according to a medical conclusion are not allowed to be engaged in night time work. Also, pregnant women and employees taking care of a child under the age of three may be engaged in night work only upon their consent.

Rest time

The rest time shall be the time free from work regulated by RA Labor Code, laws, collective agreement or Labor Agreement, which the employee uses at his or her discretion. After the end of the first half of the working day (shift) but not later than after 4 hours from starting the work the employees shall be provided with a break for rest and meal for no longer than two hours and not less than half an hour. The break for rest and meal shall not be included in the working time, and the employee shall use it at his or her discretion. The employee shall have the right to be absent from the workplace during that period. Where, in certain types of work, the provision of a break for rest and meal is impossible due to conditions of production, the employee shall be granted an opportunity to eat while working. The beginning and end of a break for rest and meal shall be defined by internal disciplinary rules, the work schedule, collective agreement or employment contract.

Employees under the age of eighteen, whose working time exceeds 4 hours, shall be granted additional break for at least 30 minutes for rest during the working time. Special breaks should be granted where the work is performed at the air temperature above +40°C or below -10°C, as well as under other hazardous conditions of hard physical or mental and emotional overpressure or with negative impact on health. Additional and special breaks shall be included in the working time, and the procedure for the provision thereof shall be defined by internal disciplinary rules, work schedule, collective agreement or Labor Agreement. The number of additional and special breaks, the duration thereof and the place of rest shall be envisaged by the collective agreement or employment contract.

In companies, where the work on common rest day may not be terminated due to the need to provide services to the population (supplying energy, gas, and heat companies etc.), the rest day shall be defined by the employer.

However, uninterrupted weekly rest should not be less than 35 hours. Pregnant women, employees taking care of a child under the age of one year old may be engaged in work on rest days only upon their consent. Employees under the age of 18 are granted at least two rest days per week. Engagement of employees in work on non-working holidays and commemoration days shall be prohibited, except for the works the termination of which is impossible due to technical reasons of production or which are necessary for the provision of services to the population, as well as for performing urgent repair, and loading or unloading operations.

Annual leave

Annual leave is a period calculated in working days, which is provided to employees for rest and for recovering their working capacity. During this time, employee's workplace (position) shall be retained, and average salary shall be paid. Annual leave can be minimal, extended and additional.

The duration of the minimal annual leave, in the case of the five-day working week, is 20 working days, and in the case of the six-day working week, 24 working days. Leaves with longer duration may be prescribed by a collective agreement or employment contract or by legal acts of the employer.

An extended annual leave with a duration of 25 working days in case of a five-day working week, and with a duration of 30 working days in case of a six-day working week (in exceptional cases - 35 working days in case of five-day working week, and 42 working days in case of six-day working week) shall be granted to employees of special category working under special working conditions whose work is related to mental and emotional overpressure or occupational hazard. The list of employees of a specific category entitled to such a leave shall be defined by RA Government. Such list is adopted and covers professions regarding educational and medicine domains.

Additional annual leave may be granted to:

- employees working under harmful and hazardous working conditions;
- employees with irregular work schedule;
- employees engaged in works of special nature.

The list of employees of a specific category entitled to additional annual leave, the minimal duration of the leave and the procedure for the provision thereof shall be defined by RA Government. In that regard, RA Government issued Decree N1384-N Decree and adopted a list of professions and appropriate periods additional annual leave. The adopted list includes, but not limited to the following professions:

- workers and truck drivers, involved in installation and repair works at mountain places
- workers engaged in the construction and renovation work
- workers of the construction domain

- welding, blacksmith, structural (structural) and related metal preparation professions and related professionals
- metalworkers and related professionals
- welding and electric professions and related professionals
- operator of machine and chemical production equipment machinist, fitter and repairer electric installation, boiler, worker of turbine and steam turbine plant, pumping station, power plant, power plant and network, radar terminal, backbone radar system and related professionals
- executing engineering and technical workers providing works above 2000 meters above sea level and etc.

Annual leave for each working year shall be granted in the same working year and additional annual leave shall be added to the minimum annual leave and may be granted together with it or separately.

