

**MINISTRY OF HEALTH  
THE KINGDOM OF CAMBODIA**

**BASIC DESIGN STUDY REPORT  
ON  
THE PROJECT FOR INFECTIOUS DISEASE CONTROL  
IN  
THE KINGDOM OF CAMBODIA**

**FEBRUARY 2009**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

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**INTERNATIONAL TOTAL ENGINEERING CORPORATION**

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## **PREFACE**

In response to a request from the Government of the Kingdom of Cambodia, the Government of Japan decided to conduct a basic design study on the Project for Infectious Disease Control and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Cambodia a study team from 29 June to 20 July, 2008.

The team held discussions with the officials concerned of the Government of Cambodia, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Cambodia from 23 to 30 October, 2008 in order to discuss a draft basic design, and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Kingdom of Cambodia for their close cooperation extended to the teams.

February 2009

Masafumi Kuroki  
Vice President  
Japan International Cooperation Agency

February 2009

## **Letter of Transmittal**

We are pleased to submit to you the basic design study report on the Project for Infectious Disease Control in the Kingdom of Cambodia.

This study was conducted by International Total Engineering Corporation, under a contract to JICA, during the period from June 2008 to February 2009. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Cambodia and formulated the most appropriate basic design for the project under Japan's Grant Aid scheme.

Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,

Shigehito Akagi

Project Manager,

Basic design study team on

the Project for Infectious Disease Control

in the Kingdom of Cambodia

International Total Engineering Corporation

## Summary

## Summary

The Kingdom of Cambodia (hereinafter referred to as “Cambodia”) is located in the central part of the Indochina Peninsula, bordering Vietnam to the east, Thailand to the west, and Laos to the north. The national land area is 181,000 square kilometers, slightly less than a half of that of Japan, and the population is 14.4 million (2007). The capital Phnom Penh, with the population of approximately one million, is the central city of the country’s administration, economy, and culture. Located at the confluence of the Mekong River and the Sap River, it has long been a crucial hub in the transportation network.

The climate is tropical monsoon climate with temperatures generally between 20 and 35°C. The rainy season extends from May to October, with particularly severe squalls in September and October. The period from November to April is the dry season with little precipitation due to the effect of dry northeastern monsoon.

The economy of Cambodia has been maintaining high growth for several years. The substantial economic growth in 2007 was 9.6%, although this figure was a decline from the record in the previous year. This economic growth depends heavily on the expansion of sewing and tourism industries. These two sectors alone represent 80% of the GDP.

Since July 2004, prices of foodstuff and petrol have been soaring. The consumer price index increased by 7.4% in the year from September 2003 to September 2004, with a 13% rise in transportation costs and 15% in foodstuff. The retail price of gas is 67% higher than that in Vietnam and 43% higher than that in Thailand and Laos. The impact of the oil price rise on Cambodian economy is tremendous, and the inflation rate in 2007 was 5.84%.

Per-capita GNP is 589 dollars (2007). The distribution of GDP among industry categories was 34.2% in primary industries, 26.7% in secondary industries, and 39.1% in tertiary industries (2005).

The health sector of Cambodia suffers from the underdevelopment of healthcare systems across the country partly due to the effect of the civil war. Recording the maternal mortality rate of 590 per 100,000 persons (2005), the infant mortality rate of 98 per 1,000 persons (2005), the situation remains inferior to that in the neighboring countries Vietnam and Thailand. There is an urgent need for improvement and enhancement in all parts of the health sector, including finance, organization, human resources, services, and infrastructure development.

In this situation, the Government of Cambodia has announced the Cambodian Millennium Development Goals (CMDGs) targeting at the reduction of the infant mortality rate, the improvement of maternal health, and the prevention of diseases such as malaria and HIV/AIDS. The Government also attaches high priority to infection control through immunization as part of basic health services in the Health Sector Strategic Plan 2008-2015.

Based on the above, the Government of Cambodia is strongly committed to the implementation of relevant programs, including the efforts to increase the government-funded procurement of vaccines in the National Immunization Program (NIP). Supported by the assistance from the Government of Japan and

other donors, the national average rate of vaccination has been increasing for more than 10 years. However, there is a problem that there are groups of people not receiving regular vaccination scattered in remote areas and urban slums, as indicated by the outbreak of vaccine-derived polio in 2006.

To ensure the quality (effectiveness) of vaccines at end-use vaccination sites, it is essential to practice appropriate management of vaccines (temperature control, storage, and transportation). However, a lack of appropriate management in some areas is causing disposal of vaccines, hampering the improvement of cost effectiveness. Although cold chain equipment that is essential to vaccine management has been provided by Japan and other donors and distributed for use in areas across the country, there is a need for solar-powered refrigeration and freezing equipment in some areas, such as remote sites without sufficient gas supply. Although the Government of Cambodia is addressing this problem through provision and replacement of equipment using its own fund, the present achievement is far from supplying such equipment in needed quantities. In addition, although installation of incinerators is an effective means to ensure safer treatment of used syringes and other items, the installation at healthcare institutions is not catching up with the need.

With this situation in the background, the Government of Cambodia planned the Project for Infectious Disease Control in the Kingdom of Cambodia, and requested Japan the implementation of the grant-in-aid cooperation regarding the fund for the procurement of cold chain equipment and transportation equipment needed for the strengthening of the Expanded Program for Immunization (EPI), as well as the procurement of incinerators needed for the treatment of used syringes.

In response to this request, the Japanese government decided to conduct a basic design study and dispatched a basic design study team for the period from 29 June to 20 July, 2008. After the study team returned back to Japan, a basic design was drafted based on the survey results and discussions held with the persons in charge of the MOH, and subsequently, the Japanese government sent a study team for an explanation of the Draft Basic Design Study Report for the period from 23 to 30 October, 2008.

This Project is intended to strengthen immunization activities in Cambodia and contribute to the improvement of the rate of vaccination, and thereby expected to lower the infant mortality rate and the maternal mortality rate. In this framework, this project covers the procurement of vaccines and related syringes for immunization campaigns, refrigerators for the storage of vaccines, vehicles for the transportation of vaccines, monitoring equipment for safe vaccine management, and incinerators for the safe disposal of used syringes.

The equipment procured by this project shall be allocated to the following facilities.

National Immunization Program (NIP)	1 location
Provincial Health Departments (PHD)	24 locations
Operational Districts (OD)	28 locations

Health Centers (HC), Health Posts (HP)	376 locations
Referral Hospitals (RH)	24 locations

Outline of the planned equipment is shown below.

Outline of Major Equipment

Description	Q'ty	Purpose of use
Refrigerator and icepack freezer with solar power system	30 units	To refrigerate and freeze EPI vaccines, and freeze ice packs by solar power generation in the areas difficult to procure LP gas
Pick up truck	3 units	To provide supervision, evaluation and training activities by NIP staffs
Incinerator	24 units	To burn the used syringes and medial waste from medical facilities
Measles vaccine	200,000 vials	To use for the National measles catch-up campaign scheduled for 2011

Upon the signing of the Exchange of Notes (E/N) between the Government of Cambodia and the Government of Japan, the work shall be executed in accordance with the Japanese grant aid framework. The work is estimated to require 14.56 months, including 5 months for detail design and 9.56 months for equipment procurement.

The estimated cost for the project to be borne by the Cambodian government is approximately 2 million Japanese Yen.

The implementation of this Project will realize the provision of cold chain systems at 376 health centers, enabling a stable supply of vaccines for immunization. In addition, the capability for appropriate medical waste treatment will be established in 24 areas, helping prevention of secondary infection resulting from inappropriate medical waste treatment. Furthermore, this project will secure the supply of measles vaccines for the 1.6 million infants who will require measles vaccination in 2011, contributing to the improvement in the rate of vaccination.

In view of the following reasons, this project is considered valid as a cooperation project conducted using the grant-in-aid fund of Japan.

- (1) Since this Project intends to develop cold chain systems in all 24 provinces of Cambodia, it will allow approximately 400,000 infants under the age of 1 and approximately 400,000 pregnant and childbearing women to receive vaccination with appropriately managed vaccines, providing direct benefits to these people. In addition, the procurement of measles vaccines will make it possible to conduct a campaign for supplementary vaccination against measles, planned for 2011 covering approximately 1.6 million children under the age of 5. This will reduce the size of susceptible population resulting from the incomplete coverage of regular vaccination, prevent the outbreaks of measles, and make it possible to attain the goal of measles eradication set for 2012 in the Western



Pacific region.

- (2) The Ministry of Health of Cambodia has developed the Health Sector Strategic Plan 2008-2015, in which the reduction of maternal, neonatal, and pediatric morbidity rate and mortality rate and the improvement of reproductive health are defined as a goal. The overcoming of infectious diseases that may be prevented through vaccination is regarded as an index of progress toward this goal and has been positioned as a prioritized issue. This project, which procures materials and equipment for the enhancement of infection control measures, will contribute to the attainment of the goals of the overall plan pursued by the Ministry of Health of Cambodia.
- (3) The main items to be procured in this project are refrigerators, vehicles, and incinerators, which would require no special knowledge or experience for maintenance. As the specifications for the planned equipment are similar to those for the items that are used effectively at respective facilities at present, it is expected that the equipment to be procured in this project will be used effectively.
- (4) The incinerators to be procured are fuelled by firewood and designed to minimize CO<sub>2</sub> emission. In addition, the amount of dioxins generated through incineration is in compliance with the environmental standards of Japan.

It is advised that the Cambodian side may take the following issues into consideration so that the effects of the project will be sustained more efficiently.

(1) Securing of Fund for Operating Cost Relating to Vaccination Activities

While vaccination is conducted at health centers and 80% of it depends on outreach activities, there is a general shortage of fund for these activities. This shortage is caused by the defects in the functioning of higher-level budgetary systems, such as that budget making does not adequately cover the needs of end-use medical institutions, that the fund allocated in the plan does not flow from higher-level organizations in a timely manner, and that the items in the approved budget often differ from those requested and fund does not reach the places where it is needed. This situation, if continued, would not only prevent the procurement of necessary materials and equipment but also diminish the motivation of healthcare personnel and impede activities. It is necessary to ensure the securing and allocation of fund needed for the operation of vaccination activities, so that the concern about these points may be eliminated.

(2) Improvement of the Capabilities for Management of Vaccines and Cold Chain Equipment

Vaccines must be procured and managed in a systematic manner, because they must be stored under certain temperature conditions and has expiration dates. As vaccines are distributed via provinces (PHD) and districts (OD) to health centers and other end-use medical institutions conducting vaccination activities, high priorities should be given to the measures ensuring that authorities at each level enhance

data collection, analysis, and monitoring and that central authorities develop appropriate vaccine procurement management plans and vaccination implementation plans. As vaccination activities are conducted at more than 1,000 sites, it is necessary to provide vaccine management guidance to these institutions, and also to ensure correct practice of vaccine management, making use of appropriate tools such as the data loggers to be procured in this project.

With respect to cold chain equipment, we have noted that provinces (PHD) and districts (OD) sometimes fail to keep adequate records of how these supplies are distributed to and used at lower-level institutions, and end-use medical institutions sometimes have equipment for which the year of procurement is unknown. It is therefore necessary to reorganize the information regarding the years in use and the condition of equipment. Appropriate inventory management should be practiced, making sure that the inventory kept at the Ministry of Health is checked against the actual conditions.

### (3) Continuation of Procurement of Vaccines

Continuity is required in the procurement of vaccines, as well as in the management of cold chain equipment. Cambodia has been procuring vaccines with the assistance from Japan, GAVI, UNICEF, etc., gradually increasing the percentage of procurement using the country's own budget. However, as donor countries and donor organizations are curtailing assistance in vaccines, a situation is feared to occur in which a sudden cutback in the budget from the Government of Cambodia or a delinquency in payment might severely impede the implementation of vaccination programs. It is therefore necessary that the Government of Cambodia should commit itself to the securing the budget for vaccines in the future.

### (4) Prevention of Secondary Infection

The recovery and incineration of used AD syringes should be conducted strictly to ensure the prevention of secondary infection.



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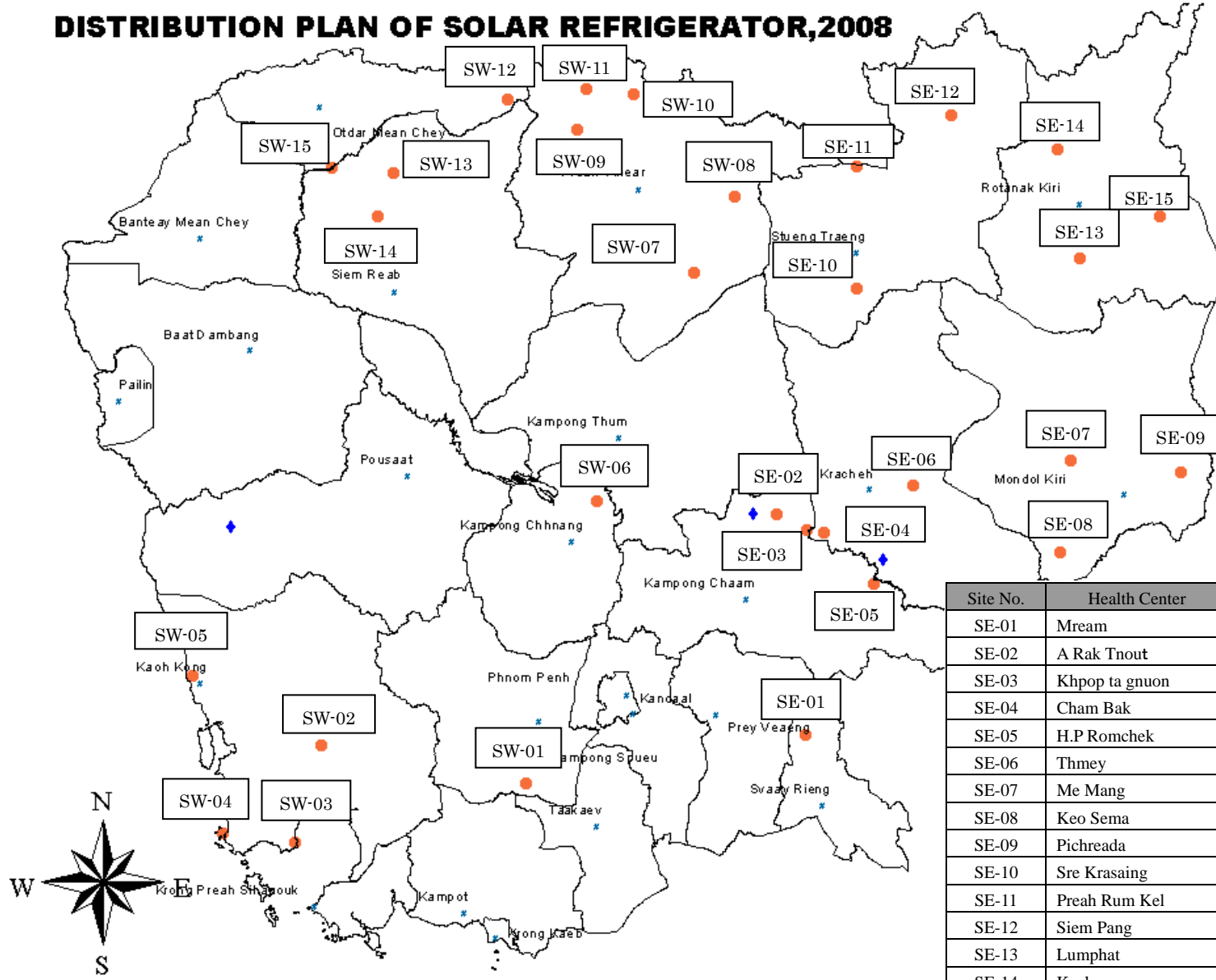
1. Member List of the Study Team
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3. List of Parties Concerned in the Recipient Country
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# Location Map



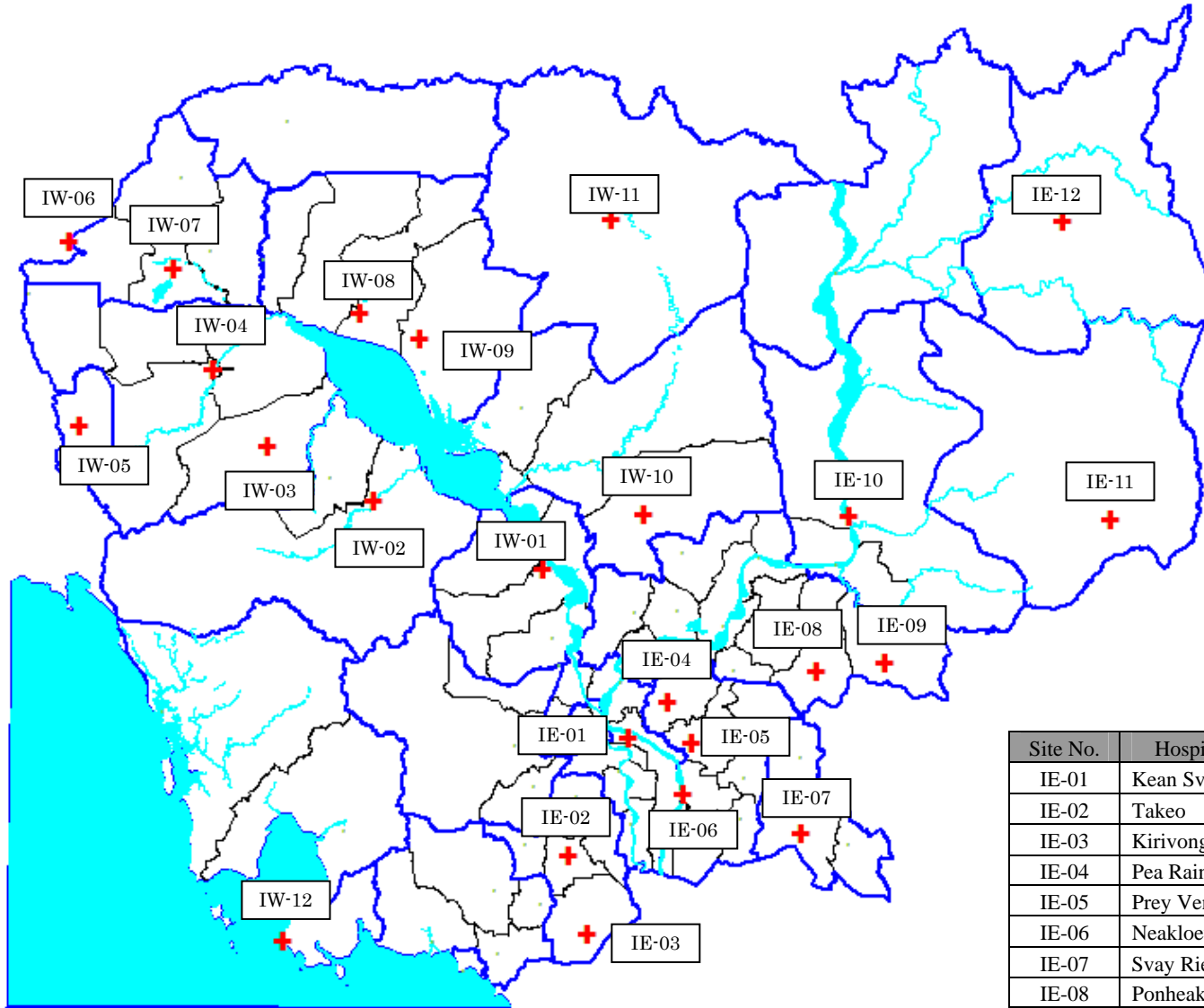
The Kingdom of Cambodia

# DISTRIBUTION PLAN OF SOLAR REFRIGERATOR, 2008



Site No.	Health Center	Site No.	Health Center
SE-01	Mream	SW-01	Kat Phlouk Pheakadey
SE-02	A Rak Tnout	SW-02	Chiphat
SE-03	Khpop ta gnuon	SW-03	Thmor Sar
SE-04	Cham Bak	SW-04	Kiri Sakor
SE-05	H.P Romchek	SW-05	Neang Kok
SE-06	Thmey	SW-06	Chror Nouk
SE-07	Me Mang	SW-07	Chhnuon
SE-08	Keo Sema	SW-08	Chheip
SE-09	Pichreada	SW-09	Yeang
SE-10	Sre Krasaing	SW-10	Chom Ksan
SE-11	Preah Rum Kel	SW-11	Sa Em
SE-12	Siem Pang	SW-12	Trapaing Prasat
SE-13	Lumphat	SW-13	Varin
SE-14	Kachon	SW-14	Kok Daung
SE-15	Oyadav	SW-15	Sleng Spean

