

# Quarterly Implementation Progress Report No. 1 and Response of Nam Ngiep 1 Power Company Limited

---

Project Number: 41924-014  
December 2014

## Nam Ngiep 1 Hydropower Project (Lao People's Democratic Republic)

Prepared by AF-Consult Hydropower Plants for Nam Ngiep 1 Power Company Limited and the Asian Development Bank.

This quarterly implementation progress report is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.



**SUMITOMO MITSUI BANKING CORPORATION**  
**as Intercreditor Agent**  
**pursuant to the Common Terms Agreement**

**Nam Ngiep 1 Hydropower Project**

**Quarterly**  
**Implementation Progress Report No. 1**

**NNP1/Ph.2/001**

**November 2014**

**AF-Consult**  
**Hydropower Plants**

**Innovation by experience**





## 7 Environmental and Social Aspects

### 7.1 Environmental Aspects

#### 7.1.1 Under the Contractors' Responsibility

The Monthly Reports by the Civil Contractor are somewhat minimising the importance of environmental and social matters under the Contractor's responsibility, as shown in the Table 7.1 below.

*Table 7.1 Summary of Environmental and Social Matters reported by the Civil Contractor*

Item	June 2014	July 2014	Aug. 2014	Sept. 2014
Environmental Monitoring (inspections) by the Contractor (Internal)	None	None	None	None
Joint Environmental, Health and Safety Monitoring (inspections) with the Owner (*)	26	14	10	8
Safety and Environmental Patrol (Internal)	None	None	None	None
Environmental Training	None	None	None	None
Environmental and Social Incidents	None	None	None	None
Non-conformances	None	None	None	None
Public Complains	None	None	None	None

(\*) Records are included in Appendix

From the above, it is concluded that the Contractor is not independently monitoring the environmental / social behaviour of its subcontractors, is not carrying out / promoting any environmental training and is not taking action when necessary, except when requested / forced to do so by NNP1. Also, the LTA cannot understand how the Contractor's reports can state "no incidents" and "no non-conformances" given the number of non-conformances reported in the joint inspections with NNP1.

This situation is not acceptable, also because in the long term, as the number of workers will drastically increase, it would overload the environmental monitoring team of the EMO unit of NNP1.

According to the progress reports the environmental compliance inspection and monitoring carried out so far identified many non-compliances: according to the NNP1 September monthly report, 14 Level 1 non-compliances were detected in that month alone. Such non compliances refer to wastewater discharging and waste management from the worker camps, hazardous waste storage area and soil erosion protection. It shall be reminded that any non-compliance of Level 1 if not corrected may be classified as Level 2 during the following EMO inspection and reporting.

Main non-compliances are reported on water quality and solid waste management.

About water quality, according to the approved ESIA in order to minimize the surface water pollution by construction works it is mandatory to carefully control the water carrying sediments and the contaminated wastewater from the workers camps. The suggested measures are: settling ponds for sediment settling and for nutrient treatment and the installation of proper septic tanks for the toilets (which probably do not exist or are not properly working in the TCM subcontractor camp according to faecal coliform counts). In the same location also the high level of oil and grease is unacceptable. According to the presentation made by the EMO team during the site visit, because of the unacceptably poor effluent water quality TCM / Obayashi received formal notice to stop discharge from site. At present the LTA has no information about how this matter was further managed.

On solid waste management, according to the information received during the visit by the EMO team, the temporary landfills at each sub-contractor camp has been nulled because of poor standards, after which the Pakxan Urban Development Administration Authority and Obayashi agreed that all waste from the camps was to be disposed of at Pakxan provincial landfill site (70 km from the project), which however operates without formal supervision and environmental management. The LTA doubts that such arrangement can work in the long term, considering the expected substantial increase of the workers in the near future. The LTA further understands that two waste disposal pits will be open at the construction site, as a back stop to using the Pakxan facility.

## 7.1.2 Under the Owner's Responsibility

### 7.1.2.1 230 kV Transmission Line Alignment

The general alignment of the transmission lines and the environmental constraints to be considered are shown in the Figure 7.1 below.

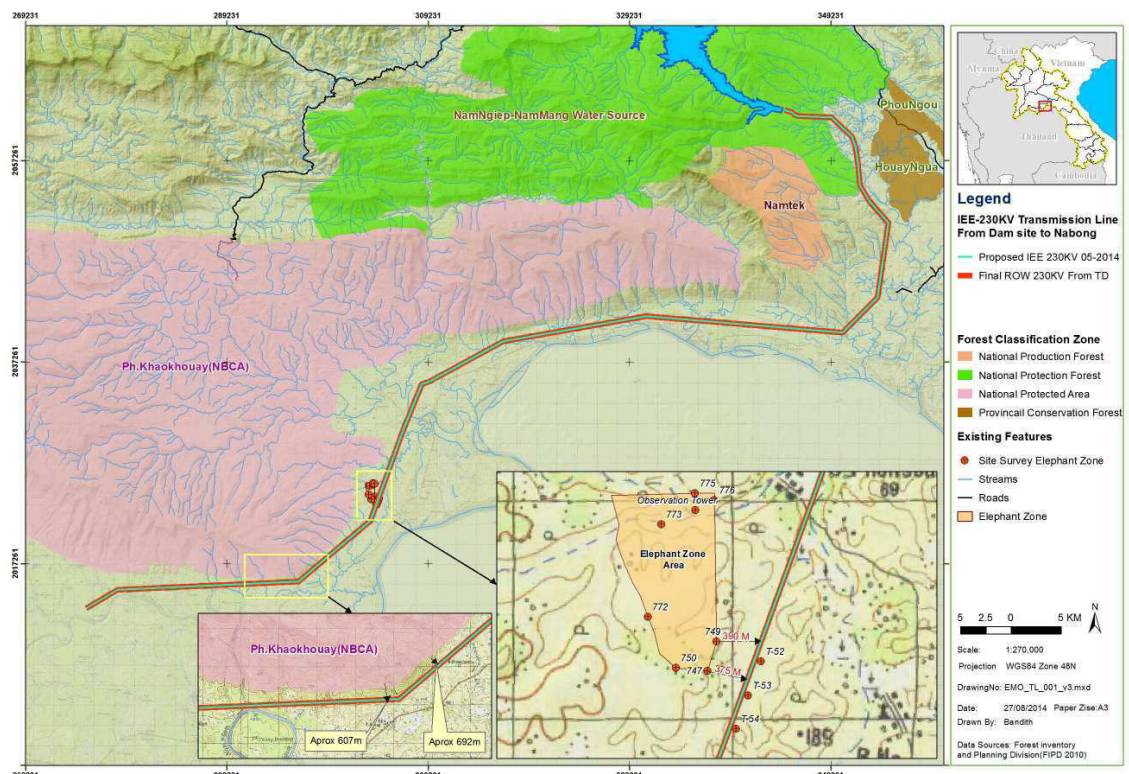


Figure 7.1 Environmental Constraints for the Alignment of the 230 kV Transmission Line



Environmental tasks under NNP1 direct responsibility include as a matter of immediate concern the definition of the boundaries of the PKK National Biological Conservation Area and the clarification about the status of the Na Ban elephant park boundary, to allow defining the alignment of the 230 kV transmission line, taking also into account other restrictions to be considered (the 230 kV line being planned by EdL for future development; the China – Lao High Speed Rail Link) and the need to minimise the impact of the line on nearby villages.