RA Labor Code also envisages leave for the special purpose, such as:

- pregnancy and maternity leave;
- leave granted for taking care of a child under the age of three;
- study leave;
- leave being granted for fulfilment of state or social duties;
- unpaid leave.

During the period of special purpose leave the employee's position shall be retained.

Meantime, upon request of the employee, the unpaid leave shall be granted to:

- the husband of a woman on pregnancy and maternity leave, as well as of one taking care of a child under the age of one. The total duration of the leave may not exceed 2 months;
- the disabled employee or the employee taking care of an ill member of the family, in periods defined by the medical conclusion, but not more than 30 days within a year;
- for marriage, three working days;
- in case of funeral of a deceased member of family, not less than three days.

Other reasons for unpaid leave may be defined by the collective agreement. In the cases prescribed by the collective agreements or employment contracts or upon the consent of the parties, the employee may be granted an unpaid leave for duration of not more than 60 days throughout the year. An unpaid leave for not more than 30 days throughout the year may be granted to officials working for civil, other state (special) services established by law and local self-government bodies.

Salary

The salary is the remuneration for works performed by an employee under law, other legal acts or an employment contract. Currently in Armenia, according to RA Law on Minimal Monthly Salary is 55000 AMD. The minimum salary shall not include bonuses, additional payments, awards and other incentive payments. The salary for each month shall be calculated and paid to the employee on working days, at least once a month by the 15th of the following month. The employer may pay salary with a periodicity of more than once a month.

The minimum conditions, amount of remuneration for work, occupational and official, tariff and qualification requirements, labor standards of works and employees shall be defined by the legislation of RA or by the collective agreement. The hourly, work-based and monthly rates, other forms, amount and conditions of remuneration for work, the labor standards shall be defined by the collective agreement or the Labor Agreement.

For each hour of overtime work, in addition to the hourly rate, an additional payment shall be made, not less than 50 percent of the hourly rate, and for each hour of night work, not less than 30 percent of the hourly rate.

Where the workload of the employee increases in comparison with the prescribed norms, he or she shall be remunerated in proportion to the volume of work performed. Certain amounts of remuneration for work shall be defined by the collective agreement or the employment contract.

The employee shall be paid an additional payment for performing heavy, harmful, especially heavy and especially harmful works prescribed by the legislation of the RA. The employee shall be paid an additional payment that is not less than 30 percent of his or her tariff salary for performing works prescribed by the list of heavy and harmful productions, works, occupations, positions and indicators, and not less than 50 percent for performing works prescribed by the list of especially heavy, especially harmful productions, works, occupations, positions and indicators.

In that regards, RA Government issued Decree N1698-N, dated on 02nd December 2010, and adopted list of heavy, harmful, especially heavy and especially harmful productions, works, professions and positions. According to that degree the Energetic domain has professions included in heavy and harmful table as well as professions included in especially heavy and especially harmful.

Heavy and harmful profession and work of Energetic domain are the following:

- provision of services for thermal power station boiler, turbine, stations, units of oil supplier equipment and automation
- manually preparing and filling chemical reagents, provision of desalinization purification processes, filters restoration with acids, salts

and alkali, preparation of chlorine mixture and dosage, water chlorination for cooling systems
- provision of services for boiler, turbine, fuel delivery units (districts), monitoring and control systems for vehicles (automatic devices, controllers, protection technology, signaling devices, etc.)
- supervision over operating equipment of boiler, turbine, stations
- running of Gantry Cranes of boiler, turbine, stations
- cold cleaning of boilers
- maintaining of underground thermal communication and thermal network
- maintenance and repair of indoor facilities of installed diesel power equipment
- repair of thermal and thermal networks infrastructure
- maintenance and repair of underground hydroelectric dam body and installed equipment
- repairing automation, relay protection system and automation equipment of boiler, turbine, stations
- test of power plants, electrical distribution networks and open devices, and 220 kV high-voltage electrical equipment
- repair and maintenance of overhead lines
- provision of anti-corruptible works with woods
- repair mercurial devices
- welding of cable lead clutches and membranes, air (oil and gas) switches and repairing of oil transformers
- Repairing of overhead lines and equipment.