Distribution Plan for Solar Refrigerator



30 0 30 60 Kilometers



Site No.	Hospital Name	Site No.	Hospital Name
IE-01	Kean Svay	IW-01	KG. Chhnang
IE-02	Takeo	IW-02	Pursat
IE-03	Kirivong	IW-03	Mong Russey
IE-04	Pea Raing	IW-04	Battambang
IE-05	Prey Veng	IW-05	Pailin
IE-06	Neakloeng	IW-06	B.M. Chey
IE-07	Svay Rieng	IW-07	O Chrov
IE-08	Ponheakrek	IW-08	Siemreap
IE-09	Memot	IW-09	Sothr Nikum
IE-10	Kratie	IW-10	Baray
IE-11	Mondul Kiri	IW-11	Preh Vihear
IE-12	Rattanakiri	IW-12	Sihanouk Ville



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## ABBREVIATIONS

Abbreviation	Original Name
AD	Auto Disabled
AI	Avian influenza
CDC	Council for the Development of Cambodia
CMDGs	Cambodia Millennium Development Goals
CMS	Central Medical Stores
CPA	Complementary Package of Activities
DPT	Diphtheria-Pertussis-Tetanus Vaccine
E/N	Exchange of Notes
EDC	Electricite du Cambodge
EPI	Expanded Program on Immunization
G/A	Grant Agreement
GAVI	Global Alliance for Vaccines and Immunization
GDP	Gross Domestic Product
HC	Health Center
HepB	Hepatitis B Vaccine
HP	Health Post
HRD	Human Resource Development
IPP	Independent Power Producer
JE	Japanese Encephalitis
JICA	Japan International Cooperation Agency
MCH	Maternal and Child Health
MEF	Ministry of Economy and Finance
MOH	Ministry of Health
MPA	Minimum Package of Activities
NGO	Non Governmental Organization
NIP	National Immunization Program
NIS	National Institute of Statistics, Ministry of Planning
OD	Operational District
OPV	Oral Polio Vaccine
PATH	Program for Appropriate Technology in Health
PHD	Provincial Health Department
RGC	The Royal Government of Cambodia
RH	Referral Hospital
UNICEF	United Nations International Children's Emergency Fund
URC	University Research Co., LLC
WHO	World Health Organization
WHO/WPRO	World Health Organization, Western Pacific Regional Office

## Chapter 1. Background of the Project

# Chapter 1 Background of the Project

## 1-1 Background and outline of the Project

### (1) Background of the Project

The health sector of Cambodia suffers from the underdevelopment of healthcare systems across the country partly due to the effect of the civil war. Recording the maternal mortality rate of 590 per 100,000 persons (2005), the infant mortality rate of 98 per 1,000 persons (2005), the situation remains inferior to that in the neighboring countries Vietnam and Thailand. There is an urgent need for improvement and enhancement in all parts of the health sector, including finance, organization, human resources, services, and infrastructure development.

In this situation, the Government of Cambodia has announced the Cambodian Millennium Development Goals (CMDGs) targeting at the reduction of the infant mortality rate, the improvement of maternal health, and the prevention of diseases such as malaria and HIV/AIDS. The Government also attaches high priority to infection control through immunization as part of basic health services in the Health Sector Strategic Plan 2008-2015.

Based on the above, the Government of Cambodia is strongly committed to the implementation of relevant programs, including the efforts to increase the government-funded procurement of vaccines in the National Immunization Program (NIP). Supported by the assistance from the Government of Japan and other donors, the national average rate of vaccination has been increasing for more than 10 years. However, there is a problem that there are groups of people not receiving regular vaccination scattered in remote areas and urban slums, as indicated by the outbreak of vaccine-derived polio in 2006.

To ensure the quality (effectiveness) of vaccines at end-use vaccination sites, it is essential to practice appropriate management of vaccines (temperature control, storage, and transportation). However, a lack of appropriate management in some areas is causing disposal of vaccines, hampering the improvement of cost effectiveness. Although cold chain equipment that is essential to vaccine management has been provided by Japan and other donors and distributed for use in areas across the country, there is a need for solar-powered refrigeration and freezing equipment in some areas, such as remote sites without sufficient gas supply. Although the Government of Cambodia is addressing this problem through provision and replacement of equipment using its own fund, the present achievement is far from supplying such equipment in needed quantities. In addition, although installation of incinerators is an effective means to ensure safer treatment of used syringes and other items, the installation at healthcare institutions is not catching up with the need.

With this situation in the background, the Government of Cambodia planned the Project for Infectious Disease Control in the Kingdom of Cambodia, and requested Japan the implementation of the grant-in-aid cooperation regarding the fund for the procurement of cold chain equipment and transportation equipment needed for the strengthening of the Expanded Program for Immunization (EPI), as well as the procurement of incinerators needed for the treatment of used syringes.

(2) Outline of the Request

The original request listed 12 items, including 5 items of cold chain-related equipment, 3 items of monitoring tool for vaccine and cold chain, 2 items of vehicles for monitoring, and 2 items of waste disposal-related equipment.

The field survey found that a part of the equipment for avian influenza (AI) vaccines, which had been requested via UNICEF, had already been procured and overlapped with the cold chain equipment requested in this project. Although the Cambodian side explained that the procured equipment for AI would not overlap with the planned allocation of the equipment in their request for Japan, we conducted reconfirmation of the sites to be covered in this project based on the inventory of existing equipment.

In addition, the list in the final request was expanded to include measles vaccines and syringes, which the Cambodian side asked to consider in the communication sent before the study team left Japan, and Japanese encephalitis vaccines and syringes and the syringes for BCG, which was requested during the discussion in Cambodia.

The following two items, which were listed in the original request, was excluded from the final request as a result of discussion.

- Spare parts (for refrigerators)

Because the requested item was found to be the spare parts for the refrigerators that the Government of Cambodia had procured in the past, this item was excluded from this project.

- Safety boxes (10 liters)

Because 5-liter safety boxes were found to be stockpiled in sufficient supply at the Central Medical Store (CMS) of the Ministry of Health and 10-liter safety boxes were intended not for vaccination programs but for the treatment of used injection needles at hospitals, deviating from the purpose of this project, these were excluded from this project.

The final requested equipment agreed in the Minutes of Discussions is as follows. Priority A is higher priority.

**Table 1-1 Final Requested Equipment**

No.	Description	Q'ty	
		Priority A	Priority B
<b>Cold Chain and Vaccine Storage</b>			
1	Icelined Refrigerator	78 units	
2	Refrigerator with Solar Power System	30 sets	
3	Cold Box	67 units	
4	Vaccine Carrier	310 units	
<b>Monitoring tool for Vaccine and Cold Chain</b>			
5	Temperature data logger		48 units
6	USB Connection cable for connecting data logger to PC		24 pcs.
7	Freeze watch indicator	500 pcs.	
8	Refrigerator monitor	1000 pcs.	

No.	Description	Q'ty	
		Priority A	Priority B
<b>Transport of Vaccine, Cold Chain and Monitoring activities</b>			
9	Motocycle	50 units	
10	Pick up truck	2 units	2 units
<b>Safe Disposal</b>			
11	Incinerator	24 units	13 units
<b>Addition</b>			
12	Measles Vaccine (10 doses)	200,000 pcs.	
13	AD syringe (0.5ml)	2,000,000 pcs.	
14	Syringe (5ml) & Needle (21G×1,5)	200,000 pcs.	
15	AD syringe for BCG (0.05ml)		400,000 pcs.
16	Japanese Encephalitis Vaccine		2,000,000 pcs.
17	AD syringe for JE		200,000 pcs.

## 1-2 Natural Conditions

The Kingdom of Cambodia is located in the central part of the Indochina Peninsula, bordering Vietnam to the east, Thailand to the west, and Laos to the north. The national land area is 181,000 square kilometers, slightly less than a half of that of Japan. Located at the confluence of the Mekong River and the Sap River, it has long been a crucial hub in the transportation network.

The climate is tropical monsoon climate with temperatures generally between 20 and 35°C. The rainy season extends from May to October, with particularly severe squalls in September and October. The period from November to April is the dry season with little precipitation due to the effect of dry northeastern monsoon.

## 1-3 Social and Environmental Issues

Coolants for refrigerators planned to be used in the refrigerator for this project satisfy WHO and UNICEF standards, with no use of chlorofluorocarbon. Incinerators used to incinerate used AD syringes for vaccination collected in a safety box to prevent secondary infections also satisfy Japanese environmental standards in terms of its dioxins emissions. The incinerators also use bio fuel (wood fuel) that does not increase the total CO<sub>2</sub> in the world in view of the prevention of global warming. Thus, this project is extremely unlikely to have direct adverse impact on the project site or its surroundings.



## Chapter 2. Contents of the Project



## Chapter 2 Contents of the Project

### 2-1 Basic Concept of the Project

#### 2-1-1 Objectives of the Project and its Overall Goals

The Government of Cambodia formulated strategies to achieve the Cambodian Millennium Development Goals (CMDGs) in its National Strategic Development Plan 2006-2010. The priority issue in the health sector is the improvement of people's health conditions. More specifically, the country aims to improve maternal health and reduce the infant mortality rate and it targets to achieve immunization indicators.

The government has also given priority to immunization for preventing infectious diseases in its Health Strategic Plan 2008-2015, aiming to achieve the goal of the CMDGs, which include the improvement of maternal health and reduction of the infant mortality rate.

Cambodia's Ministry of Health formulated the National Immunization Program Strategic Plan 2008-2015 as measures to tackle infectious diseases. It contains 12 goals, which include an increase in vaccination coverage, eradication of specially designated diseases and improvement of the vaccine control mechanism in the categories of (I) Service Delivery, (II) Surveillance and Disease Control, (III) Logistics, Communication and Training, and (IV) Health System and Program Management.

Immunization programs in Cambodia have been planned and implemented continuously, funded by foreign aids which include aids from Japan as well as by its national government. The vaccination rates against BCG, polio, DPT + hepatitis B, and measles (1st vaccination) are improving steadily. However, the vaccination rate against hepatitis B for new-born babies and the rate against tetanus for pregnant women remain low, probably due to the low delivery rate at health centers (as it is difficult to access to such facilities), lack of awareness among pregnant women and focus on vaccination for children. The situation needs to be improved.

Although the incidence of measles dropped to 264 cases in 2005, it is now increasing, 508 cases in 2006 and 1,294 cases in 2007. The source of infection supposed to be children who did not vaccinate at the time of routine campaign or children did not immunize by the first vaccination nor had weak immunity to measles. Therefore, it is necessary to have all children receive the second vaccination as much as possible, and the incidence avoid further more, vaccination campaigns need to be conducted every few years.

Meanwhile, equipment for vaccination programs is not sufficient.

Many health centers do not own enough motorcycles and private motorcycles are used for outreach programs. The travel distance of 12 of 15 vehicles owned by the National Immunization Program (NIP), an implementing agency of the Ministry of Health reaches 180,000 to 350,000 kilometers. Such a condition causes concern over monitoring, instructions and surveillance of vaccination.

Some facilities are not equipped with cold chain equipment or have difficulties obtaining propane gas necessary for running refrigerators because of their location. Such facilities without refrigerator are impossible to store vaccines, and this situation obstructs their vaccination activities.

Environment-friendly incinerators are absolutely necessary to dispose the used injection needles generated at their vaccination activities. However they are yet to be allocated in some areas, which has raised the risk of secondary infection caused by used injection needles and other medical wastes.

These equipment necessary for vaccination activities are related each other at the series of flows such as appropriate transportation, storage, vaccination and disposal of vaccines so that all items are indispensable.

However, the priority issue for the Ministry of Health is to secure the budget for obtaining vaccines for routine vaccination and for operation and maintenance of existing cold chain related equipment. It is difficult for the government to secure the budget to acquire vaccines for campaigns and replace or install additional cold chain equipment and equipment for disposal of medical wastes.

Against the backdrop, this project is to improve the vaccine management system and contribute to the improvement of vaccination coverage through procurement of vaccines and cold chain related equipment and equipment for waste disposal, which are important to promote the achievement of the Health Strategic Plan 2008-2015.

#### 2-1-2 Outline of the Project

This project is intended to strengthen immunization activities in Cambodia and contribute to the improvement of the rate of vaccination, and thereby expected to lower the infant mortality rate and the maternal mortality rate. In this framework, the requested Japanese assistance covers the procurement of vaccines and related syringes for immunization campaigns, refrigerators for the storage of vaccines, vehicles for the transportation of vaccines, monitoring equipment for safe vaccine management, and incinerators for the safe disposal of used syringes.

## 2-2 Basic Design of the Requested Japanese Assistance

### 2-2-1 Design Policy

In response to the request made by the Cambodian government, and based on surveys and discussions held between the two governments, it was decided that the following policies below shall be adopted for implementation of the requested Japanese assistance. This project is to support the implementation of Cambodia's National Immunization Program Strategic Plan 2008-2015 aiming at the infectious diseases control for vaccinations through the procurement of vaccines, cold chain-related equipment and equipment for waste disposal indispensable for promoting the program across the country.

However Japanese Encephalitis (JE) Vaccine and AD syringe for JE as additional request shall be excluded since the immunization program does not cover this vaccine. And AD syringe for BCG shall be also excluded for encouraging self-help efforts of the Cambodian side since BCG vaccination is including the routine immunization program.

#### (1) Basic Policy

The equipment plan shall be formulated in view of the immunization programs, disposal of medical waste, technological capacities and financial capability. Equipment to be procured will match the functions facilities should perform.

#### 1) Target Facilities

The vaccination campaigns cover the whole area. However, target facilities of this project shall be the ones that carry out vaccination and facilities that dispose of medical waste.

#### 2) Contents of Equipment and Quantities

This project is to procure equipment necessary for vaccination, storage, management and transport of vaccines as well as equipment necessary for medical waste disposal.

- ① The cold chain equipment such as refrigerators shall be planned the minimum number, that is 1 unit for each the facility which need it.
- ② The vehicles shall be planned as the replace of the ones logged more than 150,000 kilometers within the current operation system.
- ③ The incinerators for medical waste disposal shall be planned the minimum number, that 1 unit for each the hospital can manage it themselves. For safety reasons, installation of the incinerators requires construction of house for incinerators. As it is technically-difficult for the Cambodian side to install the roof suitable for the chimney stack and the concrete foundation for heavy load over 700kg, it shall be included in the project plan by Japanese side.
- ④ The target of measles vaccination shall be the children aged between 9 months and 4 years at the vaccination campaign in 2010. The required amount of measles vaccines are calculated based on

the target population, vaccination rate, vaccination frequency and wastage factor of measles vaccine.

(2) Policy on Natural Environment Condition

The whole area of Cambodia is the tropical monsoon region and the daily highest temperature exceeds 35°C in April and May during the hottest season. Thus, refrigerators should be the ones that keep inside temperature between 2°C and 8°C even during the hottest season. Such equipment as vaccines, freeze watch indicators and refrigerator monitor cards that require temperature control needs to be transported and stored at proper temperature.

Cambodia is in rainy season from May to October, which makes inland transportation difficult in regions with bad road conditions. Thus, inland transportation and installation of equipment should not be planned in the season.

(3) Policy on Socioeconomic Condition

Electricity and propane gas prices are soaring in Cambodia and thus operation and management of cold chain equipment is becoming financially difficult.

The electricity coverage rate in Cambodia is only 17 percent, which is the lowest in Southeast Asia. Most areas where health centers are located have no electricity supply. Thus, refrigerators to be provided in these areas shall be the ones run by combustion of propane gas.

In areas where propane gas is not so easily available (located in areas where it is difficult to secure access from the operation district that supplies propane gas or transportation of propane gas by boat, for example, is costly), refrigerators with solar power system will be provided to reduce the operation and maintenance cost to be shouldered by the Cambodian side.

(4) Policy on Procurement

Equipment to be procured in this project will be made in Japan or Cambodia in principle. However, because of the product uniqueness and limited manufacturers, cold chain related equipment and vaccines may be procured from a third country upon agreement by both countries if it is considered desirable.

Such the equipment as vaccines that require temperature control shall be transported by air to the Phnom Penh Airport and the equipment that does not require installation shall be transported by sea to the Sihanoukville Port. After landed, it shall be transported by land to the Central Medical Store (CMS) of the Ministry of Health in Phnom Penh as the place of delivery. The Cambodian side shall be responsible for the distribution of equipment from the place of delivery to the final destination.

The equipment that requires installation work shall be transported by sea to the Sihanoukville Port and delivered to the target sites by land.

(5) Environmental Policy

In view of ozone layer protection and prevention of global warming, insulation and refrigerant of refrigerators shall be CFC-free with no specified chlorofluorocarbon. Incinerators shall be the ones that meet international standards including Japanese standards in order to control dioxin emissions

and control CO2 emissions as much as possible for measures towards global warming.

(6) Policy on Operation and Maintenance

Gas refrigerators do not have any special operational or maintenance difficulties, whereas refrigerators with solar power system require some special care. It is important not to use the attached battery for other purposes (overload) and not to recharge the battery with generators, etc. (overcharge) to use them for a long time. As for incinerators, it is important not to incinerate more than the allowance and they also require regular painting and replacement of fire grates.

Instructions on operation and maintenance will be provided by supplier when the equipment is delivered.

As for motorcycles and pick-up trucks, manufacturers with local agencies will be chosen to ensure proper operation and maintenance, although consumables including oil and tires are now being replaced.

The operation and maintenance manuals will be made available in English and basic operation instructions in the manuals shall be translated into Khmer.

(7) Policy on Grades, Specifications and Quantity of Equipment

Grades and specifications of cold chain equipment shall be the ones necessary for vaccination that meet cold chain standards established by the Cambodian government or those recommended by the WHO in principle. Vehicles and motorcycles for transportation of vaccines and vaccination activities shall be the ones commonly available locally. Syringes will be chosen among the ones approved by the WHO or with appropriate ISO accreditation. Vaccines shall be chosen from those made by WHO-approved manufacturers.

Because the refrigerators are solely for the cold chain, part replacement recommended by manufacturers shall be also included in the project plan in consideration of their service life.

The proper quantity shall be decided based on the number of target facilities and their activities.

(8) Policy on Entire Process

This project shall be avoided rainy season and be completed in view of the timing of measles vaccination campaign planned by the Cambodian government.

## 2-2-2 Basic Plan

### (1) Overall Plan

Equipment to be procured in this project shall be allocated to the following facilities:

National Immunization Program (NIP)	: 1 location
Provincial Health Department (PHD)	: 24 locations
Operational District (OD)	: 28 locations
Health Center (HC), Health Post (HP)	: 376 locations
Referral Hospital (RH)	: 24 locations

### (2) Criteria for Equipment Section

Equipment shall match functions the facilities should perform, in view of the role and activities of each facility. Criteria for equipment selection are as follows. Appendix-7, Examination of the Requested Equipment, shows the result of examination of individual equipment.

Table 2-1 Criteria of Equipment Selection

Item of Examination	Contents of Examination	
① Purpose of use	○	Equipment which are suitable for Cambodian EPI Program, Vaccines, Incinerator for medical wastes.
	△	Equipment which can be substituted with other equipment
	×	Equipment which are not compatible with Cambodian EPI Program, Vaccines, Incinerator for medical wastes.
② Necessity	○	Equipment which are essential for EPI activities, equipment with beneficiary effects for patients and staff.
	×	Equipment which are not necessary for the activities, and can be substituted with the existing equipment. Also equipment which must be procured by the recipient side.
③ Technical level	○	Equipment which are compatible with the current technical level, and which can be used with easy training.
	×	Equipment which require advanced techniques.
④ Management System	○	Equipment for which staff allocation plan is provided.
	×	Equipment for which staff allocation plan is not provided.
⑤ Operation and maintenance system	○	Maintenance-free equipment or equipment which requires only easy maintenance and can be repaired by staff. Also, equipment which the after sale service by manufactures is available and easy to procure spare parts / consumables.
	×	Equipment which are difficult to be maintained by staff, and equipment which cannot offer the after sale services, and difficult to procure spare parts / consumables.
⑥ Operation and maintenance cost	○	Equipment which maintenance cost is negligible, or which do not give budgetary burden to the recipient country.
	×	Equipment which may cause budgetary problem because introduction of new equipment and replacement require large amount of maintenance cost.
⑦ Overall decision	○	Equipment judged appropriate and included in the Project.
	×	Equipment judged inappropriate and excluded from the Project.

