添　付　資　料

1.　署名ミニッツ

MINUTES OF DISCUSSIONS
ON THE PRELIMINARY STUDY
ON THE PAKSE WATER SUPPLY DEVELOPMENT PROJECT
IN LAO PEOPLE'S DEMOCRATIC REPUBLIC

In response to a request from the Government of Lao People's Democratic Republic (hereinafter referred to as "Lao PDR"), the Government of Japan decided to conduct a Preliminary Study on the Pakse Water Supply Development Project (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to the Lao PDR the Preliminary Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Fumihiko Okiura, Director, Water Resources Management Division I, Water Resources and Disaster Management Group, Global Environment Department, JICA, and is scheduled to stay in the country from Oct 19, 2008 to Nov 14, 2008.

The Team held discussions with the officials concerned of the Government of Lao PDR and conducted a field survey at the study area.

In the course of discussions and field survey, both sides confirmed the main items described in the attached sheets. Subject to the decision by the Government of Japan, JICA will conduct a further study on the Project.

Pakse, October 25, 2008

Fumihiko Okiura
Leader,
Preliminary Study Team,
Japan International Cooperation Agency
Japan

Noupheuak Virabouth
Deputy Director General
Department of Housing and Urban Planning,
Ministry of Public Works and Transport
Lao PDR

Me Thongmany
Deputy Director General
Department of Public Works and Transport
Champasack Province
Lao PDR

Witnessed by

Intong Phanthanivong
General Manager,
Water Supply State-owned Enterprise
Champasack Province
Lao PDR

ATTACHMENT

1. Objective of the Project

The objective of the Project is to improve the water supply services in urban area of Pakse district, Champasack Province in order to supply safe and sufficient water for the residents.

2. Project site

The Project site is as shown in Annex-1.

3. Responsible and Implementing Agency

(1) The Responsible Agency is Department of Housing and Urban Planning, Ministry of Public Works and Transport.

(2) The Implementing Agency is Water Supply State-owned Enterprise Champasack Province (hereinafter referred to as "PNP Champasack") under supervision of Department of Public Works and Transport of Champasack Province. The organization chart of the implementing agency is shown in Annex-2.

4. Items requested by the Government of Lao PDR

After discussions with the Team, the items described in Annex-3 were finally requested by Lao side. JICA will assess the appropriateness of the request and will report the findings to the Government of Japan.

5. Japan's Grant Aid Scheme

Lao side understood the Japan's Grant Aid scheme explained by the Team, as described in Annex-4 and Annex-5.

6. Schedule of the Study

The consultants will proceed to further studies in Lao PDR until Nov 14, 2008. The Team will proceed to further studies in Japan.

As a result of discussions, the Team expressed the idea that further study(s) in Pakse is required. The Team conveys this issue to JICA headquarters for further consideration and will have consultation with Ministry of Foreign Affairs.

7. JICA Guidelines for Environmental and Social Considerations

The Team explained Lao side about the JICA Guidelines for Environmental and Social Considerations (hereinafter referred to as "ESC"). Lao side understood the contents of ESC, and that the Project should comply with ESC. In addition, Lao side assured to take necessary measures for environmental impact assessment of the Project and to obtain the formal approval according to the laws and regulations of Lao PDR.

8. Other relevant issues

(1) Current situation and future plan of water supply in Pakse urban area

Lao side identified the following problems:

(a)The current population is about 80,000 in urban area but the coverage of water supply (number of household with house connection among household in urban area) is approximately only 71.6%. Many areas are without water supply service, especially in eastern part of urban area, Champasack University area and some areas in the western part.

(b)There is low pressure in many zones down to 0.01kg/cm^2 in the distribution network.

(c)According to the socio-economic development plan of the provincial government there will be new residential area in Km4, Km7 and others.

(d)Water quality control is not sufficient due to inadequate capacity of laboratory at Km2 Water Treatment Plant.

(e)PNP Champasack has suffered from the failure of power supply by the Electricite du Laos causing frequent discontinuity of water supply.

(f)Some parts of the pipeline are very old causing high water leakage.;

In order to solve these problems, both sides agreed as follows:

(g) Increasing the water supply capacity, especially in east part of Pakse urban area,

(h) Necessity of installation and renewal of distribution pipes, especially in the west part of Pakse urban area.

(2) Operation and maintenance of the existing facilities in Km2 Water Treatment Plant

Both sides agreed that large-scale rehabilitation for existing facilities in Km2 Water Treatment Plant is not necessary. Existing facilities are operated and maintained without serious problems by the staff of PNP Champasack.

For further improvement of water supply service, Lao side requested to install flow meters for quantity control and to improve the capacity of the laboratory for quality control.

(3) Discharge of untreated wastewater at the upstream of existing intake

(a) It was observed that untreated wastewater is being discharged to Mekong River at about 500 meters upstream of the existing intake for the Km2 Water Treatment Plant and there is a risk to the safety of water consumed by people in Pakse.

(b) Lao side proposed to construct a new water intake at some 5km upstream, however the Team stated that it would not be a sustainable solution and therefore not preferable because of the following reasons.

a) Another discharge similar to this would emerge again in future at the upstream of the new intake; and

b) The relocation of the intake would cost very high

(c) The Team explained to the Lao side that unless this issue is solved satisfactorily by Lao side in accordance with the environmental laws and regulations of the country, any rehabilitation (excluding water quality analysis component) and expansion of Km2 Water Treatment Plant and water supply system related to the facility should not be implemented. Lao side understood these explanations.

(4) Possibility of Alternative Water Resource Usage

(a) There seems to be adequate groundwater resources available around the Champasack

University which is located in the eastern part of the urban area, currently without piped water supply system.

(b) It seems to be worth studying an option in which new deep wells will be constructed and water from the wells will be distributed after proper treatment and disinfection.

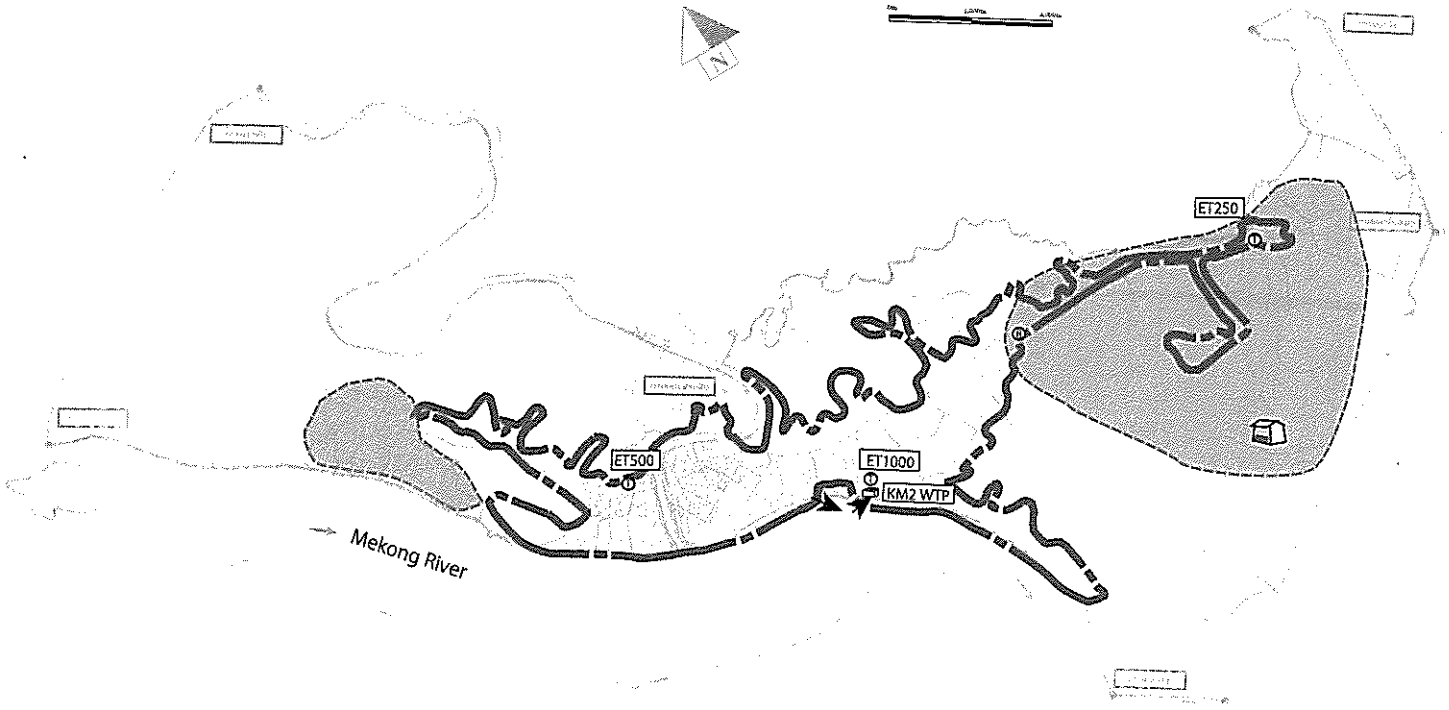
(c) This option would result in a smaller capital and operation and maintenance costs compared with the original proposal, which is to expand the existing Km2 Water Treatment Plant and distribute treated water from the plant by pumping. Furthermore, this option will have no adverse effects of the wastewater discharge stated in (3) above.

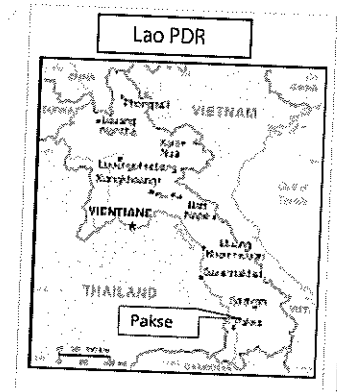
(5) Overlapping with other project

Lao side explained that the project would not be overlapped with any other project supported by other donor agencies, NGO, and Lao official organization(s).

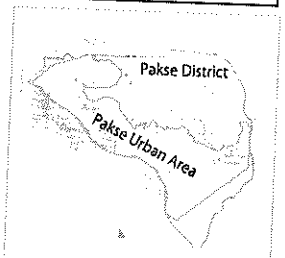
Annex-1 Project Site
Annex-2 The organization chart of the implementing agency
Annex-3 Items requested by the Lao side
Annex-4 Japan's Grant Aid Scheme
Annex-5 Undertakings to be taken by Each Government for the procurement

PAKSE URBAN WATER SUPPLY





Pakse District/Urban Area

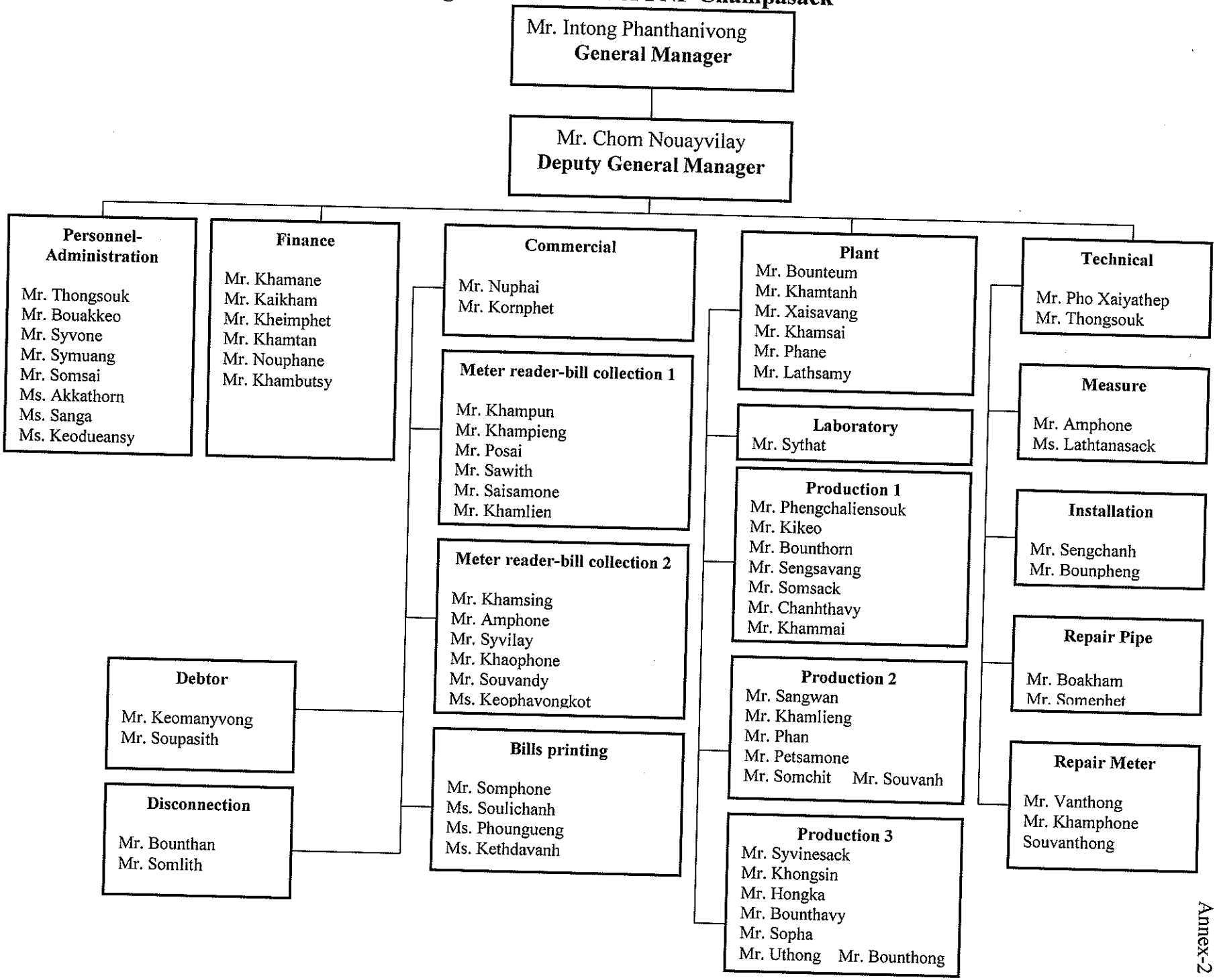


Legend:

- Boundary of Pakse Urban Area
- Present Service Area
- Area where water shortage is in a critical state
- Water Treatment Plant
- ET500 Elevated Tank with Storage
- Service Reservoir
- Booster Pump
- Champasack University
- Wastewater discharge / Intake site for WTP

PRELIMINARY STUDY ON THE PAKSE WATER SUPPLY DEVELOPMENT PROJECT, CHAMPASACK PROVINCE	
Project Site	Fig - 1

Organization chart of PNP Champasack



添1-6

Annex-2

Annex-3

Items Requested by the Lao Side

(1) Rehabilitation/replacement of mechanical and electrical equipment at the Km2 Water Treatment Plant
(2) Installation of flow meters both at the inlet and outlet of the Km2 Water Treatment Plant and at other key locations of the existing water distribution system
(3) Renovation of the existing laboratory at the Km2 Water Treatment Plant, including the provision of additional testing equipment, training of PNP Champasack's staffs and construction of a training/meeting room
(4) Provision of excavator(s) for piping works
(5) Strengthening of the existing water distribution system through replacement of existing pipes and installation of new pipes
(6) Construction of new deep wells in the eastern part of Pakse urban area
(7) Developing a new separate water supply system which will distribute water from the deep wells to areas in the eastern part of Pakse urban area

JAPAN'S GRANT AID SCHEME

The Grant Aid Scheme provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid procedures

Japan's Grant Aid Scheme is executed through the following procedures:

Application	(Request made by a recipient country)
Study	(Basic Design Study conducted by JICA)
Appraisal & Approval	(Appraisal by the Government of Japan and Approval by Cabinet)
Determination of Implementation	(The Notes exchanged between the Government of Japan and the recipient country)

Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA (Japan International Cooperation Agency) to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study), using (a) Japanese consulting firm(s).

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Scheme, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes (E/N) signed by the Government of Japan and the recipient country.

Finally, for the smooth implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

2. Basic Design Study

1) Contents of the Study

The aim of the Basic Design Study (hereinafter referred to as "the Study"), conducted by JICA on a requested project (hereinafter referred to as "the Project") is to provide a basic document necessary for the appraisal of the Project by the Government of Japan. The contents of the Study are as follows:

- Confirmation of the background, objectives, and benefits of the requested

project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.

- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, social and economic point of view.
- Confirmation of items agreed upon by both parties concerning the basic concept of the Project.
- Preparation of a Basic Design of the Project
- Estimation of cost of the Project

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid Project. The Basic Design of the Project is confirmed considering the guidelines of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures is necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consultant firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA.

The consulting firm(s) used for the Study is (are) recommended by JICA to the recipient country to also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency.

3. Japan's Grant Aid Scheme

1) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

2) "The period of the Grant Aid" means the one fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consultant firm(s) and (a) contractor(s) and final payment to them must be completed.

However in case of delays in delivery, installation or construction due to unforeseen factors such as natural disaster, the period of the Grant Aid can be

further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

3) Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country.

However the prime contractors, namely, consulting, contracting and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

4) Necessity of "Verification"

The Government of recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

5) Undertakings required to the Government of the Recipient Country

In the implementation of the Grant Aid project, the recipient country is required to undertake such necessary measures as the following:

① To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction,
② To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,
③ To secure buildings prior to the procurement in case the installation of the equipment,
④ To ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid.
⑤ To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified contracts.
⑥ To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

6) "Proper Use"

The recipient country is required to operate and maintain the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

7) "Re-export"

The products purchased under the Grant Aid should not be re-exported from the recipient country.