Especially heavy and especially harmful profession and work of Energetic domain are the following:

- cleaning hot boilers
- maintenance and repair of mercurial correctors
- repair and maintenance services of overhead transmission lines and substations under electrical voltage
- provision of works during testing and exploitation of radioactive substances and ionizing X-ray installations
- diver work.

9.2 Appendix II: Records of Meetings and Site Visits

Date	Agency/ Institution/ Company	Place	Name of Person consulted Position	Reason for Visit
28 Sep 2015	ContourGlobal Hydro Cascade CJSC	Spandaryan Reservoir Spandaryan HPP Angeghakot Reservoir	Aram Arushanyan Engineer of ContourGlobal Electric Department, Sergey Pogosyan Chief of Spandaryan HPP	Inspection of facilities
29 Sep 2015	ContourGlobal Hydro Cascade CJSC	Tolors Reservoir Shamb HPP Shamb/Tatev Reservoir	Smbat Mkrtchyan Chief of Investment Programs Department, Anush Gharagyozyan Chief of Health and Safety Department, Syoma Avanesyan Chief of Shamb HPP	Inspection of facilities
29 Sep 2015	Sisian Municipality	Sisian	Karen Hovhannisyan Deputy Mayor	Possible concerns about Vorotan Cascade
29 Sep 2015	Uyts Community	Uyts	Avetyan Artak Community Head	Possible concerns about Vorotan Cascade
30 Sep 2015	ContourGlobal Hydro Cascade CJSC	Daily Regulation Reservoir Tatev HPP	Smbat Mkrtchyan Chief of Investment Programs Department, Mamikon Gharagyozyan Hydroworkshop Superintendent, Aram Yolyan Chief of Tatev HPP	Inspection of facilities
30 Sep 2015	Goris Municipality	Goris	Vachagan Adunts Mayor	Possible concerns about Vorotan Cascade
30 Sep 2015	Landfill	Goris		Waste dumping situation
30 Sep 2015	Vorotan Water Users Company	Shinuhayr	Sevada Adamyan	Vorotan River water use for irrigation purposes between HPP Shamb and HPP Tatev

Date	Agency/ Institution/ Company	Place	Name of Person consulted Position	Reason for Visit
01 Oct 2015	ContourGlobal Hydro Cascade CJSC	Spandaryan Reservoir Spandaryan HPP Angeghakot Reservoir	Smbat Mkrtchyan Chief of Investment Programs Department, Sergey Pogosyan Chief of Spandaryan HPP	Inspection of facilities
01 Oct 2015	'Sisian' Water Users Association (WUA)	Sisian	Azazat Tangyan Head of WUA, Tsangtzyan Hamlet Chief Engineer	Vorotan River water use for irrigation purposes between HPP Spandaryan and HPP Shamb
01 Oct 2015	Municipality of Shaghat	Shaghat	Noza Stepanya, Hoyk Ohanyan	Vorotan River water use for irrigation purposes upstream HPP Spandaryan; visit of the water extraction site upstream Spandaryan HPP
02 Oct 2015	Aarhus Centers of Armenia	Yerevan	Silva Ayvazyan Coordinator of Yerevan Aarhus Center, Mary Chakryan PR Manager of Yerevan Aarhus Center	Concerns received from local population and other NGOs about Vorotan Cascade
12 Oct 2015	Regional Environmental Inspectorate, Kapan	Telephone call	Levon Petrosyan Head of the Environmental Inspection, Syunik Region	Possible concerns about Vorotan Cascade