### (3) Examination of Requested Equipment

#### ① Refrigerator and icepack freezer

As we plan to provide standard cold chain equipment that matches the facility level and infrastructure, we basically plan to choose standard equipment as well as compact electric and gas equipment similar to the existing equipment at health centers in area with no electricity. Because stable refrigeration function needs to be secured even in areas where temperature rises sharply, icepack (freeze icepack inside and maintain the inside temperature for a certain time period in case of power outage or when no gas is available) cold chain equipment is most appropriate and this type of equipment shall be planned to be procured.

#### ② Refrigerator and icepack freezer with solar power system

Standard cold chain equipment does not include refrigerators with solar power system. However, solar-powered refrigerators shall be included in this project because there is no power supply and it is difficult to procure propane gas in some areas in Cambodia. The survey revealed that they are in great need for improvement of cold chain system. Icepack freezing function shall be also included.

High quality battery shall be chosen for solar power, avoiding locally available low quality battery for vehicles. Refrigerators shall meet the WHO and UNICEF standards and the solar panel and battery shall have the capacity to cover the power necessary for refrigerators. The current system of the refrigerators shall be DC to match the battery current.

#### ③ Vaccine cold box ④ Vaccine carrier

The vaccine cold box and the vaccine carrier are used for vaccine transportation. The cold box is also used to store vaccines temporarily at regular cleaning of the refrigerator. Because these are consumables and some of existing boxes have lower cooling capacity, they are provided to replace existing ones. Boxes and carriers with high heat resistance shall be chosen to ensure temperature control even at very hot areas.

#### ⑤ Data logger ⑥ Interface cable for data logger

It is important to control temperature for proper storage of vaccines. There are cases of measles developed by vaccinated persons and there is a sense of risk over the control of vaccine storage temperature.

The data logger is mainly used during vaccine transportation (from central medical store to provincial storehouses, then to prefectural storehouses) to check the temperature fluctuation inside the cold box. The data is uploaded via a USB connection cable onto the computer to confirm the safe storage environment of vaccines.

It is confirmed that computers can be allocated by Cambodia.

#### ⑦ Freeze watch indicator

The freeze watch indicator is used to monitor the storage temperature of vaccines (DPT-B hepatitis, tetanus, hepatitis B). Storage temperature below 0°C affects the quality of vaccines. The freeze

watch indicator is placed inside the cold box during vaccine transportation (from central medical store to provincial storehouses, then to prefectural storehouses). The equipment indicates abnormalities when the inside temperature drops below 0°C. It is a consumable and cannot be reused.

⑧ Refrigerator monitor card

The refrigerator monitor card is used for temperature control of refrigerators allocated throughout the country in order to check the safety of vaccines. The inside temperature needs to be kept between 0°C and 8°C. The equipment indicates abnormalities when the inside temperatures exceeds 10°C. It is a consumable and cannot be reused.

⑨ Motorcycle

Although there are some motorcycles for vaccination at the operational district level, they are rarely allocated to 880 health centers, the front line of the activities. Privately owned motorcycles are used for outreach programs and transportation of safety boxes that contain vaccines and used syringes. Thus, motorcycles are highly needed to support the workers. The motorcycles to be provided in the project shall be small ones with an engine size of 110cc to 130cc, which even small female vaccination promotion staff can drive safely.

⑩ Pick up truck

There are 15 vehicles (10 vans and 5 trucks) at the NIP. Although three vans are in a good condition, the rest of the 12 vehicles are 11 to 13 years old with the travel distance of over 190,000 kilometers and they break down frequently. As the average annual travel distance is 20,000 kilometers to 30,000 kilometers, exceeding 16,180 kilometers assumed in the simple equipment survey the Japanese government conducted in 2003, it is fair to conclude that all vehicles are fully utilized.

Although there are two types of four-wheel vehicles, vans and trucks, the purpose of their use is almost the same, mainly used for supervision of regular vaccination, evaluation and survey of vaccination, training and instructions and case studies. The trucks to be procured in this project will be used for the same purposes in the similar frequency.

The requested trucks are lighter than vans and can drive relatively stably even under bad road conditions in rural areas. They also allow more load than vans. For these reasons, trucks will be planned for the project. Although the standard-type pick-up trucks shall be chosen in principle, accessories necessary for safe drive, which include spare tires, jacks and mud guards, will be also included.

⑪ Incinerator

Although the Cambodian government requires medical wastes including used syringes be disposed of by incinerators, there is an increasing risk of secondary infections partly because incinerator development lags behind. There are cases of citizens including children collect used syringes from



wastes to sell them, which has become a social problem. Although there are problems of management of medical wastes at medical institutions and waste facilities, there is an urgent need to develop a safe medical waste disposal system.

The incinerators in this project are to dispose of used syringes collected from health centers and medical wastes in general from hospitals (used needles, linen and gauze).

We examined the adequacy of the products in terms of their maintenance cost, environmental consideration, durability.

#### A. Operation and maintenance cost

Because it is important to reduce maintenance cost for Cambodia in severe financial conditions, the incinerators that can be operated economically shall be planned to be procured in this project.

#### B. Environmental condition

##### a. CO2 Emissions

In view of global warming prevention, the incinerators with fuel that does not increase the total CO2 on the globe shall be planned to be procured in this project.

##### b. Countermeasures against dioxin

The incinerators which the incineration temperature can be maintained at over 800°C and its dioxin emissions are 2.5-TEQ/m<sup>3</sup> (O<sub>2</sub>=12%), which satisfies Japanese environmental standards (5ng-TEQ/m<sup>3</sup>N or below) shall be planned to be procured in this project.

#### C. Durability

Incinerators which enough durability and safety can be secured, even if inside temperature rise over 800°C, shall be planned to be procured in this project.

#### ⑫ Measles vaccine ⑬ AD syringe for measles ⑭ Disposable syringe for dilution of measles vaccine

In the whole world, mainly in developing countries, 20 million to 30 million people are developed with measles every year. A total of 345,000 people are estimated to have lost their lives due to measles (fatality rate: 3 to 5 percent) in 2005. Measles account for 4 percent of cause of death of children aged five or younger in the world.

Measles virus can be transmitted not only through air but also by droplet transmission or contagious infection. Only humans become the host of the virus. The virus is highly infectious and more than 90 percent of susceptible people (those who have no immune antibody) are infected when exposed to the virus. There is no decisive treatment once the disease is developed. It can lead to such complications as pneumonia and encephalitis during the acute stage and can result in such a serious complication as subacute sclerosing panencephalitis (SSPE) as well as death several years later. Such preventive measures as washing hands, wearing a mask are not sufficiently effective. The only valid preventive measure is vaccination to become immune to the virus.

Cambodia's Ministry of Health carried out four additional measles vaccination campaigns

throughout the nation from December 2000 to May 2004 after a large breakout of measles in 2000.

A total of 170,000 children between 9 months and 4 years in age in 9 remote provinces received vaccination in Phase 1 (December 2000 to May 2001). A total of 4.5 million children between 9 months and 14 years in age in populated 15 states received vaccination in Phase 2 (October 2001 to April 2002) and Phase 3 (October 2002 to April 2003), and additional 400,000 children aged between 7 and 14 in provinces where the campaign was conducted in Phase 1 received vaccination as additional vaccination in Phase 4 (January to May 2004).

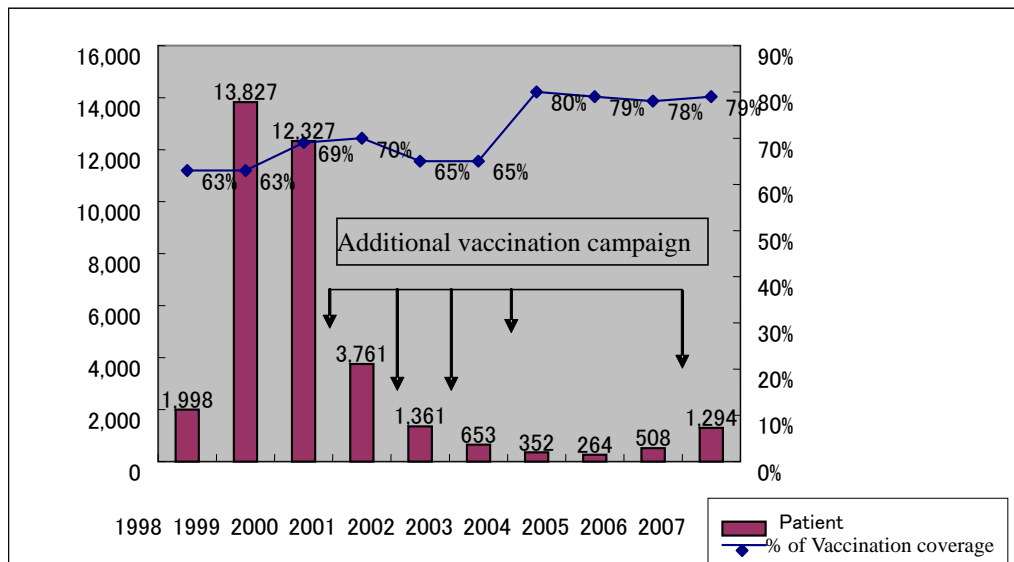


Fig.2-1 No. of Measles and Vaccination Coverage

Furthermore, three years later, in February and March 2007, additional measles vaccination program for 1.5 million children aged 5 or younger was carried out, sponsored by the WHO, UNICEF and the Japanese government. As a result, the vaccination coverage has reached 105 percent.

The Ministry of Health is actively promoting the national plan (National Immunization Program Strategic Plan) to eradicate measles by the year 2012. Although it plans to make the second vaccination a routine as it is said to be effective, it has been postponed due to its financial limitation.

Meanwhile, 2010-2011 three or four years after the most recent campaign is estimated to fall into the cycle of epidemics and a large outbreak that occurred in 2000 may occur again, if no measure is taken. Because carrying out another campaign in the year enables effective measles control, measles vaccines are highly needed and thus highly reasonable for the project. Thus, measles vaccines are the target of the project.

⑮ AD syringe for BCG

BCG vaccination has already become a routine. The vaccines and AD syringe for BCG have to be procured by the recipient country. AD syringe for BCG are not included in this project.

⑩ Japanese Encephalitis (JE) Vaccine    ⑪ AD syringe for JE

Japanese encephalitis vaccines are not included in this project for the following reasons:

- It is not included in the National Immunization Program Strategic Plan 2008-2015.
- JE vaccination is not conducted as a routine and there is no data (index) for baseline. (to be completed in September 2008)
- The vaccine is still under development and WHO approval is pending.

(4) Equipment Plan

① Refrigerator and icepack freezer

The Cambodian government has a plan of allocating one health center for every 10,000 persons. Thus, one compact refrigerator to be allocated at each health center is enough for the amount of vaccines if it has the size of the requested refrigerator. In this project, a total of 78 refrigerators is planned to be procured for health centers with no refrigerator and health centers where the equipment is out of order or has been repaired many times in areas where propane gas can be supplied.

② Refrigerator and icepack freezer with solar power system

The target of the equipment is 30 health centers that carry out vaccination campaigns in areas where propane gas cannot be obtained easily.

③ Vaccine cold box

There are 1,332 cold boxes currently. Of the boxes, temperature of 185 boxes cannot be properly controlled due to damage, etc. Because the requested number is within the number of the units that need to be replaced, the quantity of 67 boxes is reasonable.

④ Vaccine carrier

Two carriers are needed per health center, one for the outreach program and one for vaccination in the health center. There are 880 health centers in the country and thus a total of 1,760 carriers are needed for replacing all vaccine carriers at all centers. Because there are 1,260 vaccine carriers in stock at the CMS, 500 carriers are in short. The requested number of 310 is within its shortage, thus, the quantity of 310 is reasonable.

⑤ Data logger

Data management has already begun at the CMS. The logger shall be allocated to 24 provinces to strengthen the management system at the provincial level. Each province will be equipped with two loggers (transportation from the central medical store and to prefectural storehouses), which is a total of 48 units.

⑥ Interface cable for data logger

Interface cable shall be allocated to the management office to connect the data logger with the computer. A total of 24 cables are procured to provide one for each management office in 24

provinces.

⑦ Freeze watch indicator

Vaccine transportation from the CMS to 24 provinces is planned four times every year. Because an average of 5 freeze watch indicators is used per transportation, it requires a total of 480 indicators. Because the procurement unit is 400 and 500 indicators are requested, 400 indicators are planned to be procured within the requested quantity.

⑧ Refrigerator monitor card

Because there are more than 1,500 refrigerators to store vaccines at health centers in the country, the requested number of 1,000 that is within the required number is reasonable.

⑨ Motorcycle

There are not enough motorcycles at more than 880 health centers, the requested 50 units are planned to be procured.

⑩ Pick up truck

There are 12 drivers at the NIP and thus the upper limit of the truck to be allocated is 12. Because 6 trucks are scheduled to be procured by other donor and three existing vehicles are in good condition, 3 vehicles will be procured in this project although 4 trucks are requested.

The vehicles for replacement with new ones will be the ones with the travel distance of 320,000 kilometers or more procured in 1996 by the Rotary Club, not including the ones procured in 1995 and 1997 by the Japanese government.

⑪ Incinerator

A total of 37 incinerators were requested to be installed at Referral Hospitals in the country. The 24 units of priority A agreed in the Minutes of Discussions are CPA-1, CPA-2 and CPA-3 hospitals and the 13 units of priority B also agreed are for CPA-1 and CPA-2 hospitals.

The planned incinerators use wood as fuel and it requires less operation cost than burner type. However, still, it requires 1,200 US Dollars as fuel cost per unit per year. The cost can be covered with hospital operation cost as they can be expected to have a certain level of income for providing medical services. By installing them at hospitals, their medical wastes can be also disposed of. According to the Hospital Service Bureau of the Health Ministry, covering the cost and assigning workers for the facility will not cause any problem to the hospitals.

Thus, it is desirable to install incinerators at CPA-2 and CPA-3 hospitals as they have a large number of patients and thus certain amount of income for medical services can be expected, when the operation of the facility is taken into account. As for the CPA-1 hospitals as priority A, there is also no existing incinerator around the hospitals, and the necessity of incinerator in the region is quite high.

As a result, in this project, a total of 24 incinerators are planned to be installed: 2 at CPA-1

hospitals, 12 at CPA-2 hospitals and 10 at CPA-3 hospitals. This does not overlap with any existing 53 incinerators.

Table 2-2 Target site of Incinerator

No.	Area, Name of Hospital	CPA level	Priority A
<b>I</b>	<b>B.M.CHEY</b>		
	Provincial Hospital	3	1
	RH Ochrov	2	1
<b>II</b>	<b>BATTAMBANG</b>		
	Provincial Hospital	3	1
	RH Thmor Kol	1	
	RH Mong Russey	2	1
<b>III</b>	<b>KG. CHAM</b>		
	RH Krauch Chhmar	1	
	RH Memot	2	1
	RH Ponhea Krek	1	1
	RH Prey Chhor	1	
<b>IV</b>	<b>Kg.CHHNANG</b>		
	Provincial Hospital	3	1
	RH Boribo	HC	
<b>V</b>	<b>Kg. SPEU</b>		
	RH Korng pisey	1	
<b>VI</b>	<b>Kg .THOM</b>		
	RH Baray	2	1
<b>VII</b>	<b>KAM POT</b>		
	RH Chhouk	1	
<b>VIII</b>	<b>KANDAL</b>		
	RH Kean svay	1	1
	RH Muk Kampoul	1	
	RH Ang Snuol	1	
<b>IX</b>	<b>KRATIE</b>		
	Provincial Hospital	3	1
<b>X</b>	<b>MONDUL KIRI</b>		
	Provincial Hospital	2	1
<b>XI</b>	<b>PREH VIHEAR</b>		
	Provincial Hospital	2	1
<b>XII</b>	<b>PREY VENG</b>		
	Provincial Hospital	3	1
	RH Kg Trabeck	2	
	RH Neak Loeng	2	1
	RH Pea Raing	2	1
	RH Preah Sdach	1	
<b>XIII</b>	<b>PURSAT</b>		
	Provincial Hospital	3	1
	RH Bakan	1	
<b>XIV</b>	<b>RATTANAKIRI</b>		
	Provincial Hospital	2	1
<b>XV</b>	<b>PAILIN</b>		
	Provincial Hospital	2	1
<b>XVI</b>	<b>SIEMREAP</b>		
	Provincial Hospital	3	1
	RH Kra Lanh	2	
	RH Soth Nikum	2	1
<b>XVII</b>	<b>SIHANOUK VILLE</b>		
	Provincial Hospital	3	1
<b>XVIII</b>	<b>SVAY RIENG</b>		
	Provincial Hospital	3	1
<b>XIX</b>	<b>TAKEO</b>		
	Provincial Hospital	3	1
	RH Prey Kabas	1	
	RH Kirivong	2	1
	<b>Total</b>		<b>24</b>

⑫ Measles vaccine, ⑭ Disposable syringe for dilution of measles vaccine

The required amount of measles vaccines and syringes for dilution are examined as follows:

$$\text{Vaccine requirement (doses)} = (\text{target population} \times \text{vaccination rate} \times \text{vaccination frequency} \times \text{wastage factor})$$

- Target population : Children aged between 9 months and 4 years in 2010 in Cambodia

(Estimate: population estimate by age x population increase rate in 2008 by Ministry of Planning)

Population	2008	Pop. growth Rate	2009	2010
① 1 year – 4 years	1,436,916	2.0%	1,465,654	1,494,967
② Less than 1 year	394,813	2.0%	402,709	410,763
③ 9 months - 1 year (② × 25%)				102,691
Total ①+③				<b>1,597,658</b>

- Vaccination rate : 2008 target 90% set by MOH => 100% because it is for campaign
- Vaccination frequency : 1 (for campaign, second vaccination)
- Wastage factor : wastage rate 73.09% (2007 national average)

=> The wastage is small because campaigns are mass immunization.

Thus, the wastage rate is set at 20 percent. Wastage factor =  $100 \div (100 - \text{waste rate}) = \underline{1.25}$

\* dose number per vial = 10 (dosage: 3.5cm<sup>2</sup>)

Target Pop. A	Vaccination rate B%	Times C	Necessary Dose D=AxBxC	Wastage rate E%	Wastage factor F	Necessary Dose with wastage rate G=DxF	Total Adjust with 10,000 dose	No. of vial (10dose)
1,597,658	100%	1	1,597,658	20%	1.25	1,997,073	<b>2,000,000</b>	<b>200,000</b>

The volume of the disposable syringe for dilution is in accordance with the number of vial.

Judging from the above, requested 200,000 measles vaccines (10 doses) and the volume of disposal syringes for dilution are considered appropriate.

⑬ AD syringe for measles

The required quantity of AD syringes for measles (for measles campaign, 0.5ml) is examined as follows:

$$\text{Quantity of AD syringe procurement} = (\text{target population} \times \text{vaccination rate} \times \text{vaccination frequency} \times \text{wastage factor})$$

- Target population : Same as vaccine

- Vaccination rate : Same as vaccine
- Vaccination frequency : Same as vaccine
- Wastage factor : Standard wastage rate of 10 percent calculated by the WHO and thus the wastage factor is 1.11.

Target Pop. A	Vaccination rate B%	Times C	Necessary No. D=AxBxC	Wastage rate E%	Wastage factor F	Necessary Dose with wastage rate G=DxF	Total Adjust with 10,000pcs
1,597,658	100%	1	1,597,658	10%	1.11	1,773,401	<b>1,780,000</b>

Judging from the above, 1,780,000 AD syringes for measles are planned.