The problem of the boundaries of the PKK National Biological Conservation Area is mainly due to uncertainties about its actual borders: the limits

- shown in the map supplied from (MONRE, EdL)
- defined along the 200 m elevation contour line
- according to physical boundary markers, believed to have been installed incorrectly

do not coincide. NNP1 indicated during the visit that they expect the matter to be clarified shortly, after which the IEE shall be updated accordingly.

#### 7.1.2.2 Watershed Management Planning

The formation of the Watershed Management and Biodiversity Offset Management teams of the EMO was essentially completed in September 2014. Through these teams, NNP1 is supporting the GOL in establishing the Watershed Management Committee. The target is to build working partnerships with upstream catchment users including hydropower, forestry, agriculture, mining and conservation, and to develop a comprehensive Watershed Management Plan. This organisation work is presently ongoing.

In terms of watershed management, it is important at this stage to keep monitoring the water quality upstream of the construction site for at least one full hydrological year, to obtain data about the water quality of the river in natural conditions: without this it will be impossible to accurately estimate the impact of the project on the water quality of the Nam Ngiep river. We understand that the EMO is regularly monitoring the water quality

#### 7.1.2.3 Biodiversity Offset

Activities related to biodiversity offset have been reported as follows in the presentation made by the EMO team during the visit:

- 1<sup>st</sup> instalment (pre-COD) of 180 thousand USD toward the Environmental Protection Fund (EPF) to GOL has been triggered. A request has been submitted to GOL for involvement in a handover process which includes conditions around NNP1 ongoing participation in project selection (capacity building district and provincial staff in watersheds management), and sub-project vetting.
- Term of Reference to recruit a consultant for Biodiversity Offset Baseline preparation has been drafted and is under internal NNP1 review. Field work is planned to commence this dry season.
- Revision of the Biodiversity Offset Framework is currently underway. The draft introduces the establishment of GOL institutional arrangement and activities.
- EMU's monitoring under the CA Annex C: currently negotiations are in place around budget. GOL has requested more budget than agreed in the CA. EMU to develop a proposal for review.



#### 7.1.2.4 Other Activities under NNP1 Responsibility

The following other activities have been carried out / are planned by the EMO:

- The Houay Soup Resettlement Area IEE was completed in July 2014. ADB comments were received 20 August. The final version is now being prepared for distribution to IAP and ADB. Issues concern irrigation weirs on two streams, and generally the conflict between the area required for the resettlement and the limits of the adjacent National Protection Forest. The matter is further discussed in the Section 7.2.2 below.
- Flood Monitoring: on 19th September 2014 EMO and SMO deployed a Flood Monitoring Team in villages and various locations of the watershed to monitor a flood event that caused minor to moderate flooding. Only minor damage to houses and crops were observed.
- Establishment of River Monitoring (in cooperation with SMO) on fisheries including fish catch monitoring, flood and erosion.

## 7.2 Social Aspects

### 7.2.1 Under the Contractors' Responsibility

Social matters under the contractors' responsibility are limited to the impact of the construction activities on the affected villages, and the relation between the project work force and the local population.

In this respect, the following shall be mentioned:

- A speed limit of 10 km/hour was established by NNP1 for the stretches of the access roads crossing / near to villages. This limit, combined with water spraying along the roads in dry season, should minimise dust and noise impact on the villages. The LTA can confirm that water was being sprayed along the roads 2-3 time / day, which is the frequency one can reasonably expect given the extent of the project roads system. On the other hand, no information was available about the respect by the Civil Contractor and its subcontractors of the speed limit established by NNP1, and what level of monitoring by NNP1 was in place: it seems that such strict speed limit was established after some cases of very high speed / dangerous driving were noticed, although no accidents involving local people have been reported. It was also being commented by NNP1 officials that it might become necessary to strengthen speed control and possibly to establish fines or driving licence suspension directly applied to the drivers exceeding the limits.
- Relations between project work force and local population: No complains or problems have been reported, either in the Obayashi monthly reports, in the NNP1 September report to the Lenders or by NNP1 officials during the visit. Nevertheless, given the delay occurring in the relocation of the Hatsaykham village, (see following Section 7.2.2) measures to protect the local population from daily interactions with the labour force are deemed necessary: implementation of such measure will mainly fall under the responsibility of NNP1.



## 7.2.2 PAP Resettlement, Livelihood & Income Restoration Programs

### 7.2.2.1 Overview

The areas affected by the project development are shown in the following Figure 7.2.

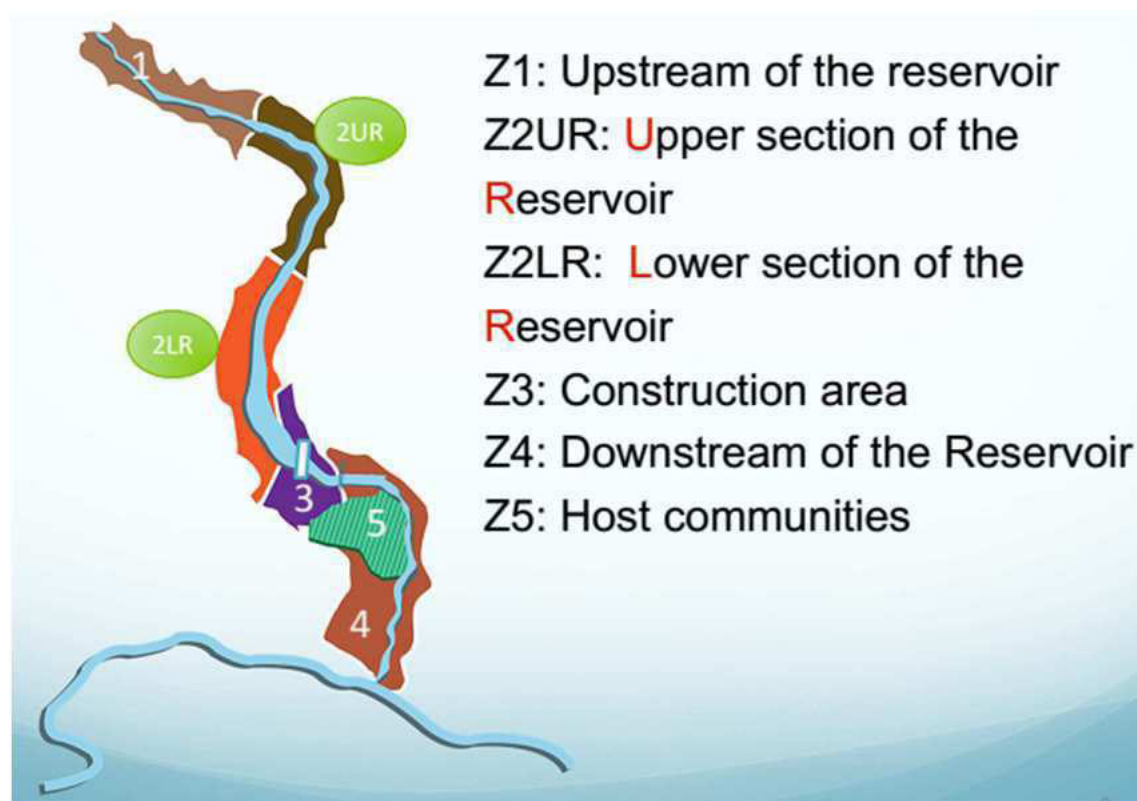


Figure 7.2 Areas Affected by the Project

Summarising:

- **Z1** Upstream of the reservoir: no impact
- **Z2UR** Upper section of the Reservoir: Relocation for some families within their village and livelihoods restoration for all impacted households:
  - Impact mainly on agricultural lands
  - Relocation in same village area of 15 PAHs
  - Livelihoods restoration for 15 relocated and 163 additional households
  - Construction of public infrastructure in the 3 communities
- **Z2LR:** Lower section of the Reservoir: 4 villages will move to Houay Soup Resettlement Area; Households may choose self-resettlement:
  - Consultations
  - Clear criteria for self-resettlement (livelihood sustainability) with approval by PRLRC
  - Consultations on design of resettlement area / PLUP
  - Resettlement and Livelihood Income Restoration Plan
  - Activities for preparing the resettlement
- **Z3** Construction area: Resettlement of Hatsaykham village
  - Resettlement in the vicinity of current location (2 km)



- Early resettlement to minimize exposure to social disruption during construction phase
- Resettlement moved from March 2015 to January 2016 because of Houay Soup development delay
- Development of initial infrastructure including access
- Availability of rice fields for wet season 2015 cultivation
- Resettlement and Livelihood Income Restoration Plan
- Strong social mitigation measures for protecting Hatsaykham
- Z4 Downstream of the Reservoir: Social Development
  - Public Health Action Plan
  - Labour Management Plan
  - Community Development Plan
- Z5 Host Villages Hat Gniun and Thahuea, impacted by land acquisition for the resettlement area
  - Water supply & all-weather road
  - Repair and Upgrade of existing public infrastructure onto project standards
  - Access to community infrastructure in Houay Soup
  - Livelihood program
- Development of Houay Soup Resettlement Area: houses + Agricultural Land + Community infrastructure - Uncertainty on number of Households who will resettle at the designated site
  - Water supply and electricity
  - Year-round access road
  - School, Health center, Market
  - Solid waste disposal
  - Irrigation system
  - Grazing area

#### 7.2.2.2 Overall Resettlement Timeline

The general time schedule of the main resettlement activities, as outlined by the SMO during the LTA visit, are shown in the Figure 7.3





Figure 7.3 General Time Schedule of the Main Resettlement Activities

In relation to previous plans, the main change is the postponement to early 2016 of the resettlement of the Hatsaykham village. The reasons for this delay are related to the difficulties being faced in the development of the Houay Soup resettlement area, as commented in the following Section 7.2.2.3.

During the visit, the LTA inquired about the reasons for planning the resettlement of the 22LR villages in early 2017, more than one year before the planned starting of the reservoir impoundment: the SMO team indicated that such early resettlement planning is due to their previous experience with other projects, where significant delays were experienced in the preparation of the resettlement area and in completing all preparatory work required. The reason is understood by the LTA: the time buffer available is significant and should be sufficient. It is only noted that an early resettlement may cause some problem, as most likely the PAPs will want to keep cultivating the area they presently farm, before it is submerged: facilities for reaching the original villages from the Houay Soup resettlement area should be provided during 2017 until June – July 2018.

#### 7.2.2.3 Development of the Houay Soup Resettlement Area

The most critical issue delaying the development of the resettlement area is the conflict between the area needed for the resettlement and the forest protected area. So far, resettlement land certificate were provided for 1,750 ha instead of the 6,000 ha originally requested: the SMO summarised the situation as follows:

- 4,250 ha is a forest protected area
- Protection area covers also the construction area and the host villages
- No awareness on the protected area during the project development stage
- Land use planning was scheduled with communities participation



- Necessity to define now the total land area necessary for residential area, public infrastructure and all production activities that cannot be implemented in a protected area.
- Currently an additional area of about 300 ha is necessary for residential area and public infrastructure. In addition, it is estimated that 1,500-2,000 ha of additional land will be necessary for agricultural productions.

Summarising, **there must be a change in land categories to be agreed upon with MONRE**, resolving the present conflict between social and environmental protection requirements. At the moment, the SMO is taking the following steps to move forward:

- Layout was reorganized for concentrating the residential area in the already attributed area. Accordingly, development for Hatsaykham and most public infrastructures can start.
- An initial land use planning for defining necessary additional land was developed in house but is deemed insufficient. Land use planning shall be urgently developed by an external consultant for identifying the most suitable areas for agricultural purpose while preserving the best forest areas.

#### 7.2.2.4 Other Critical Issues

Further challenges affecting the development of the resettlement area and the entire resettlement / compensation program, and the actions being taken to overcome / minimise difficulties are summarised in the following Table 7.2.

### 7.2.3 Other Tasks under the Owner's Responsibility

In addition to the different programs associated with the PAPs resettlement and compensation, other social tasks under the Owner's responsibility, to be managed by the SMO, includes

- As a matter of first priority, as already mentioned, establish an economic zone close to the workers camps (Camp Followers), develop and strengthen social management and mitigation measures, firm up the rules and then monitor the performance of the contractors and subcontractors in the relations with local population.
- Develop / strengthen skill development and training programs for the local population seeking employment in the construction; interact with the contractors to increase as far as possible the % of local workers employed.
- Establishment of River Monitoring (in cooperation with EMO) on fisheries including fish catch monitoring, flood and erosion.

One particular issue raised by the LTA to NNP1 and the the SMO during the visit refers to the Schedule 17 – Work Rates, of the TLWC, where different skilled and unskilled labour hourly rates are established for male and female workers: this is contrary to the provisions of Schedule 16, Sub-Clause 2 (a), and to the provisions of the social safeguards requested by the Lenders. The same comments was raised by the LTA in the Paragraph 11.5.5.17 of the Final Project Appraisal Report: at this point, the LTA considers that the Schedule 17 of the TLWC shall be amended to eliminate such disparity.



Table 7.2 Critical Issues for the Resettlement / Compensation Program

No.	Issue	Component Affected	Remedial Action	LTA Comments
1	<p>Asset Registration and Compensation Delay</p> <ul style="list-style-type: none"> <li>GOL has temporarily stopped asset registration (AR) in Houaysoup in the past. AR currently authorized by RMU.</li> <li>Agreement with GoL &amp; PAPs on Compensation rates is a complex process. Compensation Rates Approval by PRLRC expected week #1 of November</li> </ul>	Entire Program	<ul style="list-style-type: none"> <li>Swift dissemination of the Compensation Rates to the communities</li> <li>Houay Soup asset registration given priority</li> <li>Ongoing recruitment of additional SMO staff for accelerating asset registration and compensation for the Houay Soup and the 230 kV transmission line</li> <li>AR &amp; Compensation organized by priority area for allowing fast start of priority construction works in the resettlement area</li> </ul>	Actions at NNPI management level is recommended to support SMO in expediting decision making by GOL and local authorities.
2	UXO Clearing delay	Houay Soup	Preparation of open UXO clearance contracts	
3	<p>Increase in Household Numbers, Uncertainty of Resettlement / Self-resettlement rate</p> <ul style="list-style-type: none"> <li>Increase of population/households of around 16% respectively 24% between 2011 and mid-2014; possibility of further increase of HHs due to HH splitting as per CA and Entitlement Matrices</li> <li>Self-resettlement authorized by</li> </ul>	Houay Soup	<ul style="list-style-type: none"> <li>Inform 2LR HHs in advance on deadline for resettlement decision. Inform 2LR HHs in advance on need of preparing self-resettlement plan if wishing so</li> <li>Advance decision by 2LR HHs on resettlement decision probably by mid-2015 (to be fine-tuned) for allowing house construction bidding by 1 Oct 2015 and house construction works start by 1Jan</li> </ul>	The LTA assumes that decisions about self-resettlement / HH splitting by the Hatsaykham PAPs are already firmed up, taking into account that house construction works for these PAPs shall start as soon as possible to meet the new resettlement deadline (early 2016). To the contrary, the priority construction shall be planned counting perhaps 20-30% more than per present census.