8) Banking Arrangements (B/A)

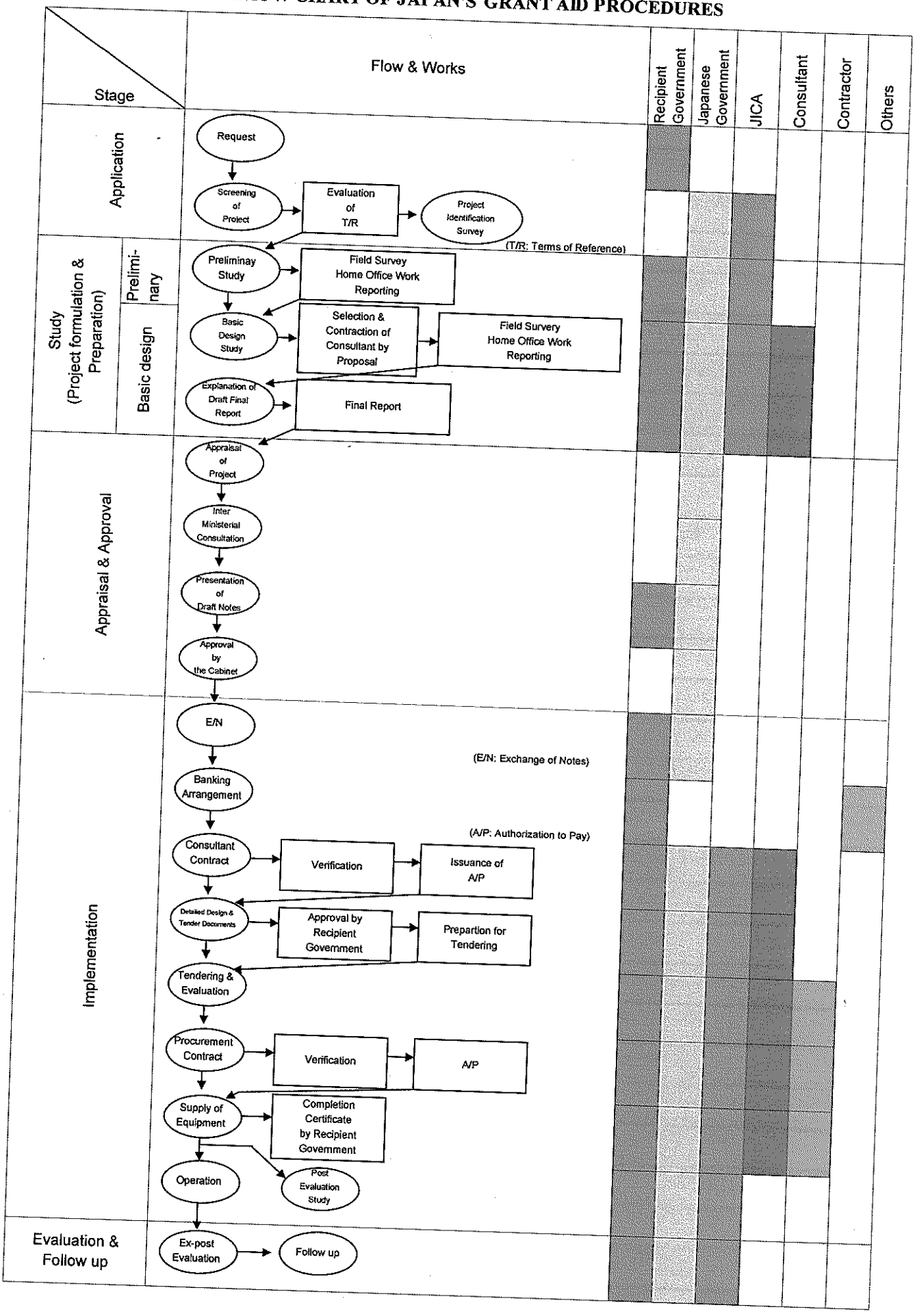
a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions to the Bank.

FLOW CHART OF JAPAN'S GRANT AID PROCEDURES



Major Undertakings to be taken by Each Government

Annex-5

NO	Items	To be covered by Grant Aid	To be covered by Recipient side
1	To secure land		●
2	To clear, level and reclaim the site when needed		●
3	To construct gates and fences in and around the site		●
4	To construct the parking lot	●	
5	To construct roads		
	1) Within the site	●	
	2) Outside the site		●
6	To construct the building	●	
7	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities		
	1)Electricity		
	a.The distributing line to the site		●
	b.The drop wiring and internal wiring within the site	●	
	c.The main circuit breaker and transformer	●	
	2)Water Supply		
	a.The city water distribution main to the site		●
	b.The supply system within the site (receiving and/or elevated tanks)	●	
	3)Drainage		
	a.The city drainage main (for storm, sewer and others) to the site		●
	b.The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	●	
	4)Gas Supply		
	a.The city gas main to the site		●
	b.The gas supply system within the site	●	
	5)Telephone System		
	a.The telephone trunk line to the main distribution frame / panel (MDF) of the building		●
	b.The MDF and the extension after the frame / panel	●	
	6)Furniture and Equipment		
	a.General furniture		●
	b.Project equipment	●	
8	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
9	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
	1) Marine(Air) transportation of the products from Japan to the recipient country	●	
	2) Tax exemption and customs clearance of the products at the entry to the recipient country		●

	3) Internal transportation from the port of disembarkation to the project site	(●)	(●)
10	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
11	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		●
12	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
13	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment		●

2.　詳細協議議事録

議事録　No.1

日　時：　2008年10月20日（月）08:30～09:00
場　所：　JICAラオス事務所
出席者：　高島宏明　　所長
　　武井耕一　　次長
　　関根創太　　所員
調査団：　沖浦団長、讃良専門員、服部団員、與田団員、宇佐美団員

協議内容

調査団が対処方針を説明し、JICA事務所側よりパクセ郡の現況、経済状況等関連情報が説明された。

議事録　No.2

日　時：　2008年10月20日（月）10:00～11:00
場　所：　フランス援助庁ラオス事務所　　afd
出席者：　Mr. Guy François　　Charge de mission
調査団：　沖浦団長、讃良専門員、服部団員、與田団員、宇佐美団員

協議内容

調査団が当該調査案件の概要を説明し、afdの活動実績、上水道案件支援に関わる課題について質問した。afdは総額4.5百万ユーロ、期間5年で現在ヴィエンチャン市の上水道整備を支援しており、その内訳は2.5百万ユーロが給水網整備、2百万ユーロが技術支援であることが説明された。技術支援は、水道料金徴収システムの構築、GIS、衛生施設調査、ヴィエンチャン市水道局の維持管理能力の向上を目的としている。2007年7月にチナイモ浄水場にトレーニングセンターを建設した。現状の課題は、kips800/m^3という水道料金の引き上げが行われないために、投入資金のうち85%を占める借款分の返済が行われないこと、運営維持管理の資金が不足すること、能力向上プログラムが円滑に進められないことなどが挙げられた。パクセ市の上水道はafdの管轄外であり、現況については不明との説明がされた。

議事録　No.3

日　時：　2008年10月20日（月）10:00～11:00
場　所：　Chimoi 浄水場
出席者：　JOCV　鵜飼氏
調査団：　沖浦団長、讃良専門員、服部団員、與田団員、宇佐美団員

協議内容

Chimoi浄水場での水質試験方法と関連の機材について説明をうけた。

議事録　No.4

日　時：　2008年10月20日（月）13:30～14:30
場　所:　公共事業省都市住宅局　Department of Housing & Urban Planning (DHUP)
出席者：　Mr. Khamthavy THAIPACHAN　Acting Director
Mr. Khanthone VORACHITH　Chief, Water Supply Division
Dr. Xaipxa LIENGSONE　Deputy Project Head, Coordinator, for Pakxe Water Supply Project
Mr.Anthony Arther　Project Accountant
調査団：　沖浦団長、讃良専門員、服部団員、與田団員、宇佐美団員

協議内容

調査団が調査の概要を説明し、要請内容について質問した。給水分野開発計画首相令での給水普及率80%の目標年度は、2020年であることが確認された。今回の要請の背景について、パクセ橋の完成でパクセ市の開発が急速に進み人口急増していること、及び、市の西側にチャンパサック大学を含む開発が進んでおり、将来的に既存浄水場の給水量（15,000m^3／day）が不足することが説明された。

議事録　No.5

日　時：　2008年10月20日（月）16:00～16:30
場　所：　在ラオス日本国大使館
出席者：　宮下正明　特命全権大使
中村建　一等書記官
JICAラオス事務所：　高島所長、関根所員
調査団：　沖浦団長、讃良専門員、服部団員、與田団員、宇佐美団員

協議内容

宮下大使より、パクセ市は近年経済活動が繁栄し、人口増加に伴う給水量の不足が予想され人口の将来予測に沿った調査がなされることに期待がされる旨説明された。

議事録　No.6

日　時：　2008年10月21日（火）10:00～11:30
場　所：　都市水道庁　Water Supply Authority (WASA), DHUP
出席者：　Noupheuak VIRABOUTH　Deputy Director General, Director of WASA)
Dr. Xaipxa LIENGSONE　Deputy Project Head, Coordinator, for Pakxe Water Supply Project
JICAラオス事務所：　関根所員
調査団：　沖浦団長、讃良専門員、服部団員、與田団員、宇佐美団員

協議内容

調査団より調査目的の概要を説明し、M/M のサイナーの確認、要請の内容についてその背景となる各種資料と情報の確認を行った。WASA 局長 Noupheuak 氏から基本情報の説明はされたが、要請の背景となる詳細資料についてはパクセ市での入手が必要との説明があった。また、現状のパクセ市浄水場取水地点の近くに下水排出点があることが初めて明らかにされた。

議事録　No.7

日　時：　2008 年 10 月 21 日（火）13:30～14:30
場　所：　ヴィエンチャン市水道局　　PNP NAKHONE LUANG
出席者：　Somlith SILAPHET　　Deputy General Manager – Technical
　　Mr. Chomsavanh MEKDARA　　Manager of Chinaimo Treatment Plant
調査団：　沖浦団長、讃良専門員、服部団員、與田団員、宇佐美団員

協議内容

ミッションから、今回の訪「ラ」国目的説明を行った。Somlith SILAPHET 次長から、ヴィエンチャン市の上水道整備の現況につき概略説明がされた。

議事録　No.8

日　時：　2008 年 10 月 21 日（火）15:00～16:00
場　所：　ヴィエンチャン市内 Kaolio 浄水場拡張現場
出席者：　浄水場拡張現場施工監理技術者
　　吉田康夫　　日本水道コンサルタント
調査団：　沖浦団長、讃良専門員、服部団員、與田団員、宇佐美団員

協議内容

Kaolio 浄水場の拡張現場を見学するとともに、拡張の内容について説明を受けた。

議事録　No.9

日　時：　2008 年 10 月 22 日（水）13:30～17:00
場　所：　チャンパサック県公共事業省（DPWT)会議室
出席者：　公共事業省都市住宅局都市水道庁:　Water Supply Authority (WASA), Department of Housing & Urban Planning (DHUP), Ministry of Public Works and Transport
　　Dr. Xaipxa LIENGSONE　　Deputy Project Head, Coordinator, for Pakxe Water Supply Project
　　チャンパサック県公共事業局:　　Department of Public Works and Transport (DPWT), Champasack Province
　　Mr. Me THONGMANY:　　Deputy Director General

	チャンパサック県水道公社：	Water Supply State-Owned Enterprise, Champasack Province (PNP Champasack)
	Mr. Intong PHANTHANIVONG：	General Manager
	Mr. Khem PHET：	Chief, Urban Planning Division
	Mr. Bounxa HOLANDUPHAB：	Deputy Chief, Urban Planning Division
	JICA ラオス事務所：	Mr. Kayasith

調査団： 沖浦団長、讃良専門員、服部団員、與田団員、宇佐美団員

協議内容

ミッション側からの質問に対し、「ラ」国側より、プロジェクトの要請背景と現状問題が以下説明された。

1) 現状の上水設備、給配水管網の問題点について
   ① 現在、パクセ市街部には 60 村あり、そのうち 43 村が水道公社からの給水を受けている。しかし、これらの村落でも乾期には給水が困難となる個所もある。
   ② 2008 年 3 月には水道料金の改定について州政府承認が得られた。
   ③ 給水管網は、ADB とノルウエーの資金によりリハビリが行われた。
   ④ KM8 の高架タンクからは、kM4 と kM8 間の家に給水が行われているが、新しい住宅には十分行き届かない。各家は、井戸を掘って生活用水を補っている。
2) 新マーケットからの汚水流出と廃水問題について
   ① 廃水処理用の酸化池は現在の新マーケット（ダオファーン市場）に建設予定であった。
   ② 現在の取水源近くの廃水問題に鑑み、チャンパサック県水道公社は、新取水源建設を空港近くの BANYO 村に考えており、これを本要請の中で検討してもらいたい。
   ③ 原水、浄水の水質分析は 3 カ月ごとに保健省で実施されている。

議事録　No.10

日　時： 2008 年 10 月 23 日（木）8:30～13:00　15:00～17:00
場　所： パクセ市 PNP 浄水場会議室

出席者：	チャンパサック県公共事業局:	Department of Public Works and Transport (DPWT), Champasack Province
	Mr. Me THONGMANY:	Deputy Director General
	チャンパサック県水道公社：	Water Supply State-Owned Enterprise, Champasack Province (PNP Champasack)
	Mr. Intong PHANTHANIVONG：	General Manager
	Mr. Chom NOUAYVILAY:	Deputy Director
	Mr. Khem PHET：	Chief, Urban Planning Division
	Mr. Bounxa HOLANDUPHAB：	Deputy Chief, Urban Planning Division
	チャンパサック県公共事業運輸省都市開発計画局：	Urban Development Administration Authority, , MPWT Champasack Province
	Mr. Bounnath SOUMPHOLPHAKDY	Deputy Director
	Nr. Bounpeng PHOTHILATH	Director of Technical Design Section
	JICA ラオス事務所：	関根所員、Mr. Kayasith

調査団： 沖浦団長、讃良専門員、服部団員、與田団員、宇佐美団員

協議内容

取水施設、浄水場施設を調査後、昨日に続きミッションより以下質問および説明を行った。
1) 廃水（排水処理）問題がラオス側で解決される必要があることの指摘。
2) パクセ郡都市部と PNP チャンパサックの給水区域の明確化。
3) ミッションとして現状考えられる代替案（地下水を水源とする）の説明。
4) 村落部という範囲と各村落の人口（家族数)。
5) 日本の無償資金協力システムの説明
6) 環境社会配慮ガイドラインの説明

議事録 No.11

日 時： 2008 年 10 月 24 日（木）8:30～13:00 15:00～17:00
場 所： パクセ市 PNP 浄水場会議室
出席者： 公共事業省都市住宅局都市水道庁： Water Supply Authority (WASA), Department of Housing & Urban Planning (DHUP), Ministry of Public Works and Transport

Noupheuak VIRABOUTH	Deputy Director General, Director of WASA
Dr. Xaipxa LIENGSONE	Deputy Project Head, Coordinator, for Pakxe Water Supply Project
チャンパサック県公共事業局:	Department of Public Works and Transport (DPWT), Champasack Province
Mr. Me THONGMANY:	Deputy Director General
チャンパサック県水道公社：	Water Supply State-Owned Enterprise, Champasack Province (PNP Champasack)
Mr. Intong PHANTHANIVONG：	General Manager
Mr. Chom NOUAYVILAY:	Deputy Director
Mr. Khem PHET：	Chief, Urban Planning Division
Mr. Bounxa HOLANDUPHAB：	Deputy Chief, Urban Planning Division
チャンパサック県公共事業運輸省都市開発計画局：	Urban Development Administration Authority, , MPWT Champasack Province
Mr. Bounnath SOUMPHOLPHAKDY	Deputy Director
Nr. Bounpeng PHOTHILATH	Director of Technical Design Section
JICA ラオス事務所：	関根所員、Mr. Kayasith

調査団： 沖浦団長、讃良専門員、服部団員、與田団員、宇佐美団員

協議内容

昨日までの JICA ミッション調査の結果を踏まえたミニッツの内容説明が以下行われた。
1) 現状の取水口に近いところで排水が行われている以上、その排水が原水に影響を及ぼしていることが想定され、その施設の修復と拡張の支援は現状ではできない。

2) この排水処理問題は「ラ」国により解決されなければならないことをミニッツにのせる。
3) その他、ミニッツの文言修正。

議事録　No.12

日　時：　2008年10月25日（土）9:30～11:00
場　所：　チャンパサック県公共事業省（DPWT)会議室
出席者：　公共事業省都市住宅局都市水道庁：Water Supply Authority (WASA), Department of Housing & Urban Planning (DHUP), Ministry of Public Works and Transport

Noupheuak VIRABOUTH	Deputy Director General, Director of WASA
Dr. Xaipxa LIENGSONE	Deputy Project Head, Coordinator, for Pakxe Water Supply Project
チャンパサック県公共事業局:	Department of Public Works and Transport (DPWT), Champasack Province
Mr. Me THONGMANY:	Deputy Director General
チャンパサック県水道公社：	Water Supply State-Owned Enterprise, Champasack Province (PNP Champasack)
Mr. Intong PHANTHANIVONG：	General Manager
Mr. Chom NOUAYVILAY:	Deputy Director
Mr. Khem PHET：	Chief, Urban Planning Division
Mr. Bounxa HOLANDUPHAB：	Deputy Chief, Urban Planning Division
チャンパサック県公共事業運輸省都市開発計画局：	Urban Development Administration Authority, , MPWT Champasack Province
Mr. Bounnath SOUMPHOLPHAKDY	Deputy Director
Nr. Bounpeng PHOTHILATH	Director of Technical Design Section
JICAラオス事務所：	関根所員、Mr. Kayasith

調査団：　沖浦団長、讃良専門員、服部団員、與田団員、宇佐美団員

協議内容

ミニッツ署名。

議事録　No.13

日　時：　2008年10月25日（土）14:00～17:00
場　所：　パクセ市内給水状況調査
出席者：　公共事業省都市住宅局都市水道庁：Water Supply Authority (WASA), Department of Housing & Urban Planning (DHUP), Ministry of Public Works and Transport