An overview of major equipment as well as planned equipment for this project concluded based on the requested equipment is attached. (Refer to Appendix-8: Equipment List, Appendix-9: Equipment Delivery List, Appendix-10: Outline of Major Equipment)

## 2-2-3 Implementation Plan

### 2-2-3-1 Implementation Policy

The project shall be executed in accordance with the framework of Japan's grant aid scheme. It is officially launched after approval by Japanese and Cambodian governments and conclusion of Exchange of Notes (E/N) and Grant Agreement (G/A). Later, a consultant from a Japanese firm will carry out detail design work (preparation of detail design documents) based on the agreement concluded with the Cambodian side. Tendering of equipment supply contractor (hereinafter referred to as "the supplier") will be held thereafter. A Japanese supplier chosen through tendering will supply and install the equipment.

During the detail design stage the consultant and the persons concerned in Cambodia will study installation schedule of the project and have discussions to ensure smooth implementation of works undertaken by the both Governments.

#### (1) Implementing Organization

The management ministry of this project is the Ministry of Health, the Cambodian government and the implementing agency is the ministry's National Immunization Program (NIP).

#### (2) Consultant

After the conclusion of the E/N and G/A between Japanese and Cambodian governments, a Japanese consultant will conclude a consulting service agreement with the implementing agency of the Cambodian side in accordance with the procedures of the Japanese grant aid project. The consultant will carry out the following services in compliance with the provisions of the consultant agreement.

- Detail Design: Preparation of the detail design documents including specifications and other technical documents
- Assistance of Tendering: Assistance of tendering to select the supplier, and concluding the supply contract
- Procurement supervision: Supervision of equipment procurement including installation and instruction for operation and maintenance provided by the supplier

In detail design stage, the consultant decides details of procurement plan based on the basic design study and prepares tender documents consisting of specifications, tender instructions and draft contract and condition of contract necessary for tender for selection of a Japanese supplier.

In tendering stage, the consultant provides the tendering services, e.g. public notice of tender, receipt of applications, distribution of tender documents, tender opening and evaluation of the tender results. Furthermore, the consultant will assist on concluding the contract between the Cambodian government and the supplier, and report to the Japanese government.



In supervision stage, the consultant will ensure that equipment procurement will be carried out properly by supplier in accordance with the contract documents. In order to promote the implementation of the project, they also will perform the following duties in fairness.

1) Coordination, instructions and advice to the supplier

The consultant will examine the equipment procurement / installation plan, and shall coordinate, give instructions and advices to the supplier.

2) Examination and approval of installation drawings, etc.

The consultant will examine, instruct and approve the installation drawings and other relevant documents submitted by the supplier.

3) Confirmation and approval of equipment

The consultant will confirm and approve the consistency of the cold chain equipment proposed by the supplier in compliance with the contract documents.

4) Inspection

The consultant shall attend the inspection of equipment during the manufacturing process to ensure its quality and performance, if necessary.

5) Reporting progress of work

The consultant shall grasp the actual conditions of the installation work and progress, and report them to both the governments of Cambodia and Japan.

6) Completion inspection and commissioning test

Upon completion of the equipment work, the consultant will conduct a final inspection and commissioning tests of the installed equipment to ensure that all the works are completed in compliance with the contract documents, and will submit the completion certificates to the Government of Cambodia.

7) Training for operation of the equipment

Some equipment to be procured in the project will require expertise on operation and maintenance. Therefore, the persons in charge of operation of the equipment will be required to receive on-site training by the supplier during the installation / adjustment / test-run period. The consultant shall give instructions and advice regarding the training programme.

(3) The supplier for equipment procurement

The supplier selected through the tenders will conclude a contract with the Cambodian side. The supplier shall procure, supply and install the medical equipment and provide instruction for operation and maintenance of the refrigerators with solar power system and the incinerators for Cambodian side

in accordance with the contract. Moreover, the supplier shall establish the system which provides spare parts / consumables as well as maintenance instruction even after handing over of the equipment.

### 2-2-3-2 Implementation Conditions

#### (1) Supervision of Equipment Installation

Installation work and instructions on operation of procured equipment shall be carried out during the operation hours of the target health institutions. Thus, the Cambodian side and the consultant need to communicate closely to manage the schedule in detail and carefully in order to avoid interference with their medical service.

#### (2) Dispatch of Engineers

Engineers need to be dispatched to teach correct operation and maintenance of the equipment for health service providers for the long-term and effective use of the procured equipment after installation and test run. In this project, engineers from equipment manufacturers or distributors shall be dispatched to provide instructions for installation and adjustment of the equipment and its operation and daily maintenance.

### 2-2-3-3 Scope of Works

This project is carried out through mutual cooperation between Japan and Cambodia. When the project is implemented with grant aid from the Japanese government, the scope of works for equipment procurement of the two governments shall be as follows:

#### (1) Japan

- Procurement of equipment covered in the project and air and marine transportation to the place of landing
- Inland transportation from the place of landing and to the place of delivery
- Installation, test run and adjustment of equipment covered in the project (for refrigerators with solar power system and incinerators)
- Instructions and training on operation and maintenance of equipment covered in the project (for refrigerators with solar power system and incinerators)

#### (2) Cambodia

- Inland transportation from the place of delivery to target facilities (for equipment excluding refrigerators with solar power system and incinerators)
- Installation, test run and adjustment of equipment covered in the project (excluding refrigerators with solar power system and incinerators)
- Instructions and training on operation and maintenance of equipment covered in the project

(excluding refrigerators with solar power system and incinerators)

- Transfer and removal of existing equipment for installation of procured equipment and arrangement of space for installation
- Securing passageway for equipment (for refrigerators with solar power system and incinerators)
- Provision of temporary storage space for equipment on site (for refrigerators with solar power system and incinerators)

#### 2-2-3-4 Consultant Supervision

##### (1) Supervision Policy on Procurement

In accordance with the scheme of Japan's Grand Aid, the consultant will organize the project working team to ensure smooth implementation of the project based on the policy of the basic design. The supervision policies on procurement are as following;

- To keep close communication with the persons in charge of the project of both the Governments to ensure completion of procurement of equipment without delay
- To promptly give proper advices and instructions with justice to the supplier
- To give proper advices and instructions concerning equipment management after handover
- To confirm completion of equipment installation in compliance with conditions of the contract, to attend handover of equipment, and to conclude the consulting services with approval of Cambodian side

##### (2) Supervision Plan on Procurement

In carrying out the aforementioned tasks, the consultant shall implement spot supervision by procurement engineers and inspection engineers. The consultant shall also dispatch necessary consultants / engineers to the site at relevant occasions for inspection, instruction and coordination, and at the same time, assign necessary engineers in Japan to establish a communication and support system. The consultant shall report the progress of the works, payment procedures and installation of the equipment, and any other relevant matters to the concerned officers of the Government of Japan.

#### 2-2-3-5 Quality Control Plan

Equipment to be procured in this project is selected from those that have been delivered to health institutions in other countries. Refrigerators, syringes and vaccines shall be chosen from those that meet the manufacturing standards of the WHO/UNICEF or acquired appropriate ISO accreditation for their manufacturing. As for other equipment, those that meet internationally-recognized standards shall be chosen.

## 2-2-3-6 Procurement Plan

### (1) Equipment Procurement Plan

Equipment to be procured in this project shall be made in Japan or Cambodia in principle. However, because of the product uniqueness and limited manufacturers, cold chain related equipment and vaccines may be procured from a third country upon agreement by both countries if it is considered desirable.

Equipment that can be produced in a third country is shown in the following table:

Table 2-3 Equipment which have the possibility of third country origin

Item No.	Equipment	Country of Origin
1	Refrigerator and icepack freezer	EU
2	Refrigerator and icepack freezer with solar power system	EU, USA
3	Vaccine cold box	EU, India
4	Vaccine carrier	India, China
5	Data logger	EU, China
6	Interface cable for data logger	EU, China
7	Freeze watch indicator	USA, Malaysia
8	Refrigerator monitor card	USA
9	Motorcycle	Thailand
10	Pick up truck	Thailand
12	Incinerator	EU, Indonesia, India
13	Measles vaccine (10 doses)	EU, Vietnam
14	AD syringe for measles, 0.5ml	EU, Vietnam

### (2) Transportation Plan

#### • Air transportation / marine transportation

Such equipment as vaccines that require temperature control shall be transported by air to the Phnom Penh Airport. Other equipment shall be in moisture-proof and airtight packages and transported in container from each port to Cambodia's major port of the Sihanoukville Port for landing. It requires about one month.

#### • Inland Transportation

After customs clearance, equipment will be transported by truck from the specified warehouse at the Sihanoukville port to each place of delivery. The refrigerators with solar power system and incinerators shall be delivered on the project site. Other equipment and vaccines shall be transported on land to be delivered to the CMS in Phnom Penh.

## 2-2-3-7 Operation Guidance Plan

For proper use and maintenance of equipment, the following training will be provided for

refrigerators with solar power system and incinerators at delivery by the supplier and technical materials, operation and maintenance manuals and a list of agencies and manufactures for contact shall be prepared:

- Operation method (equipment summary, procedures, checklist, etc.)
- Periodical maintenance method (cleaning, adjustment, repair work for minor breakdowns, etc)

No initial operation training or other operation training is needed for other equipment because that is the replacement of existing equipment.

2-2-3-8 Technical Assistance (Soft Component) Plan

This project has no plan of providing technical assistance (soft component.)

2-2-3-9 Implementation Schedule

Upon the signing of E/N between the Government of Cambodia and the Government of Japan, the work shown in the Table below shall be executed accordingly.

Table 2-4 Implementation Schedule

Month Item	1	2	3	4	5	6	7	8	9	10	11									
Detail Design	<b>(5.0 months)</b>																			
	Final Confirmation study																			
	Preparation of Tender Doc.																			
	Approval of Tender Doc.																			
	Preparation of Tender																			
Tender/Evaluation/Contract																				
Procurement Procedure	<b>(9.63 months)</b>																			
	Drawings confirmation 0.33 months																			
	Manufacturing (Japan) 6 months																			
	Manufacturing (Local·Third country) 4 months																			
	Transportation 1 month																			
	Custom clearance 0.47 month																			
	Internal Transportation 0.1 month																			
	Installation, Inspection, handing over 1.5 months																			
	Foundation (Incinerator) 2 months																			
	Product (Factory) inspection 0.1 month																			
Product inspection 0.07 months																				
Pre-shipment Inspect. 0.23 months																				

■ Work in Cambodia or third countries

□ Work in Japan

## 2-3 Obligations of the Recipient Country

The outlines of the scope of works on the Cambodian side are as follows;

### (1) Transportation/ Installation Work

- Inland transportation from the place of delivery to target facilities (for equipment excluding refrigerators with solar power system and incinerators)
- Installation, test run and adjustment of equipment covered in the project (excluding refrigerators with solar power system and incinerators)
- Instructions and training on operation and maintenance of equipment covered in the project (excluding refrigerators with solar power system and incinerators)
- Transfer and removal of existing equipment for installation of procured equipment and arrangement of space for installation
- Securing passageway for procured equipment (for refrigerators with solar power system and incinerators)
- Provision of temporary storage space for procured equipment on site (for refrigerators with solar power system and incinerators)

### (2) Infrastructure and Management Work

- Proper allocation of equipment operators at target facilities
- Securing budget for maintenance of procured equipment

### (3) Others

- To bear commissions, namely advising commissions of an Authorisation to Pay (A/P) and payment commissions, to a Japanese bank for the banking services based upon the Banking Arrangement (B/A)
- To ensure prompt unloading and customs clearance of the products purchased under the Japan's Grant Aid at ports of disembarkation
- To exempt Japanese nationals from customs duties, internal taxes and fiscal levies which may be imposed in Cambodia with respect to the supply of the products and services under the verified contracts
- 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 Cambodia and stay therein for the performance of their work
- To provide necessary permissions, licenses, and other authorisation for implementing the project, if necessary
- To bear all the expenses, other than those covered by the Japan's Grant Aid, necessary for the project

## 2-4 Project Operation Plan

### 2-4-1 Operation Plan

As described earlier, the management ministry of this project is the Ministry of Health of Cambodia and the execution body is the ministry's National Immunization Program (NIP) within the National Maternal and Child Health Center. The Program consists of 29 employees, concerned government ministries and agencies and a technical working group (TWG) of the donor country or an NGO.

The cold chain equipment planned in this project is mainly allocated and managed at health centers. However, because its technical level is almost same as that of existing equipment, current medical care service providers have sufficient capacity to operate the equipment.

Although incinerators are installed at Referral Hospitals throughout the country and operated by the hospital staff, they are capable of operating them as it does not require any high-level skills.

### 2-4-2 Maintenance Plan

Equipment that requires maintenance work is refrigerators, vehicles and incinerators. Because none of them requires special skills or knowledge for maintenance, workers at the facilities where they are installed or provided can perform the maintenance work, which includes general daily cleaning and inspections.

Operation and maintenance manuals for equipment that are not consumables including vaccines are provided when the equipment is delivered. Instructions on operation and regular inspections are provided for the refrigerators with solar power system and incinerators when they are installed. This enables employees of the facilities to perform regular inspections and simple part replacement.

The Infection Control and Waste Management Unit of the Hospital Services and Bio-medical Engineering Bureau of the Ministry of Health will be in charge of maintenance work of incinerators and assigned staff of Referral Hospitals will perform the duty under technical instructions on medical waste management by the WHO.

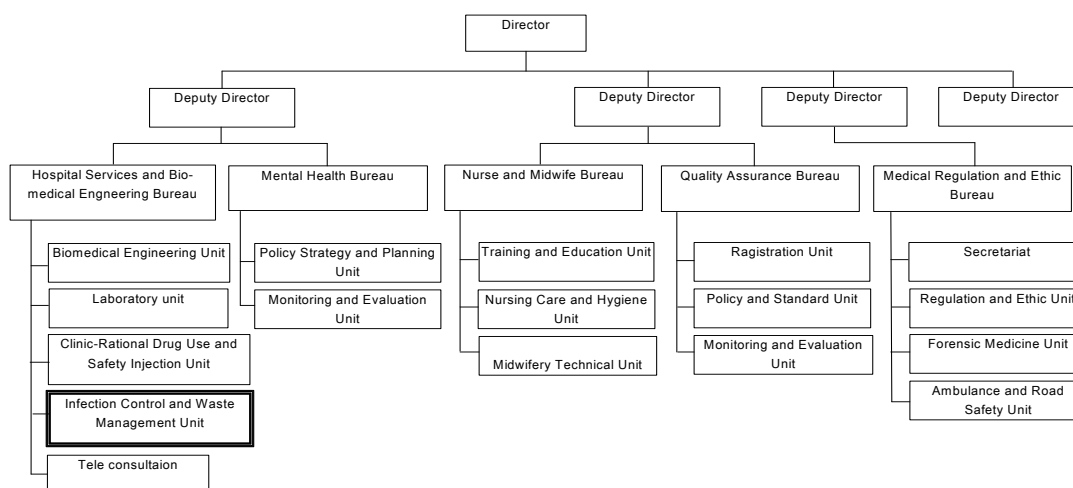


Fig. 2-2 Organization Hospital service department, MOH

## 2-5 Project Cost Estimation

### 2-5-1 Initial Cost Estimation

#### (1) Project Cost Borne by the Cambodian side

The project cost borne by the Cambodian side is estimated to be 21,900.00 US dollars (approx. 2.3 million yen). Table below show the contents of the project cost.

Table 2-5 Project Cost Borne by the Cambodian side

Category	Total
Inland Transportation	19,720.00 US\$ (2.1 million yen)
Banking commissions	2,180.00 US\$ (0.2 million yen)
Total	21,900.00 US\$ (2.3 million yen)

US\$1 = 105.89 円

#### (2) Conditions for estimation

- ① Date of estimation : July / 2008
- ② Exchange rate : 1 US dollar = 105.89 yen (average TTS for the last 6 months)  
1 € = 162.11 yen (average TTS for the last 6 months)
- ③ Procurement period: The detailed design and equipment procurement period is as shown in the Schedule (Table 2-4).
- ④ Others: The cost estimation is based on the framework of grant aid project by the Japanese government.

### 2-5-2 Operation and Maintenance Cost

#### (1) NIP budget

The breakdown of NIP's budget is shown below. The operation and maintenance cost is earmarked in the budget items of "travel expense, per-diem and operation cost" and "maintenance and overhead cost", which totals approximately 1.43 million US dollars in FY 2009. The equipment operation and maintenance cost that includes gas fees for refrigerators is not earmarked for each facility. It is covered by each facility with the budget allocated from provincial health departments and part of revenue for medical services. Labor cost and salary is not earmarked as they are the expenditure of the Ministry of Health.



Table 2-6 NIP Budget (2008-2015)

No.	Component	2008	2009	2010	2011	2012	2013	2014	2015
[A] Operation cost									
1	Vaccines								
1.1	Vaccines (traditional 6 antigens)	US\$830,765	US\$913,955	US\$879,935	US\$875,717	US\$867,259	US\$873,714	US\$888,313	US\$900,199
1.2	Vaccines (new and underused vaccines)	US\$1,803,254	US\$1,127,507	US\$1,452,238	US\$1,493,013	US\$1,531,550	US\$1,555,475	US\$1,577,508	US\$1,620,825
1.3	Vaccines for SIA (incl. injection supplies)	US\$55,456	US\$1,957,095	US\$0	US\$1,632,218	US\$0	US\$0	US\$0	US\$0
2	Injection supplies	US\$398,747	US\$411,115	US\$420,364	US\$430,453	US\$441,774	US\$443,448	US\$449,828	US\$420,364
3	Personnel	US\$0	US\$0	US\$0	US\$0	US\$0	US\$0	US\$0	US\$0
4	Transportation, Per diem, Operational Cost	US\$1,046,997	US\$1,206,664	US\$1,026,797	US\$1,006,797	US\$996,797	US\$986,797	US\$976,797	US\$966,797
5	Maintenance and overhead	US\$224,850	US\$224,850	US\$224,850	US\$224,850	US\$224,850	US\$224,850	US\$224,850	US\$224,850
6	Short-tem training	US\$99,086	US\$50,000	US\$235,000	US\$0	US\$0	US\$0	US\$0	US\$0
7	IEC/social mobilization	US\$82,050	US\$82,050	US\$82,050	US\$40,000	US\$40,000	US\$40,000	US\$40,000	US\$82,050
8	Planning/ Monitoring/ Supervision	US\$259,562	US\$279,562	US\$296,562	US\$259,562	US\$259,562	US\$259,562	US\$259,562	US\$296,562
9	Disease surveillance	US\$95,900	US\$95,900	US\$95,900	US\$95,900	US\$95,900	US\$95,900	US\$95,900	US\$95,900
10	Other (oper cost)	US\$91,721	US\$91,721	US\$91,721	US\$91,721	US\$91,721	US\$91,721	US\$91,721	US\$91,721
11	NIP Office/ Admin	US\$57,057	US\$57,057	US\$57,057	US\$57,057	US\$57,057	US\$57,057	US\$57,057	US\$57,057
12	Shared Personnel								
12.1	Salaries	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12.2	Incentives/ per diems	US\$41,200	US\$41,200	US\$41,200	US\$41,200	US\$41,200	US\$41,200	US\$41,200	US\$41,200
13	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Subtotal Operational		US\$5,086,645	US\$6,538,676	US\$4,903,674	US\$6,248,488	US\$4,647,670	US\$4,669,724	US\$4,702,736	US\$4,797,525
[B] Capital Cost									
14	Vehicles	US\$317,916	US\$0	US\$0	US\$0	US\$0	US\$0	US\$0	US\$0
15	Cold Chain Equipment & maintenance	US\$792,084	US\$250,000	US\$250,000	US\$250,000	US\$250,000	US\$250,000	US\$250,000	US\$250,000
16	Building	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
17	Other Equipment (misc office equipment)	US\$18,294	US\$18,294	US\$18,294	US\$18,294	US\$18,294	US\$18,294	US\$18,294	US\$18,294
18	Long-term training	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
19	Other-laboratory equipment, incinerators	US\$28,000	US\$28,000	US\$28,000	US\$28,000	US\$28,000	US\$28,000	US\$28,000	US\$28,000
Subtotal Capital		US\$1,156,294	US\$296,294	US\$296,294	US\$296,294	US\$296,294	US\$296,294	US\$296,294	US\$296,294
Total		US\$6,242,939	US\$6,834,970	US\$5,199,968	US\$6,544,782	US\$4,943,964	US\$4,966,018	US\$4,999,030	US\$5,093,819

Five Year Strategic Plan National Immunization Program Cambodia 2006-2010 (NIP)

The annual maintenance cost for using the cold chain equipment to be procured in this project is estimated to be approximately 75,000 US dollars as shown below. Combined with the cost for existing equipment, it will reach about 580,000 US dollars. As it is estimated to be approximately 1.43 million US dollars in the NIP budget as mentioned earlier, it can be covered without causing any difficulties.