No.	Issue	Component Affected	Remedial Action	LTA Comments
	<p>CA and REDP, depending on wish of HH, availability of a HH self-resettlement plan and agreement of PRLRC on HH feasibility of self-resettlement plan</p> <ul style="list-style-type: none"> <li>Substantial time is required for having decision on self-resettlement / HH split</li> <li>Implies resettlement layout revision, including some public infrastructures (school, water supply)</li> <li>Implies budget revision</li> </ul>		<p>2016</p> <ul style="list-style-type: none"> <li>Layout revised for accommodating up to 750 individual plots</li> <li>Public infrastructures: water supply revised, school layout revised for allowing classroom construction by modules</li> <li>Budget being revised</li> </ul>	
4	<p>Absence of access to and construction facilities in Houay Soup</p> <ul style="list-style-type: none"> <li>This absence would complicate house construction and increase prices</li> <li>Bridge, access road, water and electricity are priority infrastructures</li> <li>Water supply source is in protected area</li> </ul>	Houay Soup	<ul style="list-style-type: none"> <li>Make bridge construction top priority to be ready by end 2015</li> <li>Make access road, 22kV electricity line and water supply second priority, to be available by end 2015</li> </ul>	<p>For the construction of the resettlement housing and infrastructure it is recommended to use for access the temporary bridge under construction and the temporary road to the right bank spoil area, and to branch the 22 kV line from the power supply point to the aggregate crushing plant.</p> <p>The construction of the resettlement housing and infrastructure shall be coordinated with the construction schedule of the right bank saddle dike.</p> <p>For cost saving, it might be worth to buy the superstructure of the temporary bridge at the end of the project construction for use at the permanent access bridge downstream of the re-regulating plant,</p>



No.	Issue	Component Affected	Remedial Action	LTA Comments
				providing a temporary crossing by barges. The permanent bridge shall also be used for the river crossing by the permanent 22 kV line to the resettlement area.
5	<p>Hatsaykham early resettlement postponed to 1<sup>st</sup> quarter of 2016</p> <ul style="list-style-type: none"> <li>Residential area for Hatsaykham cannot be ready for early resettlement in April 15</li> <li>No public facilities can be ready for the same time</li> <li>Paddy fields should be ready for May 2015 &amp; available for cultivation in wet season 2015</li> </ul>	Hatsaykham PAP	<ul style="list-style-type: none"> <li>Resettlement postponed until after Hmong New Year (Jan 2016)</li> <li>Push for fast establishment of the economic zone close to the workers camps (Camp Followers)</li> <li>Develop and strengthen social management and mitigation measures</li> <li>Develop particularly the cooperation with the District</li> </ul>	Moving to the economic zone close to the workers camps might require compensating the villagers of Ban Hat Gniun now providing services (restaurants) to the construction workers.
	<p>Grievance Redress Mechanism not fully functional</p> <ul style="list-style-type: none"> <li>Informal Grievance in place and working</li> <li>Formal grievance institutions established but not trained</li> <li>Therefore cases where formal processes are needed are delayed</li> <li>Lack of awareness of GOL on importance of a formal Grievance system</li> </ul>	Entire Program	<ul style="list-style-type: none"> <li>Awareness visit to the Nam Theun 2 grievance system</li> <li>Formal training scheduled in November</li> <li>Organization of formal committees' meetings before end November 2014</li> </ul>	



## 7.3 Health and Safety Aspects

### 7.3.1 General

#### 7.3.1.1 Information Provided

The monthly reports of the Civil Contractor routinely include an appendix on Safety Management, which summarises Safety Statistical Data, Safety Training Records, Health Check, Incident and Accident (difference between Incident and Accident is not clarified), Non-conformances and Other Issues related to safety.

Information about incidents / accidents and about safety training is well documented. In general, we shall comment that:

- So far, no health checks have been carried out, and no health information is provided.
- While incidents / accidents are reported in all monthly reports received, all reports indicate “no non-conformances”: we cannot understand then what a non-conformance could be.
- All reports indicate no “other issues”.

The September 2014 monthly report of NNP1 to the Lenders reports the following accidents occurred in the 3<sup>rd</sup> quarter of 2014:

*Table 7.3 Accidents Reported by NNP1 for the 3<sup>rd</sup> Quarter of 2014*

Type of accidents	LTI	RI	NM	PD	FI	MVI	NI
No. of accidents in 3Q 2014	1	0	1	0	0	0	1
Cumulative No. of accidents	1	0	1	0	0	0	1

LEGEND	LTI	-	Lost Time Incident
	RI	-	Recordable Injury
	NM	-	Near Miss
	PD	-	Property Damage
	FI	-	Fire Incident
	MVI	-	Motor Vehicle Incident
	NI	-	Other Non-compliance Issue

A short description of each accident occurred is included, while comprehensive documentation of each accident was provided separately to the Lenders. It is noted that the accidents reported by NNP1 do not include all accidents reported by Obayashi, while the accident reported under NI is actually a non-compliance with contract conditions, not a safety related accident.

#### 7.3.1.2 Outcome from the Site Visit

The most important outcome from the visit is a full appreciation of the dangerous conditions inherent to the on-going work at the main dam site, particularly on the roads reaching the left abutment from downstream, as it can be seen in the Photographs 16 to 18: the slopes between the different roads have been cleared from vegetation and somehow excavated, however it is





apparent that a huge amount of loose rock fragments remains on the slope, prone to fall / slide down because of blasting vibrations, and almost certainly in case of heavy rains in the next wet season. It shall also be noted that the slopes downstream of the dam will remain permanently exposed, and thus if left in their present conditions will represent a constant danger for the personnel during the operation stage.

When discussing the matter, we have been assured that when the blasting for the dam foundation will take place no work will be allowed below until the blasted material is removed. Given what we saw, this is only partially reassuring, considering that:

- Hauling of the excavated material will be through the left bank roads shown in the photographs mentioned above, and from the corresponding roads on the right abutment (still to be excavated).
- A piece of rock falling along the slopes from a loaded truck will not be an uncommon occurrence, without mentioning the risk of more serious accidents.
- While the dam excavation work will take place there will certainly be work going on at the diversion tunnel, with equipment and personnel travelling along the lowest road of the left abutment.

**For all reasons above, we strongly recommend that a serious effort is devoted to effectively cleaning and making safe the slopes shown in the photographs 16 to 18, and the slopes still to be excavated on the right abutment. We would also like to review the safety measures to be put in place when excavating the dam foundations and for the diversion tunnel excavation works.**

A second important outcome from the site visit is the confirmation, already expected from the review of the Obayashi organisation (see Section 4.2.1 above) that no clinic or first aid station is presently operating at site, and not even a properly equipped ambulance is available. During the coordination meeting we were present at site, there was some discussion between NNP1 and Obayashi on which party was responsible for the operation of the health care facilities. According to the Schedule 12 – Owner's Requirements, of the CWC:

- The Contractor shall construct a health facility, equip necessary medicines.
- The Owner shall be responsible for employing a doctor at the Owner's base camp and for its operation and maintenance during construction
- The Contractor shall prepare a heliport for air ambulance services at the site.