Noupheuak VIRABOUTH	Deputy Director General, Director of WASA)

	Dr. Xaipxa LIENGSONE	Deputy Project Head, Coordinator, for Pakxe Water Supply Project
	チャンパサック県公共事業局:	Department of Public Works and Transport (DPWT), Champasack Province
	Mr. Me THONGMANY:	Deputy Director General
	チャンパサック県水道公社：	Water Supply State-Owned Enterprise, Champasack Province (PNP Champasack)
	Mr. Intong PHANTHANIVONG：	General Manager
	Mr. Khem PHET：	Chief, Urban Planning Division
	Mr. Bounxa HOLANDUPHAB：	Deputy Chief, Urban Planning Division
調査団：	沖浦団長、讃良専門員、服部団員、與田団員、宇佐美団員	

協議内容

パクセ市内東西の給水網及び今後の給水拡張区域を踏査した。

議事録 No.14

日 時： 2008年10月26日（日）9:00～14:00
場 所： ラオス／タイ国境物流調査、
調査団： 沖浦団長、讃良専門員、服部団員、與田団員、宇佐美団員

内容

パクセ橋建設による物流の状況を国境にて視察。

議事録 No.15

日 時： 2008年10月27日（月）14:00～16:00
場 所： アジア開発銀行（ADB）

出席者：	Ms. Nopakane BOUAPHIM	Project Implementing Officer (Infrastructure)
	Mr. Bouahome PHOMMALAD	Assistant Project Analyst (Urban Water Supply/ Water Supply/Health Sector)
	JICAラオス事務所：	関根所員、Mr. Kayasith
調査団：	沖浦団長、讃良専門員、服部団員、與田団員、宇佐美団員	

協議内容

ミッションから、今回の訪「ラ」国目的説明を行った。2003年に完成されたADBのPakxe市浄水場拡張プロジェクト時に廃水の問題がどのように考えられていたかの質問をしたところ、当時は排水による汚染の可能性は想定していなかったとの回答がされた。廃水処理の問題は、ヴィエンチャンでも解決されておらず「ラ」国が今後取り組まなければならない問題として考えているが、ADBは都市部の開発には重点は置いていないことが説明された。ADBの主要開発セクターは村落開発、道路網、一部排水、ゴミ、治水対策である。

議事録　No.16

日　時：　2008年10月28日（火）15:00～16:00
場　所：　在ラオス日本国大使館
出席者：　宮下正明　　特命全権大使
　　中村建　　一等書記官
　　JICAラオス事務所：　　関根所員
調査団：　沖浦団長、讃良専門員、服部団員、與田団員、宇佐美団員

協議内容

ミッションより調査結果とミニッツの内容につき説明を行うとともに、廃水の影響問題、代替案（地下水等）、現状パクセ市では緊急を要する水の問題が少ないと考えられること、酸化池等調査結果を説明した。

議事録　No.17

日　時：　2008年10月28日（火）16:00～17:00
場　所：　JICAラオス事務所
出席者：　高島宏明　　所長
　　武井耕一　　次長
　　関根創太　　所員
調査団：　沖浦団長、讃良専門員、服部団員、與田団員、宇佐美団員

協議内容

団長所感及び調査結果の現況を説明し、今後の方針は現状未定であるが、引き続き残る2名のコンサルタント団員の調査結果を踏まえ、外務省、JICA本部と協議が必要の旨説明をした。

議事録　No.18

日　時：　2008年10月29日（水）10:30～11:15
場　所：　パクセ市PNP浄水場会議室
出席者：　チャンパサック県水道公社：　　Water Supply State-Owned Enterprise, Champasack Province (PNP Champasack)
　　Mr. Khem PHET：　　Chief, Urban Planning Division
　　Mr. Bounxa HOLANDUPHAB：　　Deputy Chief, Urban Planning Division
調査団：　與田団員、宇佐美団員

協議内容

今後の調査工程、主要面談先、調査内容を説明し、合わせ質問状への回答状況を調べた。

議事録　No.19

日　時：　2008年10月29日（水）11:30～12:30
場　所：　ラオス国、チャンパサック県支部
出席者：　チャンパサック県気象水文観測庁：Methodology & Hydrology Provincial Service, Champasack Province
Mr. Sengchanh SONDALA　Director
チャンパサック県水道公社：　Water Supply State-Owned Enterprise, Champasack Province (PNP Champasack)
Mr. Khem PHET：　Chief, Urban Planning Division
Mr. Bounxa HOLANDUPHAB：　Deputy Chief, Urban Planning Division
調査団：　與田団員、宇佐美団員

協議内容

同気象観測庁に水文地質データあるいは水文地質情報の有無を確認したところ、同庁にはないことが判明した。ただし、メコン流域委員会（MRC）作成のメコン流域分水界地図（CATCHMENT IN WATERSHED CLASSIFICATIN Map）があることがわかった。

議事録　No.20

日　時：　2008年10月29日（水）14:15～15:30
場　所：　チャンパサック大学総務部
出席者：　Mr. CHANTHAHOME：　Head of Administration Office
チャンパサック県水道公社：　Water Supply State-Owned Enterprise, Champasack Province (PNP Champasack)
Mr. Khem PHET：　Chief, Urban Planning Division
Mr. Bounxa HOLANDUPHAB：　Deputy Chief, Urban Planning Division
調査団：　與田団員、宇佐美団員

協議内容

チャンパサック大学は、今後 1,900ha の敷地内に建設される総合大学であること、2000m^3 の浄水施設が必要であることが説明された。現在学校敷地内には、保健省により掘削された約 40m 深度の井戸5本がある。

議事録　No.21

日　時：　2008年10月30日（木）9:15～10:00
場　所：　保健省チャンパサック県保健局　Health Department of Champasack Province, Ministry of Health
出席者：　Mr. Kaysone THONGSAVNH：　Chief of Environment Health and Water Supply
チャンパサック県水道公社：　Water Supply State-Owned Enterprise,

Champasack Province (PNP Champasack)
Mr. Khem PHET : Chief, Urban Planning Division
Mr. Bounxa HOLANDUPHAB : Deputy Chief, Urban Planning Division

調査団： 與田団員、宇佐美団員

協議内容

チャンパサック県保健局は、2003 年日本政府無償資金協力により調達されたトラック搭載型井戸掘削機を保有し、年間 60 本程度の井戸を地方村落を中心に掘削しているとのことである（訪問当日は、掘削機は駐車場に置いてあり稼動していなかった)。水質検査も同保健局で行っており、過去掘削されたパクセ市周辺井戸の資料（水理地質柱状図及び水質分析データ）を求めたところ、古い資料なので探すとの回答であった。

議事録 No.22

日 時： 2008 年 10 月 31 日（金）9:00～9:30
場 所： 保健省チャンパサック県保健局 Health Department of Champasack Province, Ministry of Health
出席者： チャンパサック県水道公社： Water Supply State-Owned Enterprise, Champasack Province (PNP Champasack)
Mr. Khem PHET : Chief, Urban Planning Division
Mr. Bounxa HOLANDUPHAB : Deputy Chief, Urban Planning Division
調査団： 與田団員、宇佐美団員

協議内容

水理地質柱状図及び水質分析データの入手を行った。

議事録 No.23（調査記録）

日 時： 2008 年 10 月 31 日（金）10:00～12:30
場 所： パクセ市郊外東の水利用状況調査
調査団： 與田団員、宇佐美団員

調査内容

東部村落 5 世帯の水利用状況調査。

議事録 No.24（調査記録）

日 時： 2008 年 10 月 31 日（金）14:00～16:30
場 所： パクセ市郊外西部の水利用状況調査
調査者： チャンパサック県水道公社： Water Supply State-Owned Enterprise, Champasack

Province (PNP Champasack)
Mr. Khem PHET : Chief, Urban Planning Division
Mr. Bounxa HOLANDUPHAB : Deputy Chief, Urban Planning Division
調査団： 與田団員

調査内容

西部村落 3 世帯の水利用状況調査。

議事録 No.25（調査記録）

日　時： 2008 年 11 月 1 日（土）9:00～16:30
場　所： パクセ市郊外東部の水利用状況調査
調査者： 與田団員

調査内容

東西村落部 3 世帯の水利用状況調査。

議事録 No.26

日　時： 2008 年 11 月 3 日（月）9:00～10:00
場　所： チャンパサック県地質調査所 Geological Survey Unit, Champasack Province
出席者： Mr. Khoune PHEDSENGSY Director
チャンパサック県水道公社： Water Supply State-Owned Enterprise, Champasack Province (PNP Champasack)
Mr. Khem PHET : Chief, Urban Planning Division
Mr. Bounxa HOLANDUPHAB : Deputy Chief, Urban Planning Division
調査団： 與田団員、宇佐美団員

調査内容

パクセ市周辺の水文地質情報の有無を確認したところ、1995 年に実施された油田調査資料がありその資料を貸与させてもらった。更に、Beer Lao 工場が 200m の井戸を工業用水として掘削していることの情報を得た。掘削業者、井戸情報は不明である。

議事録 No.27（調査記録）

日　時： 2008 年 11 月 3 日（月）10:00～11:00
場　所： 保健省チャンパサック県保健局 Health Department of Champasack Province, Ministry of Health
出席者： Mr. Kaysone THONGSAVNH : Chief of Environment Health and Water Supply
チャンパサック県水道公社： Water Supply State-Owned Enterprise, Champasack

		Province (PNP Champasack)
	Mr. Khem PHET：	Chief, Urban Planning Division
	Mr. Bounxa HOLANDUPHAB：	Deputy Chief, Urban Planning Division

調査団： 與田団員、宇佐美団員

調査内容

保健局の水質分析室と機器の調査。

議事録 No.28

日　時： 2008年11月3日（月）14:00～15:00

場　所： チャンパサック県公共事業

	運輸省都市開発計画局：	Urban Development Administration Authority (UDAA), MPWT, Champasack Province
出席者	Mr. Boun Suane KEOSAVANG	Deputy Vice President
	Mr. Bounnak XOUMPHONPHAKDY	Deputy Vice President
	Nr. Bounpeng PHOTHILATH	Director of Technical Design Section
	公共事業省都市住宅局都市水道庁：	Water Supply Authority (WASA), Department of Housing & Urban Planning (DHUP), Ministry of Public Works and Transport
	Dr. Xaipaxa LIENGSONE	Deputy Project Head, Coordinator, for Pakxe Water Supply Project
	チャンパサック県水道公社：	Water Supply State-Owned Enterprise, Champasack Province (PNP Champasack)
	Mr. Khem PHET：	Chief, Urban Planning Division
	Mr. Bounxa HOLANDUPHAB：	Deputy Chief, Urban Planning Division

調査団： 宇佐美団員

協議内容

UDAAの組織と役割について質疑した。PNPの水道拡張計画は、UDAAが土地利用計画を行っているためUDAAとの協調が必要との回答。排水処理については、UDAAのみならずMPWTや水資源環境庁も絡む問題であり、しかもマスタープラン作りから必要となる。現状は、各家庭で汚物処理ピットをもっているが生活雑廃水は未処理である。パクセ市内に工業団地の建設計画はない。

議事録 No.29

日　時： 2008年11月4日（火）14:00～15:00

場　所： チャンパサック県水資源環境庁： Water Resources and Environment Authority, Champasack Province

出席者	Mr. Bounkham PHOTHISANE	Chief of Water Resource and Environment
	Mr. Aloon PHENGMANY	Deputy of Environment Section

公共事業省都市住宅局都市水道庁：Water Supply Authority (WASA), Department of Housing & Urban Planning (DHUP), Ministry of Public Works and Transport
Dr. Xaipaxa LIENGSONE　Deputy Project Head, Coordinator, for Pakxe Water Supply Project
チャンパサック県水道公社：　Water Supply State-Owned Enterprise, Champasack Province (PNP Champasack)
Mr. Khem PHET：　Chief, Urban Planning Division
Mr. Bounxa HOLANDUPHAB：　Deputy Chief, Urban Planning Division

調査団：　宇佐美団員

協議内容

JICA 環境社会配慮ガイドラインの説明を行うとともに、「ラ」国での IEE と EIA の手順につき質疑した。IEE の段階では郡段階におけるスクリーニング／スコーピングが実施され、その内容は郡レベルの関係部門の協議にかけられる。EIA の段階では県レベルとなり、県の閣僚会議を通らなければならない。また、事業の規模によっては中央政府レベルの承認を得ることが必要となる。

議事録 No. 30

日　時：　2008 年 11 月 5 日（水）9:30～11:00
場　所：　チャンパサック県計画投資局：　Department of Planning and Investment, Champasack Province

出席者
Mr. Khampenh KEIOKHUNNMUONG　Vice Deputy of Planning and Investment
Ms. Nalee　Deputy Chief of International Corporation
公共事業省都市住宅局都市水道庁：Water Supply Authority (WASA), Department of Housing & Urban Planning (DHUP), Ministry of Public Works and Transport
Dr. Xaipaxa LIENGSONE　Deputy Project Head, Coordinator, for Pakxe Water Supply Project
チャンパサック県水道公社：　Water Supply State-Owned Enterprise, Champasack Province (PNP Champasack)
Mr. Khem PHET：　Chief, Urban Planning Division
Mr. Bounxa HOLANDUPHAB：　Deputy Chief, Urban Planning Division

調査団：　宇佐美団員

協議内容

1) DPI チャンパサックは、Ministry of Planning のチャンパサック州出先機関として、チャンパサック州のあらゆる公共投資事業を監視する機関であり、公共事業関係当局が実施する事業は DPI の承認を経て Department of Finance から予算措置が取られる。
また、事業の環境社会配慮面・投資事業の進展度（計画、実施、運用のすべての段階）を監視し査定する機関でもあり、DPI のレポートは州知事とヴィエンチャンの本省に提出される。
2) DPI は 4 年ほど前から、チャンパサック州の４つの開発計画を日本に要請する検討を行っており、最終的な検討結果を経て出されてきたのが Pakxe 市の発展と人口増加を鑑みた当該プロジ

ェクトであり、当該要請はDPIチャンパサックの国際協力局を経由して日本へ出された。

3) DPIは、取水地近隣の汚水排水口の問題も知っており（当ミッションの指摘により知ることとなったのかは不明）、代替取水地として対岸のPonton取水地からパクセ橋を通し取水する計画の検討を提案してきた。今回は事業支援のための日本側による予備調査段階であること、いくつかの代案が日本で検討されること、この検討結果を踏まえ次調査が行われる可能性が高いことを伝えた。

4) 以上から、DPIは本件に深くかかわっており、また公共事業の監視機関としてパクセ市都市開発計画はすべてここで承認（あるいは立案）されることが判明した。東側のチャンパサック大学を中心としたPakxe市学園都市化計画（チャンパサック大学だけでなく合計4つの大学が1400haの用地に建設される）もすでに「ラ」国政府の承認を経ているということが明らかにされた。

5) DPIの組織、学園都市化計画の「ラ」国政府承認文書、パクセ市都市開発計画等、本件に係り必要と考えられる全ての文書・情報の提出を求めた。

議事録No.31

日　時：2008年11月6日（木）14:00～15:00
場　所：ヴィエンチャン市チナイモ浄水場水質試験室：
出席者　Ms KEOMANYVONG Khonsavanh　Head of Laboratory for Water Quality
　　鵜飼智弘　JOCV、水質試験室管理
　　公共事業省都市住宅局都市水道庁：Water Supply Authority (WASA), Department of Housing & Urban Planning (DHUP), Ministry of Public Works and Transport
　　Dr. Xaipaxa LIENGSONE　Deputy Project Head, Coordinator, for Pakxe Water Supply Project
調査団：宇佐美団員

協議内容

パクセ市内で採水した6サンプルの分析依頼をするとともに、分析必要項目の打ち合わせを行った。

議事録No.32

日　時：2008年11月6日（木）13:00～16:00
場　所：給水区域内水利用状況調査（東部）：
出席者　チャンパサック県水道公社：　Water Supply State-Owned Enterprise, Champasack Province (PNP Champasack)
　　Mr. Khem PHET：　Chief, Urban Planning Division
調査団：與田団員

協議内容

給水区域内の水利用状況について3件の聞き取り調査を実施した。

議事録 No.33

日　時：　2008 年 11 月 7 日（金）10:00～11:00
場　所：　チャンパサック病院 2 階：　Champsak Hospital
出席者 Dr.Keo SOSOUPHANH　Director
Mr. Khem PHET：　Chief, Urban Planning Division
Mr. Bounxa HOLANDUPHAB：　Deputy Chief, Urban Planning Division
調査団：　與田団員

協議内容

チャンパサック州の衛生状況および病気発症数について情報収集、とくに風土病、水系伝染病についての聞き取り調査を実施した。

議事録 No.34

日　時：　2008 年 11 月 7 日（金）14:00～15:00
場　所：　北部・中部給水衛生計画事務所：　Ministry of Public Works and Transport (MPWT), Department of Housing and Urban Planning (DHUP), Northern and Central Region Water Supply and Sanitation Sector Project (NCRWSSP)
出席者　Mr. Phamma VEORAVANH　Project Director
公共事業省都市住宅局都市水道庁：Water Supply Authority (WASA), Department of Housing & Urban Planning (DHUP), Ministry of Public Works and Transport
Dr. Xaipaxa LIENGSONE　Deputy Project Head, Coordinator, for Pakxe Water Supply Project
調査団：　宇佐美団員

協議内容

NCRWSSP のプロジェクト内容と地質資料について問い合わせた。「ラ」国水文地質情報は極めて少なく、NCRWSSP でも手に入れることができないとの回答であり、逆に情報の共有を求められた。

議事録 No.35

日　時：　2008 年 11 月 8 日（土）10:30～11:30
場　所：　パクセゴミ処理場：　Garbage Control Department, Urban Development Administration Authority, DPWT,
出席者　Mr. Vila KHANE　Manager
調査団：　與田団員