Table 2-7 Estimated Operation &amp; Maintenance Fee

Equipment	Q'ty (incl. existing)	contents	Unit Price	Conditions	Yearly cost/unit	Total cost US\$
Refrigerator and icepack freezer	78 (891)	Propane Gas	\$25.00/pc (50kg)	70kg/month = 16.8pc/year	\$420.00	\$32,760 (\$374,220)
Motorcycle	50 (597)	Fuel	R5,300/L	Fuel efficiency : 50km/L 20km/day, 260days/year 5,200km/year	R551,200 (\$137.80)	\$6,890 (\$82,267)
Pick up truck	3 (30)	Fuel	R5,300/L	Fuel efficiency : 10km/L 16,000km/year	R8,480,000 (\$2,120.00)	\$6,360 (\$63,600)
Incinerator	24 (51)	Wood	\$0.15/kg	10kg/time 800times/year	\$1,200.00	\$28,800 (\$61,200)
Total						\$74,810 (\$81,287)

## (2) Budget of Ministry of Health

The table below shows the trend of state finance of Cambodia. Expenditures on health account for about 12 percent of national expenditure, which is on a stable increase.

**Table 2-8 Breakdown of Health Expenditure** unit: thousand US\$

Year	2003	2004	2005	2006	2007
GDP	4,585,000	5,260,000	6,287,000	7,233,000	8,619,000
National Expenditure	441,250	472,750	564,500	633,500	716,500
Health Expenditure	50,640	56,900	63,750	74,500	84,250
% of Health Expenditure against National Expenditure	11.48%	12.04%	11.29%	11.76%	11.76%
Increasing rate of Health Expenditure (% against last year)	-	112.36%	112.04%	116.86%	113.09%
% of Health Expenditure against GDP	1.10%	1.08%	1.01%	1.03%	0.98%

The Medium-Term Expenditure Framework for Cambodia: 2005-2007, IMF

The equipment in this project is scheduled to be procured in FY 2009. According to the table above, the health expenditure grew by an annual average of 13.5 percent from 2003 to 2007. The table below is an estimate of expenditure of the Ministry of Health based on the assumption that it increases at the same rate until 2009.

**Table 2-9 Estimate of expenditure of Ministry of Health (2008-09)** \*unit: thousand US\$

Year	2007	2008	2009	2010
Expenditure of Ministry of Health	84,250	95,623	108,532	123,184

As shown in Table 2-7, the annual maintenance cost of equipment to be procured in this project is an approximate estimate of 75,000 US dollars. As this accounts for about 0.07 percent of the health expenditure of 108.53 million US dollars in 2009 shown in Table 2-9, it is fair to conclude that the maintenance cost can be fully covered by the Ministry of Health of Cambodia.

## 2-6 Other Relevant Issues

Equipment excluding refrigerators with solar power system and incinerators as well as vaccines is planned to be delivered at the Central Medical Stores (CMS) of the Ministry of Health and the storehouse will be responsible for the delivery to the final destination. It is expected that the transportation budget is secured swiftly and precise instructions and supervision of the delivery is given unflinchingly so that the equipment will be distributed to the site and the existing broken equipment will be disposed of quickly and appropriately despite the fact that there are a quite a number of health centers.

## Chapter 3. Project Evaluation and Recommendations

## Chapter 3 Project Evaluation and Recommendations

### 3-1 Project Effects

In Cambodia, health indices relating to the health of children and mothers are poor, recording high figures of an under-5 mortality rate of 82 per 1,000 births, an infant mortality rate of 65 per 1,000 births (2006, WHO), and a maternal mortality rate of 540 per 100,000 persons (2005, UNICEF). This situation is partly attributable to the low rate of vaccination.

However, because of budgetary deficiency and other reasons, there is a shortage of cold chain equipment causing a difficulty in conducting sufficient activities. As a result, the rate of vaccination in 2007 remained below the average among East Asian and Pacific countries.

The Government of Cambodia in its public health policies has developed the Health Sector Strategic Plan 2008-2015 (HSP), which intends to promote the improvement of health of the people, in particular women and children, thereby contributing to poverty elimination and socioeconomic growth. The country endeavors to promote vaccination through the infection control program under the HSP.

In the context of these challenges, the effects expected from the implementation of the requested Japanese assistance and the extent of improvement from the present state are as summarized in the Table below.

**Table 3-1. Effects of Project Implementation and Extent of Improvement**

Present State and Problems	Measures to be taken by the requested Japanese assistance	Direct Effects & Extent of Improvement	Indirect Effects & Extent of Improvement
<p>The inability to conduct adequate vaccination activities due to aging and shortage of cold chain equipment.</p> <p>The possibility of secondary infection due to insufficient facilities for treatment of medical wastes such as used injection needles.</p>	<p>Provision of materials and equipment relating to vaccination activities and equipment for medical waste treatment.</p>	<ul style="list-style-type: none"> <li>• Cold chain systems will be established at 376 health centers and health posts, ensuring stable supply of vaccines for vaccination.</li> <li>• Appropriate medical waste treatment will be in place in 24 districts.</li> <li>• A supply of measles vaccines will be secured for the 1.6 million infants who will need measles vaccination in 2011.</li> </ul>	<ul style="list-style-type: none"> <li>• The project will contribute to the improvement of vaccination rate.</li> <li>• Second infection due to inappropriate medical waste treatment will be prevented.</li> </ul>

## 3-2 Recommendations

### 3-2-1 Challenges that should be Addressed by the Recipient Country and Recommendations

It is advised that the Cambodian side may take the following issues into consideration so that the effects of the project will be sustained more efficiently.

#### (1) Securing of Fund for Operating Cost Relating to Vaccination Activities

While vaccination is conducted at health centers and 80% of it depends on outreach activities, there is a general shortage of fund for these activities. This shortage is caused by the defects in the functioning of higher-level budgetary systems, such as that budget making does not adequately cover the needs of end-use medical institutions, that the fund allocated in the plan does not flow from higher-level organizations in a timely manner, and that the items in the approved budget often differ from those requested and fund does not reach the places where it is needed. This situation, if continued, would not only prevent the procurement of necessary materials and equipment but also diminish the motivation of healthcare personnel and impede activities. It is necessary to ensure the securing and allocation of fund needed for the operation of vaccination activities, so that the concern about these points may be eliminated.

#### (2) Improvement of the Capabilities for Management of Vaccines and Cold Chain Equipment

Vaccines must be procured and managed in a systematic manner, because they must be stored under certain temperature conditions and has expiration dates. As vaccines are distributed via provinces (PHD) and districts (OD) to health centers and other end-use medical institutions conducting vaccination activities, high priorities should be given to the measures ensuring that authorities at each level enhance data collection, analysis, and monitoring and that central authorities develop appropriate vaccine procurement management plans and vaccination implementation plans. As vaccination activities are conducted at more than 1,000 sites, it is necessary to provide vaccine management guidance to these institutions, and also to ensure correct practice of vaccine management, making use of appropriate tools such as the data loggers to be procured in this project.

With respect to cold chain equipment, we have noted that provinces (PHD) and districts (OD) sometimes fail to keep adequate records of how these supplies are distributed to and used at lower-level institutions, and end-use medical institutions sometimes have equipment for which the year of procurement is unknown. It is therefore necessary to reorganize the information regarding the years in use and the condition of equipment. Appropriate inventory management should be practiced, making

sure that the inventory kept at the Ministry of Health is checked against the actual conditions.

### (3) Continuation of Procurement of Vaccines

Continuity is required in the procurement of vaccines, as well as in the management of cold chain equipment. Cambodia has been procuring vaccines with the assistance from Japan, GAVI, UNICEF, etc., gradually increasing the percentage of procurement using the country's own budget. However, as donor countries and donor organizations are curtailing assistance in vaccines, a situation is feared to occur in which a sudden cutback in the budget from the Government of Cambodia or a delinquency in payment might severely impede the implementation of vaccination programs. It is therefore necessary that the Government of Cambodia should commit itself to the securing the budget for vaccines in the future.

### (4) Prevention of Secondary Infection

The recovery and incineration of used AD syringes should be conducted strictly to ensure the prevention of secondary infection.

## 3-2-2 Technical Assistance and Collaboration with Other Donors

Although Cambodia is gradually increasing the budget for the procurement of necessary vaccines, the dependence on the assistance from GAVI, UNICEF, and other donors is still large at the present. The country should continue developing appropriate procurement plans regarding the types and required quantities of vaccines in collaboration with donors.



## **[Appendices]**

1. Member List of the Study Team
2. Study Schedule
3. List of Parties Concerned in the Recipient Country
4. Minutes of Discussions (Basic Design)
5. Minutes of Discussions (Explanation of the Draft Report)
6. Summary of Sampling Survey Results
7. Examination of the Requested Equipment
8. Equipment List
9. Equipment Delivery List
10. Outline of Major Equipment
11. References



## 1. Member List of the Study Team

Member List of the Study Team

1. Basic Design Study

No.	Name	Position	Organization
1	Mr. Hikoyuki UKAI	Team Leader	Deputy Resident Representative JICA Cambodia Office
2	Ms Keiko OSAKI	Technical Advisor	Senior Advisor (Health) Reproductive Health Division Human Development Department JICA
3	Ms Yutori SADAMOTO	Project Coordinator	Senior Program Officer Project Study Division II Grant Aid and Loan Support Department JICA
4	Mr. Shigehito AKAGI	Project Manager/ Equipment Planner	International Total Engineering Corporation (ITEC)
5	Mr. Hironori NAKAJIMA	Procurement/ Cost Planner	International Total Engineering Corporation (ITEC)
6	Ms Tomomi TAKENAKA	EPI Planner	International Total Engineering Corporation (ITEC)

2. Explanation on Draft Report

No.	Name	Position	Organization
1	Ms Naoko UEDA	Team Leader	Director Infectious Disease Control Division Health Human Resources and Infectious Disease Control Group Human Development Department JICA
2	Ms Ayako MATSUOKA	Project Coordinator	Infectious Disease Control Division Health Human Resources and Infectious Disease Control Group Human Development Department JICA
3	Mr. Shigehito AKAGI	Project Manager/ Equipment Planner	International Total Engineering Corporation (ITEC)
4	Mr. Hironori NAKAJIMA	Procurement/ Cost Planner	International Total Engineering Corporation (ITEC)

## 2. Study Schedule

Study Schedule (Basic Design Study)

Day	Date	Official Members	Consultant Members		
			Project Manager/ Equipment Planner Shigehito Akagi	Procurement/ Cost Planner Hironori Nakajima	EPI Planner Tomomi Takenaka
1	29-Jun	Sun			
2	30-Jun	Mon			
3	1-Jul	Tue			
4	2-Jul	Wed			
5	3-Jul	Thu			
6	4-Jul	Fri			
7	5-Jul	Sat			
8	6-Jul	Sun			
9	7-Jul	Mon			
10	8-Jul	Tue			
11	9-Jul	Wed	Arrive in PNH		
12	10-Jul	Thu	Move to KPC Join Study Team		
13	11-Jul	Fri	Site survey on ODO, RHs and HCs (Continued). Move to PNH		
14	12-Jul	Sat	Meeting with JICA		
15	13-Jul	Sun	Internal Meeting		
16	14-Jul	Mon	Meeting at JICA office Meeting with NIP		
17	15-Jul	Tue	Meeting with MOH Dept. of Hospital services Meeting with NIP	Visit and survey local agent of equipment	Same as above
18	16-Jul	Wed	Visit and survey HCs located in PNH, Meeting	Meeting with NIP	
19	17-Jul	Thu	Discussion with NIP regarding the Minutes of Discussions		
20	18-Jul	Fri	Singing on the Minutes of Discussion Report to JICA office and EOJ		
21	19-Jul	Sat	Leave PNH	PNH-BKK	
22	20-Jul	Sun		BKK-NRT	

PNH = Phnom Penh  
KDR = Kandal  
KPG = Kompong Chhnang  
PRS = Pursat  
KPC = Kompong Cham  
KRT = Kratie

MOH = Ministry of Health  
PHD = Provincial Health Department  
ODO = Operational District Office  
RH = Referral Hospital  
HC = Health Centre  
HP = Health Post  
EOJ = Embassy of Japan  
JICA = Japan International Cooperation Agency

IR = Inception Report  
QTR = Questionnaire  
NRT = Tokyo International Airport  
BKK = Bangkok

### Study Schedule (Explanation of the Draft Report)

Day	Date		Official Members	Consultant Members	
				Project Manager/ Equipment Planner Shigehito Akagi	Procurement/ Cost Planner Hironori Nakajima
1	23-Oct	Thu		NRT-BKK BKK-PNH	
2	24-Oct	Fri		Meeting at JICA office, Meeting with NIP and Dept. of Hospital Service (Explanation of draft BD report)	
3	25-Oct	Sat		Data filing and documentation	
4	26-Oct	Sun	Arrive in PNH Internal Meeting	Data filing and documentation Internal Meeting	
5	27-Oct	Mon	Meeting with NIP regarding the Minutes of Discussion Inspect the project-related equipment at Takhmao District		
6	28-Oct	Tue	Meeting with NIP regarding the Minutes of Discussion, Signing on the Minutes of Discussion Report to JICA office and EOJ		
7	29-Oct	Wed	Leave PNH (Ms. Ueda)	PNH-BKK	
8	30-Oct	Thu	Leave PNH (Ms. Matsuoka)	BKK-NRT	

PNH = Phnom Penh

NRT = Tokyo International Airport

BKK = Bangkok

NIP = National Immunization Program BD = Basic Design

EOJ = Embassy of Japan

JICA = Japan International Cooperation Agency

### 3. List of Parties Concerned in the Recipient Country

List of Parties Concerned in the Recipient Country

## Ministry of Health (MOH)

Prof. Eng Huot	Secretary of State for Health
Dr. OR Vandine	Director, Department of International Cooperation

## National Immunization Program (NIP), MOH

Prof. Sann Chan Soeung	Deputy Director General for Health, NIP Manager
Dr. Svay Sarath	NIP Deputy Manager, MD
Ph. Ork Vichit	NIP Program Officer, new vaccine introduction
Ph. Kong Heang Kry	NIP logistic and training
Dr. Ya Nareth	NIP surveillance
Mr. Choun Narin	NIP staff
Dr. Yong Vutthikol	NIP surveillance
Dr. Chheng Morn	NIP surveillance
MA. Ngeth Savry	NIP surveillance
MA. Lor Pharith	NIP logistic and training
Ph. Ros Phala	Regional supervisor, routine immunization
Ph. Thiep Chanthan	Regional supervisor, routine immunization
Dr. Keo Samley	Regional supervisor, routine immunization

## Department of Hospital Services, MOH

Dr. Sok Srun	Deputy director
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## Central Medical Stores (CMS), MOH

Dr. Ma Sophann	Deputy director
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## ○Phnom Penh Municipality

## PHD Phnom Penh

Dr. Paou Linar	EPI manager
Mr. Mao Heng	Deputy director

## OD Leck (East District)

Mr. He Kan	Vice director
Mr. Ouk Narith	EPI staff

## ○Kandal Province

## PHD Kandal

Mr. Oum Thorn	Director
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## OD Takhmao

Dr. Taintse	Director
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## OD Kean Svay

Mr. Tuy Saroeun	Director
-----------------	----------

Mr. Bin Samreth	Deputy director
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## ○Pursat Province

## PHD Pursat

MA. Klem Sokun	Director
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Mr. Chann Nhaing	EPI program manager, nurse
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## OD Sampov Meas

Mr. Sieng Kim Seng	Chief
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## ○Kompong Chhnang Province

## PHD Kompong Chhnang

Mr. Som Mesa	EPI manager
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## OD Kompong Chhnang

Ms. Van Chor Davin	Manager of NIP
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## OD Kompong Tralech

Dr. Lim Kun	Vice director
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## ○Kratie Province

## PHD Kratie

Dr. Cheam Saem	Director, MD, MPH
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## OD Kratie

Dr. Cheam Sa Em	Director
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## ○Kompong Cham Province

## PHD Kompong Cham

Dr. Taing Bunsreng	Deputy NIP
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Mr. Ann Rith	NIP staff
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Mr. Chhay Ly	NIP staff
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## OD Tbong Khmum

Dr. Say Heng	Chief
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## OD Ponheakrek

Mr. Hok Hian	Chief, secondary nurse
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## OD Prey Chhor

Dr. Su Lim Sun	Chief, MD
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## Embassy of Japan

Mr. Hideaki MATSUO	Head, Economic Cooperation Section
Mr. Kenichi KOBAYASHI	Second Secretary
Ms Misa TAMURA	Aid Coordination Advisor

## JICA Cambodia Office

Mr. Kazuhiro YONEDA	Resident Representative
Mr. Hikoyuki UKAI	Deputy Resident Representative
Ms Masayo TERAKADO	Assistant Resident Representative
Mr. Nobuo SAMBE	Senior Advisor (Implementation of Grant Aid Project)
Ms Shoko SATO	Project Formulation Advisor (Health Sector)
Mr. Soun Veasna	National Staff

## Project for Improvement Maternal and Child Health Service in Rural Areas

Dr. Hiromi OBARA	JICA Expert
Mr. Sadatoshi MATSUOKA	JICA Expert
Ms Yukie SAKURAI	JICA Expert

## National TB Control Project (phase 2)

Dr. Hiroyuki NISHIYAMA	JICA Expert
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## Project on Promotion of Medical Equipment Management System

Mr. Kazuhiro SUZUKI	JICA Expert
Ms Yuko KAWAGUCHI	JICA Expert

## WHO Cambodia Office

Dr. Kohei TODA	EPI Technical Adviser
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## UNICEF

Mr. Chum Aun	EPI Assistant Project Officer
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#### 4. Minutes of Discussions (Basic Design)

**MINUTES OF DISCUSSIONS  
ON THE BASIC DESIGN STUDY ON  
THE PROJECT FOR INFECTIOUS DISEASES CONTROL  
IN THE KINGDOM OF CAMBODIA**

In response to a request from the Government of the Kingdom of Cambodia (hereinafter referred to as "Cambodia"), the Government of Japan decided to conduct a Basic Design Study on the Project for Infectious Diseases Control (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Cambodia the Basic Design Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Hikoyuki UKAI, Deputy Resident Representative, JICA Cambodia Office, and is scheduled to conduct the study from June 29<sup>th</sup> to July 19<sup>th</sup> 2008.

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

In the course of discussions and field survey, both parties confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare the Basic Design Study Report.

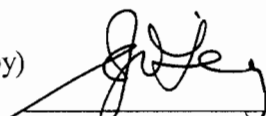
Phnom Penh, July 18, 2008



Mr. Hikoyuki UKAI  
Leader  
Basic Design Study Team  
Japan International Cooperation Agency  
Japan



Prof. Eng Huot  
Secretary of State for Health  
Ministry of Health  
The Kingdom of Cambodia

(Witnessed by) 

Dr. Michael O'leary  
Representative in Cambodia  
World Health Organization

1. Objective of the Project

The objective of the Project is to accelerate the National Immunization Program (NIP) implemented by the Government of Cambodia and to reduce the morbidity and mortality caused by vaccine preventable diseases in the Project sites.

2. Project sites

The sites of the Project are all areas in Cambodia where the NIP is being implemented.