**Taking also into account that the work at the dam site is inherently dangerous, with a high risk of accidents occurring, it is important to clarify any doubt about the responsibilities of Owner and Contractor, and to implement as soon as possible the necessary medical facilities and services.**

### 7.3.2 UXO Clearing

According to the information provided by NNP1 the UXO survey at the construction area is essentially completed, remaining only some 25 ha to be surveyed in the river bed at the main dam and the re-regulation dam locations. Only 3 UXOs were found along the Access Road A and properly disposed.

UXO survey in the resettlement area is still to be carried out: this work is now becoming urgent, at least for the portion of the area required for the resettlement of the Hatsaykham village.



### 7.3.3 Accidents Occurred

Table 7.4 Accidents reported by the Civil Contractor up to End September 2014

No.	Date	Description	Consequences	Actions Taken	LTA Comments
1	06/06/14	Rock blasting on the access road caused rock fragments to reach a village some 350 m away, damaging 2 houses	Minor material damages	Compensation paid Safety provisions before blasting revised	Luckily no injuries to people occurred (near miss)
2	27/07/14	Trying to avoid a coming excavator, the operator of a mobile crane shifted the crane with boom extended, the crane inclined and fell down.	No injured person Minor damages to equipment	30 minutes training provided to the operator involved (on the same day)	Apparently the crane operator never received a proper training before the accident
3	02/08/14	A driftwood caused the engine of the tugboat operating the pontoon near the temporary bridge to stop operation. The pontoon was dragged downstream by the flow and stopped in a zone of shallow water.	No injured person No damages	Tugboat shall operate on the downstream side of the pontoon	Implemented
				Operators and passengers shall wear life jackets	Not seen during the visit
				The pontoon shall be connected by cables to the shore	Not seen during the visit
4	11/08/14	The right front tire of a dump truck suddenly punctured and the dump truck capsized, remaining on the road.	No injured person Minor damages to equipment	Driver shall check tires conditions before working Regular maintenance shall be carried out Roads shall be kept in good conditions Continue safe driving training	All these actions, especially the regular maintenance, shall be routine, not something new introduced because the accident occurred
5	20/09/14	The 22kV line along JICA Road was still live when a worker climber a pole. The worker was electrocuted and fell 10 m to the ground.	The worker sustained burns to his hands and wrists, and broke both his legs with the fall.	Improving the procedure for checking the shut-down of the line before starting work Explaining / clarifying the procedure for using safety belt when climbing the poles Requirement to the workers to apply working procedure, safety training implementation	It appears that until the accident occurred there were no suitable safety procedures in place and no safety training was carried out. It is unbelievable that the shutdown of the line was checked by a simple phone call, without any independent proof by the subcontractor. It seems there are still no measures to prevent energisation of the line while work is ongoing.
6	26/09/14	During hauling blasted rock by excavator, some rocks fell down on a lower	No injured person Minor	Watchmen with radio shall be always arranged on the both	Very serious accident (near miss). Refer to the comments on Section



No.	Date	Description	Consequences	Actions Taken	LTA Comments
		road and one compressor and one excavator were damaged by fallen rocks.	damages to equipment	roads. A suitable distance (more than 50m) shall be kept in case of working on both roads. Barricades or safety tapes shall be arranged to show working area.	7.3.1.2 above.

At least three accidents, the number 1, 5 and 6 shall be considered very serious, with a high risk of loss of lives and serious injuries to workers and to outsiders. When reviewing the detailed reports of these accidents, the impression is that the corrective / preventive actions mentioned are included to fill a bureaucratic procedure, more than to actually improve safety. We consider that a more proactive monitoring by NNP1 will be needed to improve safety conditions at site.

## 7.4 Critical Issues


In terms of environmental, social, health and safety aspects, the critical issues identified from the review of the information available and the impressions received during the visit are the following:

- **Environment:** the need to bring the quality of the effluents from the contractor / subcontractors camps within the limits established by Lao law and by the CWC. This is clearly a Contractor's responsibility; at some point NNP1 may have to take action, according to the Clause 4.19 (g) of the CWC.
- **Social:** the need to reach agreement with MONRE about the resettlement area available at Houay Soup, so that all activities related to the preparation of the resettlement site and infrastructure can start. It is also necessary to get the compensation rates approved by the authorities involved. All this is NNP1 responsibility: support by the NNP1 management to the efforts of the SMO is probably necessary to expedite the process.
- **Safety:** the situation at site is far from satisfactory. Safety conditions must be improved, according to the comments and recommendations outlined above: this is essentially a Contractor's responsibility. NNP1 shall strengthen its safety monitoring team; at some point, if the situation does not improve it might become necessary to take action (penalties) according to applicable clauses of the CWC and its schedules.
- **Health:** it is very important to have suitable first aid facilities available at site. NNP1 and the Civil Contractor shall clarify their responsibilities on the matter and give priority to the construction of the required facilities and the starting of their operation as soon as possible.

**Response to the LTA Quarterly Implementation Progress Report No.1\_ November 2014.**

LTA comments	NNP1PC response	Note
<p><b>Environmental Aspects Section 1.5.1.1</b></p> <p>According to its own monthly reports, the Civil Contractor is not independently monitoring the environmental / social behavior of its subcontractors, is not carrying out / promoting any environmental training and is taking action only when requested / forced to do so by NNP1.</p>	<p>Each week there are two junior level joint inspections of construction activities between the Contractor and NNP1 Compliance Officers. Sites visited are preselected based on issues and or construction schedule. The reports of these inspections shared between the Contractor and NNP1. The reports are passed on to the Environmental Management Office (EMO) Manager as well as the Assistant Manager, Compliance Inspection. All reports are available on a common data base.</p> <p>Once every week there is a Coordination Meeting, usually on a Friday morning, between senior managers of Obayashi Corporation (OC), the Civil Contractor and Technical Division (TD) and the EMO has its Compliance Inspection Manager in attendance and others from EMO and Social Management Office (SMO) of NNP1 Environmental &amp; Social Division (ESD) to discuss environmental and social issues that are tabled so that resolutions are agreed.</p> <p>The NNP1 Compliance Inspection Team apply a 3-tier Compliance Management System. Level 1 is applied to routine non-compliance issues identified through normal weekly meetings. Level 2 is raised when a moderate - serious issues is identified and or when Level 1 issues are not resolved in the agreed period. Level 3 is a serious issue that requires immediate resolution by management.</p>	<p>EMO Response</p>