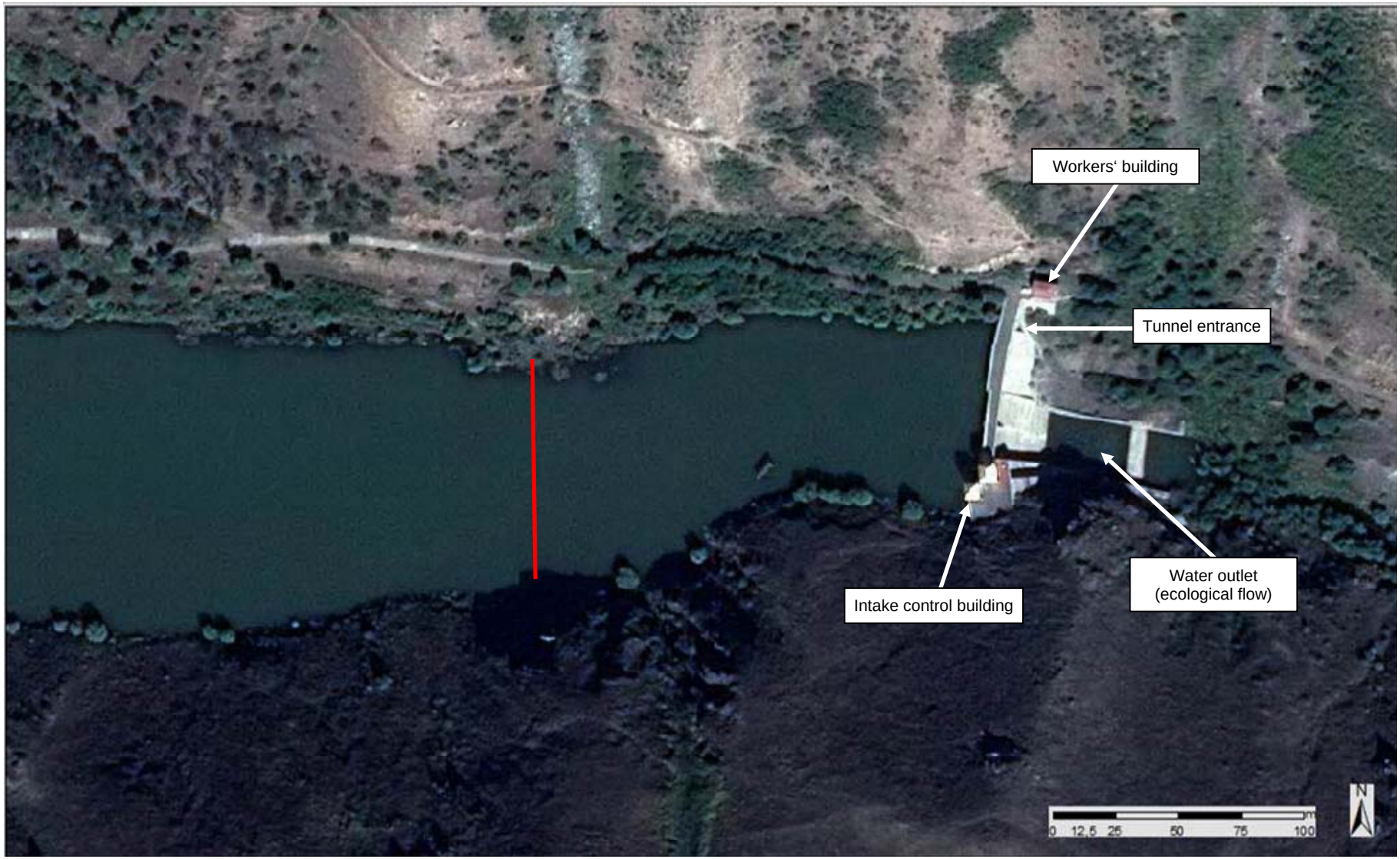
9.3 Appendix III: Maps Based on High Resolution Satellite Pictures

Map 2: Overview map of Spandaryan Reservoir

Map 3: Detailed map of Spandaryan Dam Site (red line: proposed location of swimming barrier)