協議内容

ゴミ処理場はパクセ市北西部 17km の地点に立地。処理場の現況と問題点、とくに分別方法、処理方法、廃水処理状況、今後の拡張計画について問い合わせた。4 区画に分かれほとんどが満杯となっており、拡張を予定しているとのこと。用地は 23ha、市が保有するごみ収集車６台が稼働するが、病院からの注射針等が一般ごみと一緒に廃棄されており、分別作業は実施されていない。処理場からの浸出水が小川を通じてメコン川へ流入する。

議事録 No.36

日　時：　2008 年 11 月 10 日（月）10:45～11:30

場　所：	公共事業省都市計画局１階：	Department of Housing & Urban Planning (DHUP), Ministry of Public Works and Transport
出席者	Mr. Noupheuak VIRABOUTH	Deputy Director General
	公共事業省都市住宅局：	Department of Housing & Urban Planning (DHUP), Ministry of Public Works and Transport
	Dr. Xaipxa LIENGSONE	Deputy Project Head, Coordinator, for Pakxe Water Supply Project

調査団：　與田団員、宇佐美団員

協議内容

調査団による調査結果の報告。水位センサー故障に起因する浄水量減少、流量計故障、西部の個人経営による水道システムの問題等を報告すると共に、将来の地下水開発の可能性、既存施設の有効利用についても意見交換。

議事録 No.37

日　時：　2008 年 11 月 10 日（月）14:30～15:30

場　所：	保健省国立環境衛生水供給院：	National Center for Environmental Health and Water Supply (NEW), Ministry of Health
出席者	Dr. Nouanta MANIPHOUSAY	Director
	公共事業省都市住宅局都市水道庁：	Water Supply Authority (WASA), Department of Housing & Urban Planning (DHUP), Ministry of Public Works and Transport
	Dr. Xaipxa LIENGSONE	Deputy Project Head, Coordinator, for Pakxe Water Supply Project

調査団：　宇佐美団員

協議内容

パクセ郡の水文地質情報及び NEW の組織について問い合わせるとともに、「ラ」国における民間井戸掘削業者の能力、活動状況の情報提供を求めた。NEW では業者の登録制度は行っておらず、民間業者についての詳細な情報は得られなかった。

議事録 No. 38

日　時：　2008 年 11 月 11 日（火）15:00～16:00
場　所：　アジア開発銀行（ADB）
出席者：　Ms. Nopakane BOUAPHIM　Project Implementing Officer (Infrastructure)
Mr. Bouahome PHOMMALAD　Assistant Project Analyst (Urban Water Supply/ Water Supply/Health Sector)
Dr. Xaipxa LIENGSONE　Deputy Project Head, Coordinator, for Pakxe Water Supply Project
調査団：　與田団員、宇佐美団員

協議内容

パクセ市 WTP の調査結果を概略説明。ADB 建設部分の送水ポンプ、送水・配水リレー、沈泥槽フートバルブが現状の最も重大な問題であり、ADB による改善（修復）の処置が行えないかとの提案をした。ADB 現地事務所としては対応ができないとして、次週ラオスを訪問する ADB 本部のミッションに話は通すとの回答であった。

議事録 No. 39

日　時：　2008 年 11 月 13 日（木）13:00～15:00
場　所：　バンコク井戸掘削業者：　Siam Tone Co., Ltd

出席者　浜岡　修一　社長
Jade JULAWONG　Expert-Director Hydrogeologist
Taweesak PATTARAMANON　Manager to Geotechnical and Water Well Section
調査団：　宇佐美団員

協議内容

パクセ市周辺の水文地質状況について質疑した。同社は 1995 年の JICA 開発調査で 270 本近くの井戸を掘削しているが、パクセ市周辺の水文地質の資料はない。ただし、1995 年の調査の状況から見て、同地域はバサルト（玄武岩層）の下部にある砂岩層及び風化破砕帯に有望な滞水層が期待でき、最低でも毎時 20m^3、最大で 150m^3 の揚水量が期待されるとの推察ができる、との推察が示された。水質的にも問題ないはずで、Beer LAO の井戸も本来は 150m^3 までの揚水が可能である井戸であるが、ポンプ能力が小さいために 20m^3 程度の揚水しかできていないとの情報が示された。

同社へは、地質探査、6 インチと 10 インチの井戸掘削、揚水試験、の見積りを依頼した。

3.　要請書

THE GOVERNMENT OF LAO PEOPLE'S DEMOCRATIC REPUBLIC

THE APPLICATION
FOR
THE PAKSE WATER SUPPLY DEVELOPMENT
PROJECT
IN CHAMPASACK PROVINCE

REVISED VERSION

JULY 2006

Department of Housing and Urban Planning

Ministry of Communication Transport Post and Construction

APPLICATION FORM FOR JAPAN'S GRANT AID GENERAL AND FISHERIES

1. Date of Entry : July 2006.

2. Applicant : The Government of Lao People's Democratic Republic

3. Project Title : The Pakse water supply development project in Champasack province, Lao PDR

4. Economic Sector : Infrastructure (Water Supply)

5. Project Type : 1. ~~Equipment supply~~
(2.) Facilities construction

6. Project Site : (Province / Country name) : Champasack / Lao PDR
(City / Town/ Village name) : Pakse District,
Km2, Ban Ponsavanh
(Attach a map indicating the site location to reach from the metropolis and a site map covering the intended project site area.)
Please refer to Appendix – 1

7. Project Cost : Japanese Yen 1,540,000,000.-

8. Desired Fiscal Year of Implementation:
Survey (Detail Design) : Fiscal year 2007
Implementation : Fiscal year 2008

9. Executing Agency : Department of Housing and Urban Planning (DHUP), Ministry of Communication, Transport, Post and Construction (MCTPC) via Water Supply Authority (WASA)

10. Implementing Agency : Department of Communication, Transportation, Post and Construction (DCTPC) of Champasack Province via State owned enterprise of Nam Pa Pa Chmpasack Province
Person in charge (Full name) : Mr. Intong **PHANTHANIVONG**
(Affiliation) : General Manager of Water Supply State owned enterprise of Champasack Province

Address : Ban Pakse,　Road 9
Pakse District, Champasack Province
Telephone No. : 856-31-21 22 40
Facsimile No. : 856-31-21 45 98

11. **Outlines of the implementing Agency** :

Describe in detail the position in the government, authorities, data on principal projects, annual budget, staff members, etc. and attach its organizational chart in a separate sheet.

1)　Position in the Government :

Champasack province as of others provincial authorities of Lao PDR that has responsibility to organize and execute guidelines of government planning.　Govern all business units in its province.　There are many divisions' trace on business units, therein-main division that responsible for Urban Housing, Road, Bridge and Public Services activities is DCTPC (Department of Communication, Transport, Post and Construction).　This DCTPC is responsible for tracing the companies which running its business in Public services activities field including Nam Pa Pa Champasack Province, it also has CTPC in each district (10 districts) (Please sees attached sheet of its organization chart in Appendix -2).

Staff member of DCTPC　of Champasack province as below :

Master	02
Post graduate	04
Diploma	33
Medium level	37
Experienced	03
Worker	12
Total	**91**

(Above figure of its staff members excluding the companies and the technical units are under it)

2) Nam Papa Champasack province

The implementing agency of the Project is the Nam Papa Champasack province, which is under the jurisdiction of the Department of Communications, Transport, Posts and Construction (DCTPC). Activity of Nam Papa is financed on a self-paying basis and has been successfully accomplishing its management role generating plus benefit. On the other hand, the Nam Pa Pa (s) leads the execution of the water supply projects of DCTPC implemented by the Provincial Nam Pa Pa and engages in the staff training of the employees of the each. The organization chart of Nam Papa Champasack Province is shown in Appendix-3.

Staff members:

The staff members of Nam Papa Pakse is totally 75 persons as classified below:

- *Number of Staff Members :*

Master	:	
Engineer	:	3
Assistant Engineer	:	
Medium level	:	25
Skilled Workers	:	35
Workers	:	12
Total	**:**	**75**

Annual budget of Nam Papa Pakse for the past three years and future prospects.

- *Annual Budget :*

Year	Annual Budget (KIP)	
	New Investment from 2002-2003	Current Asset
2002		2,388,647,000
2003	1,351,012,000	3,739,659,000

11. Background of the Request

General

The Lao People's Democratic Republic (Lao PDR) is a land locked country sharing its borders with China, Viet Nam, Thailand, Cambodia, and Myanmar with land area of 236,800km² holding a population of 5,609,997 in 2005 , its density 24 persons/Km². (refer to National Statistic Center Source).

Champasack province located in southern part of Lao PDR, it's a central of economic, agricultural, commercial, and industrial activities of areas. Situated along the bank of the Mekong River and Xedone River, the province is composed of ten (10) districts covering approximately 15,415 km², comprise of 924 villages or 104,857 households, its population 603,880 in 2005. (Refer to National Statistic Center Source)

In Champasack province, only some part of people of Pakse town could access to water supply service covering around 85.5% of town people in 2005, due to insufficient of water production and pipeline expansion cause many people in northward and southward of the town have suffered form a town wide water shortage. To deal with this, and also to meet with the United Nations' "Ten Year International Water Supply and Sanitation Program", the government of Lao PDR as of Nam Papa Pakse started two campaigns, "The Third Five Year National Development Project (1991-1995)" and "The Third Five Year Project by the Department of Public Health (1992 - 1996)" to improve the water distribution percentage in urban areas from 27 % to 80 %.

The population living in areas where distribution of potable water was possible was 77,097. And the population actually receiving water distribution was 58,423, which calculates to 85.5% distribution coverage in distributable area.

The water distribution capacity of the existing treatment facilities, Km2 Water Treatment Plant (WTP), is 15,000 m^3 / day. Already this facility is operating close to their maximum capability to meet the daily maximum requirement in the year 2005.

Taking in consideration the development of the residential districts in the northern area, expansion of water distribution areas to the northeast and northwest, and not forgetting the possibility of radial population growth, the expansion of water distribution capability is an urgent matter, especially for these northern areas but also for the existing areas as well.

Since the water works operation of Nam Papa Champasack Province has relied strongly on aid from other organizations, there has been a lack of emphasis to promote water work technical engineers. For Nam Papa Champasack Province be able to carry out their operation healthy, there is a definite need to promote engineers who are able to make correct decisions in many areas that are critical to create a water distribution plan, as well as a maintenance management program. For this task, there is an urgent need for training to help promote engineers.

Current situation of the sector

The present water supply system in the supply areas of Nam Papa Champasack Province is shown in Appendix -4.

<Existing Facilities>

(a) Km2 Water Treatment Plant

Km2 Water Treatment Plant has been constructed by the government of France in 1971 and initial produced in July 1973 with capacity 8,800 m^3 / day, in 1983 the intake pump has been replaced and capacity down 7,500 m^3/ day, in 1997 expansion of treatment plant has been conducted by ADB fund with capacity 15,000m^3 /day, in 2001 the Government of Norway had funded for pipeline expansion but still not to meet the demand of town people which increased year by year.

(b) Reservoirs

Location	Type	Capacity
Km2 Phonsavanh WTP	Elevated Tank	1,000 M^3
Km2 Phonsavanh WTP	Ground Reservoir	1,250 M^3
Ban Thahinh	Elevated Tank	500 M^3
Ban Km 8 (13S)	Elevated Tank	250 M^3
Ban Km 4	Ground Reservoir	300 M^3
TOTAL		3,300 M^3

(c) Transmission and Distribution Pipelines

Diameter	Nam Pa Pa Pakse								
(Mm)	Length (m)	Proportion	DIP	SP	UPVC	GSP	PE	PVC	PB
Ø 1100									
Ø 1000									
Ø 900									
Ø 800									
Ø 700									
Ø 600									
Ø 500			1,920						
Ø 450									
Ø 400			1,160						
Ø 350			200						
Ø 300			475						
Ø 250					3,722				
Ø 200					6,865				
Ø 150					620				
Ø 125					6,546				
Ø 100					5,763			644	
Ø 80					10,509		20,100,	6,000	
Ø 75					1,717				
Ø 65									
Ø 50							27,326	4,700	
Ø 40								350	
Total			3,755		35,742		47,426	11,694	

d) Booster Pump Station
Two Booster Pump Stations were installed at KM 2, KM 4 for the purpose of support the low-pressure areas.

Problems to be solved in the sector

Table, Appendix -7, is the estimate of water demand up to the year 2010 besed on policies and plans set by the government of Lao PDR and Champasack province, such as the New Residential Plan, New Industrial Plan, and plan for the new road to go north and south direction as well as expansion of commuting areas due to improvement of transporation means. (See Appendix -8 for long-term planning)

As mentioned before, the expansion of new facility and combined distribution capability of the existing WTP is 15,000 m^3/ day, meaning that the water demand will become greater than the present supply capability soon afterward.
According to the Census in 1995, population of Champasack province has been steadily growing at a rate of 2.6% in the past, which is a high ratio compared to the 2.3% population growth rate of the whole county. This is due to the concentration of the population in central of southern part as Champasack province, which is highly probable to keep on continuing.
Besides the above-mentioned, low pressure in the water supply system is also a prevalent problem in the existing facilities in Pakse. The customers of the north, northwest and especially of south, southwest (including Southern University of Lao in Km9 (13S) are located, have been suffering chronically from low water pressure in the distribution system that is resulting to water shortage in these areas. This is because the total length of the piping installed has become too long. This situation is foreseen to spread rapidly unless appropriate countermeasures are taken. These countermeasures should naturally take in consideration of the existing distribution facilities as well.
(Refer to JICA expert, Mr. Kawashima report July 2003, appendix -7)

Necessity and importance of improvement in the sector, which lead to the formulation of the project

As stipulated before, to keep water supply to people by 2001/capita/day, expansion of treatment plant and extension of distribution main pipeline are definitely required.

As water tariff in Pakse already reached quite high level, it is quite difficult to materialize those expansion works by credit, which needs reimbursement.

To materialize work under Japanese Grant Aid, Nam Pa Pa can maintain operation of water supply system in best condition.

12. Relation with the government's development and other factors

(1) Relation with the government's national development plan

Name of the plan : Sector Investment Plan for Water Supply Project, 1998 – 2020

Period : from 1998 to 2020

The position occupied by the request project / section in the above mention plan
: Small Town Communities, Provincial Capitals, Vientiane Prefecture
(please see appendix -5)

(2) Relation with the government's national program

In September 1999, the Prime Minister issued Decision No.37/PM on Management and Development of the water supply sector of Lao PDR.

According to this Decision, the government made a sector investment plan with its objective to provide 24-hour water supply service to 80% of the population in urban areas by year 2020. (SIP: Sector Investment Plan)
Other than this there is a long-term investment plan made by MCTPC to achieve the Prime Ministerial Decision. The investment priority is as follows.

1. Vientiane Municipality
2. Provincial Capitals (such as Pakse town of Champasack province)
3. 42 Small Town Communities with population of more than 4,000.
4. 30 Small Town Communities with population of more than 3,000.
5. 30 Small Town Communities with population of more than 2,000.

(3) Reason why Japan's Grant Aid is requested for this particular project

i) The water treatment system in Japan is highly developed among the developed countries and has technical know-how in this field.
If Japanese assistance is provided it would be very convenient for the executing agency, WASA since they have experienced the Japanese Grant Aid system in the past

ii) A thorough survey of Pakse town's present water distribution facilities and conditions has been conducted by JICA expert Mr. Kawashima, proposing of plans to cope with the forecast of water production capability. (Appendix -7)

13. Objectives (Itemize as concretely as possible)

(1) Objectives / Purpose of the Project

The proposed project aims to improve the following.

A) Increasing water supply to prevent water shortage in Pakse district, especially north, northwest, northeast, and areas.
B) Strengthening the reliability of water supply system.
C) To improve the environmental health through prevention of diseases and epidemics by safe piped water.
D) Promotion of water works engineers.

‘ (2) *Overall Goal / ~~Medium~~ Short and Long – Terms Objectives*

~~Medium~~ Short-term objectives:

- To prevent water shortage in the water distribution areas of Pakse town.
- To improve urban improvement and health condition of Pakse

Long term objectives:

- To develop and stabilize quality and quantity of potable water to the people.
- To develop Pakse becoming secondary town of Laos as of the government plan.
- Promotion of water works engineers

14. *Outline of the project and request (Itemize as concretely as possible)*

(1) *Project Description*

Project

Outlines of requested facilities (such as the name and address of the project site, site selecting criteria, supporting photographs, design drawings with dimensions and area, number of requested facilities, and desired materials to be used)

The project includes the construction of the following facilities. –

1. Expansion of Water treating capacity by 10,000 M3 / day.

Consist of :

- Upgrading of intake facility up to whole capacity 25,000 M3 / day
- Construction of treatment facility 10,000 M3 / day
- Construction of water reservoir 2,300 M3

2. Expansion transmission pipeline D : 400 MM, length : 10,000 M

(New pipeline to run south along main road of route 13)

Implementation Plan

The Project would be carried out according to the following implementation plan.

Fig.1 Tentative Implementation Plan of the facilities and piping work.

Month / Implementation	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
Basic design	■	■	■												
Detailed design			■	■	■	■									
Contract proceeding						■									
Construction WTPs							■	■	■	■	■	■	■	■	
Expansion of transmission pipeline												■	■	■	

(2) Methods to operate / manage and maintain the facilities or equipment.

Expected number of persons to be secured, together with their technical levels, and prospect to secure necessary budget.

- Method to operate, manage and maintain the facilities Operation, Management and maintenance of facility

- Expected number of persons to be secured and their technical level
  None
- *Financial sources for management and maintenance after completion of the Requested project*

  Financial sources for management and maintenance after completion of the project are to be fully borne by MCTPC.