	<p>OC in fact carried out separate monitoring of Environmental &amp; Social and Health &amp; Safety matters and conducts training according to their own system and requirements. This is not described particularly well in their own monthly progress reports and therefore the Contractor been instructed to expand their report in these areas in future months.</p>	
<p>...because of the unacceptably poor effluent water quality Obayashi / its subcontractor TCM received formal notice to stop discharge from site. At present the LTA has no information about how this matter was further managed.</p>	<p>August and September water quality results (50,000 MPN/100 ml and 160,000 MPN/100 ml for fecal coliforms respectively) showed, month on month, deteriorating quality of the effluent discharge from the TCM (Subcontractor) Camp. On 22 October 2014, the NNP1 (EMO) Compliance Team prepared and submitted a Level 2 Non-Compliance Report (NCR) to NNP1 Technical Division, being the administrator of the Civil Works Contract (CWC). The NCR requested three specific items:</p> <ol style="list-style-type: none"> <li>1. Stop discharge from site to the Nam Ngiep river;</li> <li>2. Collection by the Contractor of samples to determine the locations of bacterial contamination within the camp system; and</li> <li>3. Reparation and improvement of the treatment facility in consultation with NNP1.</li> </ol> <p>On the strength of the EMO NCR, the Technical Division issued a letter to OC dated 22 October 2014 requesting additional measures, and also warning that the camp could potentially be forced to close if requirements were not met.</p> <p>The Contractor responded formally by letter</p>	<p>EMO Response</p>

	<p>dated 31 October 2014 and is now preparing a review of the drainage system and its operation, is undertaking regular visual monitoring and has conducted its own water quality monitoring program to identify design faults.</p> <p>[Update]  OC constructed one additional sedimentation pond and take actions already and on 28 November OC submitted a sampling report and a corrective actions (as attached).  NNP1PC does not receive the test results after EM solution but OC committed to submit results to NNP1PC soon.</p>  <p>PCL-00573  20141128 Results of</p>	
On solid waste management, the temporary landfills at the sub-contractors camps have been nulled because of poor standards,.	<p>Up to August 2014, OC and its subcontractors had built and operated individual landfill pits at each of the two subcontractor camps (TCM and MVDC). These were routinely inspected by the EMO Compliance Team, and regularly found to be non-compliant with the required environmental standards. The Compliance Team, as early as May 2014, requested that facilities management should be improved or alternative arrangements made for construction Waste management. Without notice to EMO, the Contractor stopped the use of the individual camp landfills and commenced collection and offsite delivery by skip to the designated Pakxan Landfill Facility (PLF).</p>	EMO Response
Pakxan provincial landfill site, which however operates without formal supervision and environmental management. The LTA doubts that such	<p>On 10 September 2014 representatives from OC and NNP1 (both TD and EMO) undertook a joint site inspection of the PLF. The Inspection</p>	EMO Response



arrangement can work in the long term, considering the expected substantial increase of the workers in the near future.	<p>identified several significant environmental and social issues concerning the condition of the facility, and its operation and management. The assessment concluded that use of the facility in its current condition by the OC is a non-compliant activity to the safeguard requirements of the Lenders and in breach of Clause 70 of the CA.</p> <p>Formal notice from NNP1 to OC was provided on 26 September 2014. At the weekly Coordination Meetings the NNP1 Compliance Inspection Team requested OC to stop waste transfer to the PLF site, and to temporarily store material within the NNP1 Concession Area. The earliest notice was given on 17 September 2014.</p>	
The LTA further understands that two waste disposal pits will be open at the construction site, as a back stop to using the Pakxan facility.	<p>The Civil Contractor, in conjunction with NNP1, has selected an appropriate project landfill site, initially for the use of the Civil Works Contractor, on October 2014. The site is adjacent to Disposal Area No.6. A Landfill Master Plan / Design has been created, and initial survey, clearing and levelling of the site was commenced in November 2014, with initial clearing to be completed during December 2014. After clearing two pits will be excavated, with one to be used for temporary storage until the landfill is operational.</p> <p>[Update] At the time when the contractor landfill pits have been created all waste transfers to the PLF will be suspended. Disposal and processing will occur on the project site.</p>	EMO Response
<b>Environmental Aspects Section 1.5.1.1</b>		
the definition of the boundaries of the PKK National Biological Conservation Area and the clarification about the status of the Na Ban elephant park boundary, to allow defining the alignment of the 230 kV transmission line	According to recent investigations in October 2014 with EDL, in consultation with NNP1, the PKK boundary closest point to the NNP1 230kV TL	EMO Response

	<p>is 255m. Other sources suggest the boundary is 607m from the TL. This actual PKK boundary is a topic of discussion between MONRE, as the PKK Manager, and EDL. In any event the TL ROW does not cross over the PKK Boundary.</p> <p>The Elephant Conservation Zone (ECZ) was founded at Ban Na village. It has an area of 1.02 km<sup>2</sup> with an elephant observation tower. The nearest distance between the TL ROW from the boundary of the ECZ and elephant observation tower are 390 m and 750 m, respectively. Therefore the current 230kV transmission line will not affect the ECZ.</p>	
<p><b>7.1 Environmental Aspects</b>  <b>7.1.1. Under the Contractor's Responsibility</b></p> <p>From the above, it is concluded that the Contractor is not independently monitoring the environmental / social behaviour of its subcontractors, is not carrying out / promoting any environmental training and is not taking action when necessary, except when requested / forced to do so by NNP1. Also, the LTA cannot understand how the Contractor's reports can state "no incidents" and "no non-conformances" given the number of non-conformances reported in the joint inspections with NNP1. This situation is not acceptable, also because in the long term, as the number of workers will drastically increase, it would overload the environmental monitoring team of the EMO unit of NNP1.</p>	As Above	
<p>Main non-compliances are reported on water quality and solid waste management.</p>	As Above	
<p><b>7.1.2 Under Owner's Responsibility</b>  <b>7.1.2.1 230kV Transmission Line Alignment</b></p> <p>The problem of the boundaries of the PKK National Biological Conservation Area is mainly due to uncertainties about its actual borders: the limits shown in the map supplied from (MONRE, EdL)</p>	As Above.	

<ul style="list-style-type: none"> <li>· defined along the 200 m elevation contour line</li> <li>· According to physical boundary markers, believed to have been installed incorrectly do not coincide. NNP1 indicated during the visit that they expect the matter to be clarified shortly, after which the IEE shall be updated accordingly.</li> </ul>		
<p><b>7.2 Social Aspect</b></p> <p><b>7.2.1 Under the Contractors' Responsibility</b></p> <p>Social matters under the contractors' responsibility are limited to the impact of the construction activities on the affected villages, and the relation between the project work force and the local population. In this respect, the following shall be mentioned:</p> <ul style="list-style-type: none"> <li>· A speed limit of 10 km/hour was established by NNP1 for the stretches of the access roads crossing / near to villages. This limit, combined with water spraying along the roads in dry season, should minimise dust and noise impact on the villages. The LTA can confirm that water was being sprayed along the roads 2-3 time / day, which is the frequency one can reasonably expect given the extent of the project roads system. On the other hand, no information was available about the respect by the Civil Contractor and its subcontractors of the speed limit established by NNP1, and what level of monitoring by NNP1 was in place: it seems that such strict speed limit was established after some cases of very high speed / dangerous driving were noticed, although no accidents involving local people have been reported. It was also being commented by NNP1 officials that it might become necessary to strengthen speed control and possibly to establish fines or driving licence suspension directly applied to the drivers exceeding the limits.</li> <li>· Relations between project work force and local population: No complains or problems have been reported, either in the Obayashi monthly reports, in the NNP1 September report to the Lenders or by NNP1 officials during the visit. Nevertheless, given the delay occurring in the relocation of the Hatsaykham village, (see following Section 7.2.2) measures to protect the local population from daily interactions with the labour force are deemed necessary: implementation of such measure will mainly fall under the responsibility of NNP1.</li> </ul>	<ol style="list-style-type: none"> <li>1. Speed limit: OC train all new workers and subcontractors to follow the speed limit. Such records are included in the Contractor's Monthly Progress Report.</li> <li>2. NNP1PC is preparing necessary mitigation measures in order to avoid unnecessary conflict between project work force and villagers.</li> </ol>	