Map 4: Overview map of Spandaryan HPP and Angeghakot Reservoir

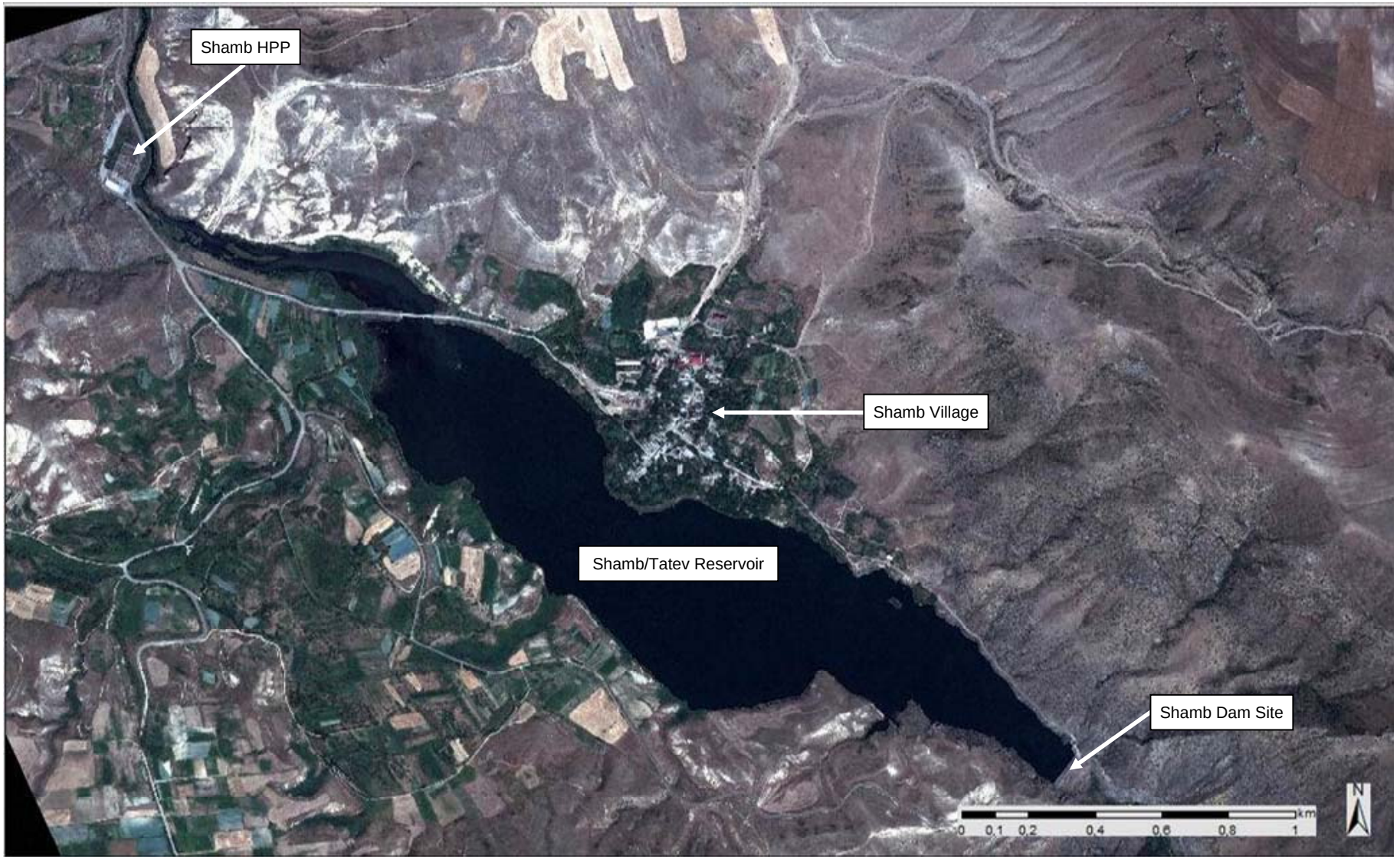
Map 5: Detailed map of Spandaryan HPP



Map 6: Detailed map of Angeghakot Dam Site (red line: proposed location of swimming barrier)