3. Responsible and Implementing Agency

The Ministry of Health is both the responsible and implementing agency.

4. Items requested by the Government of Cambodia

After discussions with the Team, the items described in Annex-1 were requested by the Government of Cambodia with priorities on the items as "A: Necessary" and "B: If possible". JICA will assess the appropriateness of the request including quantity of each item and scale of the Project based on the budget availability and will recommend to the Government of Japan for approval.

5. Japan's Grant Aid Scheme

5-1. The Government of Cambodia understands the Japan's Grant Aid Scheme explained by the Team, as described in Annex-2.

5-2. The Government of Cambodia will take the necessary measures, as described in Annex-3, for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

6. Schedule of the Study

6-1. JICA will prepare the draft report in English and dispatch a mission in order to explain its contents in October, 2008.

7. Other relevant issues

7-1. The Government of Cambodia shall operate and maintain the items procured under the Grant Aid Project properly and effectively. The Government of Cambodia shall allocate necessary budget and personnel for the implementation of the Project.

7-2. Both sides agreed that the Government of Cambodia is responsible for distribution of items procured under the Project from the Central Medical Store (CMS) to the project sites except Incinerator and Refrigerator with Solar Power System, which will be installed with introductive guidance by Japanese side. In this regard, the Government of Cambodia is required to ensure proper stock management at CMS.

7-3. Both sides confirmed that WHO continue to provide the technical assistance of medical waste management at Referral Hospitals where the incinerators are to be installed.

7-4. The Government of Cambodia plans to conduct the measles immunization campaign in 2010/11 in coordinating with WHO Western Pacific Regional to meet the Goal for measles elimination and requested the measles vaccines to the Team.

7-5. The Government of Cambodia shall take necessary measures to exempt Japanese nationals who will be engaged in the Project from all duties and related fiscal charges, which may be imposed in Cambodia with respect to the import and local procurement of equipment and services.

## Annex-1 List of Requested Equipment

No.	Item	Quantity	Priority A	Priority B
1	Icelined Refrigerator	78	78	
2	Refrigerator with Solar Power System	30	30	
3	Cold box	67	67	
4	Vaccine Carrier	310	310	
5	Temperature data logger	48		48
6	USB Connection cable for connecting data logger to	24		24
7	Freeze watch indicator	500	500	
8	Refrigerator monitor	1,000	1000	
9	Motocycle	50	50	
10	Pick up truck	4	2	2
11	Incenerator	37	24	13
12	Measles Vaccine(10 doses)	200,000	200,000	
13	AD syringe(0.5ml)	2,000,000	2,000,000	
14	Syringe(5ml) & Needle(21G × 1,5)	200,000	200,000	
15	AD syringe for BCG(0.05ml)	400,000		400,000
16	Japanese Encephalitis Vaccine	2,000,000		2,000,000
17	AD syringe for JE			200000

## ANNEX-2 JAPAN'S GRANT AID SCHEME

1. Grant Aid Procedure
  - 1) Japan's Grant Aid Program 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 Governments of Japan and the recipient country)
  - 2) 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 to conduct a study on the request. If necessary, JICA send a Preliminary Study Team to the recipient country to confirm the contents of the request.
 

Secondly, JICA conducts the study (Basic Design Study), using Japanese consulting firms.

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Programme, 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 signed by the Governments of Japan and the recipient country.

Finally, for the 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:

- a) confirmation of the background, objectives and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation;
- b) evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from the technical, social and economic points of view;
- c) confirmation of items agreed on by both parties concerning the basic concept of the Project;
- d) preparation of a basic design of the Project; and
- e) estimation of costs 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 are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even through 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 the smooth implementation of the Study, JICA uses a consulting firm selected through its own procedure (competitive proposal). The selected firm participates the Study and prepares a report based upon the terms of reference set by JICA.

At the beginning of implementation after the Exchange of Notes, for the services of the Detailed Design and Construction Supervision of the Project, JICA recommends the same consulting firm which participated in the Study to the recipient country, in order to maintain the technical consistency between the Basic Design and Detailed Design as well as to avoid any undue delay caused by the selection of a new consulting firm.

## 3. Japan's Grant Aid Scheme

### 1) What is Grant Aid?

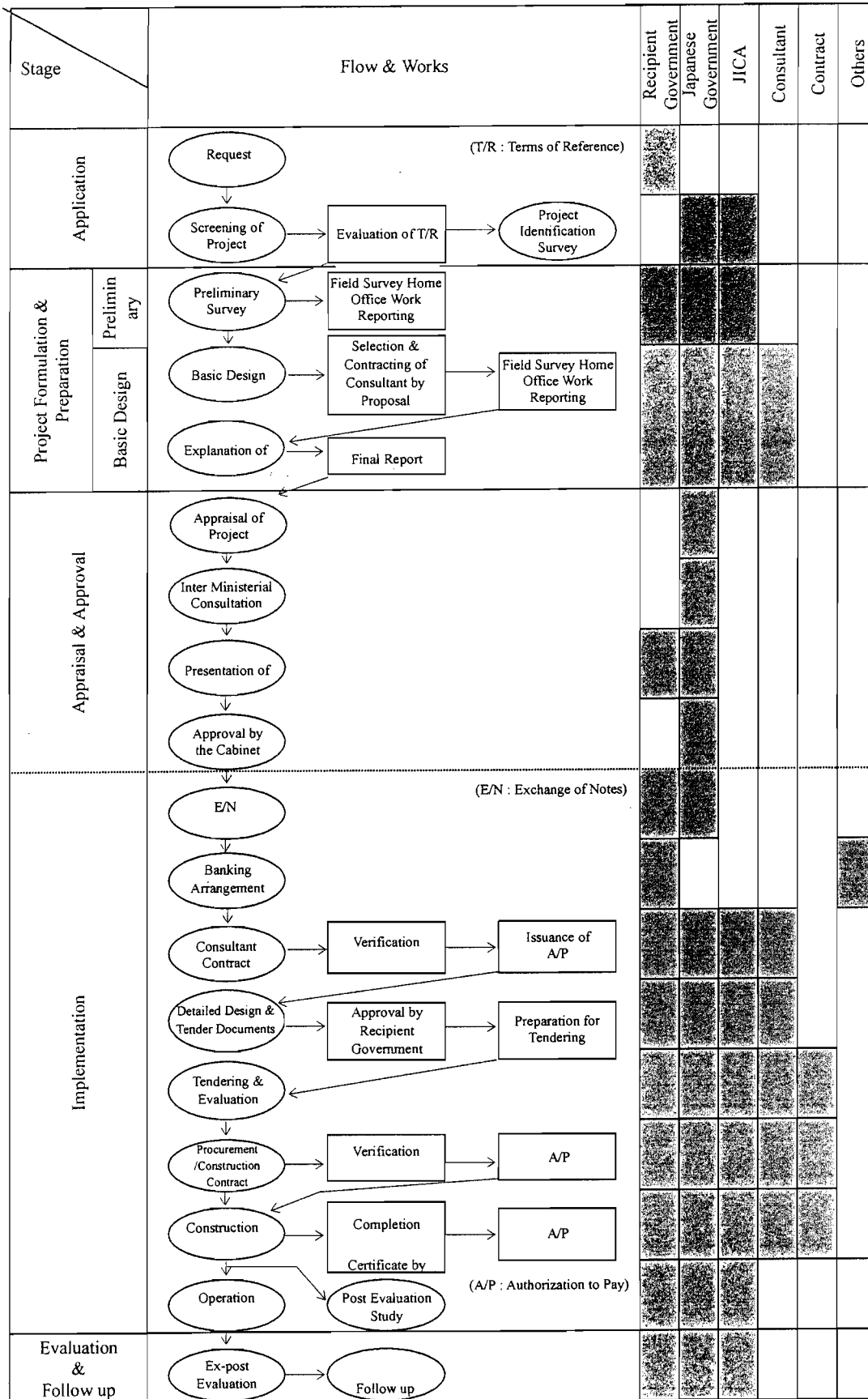
The Grant Aid Program provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and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

through the donation of materials as such.

- 2) 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.
- 3) "The period of the Grant" means the one fiscal year which the Cabinet approves the project for. Within the fiscal year, all procedure such as exchanging of the Notes, concluding contracts with consulting firms and contractors and final payment to them must be completed.  
However, in case of delays in delivery, installation or construction due to unforeseen factors such as weather, 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.
- 4) Under the Grant, 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.)
- 5) Necessity of "Verification"  
The Government of the 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 of Japanese taxpayers.
- 6) Undertakings required to the Government of the recipient country
  - a) to secure a lot of land necessary for the construction of the Project and to clear the site;
  - b) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities outside the site;
  - c) to ensure prompt unloading and customs clearance at ports of disembarkation in the recipient country and internal transportation therein of the products purchased under the Grant Aid;



- d) to exempt Japanese nationals from customs duties, internal taxes and fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts;
  - e) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such as facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work;
  - f) to ensure that the facilities constructed and products purchased under the Grant Aid be maintained and used properly and effectively for the Project; and
  - g) to bear all the expenses, other than those covered by the Grant Aid, necessary for the Project.
- 7) "Proper Use"
- The recipient country is required to maintain and use the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign the necessary staff for operation and maintenance of them as well as to bear all the expenses other than those covered by the Grant Aid.
- 8) "Re-export"
- The products purchased under the Grant Aid shall not be re-exported from the recipient country.
- 9) Banking Arrangement (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 an authorized foreign exchange 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 recipient country or its designated authority.



*Handwritten signatures and initials:*  
 [Signature] [Signature]  
 No

NO	Items	To be covered by Grant Aid	To be covered by Recipient side
1	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		●
2	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
	1) Marine(Air) transportation of the product to the recipient country	●	
	2) Tax exemption and custom clearance of the product at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the designated site	●	
3	To accord Japanese nationals whose services may be required in connection with the supply of the product 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		●
4	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 product and services under the verified contract		●
5	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
6	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for the transportation and installation of the equipment		●

## 5. Minutes of Discussions (Explanation of the Draft Report)

**MINUTES OF DISCUSSIONS  
ON THE BASIC DESIGN STUDY ON  
THE PROJECT FOR INFECTIOUS DISEASE CONTROL  
IN THE KINGDOM OF CAMBODIA  
(EXPLANATION OF THE DRAFT REPORT)**

In July 2008, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Basic Design Study Team on the Project for Infectious Disease Control (hereinafter referred to as "the Project") to the Kingdom of Cambodia (hereinafter referred to as "Cambodia") and through discussions, field surveys, and technical examination of the results in Japan, JICA prepared the draft report of the study.

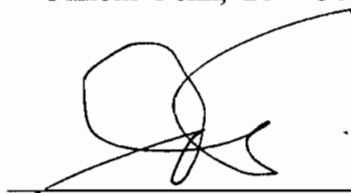
In order to explain and to consult the Government of Cambodia on the components of the draft report, JICA sent to Cambodia the Draft Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Ms. Naoko UEDA, Director of Infectious Disease Control Division, Human Development Department, from October 23rd to October 29th 2008.

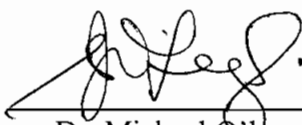
As a result of discussions, both parties confirmed the main items described on the attached sheets.

Phnom Penh, 28<sup>th</sup> October, 2008

上田 直子

Naoko UEDA  
Leader  
Basic Design Study Team  
Japan International Cooperation Agency  
Japan

  
\_\_\_\_\_  
Prof. Eng Huot  
Secretary of State for Health  
Ministry of Health  
The Kingdom of Cambodia

(Witnessed by)   
\_\_\_\_\_  
Dr. Michael O'leary  
Representative in Cambodia  
World Health Organization

## ATTACHMENT

## 1. Components of the Draft Final Report

The Government of Cambodia agreed and accepted in principle the components of the draft final report explained by the Team.

## 2. Japan's Grant Aid scheme

Cambodia side understands the Japan's Grant Aid (JGA) Scheme and the necessary measures to be taken by the Government of Cambodia as explained by the Team and described in Annex-2 and Annex-3 of the Minutes of Discussions signed by both parties on July 18, 2008. And the Team also explained the change on the JGA about Grant Agreement (G/A).

## 3. Schedule of the Study

JICA will complete the final report in accordance with the confirmed items and send it to the Government of Cambodia by the end of February, 2009.

## 4. Confidentiality of the Project

Both sides confirmed that all information related to the Project including detailed specifications of the equipment and other technical information and cost estimation shall not be released to any outside party before the signing of all the Contract(s) for the Project.

## 5. Other relevant issues

## 5-1. Confidentiality of the Project Cost Estimation

The Team explained the cost estimation of the Project as described in Annex-1. Cambodia side understood that the Project Cost Estimation attached as Annex-1 is not final and is subject to change.

## 5-2. Final Destination of the items by Japanese side

Both sides confirmed that the final destination of planned items as follows.

- (1) Solar power Refrigerator; Each Health Center
- (2) Incinerator; Each Hospital
- (3) The other items; Warehouse of Central Medical Store

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### 5-3. Budget allocation by Cambodian side

The Government of Cambodia promised to secure and allocate necessary budget such as operation and maintenance cost for the equipment as described in Annex-2.

### 5-4. Technical Specifications of the equipments

The Team explained the specification of the planned equipment, and both sides agreed.

### 5-5. Operation and Maintenance of Incinerator

The Government of Cambodia promised that each target hospital manages the operation and maintenance of the said equipment to be procured under the Project in accordance with Health Care Waste Management Guideline issued in August 2008, and that the Hospital Service Department, Ministry of Health secures that each target hospital allocates necessary staff and the budget for procurement of firewood as mentioned in the Annex-2.

### 5-6. Safety Box collection system

The Government of Cambodia promised to collect used safety boxes as shown in the Annex-4, in accordance with the Injection Safety Guideline issued in 2003, and Health Care Waste Management Guideline.

### 5-7. Schedule of the Measles Vaccination Campaign

The Government of Cambodia explained that the measles vaccination campaign shall be held in early 2011, 4 years after previous campaign in 2007, considering the WPRO-WHO advice.

Annex-1	Project Cost Estimation
Annex-2	Operation and Maintenance Cost for the Equipment
Annex-3	Tentative Schedule of the Project
Annex-4	Flow Chart for NIP Safety Box System

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Project Cost Estimation

The total cost necessary to carry out this cooperation project is approx. million yen ( million yen for Japan side and 2.3 million yen for Cambodia side). The cost breakdown by each country is estimated as in the table below, according to the conditions for estimate of accumulation condition shown in following (3).

The figures do not represent the donation limits.

(1) Project cost borne by the Japanese side: Approx. million yen

Cost item	Estimated Project Cost
Equipment	million yen
Detail design and procurement supervision	million yen
Total	million yen

(2) Project cost borne by the Cambodian side: 21,900.00 US\$ (Approx. 2.3 million yen)

Cost item	Estimated Project Cost
Internal transportation	19,720.00 US\$ (2.1 million yen)
Banking Commission	2,180.00 US\$ (0.2 million yen)
Total	21,900.00 US\$ (2.3 million yen)

(3) Calculation conditions

- 1) Estimate of accumulation: July / 2008
- 2) Exchange rate: 1 US dollar = 105.89 yen, 1 Euro = 162,11 yen (Average TTS for the last 6 months)
- 3) Procurement period: The detailed design and equipment procurement period is as shown in the Schedule.
- 4) Others: The cost estimation is based on the framework of grant aid system by the Japanese government.

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Operation and Maintenance Cost for the Equipment

(1) Operation & Maintenance cost

Equipment	Q'ty	cost/unit/year (\$)	Total/year (\$)
Refrigerator and icepack freezer	78	420.00	32,760.00
Motorcycle	50	137.80	6,890.00
Pick up truck	3	2,650.00	7,950.00
Incinerator	24	1,200.00	28,800.00
TOTAL			76,400.00

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### Tentative Schedule of the Project

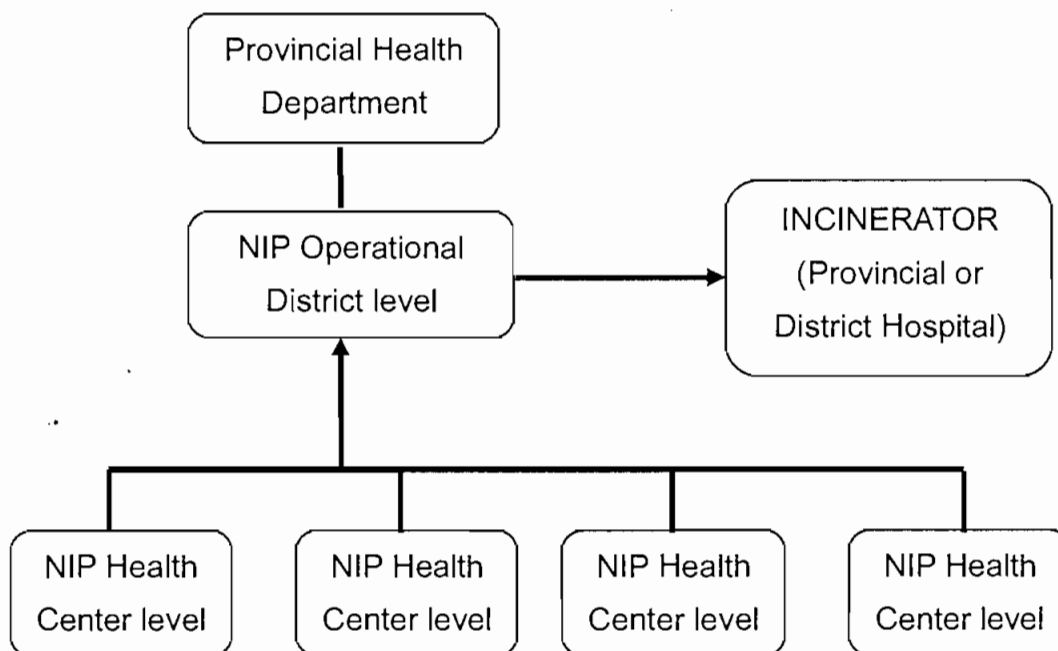
The sequence of works, shown in the table below, will be followed by the Project after the Exchange of Notes between the Government of Japan and the Government of Cambodia.