(3) Breakdown of total amount of facility, equipment and supporting data

Item	Descriptions	Construction	M&E	Consulting Fee	Total (Yen)
1	Expansion of water treatment plant capacity by 10,000 M3/day including water reservoir 2,300 M3	600,000,000	500,000,000	110,000,000	1,210,000,000
2	Expansion transmission & pipeline D : 400 MM, lengh : 10,000 M	300,000,000		300,000,000	330,000,000
	Grand Total	1,540,000,000 JPY			

(4) Prospect of secure necessary budget

It is strongly requested that the project is executed under Japan's Grant Aid Scheme.

(5) Additional information

a. Existing facilities

No

(Yes) Photographs only
Location of the proposed project site is shown in Appendix -6.

Contents of the Project :
Conceptual plan of the short-term objective and long-term objective is shown in Appendix -7 and Appendix -8.

b. Project site preparation (including expropriation) :
Land :

- Already secured

Name of the landowner	: Lao Government
Area	: 6,000 M2 for treatment plant

- Not yet secured (N.A.)

Name of the landowner	:
Area	:

In this case, specify the prospect to secure it, procedures and time needed for expropriating it.

Current situations of the project site, such as leveling, drainage, availability of power, water supply, telephone, etc.

In this case, specify the prospect to secure it, procedures and time needed for expropriating it.

- Data on natural conditions

Concretely specify the names, years prepared and agencies published of such data

Water analysis Data	:	Yes (refer to appendix -9)
Topographical Data	:	None
Hydrological Data	:	Yes (refer to appendix -12)

- *Security situation*

Give concrete information related to each project site, if more than one is involved.

Security situation is very good.

Appraisal at level of utilization of the project

A (Good)

B (Passable)

C (Bad)

D (Not utilized)

15. Benefit and effects of the project

(1)Areas that will benefit form the project (Specify the total area. If possible):
The Pakse town has an area : 108,000 Km2 that will benefit from the project.

(2)Population that will benefit (Directly and indirectly) :

Directly : The served population of Pakse district in 2010 is 70,653 (Appendix -8)

Indirectly : It is commonly known that many people are flowing in to Pakse district which have not been officially registered yet. It is recognized that the average number of people in one family is 6 persons (figure from ADB), but recently it is said that this number nay actually be 10 persons due to concentration of population by people from the rural areas moving in to relative's houses in

Pakse district making it possible to estimate that the benefiting population will be close to double the officially recognized population.

(3)Expected social and economic effects (Itemize concretely) :

Current situation

The water distribution capability is already close to the MAX capacity of the existing facilities and is forecast that the water demand will be greater than production capability from the year of 2004, which is now. The existing facilities itself are becoming old making their operation capability lower than the original plan, it necessary to extend the facility as soon as possible.

Expected effect of the project

The following effects are expected :

- Prevent water shortage and low water pressure in the distribution areas
- Strengthen the capability to transmit potable water to wider areas of Pakse district
- Improvement of lifestyle standards in Pakse district
- Decreasing of water born diseases in Pakse district

16. Relation with technical cooperation, etc

Feasibility study :

The project sites have been visited and proposed its location

Already effected :

None

Technical cooperation:

Which of the following forms of assistance do you require ?

None

When the technical cooperation is underway.

None

17. Request to other donors for same project

None

18. *Aid by third countries or international organizations in the same or relate fields*

Name of donor (period)	Type	Amount US$'000	Outline (concretely)	Relationship with the present request
France 92-94	Loan	1,115	Vientiane Prefecture – Hadxaifong District Thadeua – new scheme	Increasing need for potable water
ADB 92-97	Loan	1,125	4 Southern Towns Water Supply Attapeu / Samakkhixay	Increasing need for potable water
ADB 92-97	Loan	6,521	4 Southern Towns Water Supply Champassak / Pakse	Increasing need for potable water
ADB 92-97	Loan	2,667	4 Southern Towns Water Supply Saravane / Saravane	Increasing need for potable water
ADB 92-97	Loan	666	4 Southern Towns Water Supply Sekong / Lamam	Increasing need for potable water
France 93-95	Loan	1,216	Vientiane Province – Thoulakhom District Ban keun – new scheme	Increasing need for potable water
ADB 93-97	Loan	9,263	Vientiane Prefecture Vientiane Town – rehab & upgrading	Increasing need for potable water
Japan 93-98	Grant	28,952	Vientiane Prefecture Vientiane Town – expansion	Increasing need for potable water
Japan 93-95	Grant	324	Vientiane Prefecture Thangone (Xaythany District)-new scheme	Increasing need for potable water
Germany 94-98	Loan	1,780	Luang Prabang Province Luang Prabang Town – Expansion	Increasing need for potable water
WB 94-96	Loan	1,377	Luang Namtha Province Namtha and Sing Districts – new scheme	Increasing need for potable water
GoL 95-97	Loan	1,028	Khammouane Province Mahaxay District – new scheme	Increasing need for potable water
EU 94-96	Loan	6,261	Khammouane Province Thakhek – new scheme	Increasing need for potable water
ADB 94-98	Loan	2,028	Northern Towns Water Supply Bokeo / Houayxay – new scheme	Increasing need for potable water
ADB 94-98	Loan	2,134	Nortern Towns Water Supply Borikhamxay/Paksane – new scheme	Increasing need for potable water
ADB 94-98	Loan	1,410	Northern Towns Water Supply Houaphanh/Sam Neua – new scheme	Increasing need for potable water

ADB 94-98	Loan	1,560	Northern Towns Water Supply Phongsaly / Phongsaly – new scheme	Increasing need for potable water
ADB 94-98	Loan	2,887	Northern Towns Water Supply Sayabour / Sayabouri – new scheme	Increasing need for potable water
ADB 94-98	Loan	1,431	Northern Towns Water Supply Vientiane Province/Phonhong – new scheme	Increasing need for potable water
ADB 94-98	Loan	3,389	Northern Towns Water Supply Xiengkhouang /Phonesavane–new scheme	Increasing need for potable water
France 95-96	Loan	866	Vientiane Province Vang Vieng Water Supply – new scheme	Increasing need for potable water
France 96-97	Loan	820	Saysomboun Special Region Saysomboun Water Supply – new scheme	Increasing need for potable water
France 02-04	Grant	6,000	Piping line expansion of Distribution Network Vientiane Capital City	Increasing need for potable water
Norway 00-01	Grant	4,000	Upgrading of Water Supply Pakse (Champasack)and Treatment Facilities in Lamam(Sekong)	Increasing need for potable water
Japan 00-03	Grant	4,000	Rehabilitation of water supply facilities in Savannakhet	Increasing need for potable water

19. *Other information with remark (whether or not privatization policy is effected. If yes ; indicate the relationship with the requested project)*

None

20. General Development plan

Title of Plan : Sector development plan for water supply sector project 1998 – 2020. (Appendix -5)

No	Province/Town	Date of completion	Investment (US$ million)	Target Population	Funding source
	Small town communities				
1	About 12 small towns water supply countrywide with 4,000 to 20,000 population	2002-2005	25	(Y 2010)130,000	ADB
2	About 30 small towns water supply countrywide with 4,000 to 10,000 population	2006-2010	40	(Y2015)270,000	NYI
3	About 30 small towns water supply countrywide with 3,000 to 6,000 population	2011-2015	30	(Y 2020)200,000	NYI
4	About 30 small towns water supply countrywide with 2,000 to 4,000 population	2016-2020	20	(Y2025)140,000	NYI
5	Khong water supply project Champasachack province	2001	3	7,000	France
6	Xay upgrading and expansion (Oudomxay) and a new system in Khua (Phongsaly)	2001	3	12,000	World Bank
	Provincial capitals				
1	Southern provincial towns water supply Expansion project (Phase II) pakse, Saravane, Lanamk and Samakkhixay)	2010	10	50,000	NYI
2	Northern provincial towns water supply expansion project (phase II) Houaysay, Paksan, Xamnueua, Phongsaly, Xayabouri, Phonhong and Phonsavanh	2012	10	50,000	NYI
	Vientinae prefecture				
1	Expansion of the Vientiane water supply system	2007	27	200,000	NYI

Remark : NYI : not yet identified

Economic Social Situation.

Gross Domestic Product in 2001 – 2002

Sector	2001 M.Kip	2002 M.Kip
Agriculture	605,618.5	629,716.9
Industry	280,031.7	308,800.8
Service	297,692.1	314,702.3
Import duties	8,975.3	9,514.7
Total	1,192,317.6	1,262,734.7

(Source : National Statistic Center)

National Income

GDP growth rate by sectors :

Sector	2001	2002
Agriculture	3.8%	4%

Sector	2001	2002
Agriculture	3.8%	4%
Industry	10.1%	10.3%
Service	5.7%	5.7%
Import duties	15.8%	6.0%

(Source : National Statistic Center)

GDP Growth Rate

2001 : 5.8%

2002 : 5.9%

External debt.

1999 : 2,526.7 M.US$

2000 : 2,498.0 M.US$

(Source : National Statistic Center)

Population in economic activities in 1995.

- Legislators, Senior Officials	:	9,454	persons
- Professionals	:	26,861	persons
- Technicians	:	62,568	persons
- Clerks	:	5,249	persons
- Service Workers	:	85,713	persons
- Agriculture and Fishery	:	1,852,686	persons
- Trading	:	55,930	persons
- Operator	:	21,195	persons
- Elementary Occupation	:	25,295	persons
- Others	:	21,550	persons
Total	:	2,166,501	persons

(Source : National Statistic Center)

Exports and Imports.

Figure in 2001

- Export : Electricity, Wood, Coffee, Plywood, Gypsum, Tin.
  Approximately : US$331 Miln.

- Import : Vehicles, Petroleum products, Cement, Steel, medicines and
  Some Consumable products
  Approximately : US$551 Miln.

(Source : National Statistic Center)

Appendices. (Excluded)

1. MAP INDICATING SITE
2. ORGANIZATION CHART OF DCPC CHAMPASACK PROVINCE
3. ORGANIZATION CHART OF NAM PAPA CHAMPASACK PROVINCE
4. PRESENT SUPPLY AREA OF WATER SUPPLY SYSTEM IN PAKSE
5. PROJECT LIST FOR SECTOR INVESTMENT PLAN FOR WATER SUPPLY PROJECT, 1998-2000
6. PHOTOGRAPHS OF PROJECT SITE
7. PAKSE WATER SUPPLY PLAN AND PRODUCTION REPORT BY WASA AND JICA EXPERT
8. PAKSE WATER SUPPLY LONG-TERM PLAN
9. WATER ANALYSIS DATA
10. LAYOUT DRAWING OF PLANNED WATER TREATMENT PLANT
11. FLOW DIAGRAM OF PLANNED WATER TREATMENT PLANT
12. CHART OF RAINFALL AT PAKSE STATION.

4.　その他資料、情報等

（１）環境水関連基準と法令のリスト
（２）ラオス国 MDGs
（３）月別雨量データ(2005-2007)
（４）メコン河水位データ
（５）水質基準
（６）放流基準
（７）チャンパサック県保健局井戸水質分析結果
（８）パクセ郡地区別人口データ(1995、2000、2005 年)
（９）日浄水量データ
(10) 月別浄水量、使用量データ
(11) 電力および薬品使用量
(12) 給水栓数とメータの設置状況
(13) PNP チャンパサックへの苦情と処理状況
(14) 電気料金
(15) 水系伝染病発症数(チャンパサック病院)
(16) 収集資料リスト

（１） 環境水関連基準と法令のリスト

表 A2－8　環境関連、水道関連の基準と法令リスト

No.	Month - Year	Laws, Regulation and Agreement	Agency
1)	1994	First National Environmental Action Plan STEA	
2)	Apr. 1995	Agreement on the Cooperation for Sustainable Development of Mekong River Basin	STEA
3)	1996	Forestry Law	
4)	1996	Water and Water Resource Law	MAF
5)	1997	Draft National Resettlement Policy for Major Projects	CPI, STEA
6)	1997	Draft Public Involvement Guidelines	CPI, STEA
7)	1997	Sector Strategy & Guideline National Framework - Rural Water Supply & Environmental Health Sector	MoH
8)	1997	Land Law	WRCC
9)	1997	Electricity Law	STEA/DoE
10)	1998	Water Sector Strategy and Action Plan 1999-2004	WRCC/PMO
	May 1998	Regulations on the Monitoring and Control of Wastewater Discharge	STENO
11)	Feb-99	Prime Ministerial Decree No.09/PM on Organization and Activities of the WRCC	PM
12)	Sep. 1999	Prime Ministerial Decision No.37/PM on Management and Development of Water Supply Sector	PM
13)	1999	Sector Investment Plan	
14)	1999	The Government Strategic Vision for the Agricultural Sector	DoP/MAF
15)	1999	Industry Law	STEA/DoE
16)	2000	Draft Policy on Water & Water Resources Law	WRCC/PMO
17)	2000	Lao PDR Food Security Strategy in the period of 2001-2010	MAF
18)	2000	Forest Vision for 2020	MAF
19)	2000	Hydropower Development Strategy	MEM
20)	2000	Social Impact Statement for Electricity Projects	MEM
21)	May 2000	A3. Private Sector Mapping Building Consensus for Small Town Water Supply Management Models in Lao PDR	MCTPC
22)	May 2000	1728_MCTPC on Organization and the Activities of WASA	MCTPC
23)	Sep. 2000	Adopted the Millennium Declaration	MOFA
24)	2001	5th National Socio-Economic Development Plan	CPI
25)	2001	Master Plan Study Integrated Agricultural Development Lao PDR	MAF
26)	2001	Power Sector Environment Policy	MEM
27)	2001	Decree of EPL	STEA/DoE
28)	Oct. 2001	Water and Water Resource Law	PMO
29)	2003	Agriculture and Forestry Sector Development Plan	MAF
30)	Mar. 2003	Draft National Environmental Quality Monitoring Program (NEQMP) 2003-2010	STEA
31)	2003	Draft Policy on Resettlement STEA	STEA
32)	2003	National Public Involvement Guidelines	STEA
33)	2004	National Environmental Strategy years up to the year 2020	STEA
34)	2004	Environment Action Plan, 2006-2010	STEA
35)	2004	National Growth and Poverty Eradication Strategy (NGPES)	STEA
36)	Feb. 2004	Regulatory Accounting Guideline (WASA)	STEA
37)	Apr. 2004	Ministerial Decision on Water Supply Tariff Policy of the Lao PDR	MCTPC
38)	May 2004	Signed on Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	STEA

39)	Jun. 2004	National Biodiversity Strategy and Action Plan, years 2010 and 2020	STEA
40)	Jun. 2004	National Strategy on Environment Education and Awareness to the years 2020 and Action Plan for the years 2006-2010	STEA
41)	Sep. 2004	Regulation on Solid Waste Management of Public Service Area	MOH
42)	2005	National Policy on Environmental and Social Sustainability of the Hydropower Sector in Lao PDR	MEM/STEA
43)	Jul. 2005	191 PM Decree on Regulation of Urban Water Supply Operations	PM
44)	Jul. 2005	Decree 197 on Compensation and Resettlement	PM
45)	Jul. 2005	8027/DHUP Decision of WSD	DHUP
46)	Oct. 2005	Decision on the Management of Quality Standards for Drinking Water and Household Water Supply	
47)	Oct. 2005	Water Discharge 2005	MIH
48)	Nov. 2005	Implementing Regulations and Technical Guidelines on Compensation and Resettlement	STEA
49)	Nov. 2005	Adopted Implementing Regulations and Technical Guidelines on Compensation and Resettlement	MEM
50)	May 2006	Ministerial decision on Bottled Drinking Water	MOH
51)	Oct. 2006	6th National Socio-Economic Development Plan (2006-2010)	CPI

出典：JICA 予備調査団、2008

（２） ラオス国ＭＤＧｓ

表 A2-9　ミレニアム目標

No.	INDICATOR	1990	1996	2002	2005	2010	MDG Target
						Target	2015
POVERTY, INEQUALITY AND HUNGER (貧困)							
1	Proportion of population below national poverty line (%)	48	39 *-1997*	33.5		25	24
2	Proportion of population below minimum level of dietary energy consumption (%)	31		29 *-2000*			20
EDUCATION(教育)							
3	Net enrolment ratio in primary education, both sexes, (%)	58 *-1991*			83	90.6	98
4	Net enrolment ratio in primary education, girls, (%)					89.7	
5	Net enrolment ratio in primary education, boys, (%)					91.4	
6	Proportion of pupils starting grade 1 who reach grade 5, (%)	48 *-1991*			62 *-2001*		95
7	Primary completion rate, both sexes, ((%))					77.4	
8	Primary completion rate, girls, (%)					75.4	
9	Primary completion rate, boys, (%)					79.5	
GENDER EQUALITY IN EDUCATION, ETC. (男女平等)							
10	Ratio of girls to boys in primary education, (%)	77 *-1991*		84		89	100
11	Ratio of literate women to men of 15-24 year olds, (%)		81 *-1995*	90 *-2001*			100
12	Proportion of seats held by women in National Assembly, (%)	6.3		23 *-2003*		30	

MATERNAL AND CHILD HEALTH (母子健康問題)							
13	Maternal mortality ratio, per 100,000 live births	750		530	350	300	185
14	Infant mortality rate, per 1,000 live births	134			60	55	45
15	Under-five mortality rate, per 1,000				98	75	55
16	Prevalence of underweight children, under five years of age, (%)					Less than 30	20
SAFE WATER AND SANITATION（水と衛生）							
17	Proportion of population with sustainable access to an improved water source, Total, (%)	28		58 *-2000*		75	80
18	Rural, (%)					65	
19	Proportion of population with access to improved sanitation, Total, (%)					60	
MALARIA AND TUBERCULOSIS (TB) (マラリアと結核)							
20	Morbidity (prevalence rate) associated with malaria (suspected cases per year per 1,000)	44		48			15
21	Death rate associated with malaria, per 100,000	9		3.5			0.2
22	Proportion of population in malaria-risk areas using effective malaria prevention measures, (%)			24 (treated bed nets)			100
23	Prevalence rate associated with TB, per 100,000 population (excl. HIV positive)	144				72	50
24	Proportion of tuberculosis cases detected under DOTS, (%)		24	47			70
25	Proportion of tuberculosis cured under DOTS, (%)		72	83			85
ENVIRONMENT（環境）							
26	Proportion of land area covered by forest (%)	47				>50	