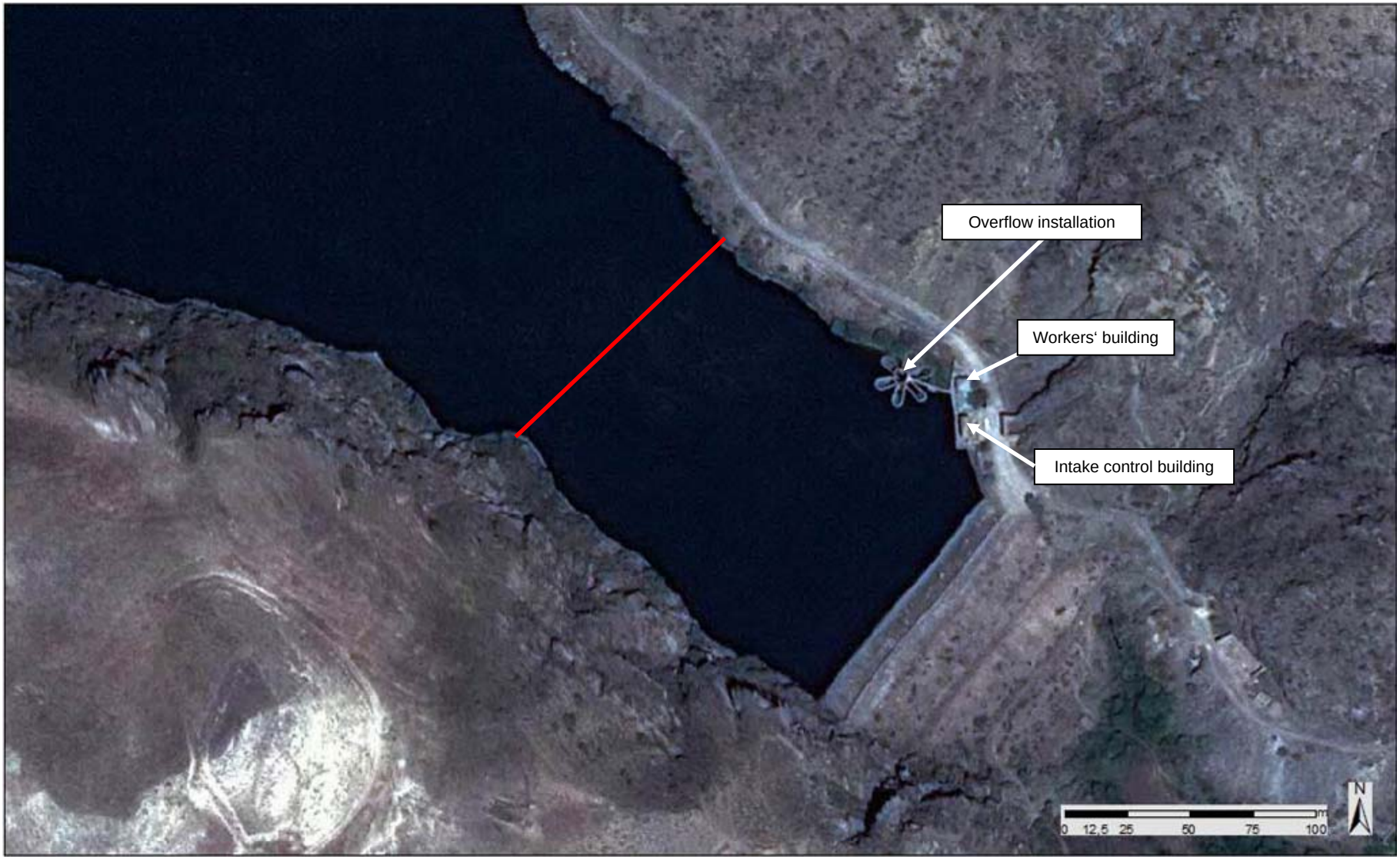
Map 7: Overview map of Tolors Reservoir

Map 8: Detailed map of Tolors Dam Site (red line: proposed location of swimming barrier)



Map 9: Overview map of Shamb HPP and Shamb/Tatev Reservoir

Map 10: Detailed map of Shamb HPP



Map 11: Detailed map of Shamb/Tatev Dam Site (red line: proposed location of swimming barrier)

Map 12: Overview map of Tatev Daily Regulation Reservoir and Tatev HPP

Map 13: Detailed map of Tatev Daily Regulation Reservoir

Map 14: Detailed map of Tatev HPP