Number of Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
● Japan																			
E/N	•																		
G/A	•																		
Consultant Agreement		•																	
Detail Design (Final Confirmation)																			
Tender related work																			
Supply Contract						•													
Equipment Ordering, Manufacturing																			
Foundation Work for Incinerator																			
Transportation, custom clearance and Internal transportation																			
Unpacking, Installation & Training, Inspection and Handing over of the																			
● Cambodia																			
Internal Transportation (Equipment except Incinerator and Solar Refrigerator)																			
Delivery & Training (Equipment except Incinerator and Solar Refrigerator)																			

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**FLOW CHART FOR NIP SAFETY BOX SYSTEM**



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## 6. Summary of Sampling Survey Results

## Summary of Sampling Survey Results

Appendix-6

PHD	OD	Name of facilities	Product	Manufacture	Model	Type	Power source	Year	Donor	Condition	Note	
PHNOM PENH	TUOL KORK (Lech)	OD Lech	Refrigerator	Vest Frost	MK074	Electrical	Electricity	2004	UNICEF	Good		
			Refrigerator	Vest Frost	MK304	Electrical	Electricity	2003	Japan	Good		
			CB	Dometic	RCW25			2004	Japan			
			VC								15 pcs.	
			SB								500 pcs.	
			ADS(0.5ml)	BD Soloshot							2,400 pcs.	
			ADS(0.05ml)	Kendall							1,600 pcs.	
		CPA1 Pochentong	Refrigerator	Vest Frost	MK074	Electrical	Electricity	2004	UNICEF	Good		
			Motorcycle								28,904 km drive	
		HC Samrong Kron	Refrigerator	Dometic	RCW50EG	Electrical/gas	Gas	Unclear	?		Good	
			Refrigerator	Sibir	V240	Electrical/oil		Unclear	UNICEF		Out of order	
			CB	Dometic	RCW25			1999	?		Good	
			VC	Unclear	Unclear			Unclear	?		Good	2 pcs.
			Incinerator	SICIM	Prototype			2002	UNICEF		Partial failure	Suffer some cracks, temperature instability
		KANDAL	PHD Kandal	Refrigerator	Vest Frost	MK304	Electrical	Electricity	2006	Japan	Good	
				Refrigerator	Vest Frost	MK304	Electrical	Electricity	2006	Japan	Good	
Refrigerator	Vest Frost			MK304	Electrical	Electricity	2002	Japan	Good			
Refrigerator	Vest Frost			MK304	Electrical	Electricity	2002	Japan	Good			
Refrigerator	Sibir			V240	Electrical/oil		Unclear	UNICEF		Out of order		
Refrigerator	Sibir			V240	Electrical/oil		Unclear	UNICEF		Out of order		
Refrigerator	Sibir			V240	Electrical/oil		Unclear	UNICEF		Out of order		
Freezer	Vest Frost			MF314	Electrical	Electricity	2001	UNICEF		Good		
Freezer	Vest Frost			MF314	Electrical	Electricity	2005	Japan		Good		
Freezer	Vest Frost			MF314	Electrical	Electricity	2004	Japan		Good		
VC										15 pcs.		
SB										750 pcs.		
CB										7 pcs.		
ADS(0.5ml)	BD Soloshot									86,400 pcs.		
TAKHMAO	OD Takhmao		Refrigerator	Vest Frost	MK304	Electrical	Electricity	2007	Japan	Good		
			Freezer	Vest Frost	MF114	Electrical	Electricity	2005	Japan		Out of order	
			CB	Dometic	RCW25			2002	Japan		Good	
			CB	Dometic	RCW25			2004	Japan		Good	
			Refrigerator	Vest Frost	MK074	Electrical	Electricity	Unclear	?		Good	Operation at home of EPI staff because the electrical power condition at the health center is bad.
			Incinerator	Stella					prototype		Good	Prototype by Japanese manufacture, Use 1-2 times week, Cost of firewood: US\$3-4 /time, Ash: collected by trader
			Motorcycle	Honda	Wave 125			2006	Japan		Good	
KEAN SVAY	OD Kean Svay		Refrigerator	Vest Frost	MK304	Electrical	Electricity	2006	Japan	Good		
			Refrigerator	Sibir	V240	Electrical/oil		Unclear	UNICEF		Out of order	
			Refrigerator	Sibir	V240	Electrical/oil		Unclear	UNICEF		Out of order	
			CB	Dometic	RCW25			2005	Japan		Good	
			Motorcycle	Honda	Wave 125			2006	Japan		Good	
			SB								100 pcs.	
		ADS(0.5ml)	BD Soloshot							12,000 pcs.		

## Summary of Sampling Survey Results

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PHD	OD	Name of facilities	Product	Manufacture	Model	Type	Power source	Year	Donor	Condition	Note	
		HC Koki Thom	Refrigerator	Dometic	RCW50EG	Electrical/gas	Gas	2004	Japan	Good		
			CB	Dometic	RCW25				Japan	Good		
			CB	Dometic	RCW25				?	Good		
			ADS(0.5ml)	BD Soloshot							200 pcs.	
			ADS(0.05ml)	Kendall							200 pcs.	
			VC								2 pcs.	
		SB								1 pc.		
		HC Samrong Thom	Refrigerator	Dometic	RCW50EG	Electrical/gas	Gas	2004	Japan	Good		
			CB	Dometic	RCW25			1999	UNICEF	Good		
			Refrigerator	Sibir	V240	Electrical/oil		Unclear	UNICEF	Out of order		
			VC								3 pcs.	
			SB								1 pc.	
PURSAT	PHD Pursat	Refrigerator	Vest Frost	MK304	Electrical	Electricity	2003	Japan	Good			
		Refrigerator	Vest Frost	MK304	Electrical	Electricity	2003	Japan	Good			
		Refrigerator	Vest Frost	MK304	Electrical	Electricity	2002	Japan	Good			
		Refrigerator	Vest Frost	MK304	Electrical	Electricity	2002	?	Good			
		Freezer	Vest Frost	MF114	Electrical	Electricity	2003	UNICEF	Good			
		Freezer	Vest Frost	MF114	Electrical	Electricity	2004	Japan	Good			
		CB	Dometic	RCW25				Japan	Good			
		Motorcycle	Honda	Wave			2005	Japan	Good	45,042 km drive		
		VC								2 pcs.		
		ADS(0.5ml)	BD Soloshot							33,600 pcs.		
		ADS(0.05ml)	Kendall							5,600 pcs.		
		SB								200 pcs.		
		SAMPOV MEAS	OD Sampov Meas	Refrigerator	Vest Frost	MK304	Electrical	Electricity	2002	Japan	Good	
	Motorcycle			Yamaha	Spark Z			2004	Japan		58,194 km drive	
	HC Peal Nhek		Refrigerator	Vest Frost	MK074	Electrical	Electricity	2006	Japan	Good		
			HC Phnom Kravanh	Refrigerator	Sibir	V110			2003	Japan	Good	
				CB	Dometic	RCW25			2005	Japan		
				VC								2 pcs.
				ADS(0.5ml)	BD Soloshot							1,000 pcs.
	ADS(0.05ml)		Kendall							200 pcs.		
SB									300 pcs.			
HC Kandieng	Refrigerator		Dometic	RCW50EG	Electrical/gas	Gas	2004	Japan	Good			
	Refrigerator		Dometic	?	Electrical/oil				Out of order			
	VC									1 pc.		
	ADS(0.5ml)		BD Soloshot							600 pcs.		
	SB									18 pcs.		
HC Koh Chum	Refrigerator		Dometic	RCW50EG	Electrical/gas	Gas	2005	Japan	Good			
	CB											
	VC									2 pcs.		
	ADS(0.5ml)	BD Soloshot							600 pcs.			
	SB							Unused	25 pcs.			

## Summary of Sampling Survey Results

Appendix-6

PHD	OD	Name of facilities	Product	Manufacture	Model	Type	Power source	Year	Donor	Condition	Note	
KOMPONG CHHNANG	PHD Kompong Chhnang	Freezer	Vest Frost	MF114	Electrical	Electricity	2004	Japan	Good			
		Freezer	Vest Frost	MF114	Electrical	Electricity	2003	Japan	Good			
		Refrigerator	Vest Frost	MK304	Electrical	Electricity	?	UNICEF	Good			
		Refrigerator	Vest Frost	MK304	Electrical	Electricity	2002	UNICEF	Good			
		Refrigerator	Vest Frost	MK304	Electrical	Electricity	2002	UNICEF	Good			
		Refrigerator	Vest Frost	MK304	Electrical	Electricity	2005	Japan	Good			
		Refrigerator	Sibir	V240KE	Electrical/oil		1995	Japan	Unused	Unused because oil is unavailable		
		Refrigerator	Sibir	V240KE	Electrical/oil				Unused	Unused because oil is unavailable		
		Refrigerator	Sibir	V240KE	Electrical/oil				Unused	Unused because oil is unavailable		
		Refrigerator	Sibir	V240KE	Electrical/oil				Unused	Unused because oil is unavailable		
		Refrigerator	Sibir	V240KE	Electrical/oil				Unused	Unused because oil is unavailable		
		CB									7 pcs.	
		VC									30 pcs.	
		SB									300 pcs.	
		ADS(0.5ml)	BD Soloshot								14,000 pcs.	
		Motorcycle	Honda	Wave				2005	Japan	Good		
		KOMPONG CHHNANG	OD Kompong Chhnang	Refrigerator	Vest Frost	MK074	Electrical	Electricity	2005	Japan	Good	
				Refrigerator	Vest Frost	MK304	Electrical	Electricity	2002	UNICEF	Good	
				Freezer	Vest Frost	MF314	Electrical	Electricity		Japan	Good	For PHD
				Refrigerator	Vest Frost	MK304	Electrical	Electricity		Japan	Good	For PHD
CB										11 pcs. Plan to distribute 3 pcs. to OD Borido		
Refrigerator	Sibir			V240KE	Electrical/oil				Out of order	4 units unused		
ADS(0.5ml)	BD Soloshot									19,200 pcs.		
ADS(0.05ml)	Kendall									9,600 pcs.		
SB												
Motorcycle	Yamaha			Spark Z				?	Japan	Good		
HC Chrey Bak	Refrigerator		Dometic	RCW50EG	Electrical/gas	Gas	2004	?	Good			
	Incinerator		Sicim				2002	WHO	Out of order	A hole opened, Use 5 times a month, Ash: buried in the ground		
	Solar Panel									For lighting		
HC Pray Khmer	Refrigerator		Dometic	RCW50EG	Electrical/gas	Gas	2004	?	Good			
	VC									2 pcs.		
	ADS(0.5ml)		BD Soloshot							100 pcs.		
	ADS(0.05ml)		Kendall									
	SB									2 pcs.		
	CB		Dometic	?						1 pc. for temporary storage for vaccine		
HC Chierp	Refrigerator		Dometic	RCW50EG	Electrical/gas	Gas		?	Good			
	CB								For temporary storage for vaccine			
KOMPONG TRALACH	OD Kompong Tralach	Refrigerator	Vest Frost	MK304	Electrical	Electricity	2002	UNICEF	Good			
		Refrigerator	Vest Frost	MK074	Electrical	Electricity	2005	Japan	Good			
		CB	Dometic	RCW25						7 pcs.		
		VC								23 pcs.		
		ADS(0.5ml)	BD Soloshot							20,400 pcs.		
		ADS(0.05ml)	Kendall							8,400 pcs.		
		SB								375 pcs.		
		Motorcycle										

## Summary of Sampling Survey Results

Appendix-6

PHD	OD	Name of facilities	Product	Manufacture	Model	Type	Power source	Year	Donor	Condition	Note		
		HC Seb	Refrigerator	Dometic	RCW50EG	Electrical/gas	Gas	2004	?	Good			
			CB	Dometic	RCW25						1 pc.		
			VC								2 pcs.		
			ADS(0.5ml)	BD Soloshot							300 pcs.		
			ADS(0.05ml)	Kendall							20 pcs.		
			SB								15 pcs.		
			Generator	AKI	Manalan				2003	PATH	Good	Similar to Sicim. Made in Cambodia. Use 4-5 times a month	
			Motorcycle	Suzuki	VIVA					MoH	Good		
		HC Svay	Refrigerator	Dometic	RCW50EG	Electrical/gas	Gas	2004	?	Good			
			VC								2 pcs.		
			ADS(0.5ml)	BD Soloshot							30 pcs.		
			SB								1 pc.		
			CB	Dometic	RCW25				2004	Japan	1 pc.		
			KRATIE		PHD Kratie	Refrigerator	Dometic	RCW50EG	Electrical/gas		2002	Japan	Out of order
Refrigerator	Vest Frost	MK304				Electrical	Electricity	2002	UNICEF	Good			
Refrigerator	Vest Frost	MK304				Electrical	Electricity	2002	UNICEF	Good			
Freezer	Vest Frost	MF114				Electrical	Electricity	2003	UNICEF	Good			
Freezer	Vest Frost	MF114				Electrical	Electricity	2004	Japan	Good			
CB											3 pcs.		
ADS(0.5ml)	BD Soloshot										24,000 pcs.		
ADS(0.05ml)	Kendall										1,500 pcs.		
SB											250 pcs.		
Motorcycle	Honda	Wave								Japan		12986 km drive	
Car	Toyota	Hilux							2004	Japan	Good	133,931 km drive, storage in the garage	
CHHLONG	OD Chhlong	Motorcycle				Yamaha	Spark Z				Japan	Good	Stay out (OD conference)
KRATIE	OD Kratie	Refrigerator				Vest Frost	MK304	Electrical	Electricity	2002	UNICEF	Good	
		Refrigerator	Sibir	V170KE	Electrical/oil	Electricity	2001	UNICEF	Good				
		CB	Dometic	RCW25						2 pcs. at house			
		ADS(0.5ml)	BD Soloshot							50 pcs.			
		ADS(0.05ml)	Kendall							5 pcs.			
		SB								5 pcs.			
		VC								2 pcs.			
		Motorcycle	Yamaha	Spark Z					Japan	Good	50,932 km drive		
		HC Rokar Kandal	Refrigerator	Dometic	RCW50EG	Electrical/gas	Gas	2004	Japan	Good	Use by gas		
		CPA2 Kratie	Refrigerator	Dometic	RCW50EG	Electrical/gas	Electricity	2008	?	Good	Use for blood bank		
			Refrigerator,	Norocoast							Out of order		
		HC Thmor Kre	Refrigerator	Dometic	RCW50EG	Electrical/gas	Gas	2004	Japan	Good			
			ADS(0.5ml)	BD Soloshot							260 pcs.		
ADS(0.05ml)	Kendall								16 pcs.				
SB									4 pcs.				
VC									1 pc.				
Incinerator	Sicim						2001	WHO	Out of order	Suffer some cracks			



## Summary of Sampling Survey Results

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PHD	OD	Name of facilities	Product	Manufacture	Model	Type	Power source	Year	Donor	Condition	Note	
		HP Changkrang	Refrigerator	Sibir	V110EG	Electrical/gas	Gas	2008	UNICEF	Good		
			ADS(0.5ml)	BD Soloshot								220 pcs.
			ADS(0.05ml)	Kendall								55 pcs.
			VC									1 pc.
			Solar Panel									For lighting
		HC Thmey	Refrigerator	Dometic	RCW50EG	Electrical/gas	Gas	2004	Japan	Good		
			CB	Dometic	RCW25							1 pc.
			ADS(0.5ml)	BD Soloshot								150 pcs.
			ADS(0.05ml)	Kendall								30 pcs.
			VC									3 pcs.
			SB									4 pcs.
			Generator									
		HC Kantout	Refrigerator	Dometic	RCW50EG	Electrical/gas	Gas	2004	Japan	Good		
			CB	Dometic	RCW25			2004	?			1pc. for temporary storage for vaccine
			ADS(0.5ml)	BD Soloshot								100 pcs.
			ADS(0.05ml)	Kendall								30 pcs.
			VC									2 pcs.
			SB									4 pcs.
			Generator									
		HP Beung Char	Refrigerator	Sibir	V110GE	Electrical/gas	Gas	2008	UNICEF	Good		There is no budget for providing gas.
			CB	Dometic	RCW25				?			1pc. for temporary storage for vaccine
			ADS(0.5ml)	BD Soloshot								50 pcs.
			ADS(0.05ml)	Kendall								15 pcs.
			VC									1 pc.
			SB									1 pc.
			Solar Panel									For lighting
		HC Sambo	Refrigerator	Sibir	V170GE	Electrical/gas	Gas	2004	PATH	Good		
			Refrigerator	Sibir	S55GE	Electrical/gas	Gas	2007	USAID	Good		
			ADS(0.5ml)	BD Soloshot								230 pcs.
			ADS(0.05ml)	Kendall								60 pcs.
			VC									3 pcs.
			SB									1 pc.
			Solar Panel									For lighting
HP Koh Kgner												
HC O Krieng	Refrigerator	Dometic	RCW50EG	Electrical/gas	Gas	2004	Japan	Good				
	Motorcycle	Honda				2003	USAID	Good				
	Motorcycle	Suzuki				99	Japan	Partial failure				
	ADS(0.5ml)	BD Soloshot								800 pcs.		
	ADS(0.05ml)	Kendall								300 pcs.		
	VC									1 pc.		
	SB									40 pcs.		
	Solar Panel											
Generator												

## Summary of Sampling Survey Results

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PHD	OD	Name of facilities	Product	Manufacture	Model	Type	Power source	Year	Donor	Condition	Note			
KOMPONG CHAM		PHD Kompong Cham	Refrigerator	Vest Frost	MK304	Electrical				Japan	Good	3 units		
			Refrigerator	Vest Frost	MK304	Electrical				?	Good	5 units		
			Refrigerator	Vest Frost	MK314	Electrical					Japan	Good	2 unites	
			Refrigerator	Vest Frost	MF114	Electrical						Good		
			Refrigerator	Vest Frost	MK074	Electrical					Japan	Unopened		
			Refrigerator	Elextrolux	TCW1151	Electrical	Electricity	1995	NIP			Good		
			Refrigerator	Dometic	RCW50EG	Electrical/gas					Japan	Good	Plan to distribute to a health center in Prey Chor OD	
			Refrigerator	Sibir									Out of order: 2 in 4 units	
			CB	Dometic	RCW25 etc.								4 pcs. for spare	
			ADS(0.5ml)	BD Soloshot									75,000 pcs.	
			ADS(0.05ml)	Kendall									19,600 pcs.	
			VC										15 pcs.	
			SB										2,500 pcs.	
			Motorcycle	Yamaha	Spark Z					2005	Japan	Good	26,241 km drive. It is difficult to find out spare parts for Yamaha.	
			Motorcycle	Honda	Wave					2005	Japan	Good	16,430 km drive	
TBONG KHMUM	OD	Tbong Khmum	Refrigerator	Vest Frost	MK074	Electrical		2005	Japan	Unopened	Unused because of skyrocketing electricity prices (1 pc. for Chiro HC, 1 pc. for Suong 2 HC)			
			Refrigerator	Sibir	V240KE	Electrical/oil		93			Out of order	It had been used at HC		
			Refrigerator	Sibir	V240KE	Electrical/oil		90			Out of order	It had been used at HC		
			Refrigerator	Vest Frost	MK304	Electrical	Electricity	2002	UNICEF		Good			
			CB	Dometic	RCW25				2005	Japan				
			CB	Dometic	RCW25				2005	Japan		Plan to distribute to CKS Chup HC		
			ADS(0.5ml)	BD Soloshot								15,000 pcs.		
			ADS(0.05ml)	Kendall								2,200 pcs.		
			VC									15 pcs.		
			SB									50 pcs.		
			Incinerator	Sicim	Pioneer AC/N121				2004	USAID	Good	Use 1 time a month for EPI, Ash: buried in the ground		
			Motorcycle	Yamaha	Spark Z				2004	Japan	Good	34,729 km drive		
			HC	Chhouk	Refrigerator	Dometic	RCW50EG	Electrical/gas	Gas	2007	Japan	Out of order	Already contacted for service	
					CB	Dometic	RCW25				2004	Japan	Good	
					ADS(0.5ml)	BD Soloshot								70 pcs.
ADS(0.05ml)	Kendall										15 pcs.			
VC											1 pc.			
SB											1 pc.			
HC	CKS Choup	Refrigerator	Sibir	V240KE	Electrical/oil	Oil	1993	UNICEF	Bad	Temperature instability				
		ADS(0.5ml)	BD Soloshot								200 pcs.			
		ADS(0.05ml)	Kendall								100 pcs.			
		VC									2 pcs.			
		SB									3 pcs.			
KOMPONH SIEM	OD	KG Siem	Refrigerator	Vest Frost	MK074	Electrical	Electricity	2004	Japan	Good				
			Refrigerator	Vest Frost	MK304	Electrical	Electricity	2002	UNICEF	Good				
			CB	Dometic	RCW25									
			ADS(0.5ml)	BD Soloshot								9,600 pcs.		
			SB									225 pcs.		
			Motorcycle	Honda	Wave				2004	Japan	Good	73,254 km drive, Cost burden by OD: S/P 70%, petrol 50%		

## Summary of Sampling Survey Results

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PHD	OD	Name of facilities	Product	Manufacture	Model	Type	Power source	Year	Donor	Condition	Note		
	HC	Veal Vang	Refrigerator	Vest Frost	MK074	Electrical	Electricity	2005	Japan	Good			
			ADS(0.5ml)	BD Soloshot								200 pcs.	
		Kro La	Refrigerator	Dometic	RCW50EG	Electrical/gas	Gas	2003	Japan	Out of order	Already contacted for service but no response		
			ADS(0.5ml)	BD Soloshot								100 pcs.	
			ADS(0.05ml)	Kendall								50 pcs.	
			SB									2 pcs.	
			CB	Dometic	RCW25			2004	?				
		Beung Kok	Refrigerator	Vest Frost	MK074	Electrical	Electricity	2005	Japan	Good			
			CB	?									
		Prek Kak	Refrigerator	Dometic	RCW50EG	Electrical/gas	Gas	2003	Japan	Out of order			
			CB	Dometic	RCW25			2003	Japan				
			ADS(0.5ml)	BD Soloshot								80 pcs.	
			ADS(0.05ml)	Kendall								20 pcs.	
			VC									1 pc.	
			SB									3 pcs.	
	KRAUCH CHHMAR	HC	A Ruk Tnout	Refrigerator	Dometic	RCW50EG	Electrical/gas	Gas	2006	Japan	Good		
				CB	Dometic	RCW25			2006	Japan	Good		
				ADS(0.5ml)	BD Soloshot								350 pcs.
				ADS(0.05ml)	Kendall								180 pcs.
				VC									5 pcs.
SB												2 pcs.	
Solar Panel												For lighting	
HC				Peam Kohsna	Refrigerator	Dometic	RCW50EG	Electrical/gas	Gas	2002	PATH	Good	
		Refrigerator,	Unclear							Good	Donated by the Prime Minister for test		
		ADS(0.5ml)	BD Soloshot									120 pcs.	
		ADS(0.05ml)	Kendall									20 pcs.	
		VC										1 pc.	
		SB										2 pcs.	
		Generator										Donated by the Governor	
HC		Khpob Ta Gnuon	Refrigerator	Dometic	RCW50EG	Electrical/gas	Gas	2004	PATH	Good			
			CB							Good			
			ADS(0.5ml)	BD Soloshot								200 pcs.	
			VC									1 pc.	
PONHEAKREK		OD	Ponheakrek	Refrigerator	Vest Frost	MK304	Electrical	Electricity	2005	UNICEF	Good		
				CB	Dometic	RCW25				Japan		4 pcs. (1 pc. for Chong Cheak HC, 1 pc. for CK,Krek HC)	
	CB			Dometic	RCW25				Japan				
	CB			Dometic	RCW25				Japan				
	CB			Dometic	RCW25				Japan		Unopened		
	Refrigerator			Sibir							2 units out of order		
	Incinerator			Sicim	Pioneer AC/No.161			2003	?	Out of order	Suffer some cracks		
	ADS(0.5ml)			BD Soloshot								7,800 pcs.	
	ADS(0.05ml)			Kendall								1,700 pcs.	
	SB											40 pcs.	