出典：6th National Socio-Economic Development Plan (2006-2010)

（３） 月別雨量データ(2005-2007)

表 A2-10　雨量データ

Month	2005			2006			2007		
	Number of days	Total	Maximum (daily	Number of days	Total	Maximum (daily	Number of days	Total	Maximum (daily
Jan	0	0	0	0	0	0	0	0	0
Feb	0	0	0	0	0	0	0	0	0
Mar	2	14.8	10.5	1	6.4	6.4	4	121.2	56.0
Apr	6	53.1	26.5	10	155.3	68.0	6	34.6	26.2
May	15	230.8	56.4	11	231.9	63.4	16	235.3	59.0
Jun	21	290.7	34.5	14	205.6	66.3	17	215.1	114.6
Jul	23	434.3	106.8	27	846.3	147.9	22	371.4	82.0
Aug	25	511.4	63.4	28	739.7	127.9	24	375.1	86.2
Sep	20	352.3	97.8	17	240.6	41.0	12	218.8	46.0
Oct	8	8.2	3.3	13	256.5	90.9	12	290.6	114.0
Nov	5	61.0	27.0	2	11.2	7.2	5	26.1	11.0
Dec	0	0	0	0	0	0	0	0	0
Total	125	1956.6	106.8	123	2693.5	147.9	118	1888.2	114.6

Source: Meteorology & Hydrology Provincial Service of Champasack, 2008

（４） メコン河水位データ

表 A2-11　メコン川水位

Year	High	Low
1915	5.53	0.15
1960	13.01	0.12
1978	14.63	0.55
1989	9.61	0.41
2000	13.36	0.80
2001	12.74	0.80
2002	12.22	0.80
2003	11.05	1.02
2004	12.02	0.57
2005	12.24	0.65
2006	10.52	0.70
2007	10.86	0.34
2008	11.27	-

Note: Level above the bench mark, EL. +110.133

Source: Meteorology & Hydrology Provincial Service of Champasack, 2008

（５） 水質基準

1) 細菌類

表 A2-12　水質基準（その１）

Parameter	Unit	Concentration
Faecal Coliform	MPN/100ml	0
Total Coliform	MPN/100ml	0

2) 化学物質に関わる項目

表 A2-12　水質基準（その 2）

Parameter		Unit	Acceptable	Maximum
Aluminium	Al	mg/l	0.1	0.2
Ammnonia	NH_3	mg/l	0.5	1.5
Chloride	Cl	mg/l	200	250
Copper	Cu	mg/l	1.0	2.0
Iron	Fe	mg/l	0.3	<1.0
Manganese	Mn	mg/l	0.1	0.5
Sodium	Na	mg/l	200	250
Sulfate	SO_4	mg/l	200	250
Hydrogen Sulphid	H_2S	mg/l	0.05	0.10
Conductivity		µS/cm		<1000
Salt	NaCl	mg/l	100	300-350
Hardness		mg/l	50	300
Turbidity		NTU		<10
Colour		TCU		5
Taste and odour				Acceptable
pH			6.5	8.5
Temperature		degree centig	25	35
Residual Chlorine		mg/l		<0.2

3) 健康にかかわる項目

表 A2-12　水質基準（その 3）

Parameter		Unit	Maximum Concentration
Antimony	Sb	mg/l	0.005
Arsenic	As	mg/l	0.05
Barium	Ba	mg/l	0.7
Boron	B	mg/l	0.5
Cadmium	cd	mg/l	0.003
Chromium	Cr	mg/l	0.05
Cyanide	CN^-	mg/l	0.07
Fluoride	F^-	mg/l	1.5
Lead	Pb	mg/l	0.01
Mercury	Hg	mg/l	0.001
Nitrate	$NO3^-$	mg/l	50
Nitrite	$NO2^-$	mg/l	3
Selenium	Se	mg/l	0.01

Source: Water quality standard, 2006

（６） 放流基準

環境省である STENO が、一般家庭、マーケット、ホテル、病院、レストラン等の建造物、施設からの排水水質を規制する目的で放流水質基準を設定した。なお、工場等からの廃水水質については 1994 年および 2005 年の法令で廃水基準が設定された。

表 A2-13　放流水質基準（段階別基準値）

1. 基準

No.	Unit (mg/l)	Standard				
		a	b	c	d	e
1	Biochemical oxygendemand (BOD): the amount of oxygen required by polluted water to clean up by means of bacteria flora by using oxygen dissolved in the water	No more than				
		20	30	40	50	200
2	Suspended solids	No more than				
		30	40	50	50	60
3	Settleable solids	No more than				
		0.5	0.5	0.5	0.5	-
4	Total dissolved solids (TDS) - increase from the regular use	No more than				
		3000	2300	2000	1500	-
5	Chemical oxygen demand (COD) theamount of oxygen required by polluted water to clean up by means of chemical reactions	No more than				
		120	130	150	350	400
6	Sulfide	No more than				
		1.0	1.0	3.0	4.0	
7	Total Kjeldahl Nitrogen (TKN)	No more than				
		35	35	40	40	
8	Fat oil and grease	No more than				
		20	20	20	20	100
9	Temperature (Celsius)	No more than				
		40	40	40	40	40
10	pH-value	No more than				
		6-9.5	6-9.5	6-9.5	6-9.5	6-9.5

出典：Regulations on the Monitoring and Control of Wastewater discharge, 1998 by STENO

表 A2-14　放流水質基準（建物の分類）

建物の分類	建物の規模	基準
Buildings	Less than 100 rooms	c
	From 101 to 500 rooms	b
	Above 501 rooms	a
Hotel	Less than 60 rooms	c
	from 61 to 200 rooms	b
	Above 201 rooms	a
Dormitories	From 10 to 500 rooms	d
	From 51 to 520 rooms	c
	Above 251 rooms	a
Service areas, Swimming pool, massage centres	From 1000 to 5000m2	d
	Above 5001m2	b
Medical centers, hospitals	From 10 to 30 beds	b
	Above 31 beds	a
Buildings, hotel, educational	From 5000 to 25000m2	b
	Above 25001m2	a
State, state enterprises, foreign and private buildings	From 5000 to 10000m2	c
	From 10001 to 55000m2	b
	Above 55001m2	a
Commercial centers or supermarkets	From 5000 to 25000m2	b
	Above 25001m2	a
Markets	From 500 to 1000m2	d
	From 1001 to 1500m2	c
	From 1501 to 2500m2	b
	Above 2501m2	a
Restaurants	Less than 100m2	e
	From 101 to 250m2	d
	From 251 to 500m2	c
	From 501 to 2500m2	b
	Above 2501m2	a

出典：Regulations on the Monitoring and Control of Wastewater discharge, 1998 by STENO

（７） チャンパサック県保健局井戸水質分析結果

表 A2-15　水質分析結果

パクセ市内井戸水質分析結果　　チャンパサック州保健局水質分析室

井戸深度：30 ～40 m

井戸 No.			1	2	3	4	5	6	7	8	9	10	11
村落名			Chatsan	Dahkalong	Nonsavang	Chatsan	Nonlling	Nansavang	Phansykhang	Chatsan	Chatsan	Nokamnyay	Chatsan
検査日			13.6.07	13.6.07	26.12.07	26.2.08	05.5.08	12.5.08	—	—	—	08.12.06	—
検査項目	単位	基準値	大学近郊	空港北西		大学近郊				大学構内	大学構内	ゴルフ場	大学近郊
pH		6.5-8.5	7.5	7.2	7.5	7.5	6.5	7	7	7	7	7	7
濁度	NTU	＜10	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5
味・臭気	無いこと		無	無	無	無	無	無	無	無	無	無	無
導電率	mS/cm	1000	192	488	334	352	294	347	540	378	405	330	317
鉄	mg/L	＜1	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
マンガン	mg/L	＜0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ヒ素	mg/L	＜0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
フッ素	mg/L	＜1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
硝酸	mg/L	50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
大腸菌群	検出されない事		無	無	無	無	無	無	無	無	無	無	無
硬度度	mg/L	＜300	205	197	200	260	180	200	180	180	180	210	180
亜硝酸	mg/L	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
残留塩素	mg/L	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
判定			良	良	良	良	良	良	良	良	良	良	良

井戸の概略位置図

（８） パクセ郡地区別人口データ(1995、2000、2005 年)

表 A2－16　人口センサスデータ

Name of Village	Sortof Village	Population			Households	
		1995	2000	2005	2000	2005
Tha-Luang	1	2,046	1,569	1,501	257	246
Pha-Batt	1	1,700	1,297	1,358	241	221
Phon-Sai	1	704	595	606	110	104
Phon-Bok	1	1,255	1,202	1,003	253	180
Ruck-Muang	1	1,167	917	879	159	143
Vatt-Luang	1	723	540	605	116	83
Tha-Salakham	1	688	744	491	120	67
Pakse	1	1,633	1,469	1,057	281	168
Thong	1	1,268	1,113	1,192	224	206
Park-Houiduea	1	903	896	751	162	120
Hom-Kha-Yom	1	1,700	1,319	1,362	253	226
Sang-Nam-Manh	1	1,214	1,125	1,128	163	167
Sang-Vilai	1	1,281	1,103	1,003	183	165
Phaonh-Kuung	1	1,778	1,691	1,467	292	254
Phonh-Savanh	1	2,370	888	1,086	147	169
Tha-Hin-Nua	1	1,960	2,026	2,051	342	331
Houa-Puunh	1	1,128	681	737	125	138
Khoa-Ta-Phane	1	2,318	891	1,001	171	180
Kok-Doua	2	574	415	500	76	76
Phonh-Gam	1	1,732	1,920	2,067	292	330
Buung-Ou-Dom	1	946	895	974	174	162
Tha-Xe-Mai	1	964	974	912	161	152
Tha-Hai	1	916	906	929	158	146
Tha-Hin-Kang	1	1,057	1,237	997	184	176
Tha-Hin Tai	1	838	844	829	146	136
Khanh-Keung	1	1,401	1,339	1,409	246	222
Keang-Keung	2	559	650	800	121	137
Nong-Ee-Leung	2	386	480	536	79	87
Houa-Lao	2	1,057	1,157	1,197	211	212
Phonh-Si-Kai	2	2,150	2,101	2,545	339	416
Dong-Ka-Long	2	1,256	1,435	1,546	229	258
Done-Khork	2	1,879	2,130	2,169	391	350
Keng-Sanh	2	606	679	757	102	112
Song-Mai	2	254	285	318	47	62
Sang-Thiang	2	2,036	659	864	120	157
Na-Thek	2	754	858	1,048	146	186
Xork-Am-Nuia	1	1,990	2,450	2,372	282	293
Si-Bounh-Houang	1	938	834	1,225	147	165
Huai-ngan-Kham	2	1,288	1,591	1,296	325	223
Huai-ngan-Kham	2	1,203	1,191	1,373	217	221
Huai-ngan-Kham	2	2,022	1,205	2,342	202	282
Phou-Mouang	1	1,248	1,052	1,108	172	203
Suanh-Savanh	1	875	969	1,014	160	175
Sa-Namxai	1	1,086	1,050	1,236	180	210
Tha-Oudom	1	1,062	1,150	1,579	214	242
Keo-Oudom	1	760	792	1,188	160	182
Nonh-Savang	2	1,214	1,396	1,305	229	244
Khone-Lai	2	417	402	590	83	104
Phonh-Sa-art	1	1,554	1,402	1,475	247	237
Kae	1	1,677	962	1,162	170	214
Pho-Tark	2	346	372	391	60	62
Haei	2	790	924	990	148	171
Song-Yai	2	1,190	786	802	154	145
Na-Jiang	2	359	398	459	62	75
Sa-Phanhxai	1		1,438	1,688	254	263
Don-Samsip	1		469	776	93	126
Sa-Guanhsack	2		310	419	62	71
Phat-Thana	2		687	1,114	121	188
Keo-Samphanh	1		1,195	1,545	206	266
Nong-Kuung	2		565	618	85	108
Oudom-Savanh	1		1,366	1,390	219	235
Nonh-Sivilai	2		291	401	53	63
Nonh-Duu	1		1,900	1,748	250	286
Phou-Kounh	2		353	583	59	105
Houi-Nangkhamk	1			1,300		193
Bang-Yoo	2			1,035		109
Jut-Sanh	2			1,981		249
Total		65,220	66,530	76,180	11,435	12,255

出典：人口センサス

（９） 日浄水量データ

表 A2－17　浄水量（2003－2007 年）

[Pakse] WPT Daily Production in 2007

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	15,050	13,688	11,348	14,057	13,988	13,699	13,874	12,524	10,197	12,201	10,987	10,425
2	15,033	12,874	13,050	13,357	14,367	14,505	13,901	12,252	12,070	12,708	9,487	10,444
3	13,610	13,268	11,967	13,646	13,442	14,256	15,007	11,899	12,591	15,238	11,817	11,908
4	14,543	12,266	11,784	12,661	14,378	15,153	15,678	11,722	12,666	16,264	11,013	11,244
5	12,766	10,702	13,539	14,164	14,399	15,239	15,625	12,470	12,364	13,383	10,889	11,288
6	12,944	12,931	11,599	12,723	14,811	14,877	12,509	11,837	12,085	12,271	11,532	12,055
7	14,081	12,555	11,757	13,883	15,068	15,696	14,171	10,930	15,222	12,221	11,047	11,768
8	9,711	11,125	13,793	12,455	14,586	14,477	13,049	13,999	11,404	12,327	11,259	11,852
9	12,824	12,808	12,619	14,053	12,643	15,135	14,939	15,101	14,947	12,073	11,307	12,479
10	12,610	10,150	10,804	13,480	13,617	15,521	14,139	12,726	15,222	11,833	11,578	11,474
11	12,987	10,912	14,781	14,629	11,766	15,444	12,511	13,068	9,712	10,949	12,836	12,121
12	12,043	13,318	12,358	13,118	11,892	15,640	15,440	13,494	12,622	11,726	11,526	12,370
13	12,257	11,439	12,102	14,100	12,085	14,111	13,655	13,161	12,112	11,864	11,583	11,315
14	12,872	13,168	12,337	14,418	10,966	14,991	12,123	13,706	12,032	11,835	12,426	12,598
15	14,164	12,873	12,843	13,786	12,059	14,354	14,492	13,652	12,141	12,046	11,870	14,155
16	13,789	14,163	13,262	12,895	13,969	13,620	13,453	12,489	14,584	11,186	11,712	11,956
17	12,973	13,671	12,963	13,446	15,082	13,052	12,932	12,595	12,687	11,517	11,890	12,251
18	10,465	13,840	12,728	13,476	14,588	14,837	10,696	12,482	12,383	13,098	12,978	13,073
19	13,211	13,700	13,033	13,288	14,091	14,405	13,155	12,054	13,057	12,502	12,015	13,304
20	12,875	13,883	12,640	13,619	13,504	13,232	12,794	13,690	11,929	11,881	11,633	12,916
21	12,791	13,996	12,505	14,149	14,508	13,914	12,917	12,026	13,087	12,456	11,836	11,465
22	12,914	12,880	11,771	14,094	14,380	12,610	12,267	11,761	10,267	11,959	12,411	11,739
23	11,523	11,267	12,753	14,387	12,879	12,734	12,698	13,639	12,181	11,249	10,511	11,699
24	10,813	13,152	12,151	13,665	13,964	13,299	13,200	13,411	12,120	12,066	10,930	12,153
25	13,508	11,745	13,060	13,179	14,518	13,189	11,997	12,637	12,864	12,275	11,904	11,651
26	13,788	11,219	12,586	12,937	14,595	12,369	13,036	11,776	11,818	11,866	10,974	13,014
27	12,345	11,746	11,878	13,584	12,390	13,792	13,767	12,270	11,795	12,195	12,000	11,609
28	13,506	11,321	12,590	13,835	15,727	12,698	12,964	12,945	11,658	11,425	10,930	11,413
29	13,599		14,705	14,324	17,122	11,126	12,767	12,645	12,297	11,029	12,243	12,589
30	13,625		13,473	13,136	12,663	13,333	14,690	12,941	11,865	11,153	12,356	14,838
31	16,201		13,081		14,278		13,096	11,478		11,672		14,384
Ave	13,078	12,524	12,641	13,618	13,817	14,044	13,469	12,690	12,399	12,209	11,583	12,179
Max	16,201	14,163	14,781	14,629	17,122	15,696	15,678	15,101	15,222	16,264	12,978	14,838
Total	405,421	350,660	391,860	408,544	428,325	421,308	417,542	393,380	371,979	378,468	347,480	377,550
Daily Maximam			17,122		Daily Average		12,856		Rate of Loading		75%	
Grand Total					4,692,517							