<p><b>7.2.2.2 Overall Resettlement Timeline</b></p> <p>In relation to previous plans, the main change is the postponement to early 2016 of the resettlement of the Hatsaykham village. The reasons for this delay are related to the difficulties being faced in the development of the Houay Soup resettlement area, as commented in the following Section 7.2.2.3.</p> <p>During the visit, the LTA inquired about the reasons for planning the resettlement of the Z2LR villages in early 2017, more than one year before the planned starting of the reservoir impoundment: the SMO team indicated that such early resettlement planning is due to their previous experience with other projects, where significant delays were experienced in the preparation of the resettlement area and in completing all preparatory work required. The reason is understood by the LTA: the time buffer available is significant and should be sufficient. It is only noted that an early resettlement may cause some problem, as most likely the PAPs will want to keep cultivating the area they presently farm, before it is submerged: facilities for reaching the original villages from the Houay Soup resettlement area should be provided during 2017 until June – July 2018.</p>	<p>Noted.</p>	
<p><b>7.2.3 Other Tasks under the Owner's Responsibility</b></p> <p>One particular issue raised by the LTA to NNP1 and the the SMO during the visit refers to the Schedule 17 – Work Rates, of the TLWC, where different skilled and unskilled labour hourly rates are established for male and female workers: this is contrary to the provisions of Schedule 16, Sub-Clause 2 (a), and to the provisions of the social safeguards requested by the Lenders.</p> <p>The same comments was raised by the LTA in the Paragraph 11.5.5.17 of the Final Project Appraisal Report: at this point, the LTA considers that the Schedule 17 of the TLWC shall be amended to eliminate such disparity.</p>	<ol style="list-style-type: none"> <li>1. TD has reviewed and will discuss with the Transmission Line Works (TLW) Contractor to amend the rate indicated in Schedule 17 of TLWC.</li> </ol>	
<p><b>7.3 Health and Safety Aspects</b></p> <p><b>7.3.1 General</b></p> <p>For all reasons above, we strongly recommend that a serious effort is devoted to effectively cleaning and making safe the slopes shown in the photographs16 to 18, and the slopes still to be excavated on the right abutment. We would also like to review the safety measures to be put in</p>	<ol style="list-style-type: none"> <li>1. NNP1PC appreciates that the work being carried out on slopes for construction of access roads, diversion tunnel inlet/outlet portals and dam foundation</li> </ol>	

<p>place when excavating the dam foundations and for the diversion tunnel excavation works.</p> <p>A second important outcome from the site visit is the confirmation, already expected from the review of the Obayashi organisation (see Section 4.2.1 above) that no clinic or first aid station is presently operating at site, and not even a properly equipped ambulance is available. During the coordination meeting we were present at site, there was some discussion between NNP1 and Obayashi on which party was responsible for the operation of the health care facilities.</p> <p>According to the Schedule 12 – Owner’s Requirements, of the CWC:</p> <ul style="list-style-type: none"> <li>· The Contractor shall construct a health facility, equip necessary medicines.</li> <li>· The Owner shall be responsible for employing a doctor at the Owner’s base camp and for its operation and maintenance during construction</li> <li>· The Contractor shall prepare a heliport for air ambulance services at the site.</li> </ul> <p>Taking also into account that the work at the dam site is inherently dangerous, with a high risk of accidents occurring, it is important to clarify any doubt about the responsibilities of Owner and Contractor, and to implement as soon as possible the necessary medical facilities and services.</p>	<p>excavation and for the drill and blast operation for the diversion tunnel are the most dangerous activities being undertaken, not least because of the potential for accidents caused by falling or flying rocks and boulders.</p> <p>NNP1PC will continue to ensure with OC through ongoing Risk Assessment that appropriate preventative measures are introduced and training is carried out to ensure the safe working conditions at the site.</p> <p>2. First Aid</p> <p>NNP1PC will ensure that OC provide appropriate first aid, medical equipment and facilities including an ambulance for their subcontract workers.</p> <p>[Update]</p> <p>NNP1PC and IAP confirmed that one doctor is employed at Songda Camp and Songda agrees to use the doctor in case of emergency.</p> <p>OC’s sub contractors have their own health and safety system in place, with first aid kits and designated first aid trained staff available at each workers camp and onsite with first aid kits, on site and at camp,</p> <ul style="list-style-type: none"> <li>- TCM has eight first aid trained staff on site</li> <li>- MVDC has two first aid trained staff</li> <li>- ASA, Lamsei, PKCC and RT each have one first aid trained staff</li> </ul> <p>Also an emergency responses flow chart and emergency action plan is used to</p>	
---	---	--

	<p>identify the route of communication in the event of any emergency.</p> <p>The helipad is and was already established after earthmoving adjacent to the Owner's/Contractor's Camps.</p>	
<p>7.3.3 Accident Occurred</p> <p>At least three accidents, the number 1, 5 and 6 shall be considered very serious, with a high risk of loss of lives and serious injuries to workers and to outsiders. When reviewing the detailed reports of these accidents, the impression is that the corrective / preventive actions mentioned are included to fill a bureaucratic procedure, more than to actually improve safety. We consider that a more proactive monitoring by NNP1 will be needed to improve safety conditions at site.</p>	<p>1. NNP1PC will strengthen the safety monitoring and for this purpose, is establishing an occupational health and safety team and which is currently under internal process.</p>	
<p>7.4 Critical Issues</p> <p>In terms of environmental, social, health and safety aspects, the critical issues identified from the review of the information available and the impressions received during the visit are the following:</p> <ul style="list-style-type: none"> <li>· Environment: the need to bring the quality of the effluents from the contractor / subcontractors camps within the limits established by Lao law and by the CWC. This is clearly a Contractor's responsibility; at some point NNP1 may have to take action, according to the Clause 4.19 (g) of the CWC.</li> <li>· Social: the need to reach agreement with MONRE about the resettlement area available at Houay Soup, so that all activities related to the preparation of the resettlement site and infrastructure can start. It is also necessary to get the compensation rates approved by the authorities involved. All this is NNP1 responsibility: support by the NNP1 management to the efforts of the SMO is probably necessary to expedite the process.</li> <li>· Safety: the situation at site is far from satisfactory. Safety conditions must be improved, according to the comments and recommendations outlined above: this is essentially a Contractor's responsibility. NNP1 shall strengthen its safety monitoring team; at some point, if the situation does</li> </ul>	<p>As above 1.5.1.1 (Water Quality Issue)</p> <p>[Update]</p> <p>Agree: NNP1 has ongoing dialogue with the GOL to conclude compensation rates and the preparation of the Houay Soup resettlement area. This is a priority of SMO team.</p> <p>[Update]</p> <ul style="list-style-type: none"> <li>- NNP1PC instructed OC to check the loosen rock in the slope around the main</li> </ul>	