## Summary of Sampling Survey Results

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PHD	OD	Name of facilities	Product	Manufacture	Model	Type	Power source	Year	Donor	Condition	Note	
	HC	Koang Kang	Refrigerator	Vest Frost	MK074	Electrical	Electricity	2005	Japan	Good		
			CB	Dometic	RCW25			2004	?			
			ADS(0.5ml)	BD Soloshot								400 pcs.
			ADS(0.05ml)	Kendall								200 pcs.
			VC									1 pc.
			SB									6 pcs.
	PREY CHHOR	OD	Prey Chhor	Refrigerator	Vest Frost	MK304	Electrical	Electricity		Japan	Good	
				Refrigerator	Vest Frost	MK74	Electrical	Electricity		Japan	Good	
				CB					2006	Japan		Already distributed to Pean Chikang HC
				CB					2005	Japan	Good	
				ADS(0.5ml)	BD Soloshot							8,600 pcs.
				ADS(0.05ml)	Kendall							1,600 pcs.
				VC								12 pcs.
				SB								150 pcs.
				Motorcycle	Yamaha	Spark Z			2004	Japan	Good	43,710 km drive
		HC	Kor	Refrigerator	Dometic	RCW50EG	Electrical/gas	Gas	2004	?	Out of order	Already contacted for service 2 months ago but no response
				CB	INALSA						Good	For storage for vaccine
				ADS(0.5ml)	BD Soloshot							500 pcs.
				ADS(0.05ml)	Kendall							100 pcs.
				SB								7 pcs.
			Solar Panel							For lighting		
	SREY SANTHOR	HC	Sdao	Refrigerator	Dometic	RCW50EG	Electrical/gas	Gas	2003	PATH	Out of order	Already contacted for service in January 2008 but no response
				CB	BLOWKINGS						Failure	Packing failure. Already contacted for service but no response
				Solar Panel						MOH		For lighting
				Generator					2006	Japan		

## 7. Examination of the Requested Equipment

Examination of the Requested Equipment

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Minute No.	Description (Requested)	Q'ty (Request)	Purpose	Necessity	Tec. Level	Staff	Maintenance	Ope. Cost	Judgment	Item No.	Description (Project)	Q'ty (Project)	Remarks
1	Icelined Refrigerator	78	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1	Refrigerator and icepack freezer	78	
2	Refrigerator with Solar Power System	30	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2	Refrigerator and icepack freezer with solar power system	30	
3	Cold Box	67	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3	Vaccine cold box	67	
4	Vaccine Carrier	310	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4	Vaccine carrier	310	
5	Temperature data logger	48	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5	Data logger	48	2pcs. for each PHD.
6	USB Connection cable for connecting data logger to PC	24	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6	Interface cable for data logger	24	1pc for 2 data logger
7	Freeze watch indicator	500	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7	Freeze watch indicator	400	To use vaccines transportation from CMS to each PHD (5pcs/time x 4times/year)
8	Refrigerator monitor	1,000	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8	Refrigerator monitor card	1,000	For the refrigerator in Health Center
9	Motocycle	50	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9	Motorcycle	50	
10	Pick up truck	4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	10	Pick up truck	3	For NIP
11	Incinerator	37	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	11	Incinerator	24	Deliver to Referral Hospital
12	Measles vaccine (10 doses)	200,000	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	12	Measles vaccine (10 doses)	200,000	For the campaign in 2010 to pediatric (9month - 4 years)
13	AD syringe (0.5ml)	2,000,000	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	13	AD syringe for measles, 0.5ml	1,780,000	Ditto
14	Syringe (5ml) & Needle (21G x 1.5)	200,000	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	14	Disposable syringe for dilution of measles vaccine, 5ml	200,000	Ditto
15	AD syringe for BCG (0.05ml)	400,000	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>			0	Procured by the Cambodian side
16	Japanese Encephalitis Vaccine	2,000,000	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>			0	It is not program in the National Immunization Program
17	AD syringe for JE	200,000	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>			0	Ditto

## 8. Equipment List

Equipment List

Appendix-8

<b>Item No.</b>	<b>Description (planned)</b>	<b>Q'ty</b>
1	Refrigerator and icepack freezer	78
2	Refrigerator and icepack freezer with solar power system	30
3	Vaccine cold box	67
4	Vaccine carrier	310
5	Data logger	48
6	Interface cable for data logger	24
7	Freeze watch indicator	400
8	Refrigerator monitor card	1,000
9	Motorcycle	50
10	Pick up truck	3
11	Incinerator	24
12	Measles vaccine (10 doses)	200,000
13	AD syringe for measles, 0.5ml	1,780,000
14	Disposable syringe for dilution of measles vaccine, 5ml	200,000



## 9. Equipment Delivery List

## Equipment Delivery List

Appendix-9

Item No.	1	2	3	4	5	6	7	8	9	10	11
Description	Refrigerator and icepack freezer	Refrigerator and icepack freezer with solar power system	Vaccine cold box	Vaccine carrier	Data logger	Interface cable for data logger	Freeze watch indicator	Refrigerator monitor card	Motorcycle	Pick up truck	Incinerator
No. PHD and OD											
<b>I B.M.CHEY</b>					2	1					1
1 MONKUL BOREY	3		2	10					1		
2 O CHROV			1	9					1		1
3 THMOR PUOK			1	1					1		
4 PREAH NETH PREAH			3	1					1		
	3	0	7	21	2	1	0	0	4	0	2
<b>II BATTAMBANG</b>					2	1					1
5 BATTAMBANG	1		2	14					1		
6 SANG KE	1		5	1					1		
7 THMOR KOL	1		6	12					1		
8 MONG RUSSEY	1		10	8					1		1
9 SAMPOV LOUN	2		5	6					1		
	6	0	28	41	2	1	0	0	5	0	2
<b>III KG.CHAM</b>					2	1					
10 KAMPONG SIEM									1		
11 CHAMKAR LEU	1			4					1		
12 CHOEUING PREY				14					1		
13 KRAUCH CHHMAR		2		4					1		
14 MEMOT		1		8							1
15 O RAING OV				8					1		
16 PONHEAKREK	4										1
17 PREY CHHOR	3		1	12					1		
18 SREY SANTHOR									1		
19 TBONG KHMUM	3		1						1		
	11	3	2	50	2	1	0	0	8	0	2
<b>IV KG.CHNANG</b>					2	1					1
20 KG.CHNANG	3	1							2		
21 BARIBOU											
22 KG.TRALACH	5								1		
	8	1	0	0	2	1	0	0	3	0	1
<b>V KG.SPEU</b>			4		2	1					
23 KG.SPEU	1		2								
24 KONG PISSEY	2	1									
25 OU DONG	1		2								
	4	1	8	0	2	1	0	0	0	0	0
<b>VI KG.THOM</b>					2	1					
26 KG.THOM	2		2	1							
27 BARAY				5							1
28 STAUNG	2		2	4							
	4	0	4	10	2	1	0	0	0	0	1
<b>VII KAM POT</b>					2	1					
29 KAM POT									1		
30 ANKORCHEY									1		
31 CHHOUK									1		
32 KG.TRACH									1		
	0	0	0	0	2	1	0	0	4	0	0
<b>VIII KANDAL</b>					2	1					
33 TAKHMAO	3			5					1		
34 KEAN SVAY	2			10					1		1
35 KHSACH KANDAL	1			1					1		
36 KOH THOM	2			3					1		
37 MUK KAMPOUL	2								1		
38 ANG SNUOL				1					1		
39 PONHEA LOEU	1								1		
40 SAANG	1			11					1		
	12	0	0	31	2	1	0	0	8	0	1
<b>IX KOH KONG</b>					2	1					
41 SRE AMBIL		2									
42 SMACH MEAN CHEY		2		1							
	0	4	0	1	2	1	0	0	0	0	0
<b>X KRATIE</b>					2	1			1		1
43 CHHLONG	1	1	2	1							
44 KRATIE	2	1		5					1		
	3	2	2	6	2	1	0	0	2	0	1
<b>XI MONDUL KIRI</b>					2	1					1
45 SEN MONORUM		3		16					2		
	0	3	0	16	2	1	0	0	2	0	1
<b>XII PHNON PENH</b>					2	1					

## Equipment Delivery List

Appendix-9

Item No.	1	2	3	4	5	6	7	8	9	10	11
Description	Refrigerator and icepack freezer	Refrigerator and icepack freezer with solar power system	Vaccine cold box	Vaccine carrier	Data logger	Interface cable for data logger	Freeze watch indicator	Refrigerator monitor card	Motorcycle	Pick up truck	Incinerator
No. PHD and OD											
46 CHAMKAR MORN (kandal)									1		
47 TUOL KORK (lech)	1										
48 MEAN CHEY (tbong)									1		
49 DAUN PPHH (choeung)	1										
	2	0	0	0	2	1	0	0	2	0	0
<b>XIII PREAH VIHEAR</b>					2	1					1
50 PREAH VIHEAR	1	5		1							
	1	5	0	1	2	1	0	0	0	0	1
<b>XIV PREY VENG</b>					2	1					1
51 KAMCHAY MEAR											
52 KG.TRABEK				1							
53 MESANG				4							
54 NEAKLOEUNG				15							1
55 PEA RANG											1
56 PREAH SDACH											
57 PREY VENG				12							
	0	0	0	32	2	1	0	0	0	0	3
<b>XV PURSAT</b>			4		2	1					1
58 SAMPOV MEAS	2			1					2		
59 BAKAN	1		1	6							
	3	0	5	7	2	1	0	0	2	0	1
<b>XVI RATTANAKIRI</b>					2	1					1
60 OD BANLUNG	3	3	3	6							
	3	3	3	6	2	1	0	0	0	0	1
<b>XVII PAILIN</b>					2	1					1
61 PAILIN	1								1		
	1	0	0	0	2	1	0	0	1	0	1
<b>XVIII SIEM REAP</b>					2	1					1
62 SIEM REAP	2			7					1		
63 ANGGKOR CHUM	1	2	2	6					1		
64 KRAR LANH	2	1							1		
65 SOTHR NIKUM	2								1		1
	7	3	2	13	2	1	0	0	4	0	2
<b>XIX SIHANOUKVILLE</b>					2	1					1
66 SIHANOUKVILLE				2							
	0	0	0	2	2	1	0	0	0	0	1
<b>XX STUNG TRENG</b>					2	1					
67 STUNG TRENG	1	3									
	1	3	0	0	2	1	0	0	0	0	0
<b>XXI SVAY RIENG</b>			2		2	1					1
68 SVAY RIENG	1			2							
69 CHI PHOU											
70 ROMEAS HEK	4	1									
	5	1	2	2	2	1	0	0	0	0	1
<b>XXII TAKEO</b>					2	1					1
71 DAUNKEO				15					1		
72 ANGROKA			2								
73 BATI				13					1		
74 KIRIVONG				19							1
75 PREY KABASS	1		2	14					1		
	1	0	4	61	2	1	0	0	3	0	2
<b>XXIII KEP</b>					2	1					
76 KEP	1			6					1		
	1	0	0	6	2	1	0	0	1	0	0
<b>XXIV ODAR MEAN CHEY</b>				4	2	1					
77 SAMRONG	2	1									
	2	1	0	4	2	1	0	0	0	0	0
<b>NIP</b>							400	1000	1	3	
	<b>78</b>	<b>30</b>	<b>67</b>	<b>310</b>	<b>48</b>	<b>24</b>	<b>400</b>	<b>1000</b>	<b>50</b>	<b>3</b>	<b>24</b>

\* Item No. 12 "Measles vaccine", No. 13 "AD syringe for measles, 0.5ml", No. 14 "Disposable syringe for dilution of measles vaccine, 5ml" shall be delivered to the Central Warehouse.

## 10. Outline of Major Equipment

### Outline of Main Equipment

Item No.	Description	Main specification or Component	Grade	Q'ty	Purpose and Appropriateness of equipment grade
1	Refrigerator and icepack freezer	1. Vaccine storage volume: 20L or more 2. Cooling method: Absorption 3. Power source: AC220V and LP gas 4. Quality standard: WHO/UNICEF standard E3/RF2	Middle	78	To refrigerate and freeze EPI vaccines, and freeze ice packs.
2	Refrigerator and icepack freezer with solar power system	1. Vaccine storage volume: 24L or more 2. Cooling method: Compressor 3. Quality standard: WHO/UNICEF standard E3/RF4 4. Battery: Sealed type 5. Standard insolation: 3.48 kWh/m <sup>2</sup> /day	Middle	30	To refrigerate and freeze EPI vaccines, and freeze ice packs by solar power generation in the areas difficult to procure LP gas.
3	Vaccine cold box	1. Hinged type 2. Vaccine storage capacity: 20-23L 3. Material (Insulation): CFC free 4. Cold life without opening: 120 hours or more (at 43°C) 5. Quality standard: WHO standard E4/CB.2	Middle	67	To transport vaccines and use for vaccines temporary storage.
4	Vaccine carrier	1. Lid type: Removable 2. Vaccine storage capacity: 1.4-1.7L 3. Material (Insulation): CFC free 4. Cold life without opening: 34 hours or more (at 43°C) 5. Quality standard: WHO standard E4/VC.2	Middle	310	To transport vaccines including out reach activities.
5	Data logger	1. Reading capacity: 1,920 data point or more 2. Logging interval: 30 sec. ~ 2 hours or wider 3. Reading range: -30 ~ +70°C or wider 4. Reading resolution: 0.1°C or less (-40 ~ +40°C)	Middle	48	To record the temperature and manage it if the vaccines keeping safety.
6	Interface cable for data logger	1. Connection type : USB	Middle	24	To transfer the data from data logger into PC.
7	Freeze watch indicator	1. Alarm conditions: 0°C or less, within 1 hour 2. Alarm display: Visual	Middle	400	To confirm the storage at the right temperature for the vaccines which is not required freezing.
8	Refrigerator monitor card	1. Threshold temperature: 10°C 2. Recording time: 1 week	Middle	1,000	To confirm the adequate storage temperature for the vaccines.
9	Motorcycle	1. Displacement: 110cc or more 2. Fuel tank capacity: 4L or more 3. Gear: 4 speed or more	Middle	50	To use out reach activities for vaccination and transport used syringes.
10	Pick up truck	1. Double cabin, Left steering 2. 4WD 3. Engine type: Diesel, 2,450cc or more 4. Maximum power: 50kw or more 5. Fuel tank capacity: 75L or more 6. Transmission: 5 speed manual	Middle	3	To transport vaccines. To provide supervision, evaluation, training activities.
11	Incinerator	1. Burning material: Medical waste including plastic syringes 2. Dioxin emission: less than 5ng-TEQ/m <sup>3</sup> N (at 12% of O <sub>2</sub> converted) 3. Burning temperature: 800°C or more 4. Fuels: Solid biomass (firewood, waste lumber, etc) 5. Dimensions (main body): Approx. 700(W)x700(D)x2000(H) mm 6. Dimensions (fire grate): Approx 500x500 mm 7. Disposal box capacity: Approx 100L 8. Draft fan: Operated by Solar power system	Middle	24	To burn the used syringes and medical waste.
12	Measles vaccine (10 doses)	1. Attenuated live virus vaccine 2. Dosage size: 0.5ml/dose 3. Dose package: 10doses in vial 4. Presentation: Freeze-dried 5. Quality standard: UN pre-qualified	Middle	200,000	To use for the National measles catch-up campaign scheduled for 2010.
13	AD syringe for measles, 0.5ml	1. Auto-disable, disposable 2. Syringe capacity: 0.5ml 3. Material of syringe: Polypropylene 4. Needle 23Gx25mm, Fixed, with Cap 5. Quality standard: ISO 13485 or 9001 6. Product standard: ISO 7886-3	Middle	1,780,000	To use with Measles vaccine.
14	Disposable syringe for dilution of measles vaccine, 5ml	1. Disposable, sterilized 2. Syringe capacity: 5.0ml 3. Material of syringe: Polypropylene 4. Needle 21Gx38mm, pre-fitted to syringe body 5. Quality standard: ISO 13485 or 9001 6. Product standard: ISO 7886-1 (syringe) and 7864 (needle)	Middle	200,000	To dilute Measles.

## 11. References

## References

### **Project title: Basic Design Study on the Project for Infectious Disease Control in the Kingdom of Cambodia**

No.	Title	Form Book/Video Map/Photo etc.	Original or Copy	Source	Date of Issue
1	An Assessment of Progress under Sector-Wide Management (SWiM)	Book	Copy	MoH	2007
2	Annual Health Financing Report 2007	Book	Copy	MoH	2007
3	Cambodia Child Survival Strategy	Book	Copy	MoH	2006
4	Cambodia Demographic and Health Survey 2005	Book	Copy	MoH	2006
5	Five Year Strategic Plan National Immunization Program 2006-2010	Book	Copy	MoH	2006
6	Guidelines on Minimum Package of Activities for Health Center Development	Book	Copy	MoH	2007
7	Health Strategic Plan 2008-2015	Book	Copy	MoH	2008
8	Immunization, Vaccines and Biologicals (IVB Catalogue 2007)	Book	Copy	WHO	2007
9	Injection Safety	Book	Original	MoH	2001
10	National Assessment on Health Care Waste Management Current Situation	Book	Copy	Dept. of Hospital Services	2006
11	National Immunization Program Annual Workshop Report 2007	Book	Copy	NIP	2007
12	National Immunization Program Guideline on Cold Chain	Book	Original	NIP	2003
13	National Immunization Program Strategic Plan 2008-2015	Book	Copy	MoH	2008
14	National Plan for the Management of Healthcare Wastes in Cambodia	Book	Copy	WPRO	2008
15	National Strategic Development Plan 2006-2010	Book	Copy	Govt of Cambodia	2006
16	Observations of Infection Control Practices during Quality Improvement assessments in Cambodia Public Health Facilities	Book	Copy	USAID/URC	
17	Report Measles Supplemental Immunization Activity (SIA) 2007 Cambodia	Book	Copy	WHO	2007
18	Scaling up for Better Health in Cambodia	Book	Copy	WHO	2007