[Pakse] WPT Daily Production in 2006

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	12,627	12,630	11,754	13,854	11,517	14,331	10,407	12,309	10,197	10,495	12,223	10,375
2	12,205	12,777	11,191	12,418	13,776	14,617	11,111	11,463	12,070	11,248	11,331	10,939
3	13,582	13,268	11,693	12,773	14,052	14,793	11,718	12,443	12,591	11,953	11,376	12,936
4	11,283	12,190	11,275	12,138	14,281	15,011	10,128	10,341	12,666	12,138	14,306	9,825
5	13,075	13,163	11,797	13,646	15,236	14,123	9,139	14,684	12,364	12,322	11,713	11,629
6	11,960	13,736	12,228	13,141	12,320	14,932	8,763	12,403	12,085	12,136	11,376	10,483
7	12,187	12,889	11,495	14,431	15,212	16,698	8,195	12,516	13,222	11,238	12,556	9,649
8	10,647	13,438	12,370	12,264	13,632	15,955	8,957	11,658	11,404	12,176	13,636	9,783
9	11,657	12,551	12,303	13,113	11,929	14,927	8,977	10,388	12,947	12,420	13,428	9,439
10	12,959	12,264	11,678	13,818	13,254	14,151	12,815	13,028	13,222	11,546	11,636	10,109
11	13,053	13,216	12,247	12,177	12,892	14,107	12,048	12,876	9,712	11,887	13,319	10,025
12	11,840	13,441	12,157	13,008	13,111	13,274	11,020	10,951	12,622	11,619	15,234	10,168
13	10,739	13,151	12,006	13,702	13,723	13,202	12,665	12,306	12,112	11,665	16,142	10,194
14	10,491	14,546	11,758	12,875	9,635	13,757	11,426	12,291	12,032	11,449	16,588	10,804
15	14,324	14,168	10,111	13,639	12,555	12,928	11,614	11,476	12,141	11,569	16,158	10,152
16	13,290	11,739	11,710	13,803	14,529	13,263	11,938	12,238	12,584	12,136	15,681	13,935
17	12,227	14,327	12,525	11,655	13,595	7,255	12,353	12,351	12,379	11,107	11,296	11,549
18	12,984	14,087	11,895	12,801	13,496	12,880	13,162	11,930	12,383	12,094	12,946	11,223
19	12,345	12,653	12,457	12,959	12,763	13,799	11,733	11,337	12,057	12,453	14,042	11,107
20	11,853	12,624	11,072	11,710	9,363	13,318	12,780	12,508	11,929	12,987	13,779	12,005
21	13,723	14,875	12,306	13,131	17,108	12,985	13,067	12,266	12,087	12,871	12,637	11,565
22	12,288	12,949	12,342	12,953	16,412	12,283	12,881	11,217	10,267	11,013	12,242	11,918
23	11,706	13,943	12,634	12,872	7,922	12,407	13,374	12,276	12,181	12,187	12,776	12,138
24	11,149	12,248	10,553	13,344	19,135	11,752	12,529	12,148	12,120	11,511	12,418	11,886
25	11,738	13,493	13,969	13,470	16,946	10,988	11,363	11,882	11,864	11,827	11,729	11,373
26	11,760	11,354	13,978	11,284	14,215	11,693	11,631	11,570	11,818	12,144	12,768	12,229
27	12,540	14,079	13,781	5,208	14,315	12,168	12,132	12,424	11,795	12,144	12,137	11,005
28	13,336	12,711	11,706	14,408	12,723	11,806	13,328	11,735	11,658	12,211	11,231	11,271
29	12,202		13,342	12,181	13,722	13,127	11,532	11,446	12,297	11,898	11,808	12,339
30	12,132		12,529	11,987	13,659	11,695	12,912	11,947	11,865	12,818	11,971	12,468
31	12,329		12,096		14,074		11,335	11,131		12,960		11,394
Ave	12,266	13,161	12,095	12,692	13,584	13,274	11,517	11,985	12,022	11,943	13,016	11,159
Max	14,324	14,875	13,978	14,431	19,135	16,698	13,374	14,684	13,222	12,987	16,588	13,935
Total	380,231	368,510	374,958	380,763	421,102	398,225	357,033	371,539	360,671	370,222	390,483	345,915
Daily Maximam			19,135		Daily Average		12,383		Rate of Loading		65%	
Grand Total					4,519,652							

[Pakse] WPT Daily Production in 2005

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	15,050	13,688	11,348	14,057	13,988	13,699	13,874	12,524	10,197	12,201	10,987	10,425
2	15,033	12,874	13,050	13,357	14,367	14,505	13,901	12,252	12,070	12,708	9,487	10,444
3	13,610	13,268	11,967	13,646	13,442	14,256	15,007	11,899	12,591	15,238	11,817	11,908
4	14,543	12,266	11,784	12,661	14,378	15,153	15,678	11,722	12,666	16,264	11,013	11,244
5	12,766	10,702	13,539	14,164	14,399	15,239	15,625	12,470	12,364	13,383	10,889	11,288
6	12,944	12,931	11,599	12,723	14,811	14,877	12,509	11,837	12,085	12,271	11,532	12,055
7	14,081	12,555	11,757	13,883	15,068	15,696	14,171	10,930	15,222	12,221	11,047	11,768
8	9,711	11,125	13,793	12,455	14,586	14,477	13,049	13,999	11,404	12,327	11,259	11,852
9	12,824	12,808	12,619	14,053	12,643	15,135	14,939	15,101	14,947	12,073	11,307	12,479
10	12,610	10,150	10,804	13,480	13,617	15,521	14,139	12,726	15,222	11,833	11,578	11,474
11	12,987	10,912	14,781	14,629	11,766	15,444	12,511	13,068	9,712	10,949	12,836	12,121
12	12,043	13,318	12,358	13,118	11,892	15,640	15,440	13,494	12,622	11,726	11,526	12,370
13	12,257	11,439	12,102	14,100	12,085	14,111	13,655	13,161	12,112	11,864	11,583	11,315
14	12,872	13,168	12,337	14,418	10,966	14,991	12,123	13,706	12,032	11,835	12,426	12,598
15	14,164	12,873	12,843	13,786	12,059	14,354	14,492	13,652	12,141	12,046	11,870	14,155
16	13,789	14,163	13,262	12,895	13,969	13,620	13,453	12,489	14,584	11,186	11,712	11,956
17	12,973	13,671	12,963	13,446	15,082	13,052	12,932	12,595	12,687	11,517	11,890	12,251
18	10,465	13,840	12,728	13,476	14,588	14,837	10,696	12,482	12,383	13,098	12,978	13,073
19	13,211	13,700	13,033	13,288	14,091	14,405	13,155	12,054	13,057	12,502	12,015	13,304
20	12,875	13,883	12,640	13,619	13,504	13,232	12,794	13,690	11,929	11,881	11,633	12,916
21	12,791	13,996	12,505	14,149	14,508	13,914	12,917	12,026	13,087	12,456	11,836	11,465
22	12,914	12,880	11,771	14,094	14,380	12,610	12,267	11,761	10,267	11,959	12,411	11,739
23	11,523	11,267	12,753	14,387	12,879	12,734	12,698	13,639	12,181	11,249	10,511	11,699
24	10,813	13,152	12,151	13,665	13,964	13,299	13,200	13,411	12,120	12,066	10,930	12,153
25	13,508	11,745	13,060	13,179	14,518	13,189	11,997	12,637	12,864	12,275	11,904	11,651
26	13,788	11,219	12,586	12,937	14,595	12,369	13,036	11,776	11,818	11,866	10,974	13,014
27	12,345	11,746	11,878	13,584	12,390	13,792	13,767	12,270	11,795	12,195	12,000	11,609
28	13,506	11,321	12,590	13,835	15,727	12,698	12,964	12,945	11,658	11,425	10,930	11,413
29	13,599		14,705	14,324	17,122	11,126	12,767	12,645	12,297	11,029	12,243	12,589
30	13,625		13,473	13,136	12,663	13,333	14,690	12,941	11,865	11,153	12,356	14,838
31	16,201		13,081		14,278		13,096	11,478		11,672		14,384
Ave	13,078	12,524	12,641	13,618	13,817	14,044	13,469	12,690	12,399	12,209	11,583	12,179
Max	16,201	14,163	14,781	14,629	17,122	15,696	15,678	15,101	15,222	16,264	12,978	14,838
Total	405,421	350,660	391,860	408,544	428,325	421,308	417,542	393,380	371,979	378,468	347,480	377,550
Daily Maximam			17,122		Daily Average		12,856		Rate of Loading		75%	
Grand Total					4,692,517							

[Pakse] WPT Daily Production in 2004 [Unit m3]

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	11,500	14,256	12,563	11,569	12,865	14,256	11,569	11,569	12,000	10,500	10,500	12,583
2	11,659	13,698	11,458	12,356	15,622	13,698	10,569	10,569	11,659	10,558	10,558	10,477
3	9,653	12,562	12,588	12,562	11,478	12,562	10,258	10,258	10,397	9,653	12,587	12,562
4	9,228	13,896	13,599	13,896	12,358	13,896	9,357	9,357	9,228	9,228	13,687	11,587
5	11,948	14,563	11,432	10,569	10,477	14,563	10,569	10,569	11,948	11,948	11,948	10,255
6	11,735	11,735	11,735	11,735	10,965	11,735	10,735	10,735	11,735	11,735	11,735	11,735
7	10,717	13,587	10,717	10,588	12,354	13,587	10,588	10,588	10,717	10,717	10,717	12,555
8	10,966	10,966	10,966	10,966	14,658	10,966	10,966	10,966	10,966	10,966	10,966	10,966
9	11,085	11,085	11,085	11,085	10,877	11,085	11,085	11,085	11,085	11,085	11,085	11,085
10	11,973	13,575	11,973	11,569	10,877	13,575	11,569	11,569	11,973	11,973	11,973	13,575
11	11,756	13,575	11,756	10,956	14,875	13,575	10,956	10,956	11,756	11,756	11,756	13,575
12	11,892	11,892	11,892	11,892	9,658	11,892	11,892	11,892	11,892	11,892	11,892	11,892
13	11,994	11,994	11,994	11,994	10,698	11,994	11,994	11,994	11,994	11,994	11,994	11,994
14	11,838	11,838	11,838	11,838	10,698	11,838	11,838	11,838	11,838	11,838	11,838	11,838
15	9,683	13,596	9,683	12,477	13,588	13,596	11,022	11,022	12,524	9,683	15,983	13,596
16	11,498	13,555	11,498	12,113	11,258	13,555	11,113	11,113	11,498	11,498	11,498	13,555
17	9,791	12,453	9,791	12,279	15,698	12,453	10,255	10,255	12,478	9,791	10,021	12,453
18	11,788	11,788	11,788	11,788	13,567	11,788	9,657	9,657	11,788	11,788	11,788	11,788
19	12,113	12,113	12,113	12,113	12,243	13,105	12,113	12,113	11,014	12,113	12,113	13,105
20	10,571	15,669	10,571	15,669	10,465	15,669	10,688	10,688	10,571	10,571	10,571	13,185
21	12,589	12,589	12,589	12,589	12,256	15,669	11,202	11,202	12,589	12,046	12,046	12,581
22	10,566	11,374	10,566	11,374	14,420	11,374	11,374	11,374	10,566	10,344	10,344	11,374
23	12,676	12,676	12,676	12,676	15,084	12,676	12,676	12,676	12,676	11,589	11,589	12,676
24	10,902	11,589	10,902	11,589	14,485	11,589	11,589	11,589	10,902	10,902	10,237	11,589
25	10,967	14,255	10,967	14,255	14,842	14,255	14,255	9,810	10,967	10,967	10,967	14,255
26	11,764	11,764	11,764	11,764	14,484	11,764	11,764	11,764	11,764	11,764	11,764	11,764
27	10,555	13,624	10,555	13,624	15,197	13,624	13,624	13,624	10,555	10,555	10,555	13,624
28	10,668	12,598	10,668	12,598	13,987	12,598	12,598	12,598	12,583	10,668	10,668	12,598
29	10,872	12,596	10,872	12,596	14,418	12,596	12,596	12,596	13,699	10,872	10,872	12,596
30	10,978		10,978	15,423	14,931	14,007	15,423	15,423	11,442	10,978	10,978	14,007
31	9,635		9,635		16,204		14,978	14,978		9,635		12,655
Ave	11,147	12,809	11,394	12,283	13,083	12,985	11,641	11,498	11,560	11,020	11,508	12,390
Max	12,676	15,669	13,599	15,669	16,204	15,669	15,423	15,423	13,699	12,113	15,983	14,255
Total	345,560	371,461	353,212	368,502	405,587	389,540	360,872	356,427	346,804	341,607	345,230	384,080
Daily Maximam			16,204		Daily Average		11,024		Rate of Loading		68%	
Grand Total					4,368,882							

[Pakse] WPT Daily Production in 2003

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	13,383	14,482	13,662	13,034	15,662	19,387	13,763	15,906	16,437	11,623	9,228	9,944
2	13,659	15,928	14,655	14,199	16,076	18,061	13,249	16,239	17,750	13,581	11,948	13,964
3	13,065	17,516	13,171	13,997	15,462	20,959	14,565	15,472	17,479	11,444	11,735	13,714
4	13,029	17,612	13,357	11,854	14,700	20,453	12,819	13,748	17,571	12,483	10,717	12,525
5	12,758	15,468	14,655	10,669	13,035	20,383	13,182	14,667	15,412	11,627	12,148	14,198
6	11,847	16,178	13,676	13,555	17,042	18,861	12,192	15,436	17,296	12,039	11,085	13,796
7	11,792	14,844	13,434	15,006	16,301	19,766	12,732	15,131	16,220	13,463	11,973	13,993
8	12,031	14,578	14,472	14,387	16,191	19,746	12,410	14,585	18,757	11,926	11,756	13,739
9	12,774	15,385	13,123	13,917	14,379	19,665	13,282	17,615	15,956	14,271	11,892	13,899
10	12,833	13,276	13,544	15,264	16,166	20,455	13,075	16,293	15,595	16,838	11,994	14,018
11	13,408	14,864	14,092	15,001	13,726	16,432	15,179	16,089	16,176	14,448	11,838	13,835
12	12,120	15,566	12,429	13,726	11,475	14,864	11,768	14,415	16,095	14,948	12,840	15,007
13	12,288	15,937	13,870	15,026	14,040	16,873	13,970	14,939	15,478	14,393	11,498	13,438
14	12,420	18,473	14,822	15,106	16,497	15,658	10,630	16,101	14,716	14,003	12,467	14,570
15	12,352	16,393	15,470	14,430	16,239	15,658	14,870	16,331	16,093	12,288	12,788	14,945
16	12,174	15,946	16,318	14,546	19,763	15,512	14,652	15,359	18,033	12,054	12,113	14,157
17	11,458	16,248	16,457	14,847	11,892	17,569	15,312	15,182	14,665	9,102	10,571	12,355
18	12,585	17,406	11,732	14,342	12,781	14,794	13,288	11,053	13,267	13,138	15,844	18,517
19	12,271	15,170	13,222	14,940	12,243	14,166	12,692	16,456	18,970	13,138	12,227	14,290
20	10,669	14,057	14,360	14,382	10,465	14,007	14,021	14,326	14,765	12,966	12,676	14,814
21	12,381	15,868	13,904	14,638	12,256	14,589	12,577	13,005	15,531	11,508	12,902	15,078
22	13,304	15,070	14,452	14,638	14,420	15,936	12,255	12,538	15,366	10,591	13,094	15,304
23	13,389	15,246	14,061	15,439	15,084	16,617	13,489	12,382	15,001	11,302	11,764	13,749
24	11,518	15,870	13,884	13,826	14,485	14,498	12,255	12,548	15,827	10,722	12,639	14,771
25	12,373	13,502	13,841	14,458	14,842	14,918	13,656	13,875	14,926	12,733	11,540	13,487
26	12,642	15,134	14,564	15,059	14,484	15,647	15,438	12,747	15,068	12,623	11,912	13,921
27	13,033	15,257	15,891	15,619	15,197	14,203	15,562	13,549	15,422	12,726	10,822	12,648
28	13,675	15,371	15,410	14,616	13,987	15,455	15,457	16,402	16,193	13,096	12,269	14,339
29	13,565		17,975	13,876	14,418	14,846	13,821	14,484	15,104	12,209	12,726	14,874
30	12,763		17,224		14,931		13,323	13,904	17,459	12,292	12,921	15,101
31	13,108		15,326		16,204		14,978	12,518		11,952		
Ave	12,602	15,594	14,421	14,290	14,659	16,896	13,563	14,622	16,088	12,630	12,064	14,100
Max	13,675	18,473	17,975	15,619	19,763	20,959	15,562	17,615	18,970	16,838	15,844	18,517
Total	390,667	436,645	447,053	414,397	454,443	489,978	420,462	453,295	482,628	391,527	361,927	422,990
Daily Maximam			20,959		Daily Average		14,271		Rate of Loading		68%	
Grand Total					5,166,012							

出典：PNP チャンパサック

（１０） 月別浄水量、使用量データ

表 A2－18　月別浄水量、使用水量、ロス等（2003-2007 年）

Production and Consumption in 2007

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Average
Monthly Production(m3)	405,421	350,660	391,860	408,544	428,325	421,308	417,542	393,380	371,979	378,468	347,480	377,550	4,692,517	391,043
Monthly Consumption(m3)	340,690	289,802	301,002	330,921	342,660	332,989	334,034	310,770	295,355	301,157	271,018	294,189	3,744,587	312,049
Water Loss(m3)	64,731	60,858	90,858	77,623	85,665	88,319	83,508	82,610	76,624	77,311	76,462	83,361	947,930	78,994
Rate of Non-Revenue (Water	16%	17%	23%	19%	20%	21%	20%	21%	21%	20%	22%	22%	-	20%

Production and Consumption in 2006

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Average
Monthly Production(m3)	380,231	368,510	374,958	380,763	421,102	398,225	357,033	371,539	360,671	370,222	390,483	345,915	4,519,652	376,638
Monthly Consumption(m3)	304,185	291,123	296,217	304,610	341,093	318,580	283,636	297,231	281,323	292,475	312,386	288,263	3,611,122	300,927
Water Loss(m3)	76,046	77,387	78,741	76,153	80,009	79,645	73,397	74,308	79,348	77,747	78,097	57,652	908,530	75,711
Rate of Non-Revenue (Water	20%	21%	21%	20%	19%	21%	21%	20%	22%	21%	20%	17%	-	20%