<p>not improve it might become necessary to take action (penalties) according to applicable clauses of the CWC and its schedules.</p> <p>· Health: it is very important to have suitable first aid facilities available at site. NNP1 and the Civil Contractor shall clarify their responsibilities on the matter and give priority to the construction of the required facilities and the starting of their operation as soon as possible.</p>	<p>dam site already.</p> <ul style="list-style-type: none"> <li>- NNP1PC is taking action to set up safety team and on-going.</li> <li>- Health issue as above 7.3.</li> </ul>	
---	--	--

Date: 28<sup>th</sup> November 2014

Ref: NNP1-PCL-00573



**OBAYASHI CORPORATION**

Ban Phonsay, Nouy-17, Paksan District, Bolikhamxay Province, Lao P.D.R.  
Tel: +856-20 54-790-686 Fax: +856-20 54-790-688

---

**To:** Mr. Shoji TSUTSUI  
Deputy Managing Director,  
Nam Ngiep 1 Power Company Limited

**Subject:** Results of coliform tests at TCM Camp

Dear Sir,

As a follow up to our previous letter regarding *Actions taken to high coliform levels at TCM Camp* (NNP1-PCL-00499 dated 30<sup>th</sup> or October) we would like to inform you of these test result.

As per *Attachment 1*, these results show that only discharge point no. 3 was below the National Standard (1000MPN/100ml), the remaining points were all slightly higher than the allowed standard. Discharge point no. 3 is located at the wastewater treatment at the bathing area (see map in attachment 1) and is not connected to any sewage or septic tank. The other points which yielded high readings were all at kitchen discharge areas. These results showed significant improvement from the samples collected by NNP1, which showed a value of 160,00MPN/ml (document NNP1/ 0323-014/ OBA/ EPC-CE).

After discussion with NNP1/EMO, as a corrective action to minimize the total amount of fecal coliforms within waste water discharge OC and TCM are trialing an Effective Microorganism (EM) solution. This was added to the treatment systems of the camps, as well as the main sediment pond (see attachment 2). The EM solution will take two weeks to take effect. After two weeks, tests will be re-conducted, in the meantime we will instruct TCM to block the discharge point from the main sediment pond and conduct maintenance of grey water treatment systems at kitchen areas. Our team is also discussing with EMO about options to disperse sediment pond water by pump, onto a field or nearby vegetation, to ensure no effluent is directly discharged into Nam Ngiep.

We will continually work with EMO and keep them updated on any activities, with our target to close this issue as soon as possible.

Thank you for your understanding and support, please do not hesitate to contact us if your have any questions.

Sincerely Yours,

OBYASHI CORPORATION

A handwritten signature in black ink, appearing to read 'K. Chabayashi', written over a horizontal line.

Kazuhiko CHABAYASHI  
Project Manager  
Nam Ngiep Project Office  
OC/SS

***Attachments:***

- 1. Water sampling results*
- 2. Corrective actions, Water treatment*

### Water sampling locations at TCM camp yard

No	ID	Location	Description	Picture	Date and Time
1	Point1	TCM2 (VV Kitchen)	Wastewater treatmentfor kitchen area and washing discharge	No Water	N/A
2	Point 2	TCM1 (Kitchen)	Wastewater treatmentfor kitchen area and washing discharge		28/10/2014 07:03 AM.
3	Point 3	TCM1 (Bathing)	Retention pondfor bathing		28/10/2014 06:47 AM.
4	Point 4	TCM3 (Bathing to main)	Retention pondfor bathing and washing clothes		28/10/2014 06:50 AM.
5	Point 5	TCM4 (Kitchen to main)	Wastewater treatmentfor kitchen area and washing discharge		28/10/2014 06:56 AM.
6	Point 6	Sediment Pond	Main discharge point from staff canteen and wash rooms		28/10/2014 06:59 AM.
7	Point 7	TCM 1 (to main)	Main discharge point for three wastewater treatment systems including kitchens and wash rooms		28/10/2014 06:52 AM.



LAO PEOPLE'S DEMOCRATIC REPUBLIC  
Peace Independence Democracy Unity Prosperity

Natural Resources and Environment Institute (NREI)  
National Environmental Laboratory (NEL)  
Address: Nahaideo Rd, PO.Box: 7864, Vientiane, Lao PDR,  
Tel: 856- 030- 9832286

Date of report: 5 11 14

ANALYSIS TEST REPORT

Customer name: Nam Ngiep Hydropower Project I  
Address: Bollokhamsay Province  
Phone No: +856 20 96 096 900  
Sample type: Surface  
Sampling by: Customer

Test report no: 0098/2014  
Sample receipt no: 0188/2014  
Receipt date: 28 October 2014  
Sampling date: 28 October 2014  
Analysis date: 28 October 2014  
Page: 1/1

Parameter	Unit	Method of Analysis	Result						Surface/wastewater quality standard
			Point 2 141028002	Point 3 141028003	Point 4 141028004	Point 5 141028005	Point 6 141028006	Point 7 141028002	
Fecal Coliform Bacteria	MPN/ 100ml	Multiple-tube Fermentation Technique for Members of the Coliform Group, Part 9221	4,430	900	3,995	2,916	3,161	2,407	1,000/-

Note on sample condition:

Test Methods: APHA/AWWA/WEF Standard Method for the Examination of Water and Wastewater, 22th Edition, 2012

Deputy Director General of NREI



Mr. Virasack CHUNDARA

Director of EQMC

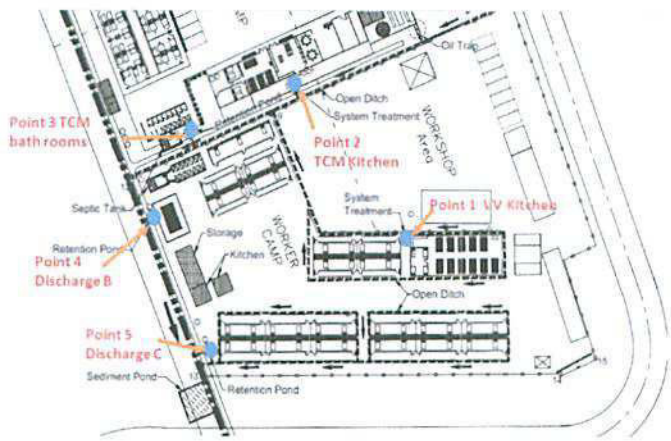




Ms. Setouanh PHANTHAVONGSA

Note: This analysis test report certified only for samples be tested.

Form # 25-00-002.0



# Water Treatment by EM Using November, 2014

	<p>Date: 16-Nov-2014 (No Photo)</p> <p>Total EM Mixing water 80L (Usage 4L of EM, mixing 1L with 20L water)</p> <p>Average splitting to each point 1.6L</p> <p>Point 1 VV Kitchen Point 2 TCM Kitchen Point 3 TCM bathrooms Point 4 Discharge B (Staffs bathing area) Point 5 Discharge C (TCM4 Kitchen)</p>
	
<p>18<sup>th</sup> November 2014</p> 	<p>18<sup>th</sup> November 2014</p> 
<p>18<sup>th</sup> November 2014</p>	<p>18<sup>th</sup> November 2014</p>
<p>Date: 18-Nov-2014</p> <p>Total EM Mixing water 100L (Usage 5L of EM, mixing 1L with 20L water)</p> <p>(EM Mixing ratio for strong smell treatment 2-3L : 1 m<sup>3</sup> water)</p>	