Production and Consumption in 2005

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Average
Monthly Production(m3)	369,046	357,804	350,246	353,000	398,775	406,214	402,806	371,188	373,199	364,862	363,467	364,838	4,475,445	372,954
Monthly Consumption(m3)	291,546	282,665	276,694	282,400	319,020	320,000	318,217	289,527	294,827	284,592	287,139	288,222	3,534,849	294,571
Water Loss(m3)	77,500	75,139	73,552	70,600	79,755	86,214	84,589	81,661	78,372	80,270	76,328	76,616	940,596	78,383
Rate of Non-Revenue (Water	21%	21%	21%	20%	20%	21%	21%	22%	21%	22%	21%	21%	-	21%

Production and Consumption in 2004

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Average
Monthly Production(m3)	345,560	371,461	353,212	368,502	405,587	389,540	360,872	356,427	346,804	341,607	345,230	384,080	4,368,882	364,074
Monthly Consumption(m3)	269,108	280,507	276,406	283,978	324,484	305,931	275,059	262,237	263,120	271,120	272,839	301,942	3,386,731	282,228
Water Loss(m3)	76,452	90,954	76,806	84,524	81,103	83,609	85,813	94,190	83,684	70,487	72,391	82,138	982,151	81,846
Rate of Non-Revenue (Water	22%	24%	22%	23%	20%	21%	24%	26%	24%	21%	21%	21%	-	22%

Production and Consumption in 2003

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Average
Monthly Production(m3)	390,667	436,645	447,053	414,397	454,443	489,978	420,462	453,295	482,628	391,527	361,927	422,990	5,166,012	430,501
Monthly Consumption(m3)	285,187	327,484	326,349	310,798	333,328	352,784	311,142	330,905	357,145	293,645	278,684	325,702	3,833,153	319,429
Water Loss(m3)	105,480	109,161	120,704	103,599	121,115	137,194	109,320	122,390	125,483	97,882	83,243	97,288	1,332,859	111,072
Rate of Non-Revenue (Water	27%	25%	27%	25%	27%	28%	26%	27%	26%	25%	23%	23%	26%	26%

出典：PNP チャンパサック

（１１） 電力および薬品使用量

表 A2－19　電力および薬品使用量（2005-2007 年）

Power and Chemical Consumption in 2007

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Average
Electricity (KWH)	######	######	######	######	######	######	######	######	######	######	######	######	2,428,998	######
Alum(kg)	12,200	8,800	10,500	10,000	24,400	23,700	28,200	25,300	20,700	17,100	12,050	10,300	203,250	16,938
Chlorine(kg)	1,200	700	750	750	800	750	750	800	750	750	750	800	9,550	796
Polymer(kg)	-	-	-	-	50	-	-	-	-	25	-	-	75	6
Lime(kg)	-	-	-	-	1,070	30	-	1,790	800	390	-	200	4,280	357

Power and Chemical Consumption in 2006

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Average
Electricity (KWH)	######	######	######	######	######	######	######	######	######	######	######	######	2,199,245	######
Alum(kg)	11,100	5,800	8,200	11,100	13,700	18,850	28,100	23,100	20,700	23,600	16,000	8,850	189,100	15,758
Chlorine(kg)	650	500	550	650	800	750	750	750	750	800	750	395	8,095	675
Polymer(kg)	-	-	-	-	25	25	75	50	50	-	-	-	225	19
Lime(kg)	-	-	-	-	64	224	1,580	2,150	1,230	1,600	230	-	7,078	590

Power and Chemical Consumption in 2005

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Average
Electricity (KWH)	######	######	######	######	######	######	######	######	######	######	######	######	2,272,344	######
Alum(kg)	17,900	11,200	12,400	12,000	15,200	18,400	24,450	23,250	16,050	15,300	16,615	7,700	190,465	15,872
Chlorine(kg)	800	700	750	750	800	750	750	650	500	550	700	350	8,050	671
Polymer(kg)	-	-	-	-	-	-	50	50	25	25	150	-	300	25
Lime(kg)	-	-	-	-	48	552	1,392	1,936	1,712	1,208	684	272	7,804	650

出典：PNP チャンパサック

（１２） 給水栓数とメータの設置状況

表 A2－20　用途別顧客数とメータの設置状況(2003-2007 年)

Number of Connections 2007

Metered or unmetered		Domestic & Government	Businesses and Enterprizes not using water as raw materials	Business and Enterprizes using water as raw materials	Total
Metered	Operative	7,410	1,035	137	8,582
	Inoperative	178	81	21	280
Unmetered		-	-	-	-
Total		7,588	1,116	158	8,862

Number of Connections 2006

Metered or unmetered		Domestic & Government	Businesses and Enterprizes not using water as raw materials	Business and Enterprizes using water as raw materials	Total
Metered	Operative	7,223	900	132	8,255
	Inoperative	191	62	22	275
Unmetered		-	-	-	-
Total		7,414	962	154	8,530

Number of Connections 2005

Metered or unmetered		Domestic & Government	Businesses and Enterprizes not using water as raw materials	Business and Enterprizes using water as raw materials	Total
Metered	Operative	7,159	779	138	8,076
	Inoperative	171	34	13	218
Unmetered		-	-	-	-
Total		7,330	813	151	8,294

Number of Connections 2004

Metered or unmetered		Domestic & Government	Businesses and Enterprizes not using water as raw materials	Business and Enterprizes using water as raw materials	Total
Metered	Operative	7,204	493	140	7,837
	Inoperative	155	30	11	196
Unmetered		-	-	-	-
Total		7,359	523	151	8,033

Number of Connections 2003

Metered or unmetered		Domestic & Government	Businesses and Enterprizes not using water as raw materials	Business and Enterprizes using water as raw materials	Total
Metered	Operative	6,928	421	154	7,503
	Inoperative	164	26	12	202
Unmetered		-	-	-	-
Total		7,092	447	166	7,705

出典：PNP チャンパサック

（１３） PNP チャンパサックへの苦情と処理状況

表 A2－21　水道局への苦情件数

Item	Number of cases
1) Missreading or bills	6
2) Meter conditions	293
3) Leakage at pipelines	272
4) Storage tanks	-
5) Neighbourhood nuisance	-
6) Service(water quality)	8
7) Service(water pressure)	150
8) Others	-
Total	729

表 A2－22　苦情処理状況

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Number of Complaints	7	12	16	10	6	11	5	12	8	4	6	8
Response taken	5	10	16	10	6	9	5	11	8	4	5	7
Solved	5	10	16	10	6	9	5	11	8	4	5	7
Remainings	2	2	0	0	0	2	0	1	0	0	1	1

出典：PNP チャンパサック

（１４） 電気料金

表 A2－23　ラオス国電気料金

Electricity　　Unit: Kip/kwh

	2006	2007	2008	2009	2010	2011
I. Domestic						
0－25kwh	115	154	177	203	234	269
26－150kwh	265	284	293	301	310	320
150kwh以上	765	773	773	773	773	773
II. Non-domestic (low)						
Irrigation	295	329	345	362	380	399
Government	706	694	684	674	665	656
Industry	636	625	616	607	599	591
Business	826	835	836	835	835	835
Embassy & Foreigners	1,066	1,077	1,077	1,077	1,077	1,077
Amusement	1,095	1,106	1,106	1,106	1,106	1,106
III. Non-domestic (high)						
Irrigation	251	279	293	308	323	340
Industry	541	531	524	516	509	502
Government	600	590	581	573	565	557
Business	702	709	709	709	709	709

Source: Electric Du Laos

（１５） 水系伝染病発症数(チャンパサック病院)

表 A2-24 水に関連する病気の患者数

Number of Patients in Champasack Hospital (2007.10-2008.9)

Out Patient

Name of disease	Age < 5 yr		5 yr or more		Totql
	Male	Female	Male	Female	
Dysentry	47	25	17	21	110
Mild diarrhea	250	191	100	137	678
Accute Diarrhea	78	47	0	0	125
Digestive Diseases	9	10	1,334	1,711	3,064
Unitary Diseases	6	6	428	474	914
Dengue Fever	92	84	538	464	1,178
Parasite	47	51	102	66	266
Infection Diseases	513	422	4	5	944

In Patient

Name of disease	Age < 5 yr		5 yr or more		Totql
	Male	Female	Male	Female	
Dysentry	43	23	28	71	165
Mild diarrhea	227	128	120	119	594
Accute Diarrhea	6	8	40	46	100
Digestive Diseases	57	45	981	1,076	2,159
Unitary Diseases	20	17	737	586	1,360
Dengue Fever	40	39	362	282	723
Parasite	10	11	36	31	88
Infection Diseases	28	26	145	155	354

Note:

1) Digestive diseases: food poisoning, hepatitis, gastritis, duspepsia, Peptic ulcer, cholecystitis

2) Unitary diseases: renal sone, vesicular stone, biadder stone, etc.

3) Infection diseases: tyfoid fever, leptosperosis, etc.

Source: Champasack Hospital, 2008

（１６） 収集資料リスト

表 A2-25 収集資料リスト

番号	名称	形態	内容	発行機関	発行年
1)	Report and Recommendation of the President to the Board of Directors on a Proposed Sector Loan to the Lao People's Democratic Republic for the Water Supply and Sanitation Sector Project October 1999	書類、電子ファイル、A4-81ページ	水道衛生部門プロジェクトのADBボードに対する上申書	ADB	1999年10月
2)	ADB Completion Report, Lao People's Democratic Republic: Water Supply and Sanitation Sector Project	書類、電子ファイル、A4-45ページ	上記プロジェクトの完了報告書	ADB	2008年8月
3)	ラオス国別援助検討会報告書	書類、電子ファイル	ラオス国に対する援助方針を検討	国際協力事業団	1998年3月
4)	ラオス国サバナケット地区上水道施設改善計画予備調査報告書	書類、電子ファイル	JICA予備調査報告書	国際協力事業団	2000年4月
5)	ラオス国サバナケット地区上水道施設改善計画基本設計調査報告書	書類、電子ファイル	JICA基本設計調査報告書	国際協力事業団	2001年4月
6)	Lao PDR Environment Monitor 2005	書類、電子ファイル、A4-68ページ	ラオス国環境部門の現状	STEA	2005年
7)	Lao PDR Economic Monitor 2005	書類、電子ファイル、A4-44ページ	ラオス国経済部門の現状	The World Bank Office, Vientiane	2008年4月
8)	Paris Declaration on Aid Effectiveness, March 2005	書類、PDF	パリス会議宣言文	High Level Forum	2005年3月
9)	DAC Recommendation on Untying Official Development Assistance to the Least Developed Countries, March 2006	書類、PDF	DAC勧告	DAC	2006年3月
10)	Lao PDR Annual Urban Water Performance Report 2006	書類、PDF	WASAによる都市水道の現状報告書	WASA	2006年
11)	37_Prime Ministerial Decision on Management and Development of Water Supply Sector	書類、PDF, A4-7ページ	水道部門活動に対する基本令	Prime Minister	1999年9月
12)	A3. Private Sector Mapping Building Consensus for Small Town Water Supply Management Models in Lao PDR	書類、PDF, A4-16ページ	WASA組織に関する大臣令	MCTPC (WB)	2000年5月
13)	No. 5336/MCTPC, Ministerial Decision on Water Supply Tariff Policy of the Lao PDR	書類、PDF, A4-7ページ	料金設定にかかわる政府方針	MCTPC	2004年4月
14)	B1. Water supply Tariff Determination Methodologies Building Consensus for Small Town Water Supply Management Models in Lao PDR	書類、PDF, A4-52ページ	料金設定にかかわる基本事項の解説書	WASA (WB)	2004年6月
15)	The Application Form for the Pakse Water Supply Development Project in Champasack Province	書類、PDF, A4-62ページ	旧版、Revised版については添付資料3．要請書参照	DCTPC	2006年7月
16)	National Socio-Economic Development Plan (2006-2010)	書類、コピー、A4-239ページ	第六次国家社会経済開発計画	CPI	2006年10月
17)	Project Completion Report, Southern Provincial Towns Water Supply in the Lao PDR	書類、PDF, A4-56ページ	完了報告書	ADB	1998年6月
18)	Project Performance Audit Report on the Southern Provincial Towns Water Supply in the Lao PDR	書類、PDF, A4-42ページ	監査レポート	ADB	2000年10月

番号	名称	形態	内容	発行機関	発行年
19)	191 PM Decree on Regulation of Urban Water Supply Operations.pdf	書類、PDF、A4-10ページ	事業申請、許可および運営管理	PMO	2005年7月
20)	1728_MCTPC on Organization and the Activities of WASA	書類、PDF、A4-4ページ	WASAの組織運営について	MCTPC	2000年5月
21)	1122 STENO Regulation on the monitoring and control of wastewater discharge	書類、PDF、A4-14ページ、後半4ページは英語版	一般排水放流基準の設定	STENO	1998年5月
22)	Decision on the Management of Quality Standards for Drinking Water and Household Water Supply	書類、PDF、A4-32ページ	飲用水質基準の設定		2005年10月
23)	Water Supply Development Plan upto 2020 & 2001-2005 (WASA)	書類、コピー、A4-12ページ	2020年までのプロジェク実施スケジュール	WASA	2007年
24)	National Socio-Economic Development Plan (2007-2008)	書類、A4-73ページ	2007-2008年に対する開発計画	CPI	2001年
25)	Water Supply Plan of Pakse 2000-2020 prepared by JICA Expert	エクセルファイル	2003年水需要予測結果	JICA Expert	2004年
26)	Tariff Review 2008-2010	書類、DOCファイル、A4-37ページ	全国17都市水道の料金レベル予測（1都市除く）	WASA/NORAD	2008年1月
27)	ラオス人民民主共和国南部地方都市水道整備計画調査報告書	書類、A4-42ページ	プロジェクト発掘調査	JICWELS	2004年
28)	2004 Annual Report on operation of Water Supply Sector of Lao PDR (WASA)	書類、A4-69ページ	WASAによる都市水道の現状報告書	WASA	2004年
29)	The National Strategy for the Rural Water Supply and Environmental Health Sector	書類、A4-130ページ	2020年までに全国90%の水道普及率を達成するための地方水道	MOH	2004年6月
30)	Statistical Yearbook 2007 (MPI)	書類、A4-127ページ	ラオス国社会経済データ	MPI	2008年6月
31)	Water Safety Plans (WSP) for Urban Piped Water Supplies in Developing Countries	書類、PDF、A4-114ページ	WSPの基本思想、考え方を解説	Godfrey S. and Howard G.	2004年
32)	Water Safety Plan Workbook for Drinking-water: Materials for Training of Trainees	書類、PDF、A4-52ページ	WSPの教材	WHO	2007年12月
33)	Water Safety Plan in Lao PDR	書類、PDF、A4-52ページ	WSPパクセの結果公表	WASA	2007年12月
34)	Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank 2008-2020	パンフレット、ファイル	ADBの援助基本方針	ADB	2008年
35)	Country Strategy and Program: LAO PDR 2007-2011	書類、A4-35ページ	ADBのラオス国に対する援助基本方針	ADB	2008年
36)	Country Operations Business Plan: LAO People's Democratic Republic 2008-2010	書類、A4-35ページ	ADBの援助方針:ラオス国国家開発計画との整合性の保持	ADB	2007年
37)	Technical Guideline and Drawing Standard of Water Supply (Final draft, WSD)	書類、PDF	技術指針と計画基本図WASA	WASA	

番号	名称	形態	内容	発行機関	発行年
38)	Water and Water Resource Law	書類、PDF、A4-28ページ	水資源の管理保護法	PMO	2001年10月
39)	Law on Health Care	書類、PDF、A4-36ページ、後半英語	医療体制の整備法	MOH	2005年1月
40)	National policy on Health	書類、PDF、A4-13ページ、ラオス語		MOH	2006年3月
41)	Miniterial decision on Bottled Drinking Water	書類、PDF、A4-21ページ、後半英語	ボトル水水質を規定（かなり緩い）	MOH	2006年5月
42)	Hygiene Prevention Health Promotion Law	書類、PDF、A4-20ページ、ラオス語		MOH	2001年4月
43)	Report on the outcomes of studies and analyses carried out in sub-area 6L (MRC)	書類、PDF、A4-56ページ	Sub-area 6Lの短期長期開発のレビュー	MRC	2004年4月
44)	Primary Health Care Policy	書類、PDF、A4-23ページ、ラオス語		MOH	2001年1月
45)	Regulation on Public Hygiene (MOH, supported by WHO)	書類、PDF、A4-56ページ、ラオス語		MOH	2004年9月
46)	Regulation on Solid Waste Management of Public Service Area (MOH, supported by WHO)	書類、PDF、A4-46ページ、ラオス語		MOH	2004年9月
47)	Drinking water standard and water use in household (MOH)	書類、PDF、A4-32ページ、ラオス語		MOH	2005年10月
48)	Regulatory Accounting Guideline (WASA)	書類、PDF、A4-27ページ	資産、減価償却等の考えかた	WASA	2004年2月
49)	8027/DHUP Decision of WSD	書類、PDF、A4-6ページ	WASAの組織運営について	DHUP	2005年7月
50)	Water Discharge 2005(MIH)	書類、PDF、A4-9ページ	業種別排水放流基準の設定	MIH	2005年10月
51)	Overview of the Hydrology of the mekong Basin	書類、PDF、A4-82ページ	メコン水系の水文解説ならびに水理モデルの提案	MRC	2005年11月
52)	Laos Hunt Oil Company Guidebook for Field trip: Pakse Contract Area	書類、PDF、A4-16ページ	パクセ地域の地層地質に関する解説書	Hunt Oil Company	1994年2月
53)	Soil and Groundwater Salinization Problems in the Khorat Plateau, NE Thailand	書類、PDF、A4-54ページ	タイ国コラート台地における塩分土壌分布状況調査	German Academic Exchange Services	2005年7月
54)	Overview of the Hydrology of the Mekong Basin	書類、PDF、A4-82ページ	メコン水系の水文解説ならびに水理モデルの提案	MRC	2005年11月
55)	ラオス国チャンパサック及びサラワン県地下水開発計画調査	書類、PDF、A4-122ページ	チャンパサック県およびサラワン県における地下水状況	JICA	2005年11月