E4595

June 19, 2014

Cambodia: Second Health Sector Support Program – Second Additional Financing

Updated Environmental Management Plan

PREPARED FOR	**PREPARED BY**
The World Bank, *Washington D.C.*	**Ministry of Health** *Royal Government of Cambodia*

CAMBODIA: SECOND ADDITIONAL FINANCING FOR THE SECOND HEALTH SECTOR SUPPORT PROGRAM

UPDATED

ENVIRONMENTAL MANAGEMENT PLAN

Prepared for

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MINISTRY OF HEALTH
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1.0 INTRODUCTION

In 2002, the Ministry of Health, with support from the EVS Environment Consultants (EVS), undertook an environmental review (ER) for the Cambodia Health Sector Support Project (HSSP). This was done during project preparation and included development of an environment management plan (EMP). In 2008, the ER and EMP were reviewed and revised as part of preparation for the Second Cambodia Health Sector Support Program (HSSP2). HSSP was closed on December 31, 2011.

The 2008 ER assessed potential environmental and human health impacts of the HSSP2, particularly with regard to: (a) construction and rehabilitation of health care facilities (HCF) focusing on operational health care waste management (HCWM) practices, incinerator use, arsenic in groundwater, and extraction of asbestos when present during civil works; and (b) pesticide use in malaria and dengue vector control programs. The HSSP2 triggered the following safeguard policies: Environmental Assessment (OP/BP 4.01), Pest Management (OP 4.09), Indigenous Peoples (OP/BP 4.10), and Involuntary Resettlement (OP/BP 4.12).

The EMP is the EA instrument that describes measures against risks related to project activities such as civil works, including asbestos; health care waste management, and use of pesticides. The 2008 HSSP EMP recommends appropriate mitigation measures and monitoring activities to be followed with a view to guide project design and incorporate appropriate measures during HSSP2 implementation.

In October, 2013, the First Additional Financing (AF1) for HSSP2 of USD 13.44 million was approved. The additional financing is being used to scale up the number of health equity funds (HEFs) and special operating agencies (SOAs) that finance health services as well as fill financing gaps for other activities such as training and operating costs. It triggered the same safeguard policies as the original project. The task team paid close attention to monitoring the project implementation and did not identify any major environmental adverse impacts in link with project activities. Implementation of safeguard policies under HSSP2 and AF1 has been satisfactory so far.

The HSSP2 closing date has been extended from June 30, 2014 to December 31, 2015 to allow adequate time for completion of remaining civil works and procurement of medical equipment planned from the original project.

Further, the Second Additional Financing (AF2) for HSSP2 of US$ 12.69 is under preparation. The AF2 will cover a six month financing gap for the second half of 2014 for health equity funds (HEFs) and Service Delivery Grants (SDGs), while a new operation is prepared to start early 2016.

The current document includes updates of the 2008 EMP as part of preparation for the AF2 to reflect the lessons learned during safeguards implementation of HSSP2 and AF1. The AF2 will not finance civil works. The updated EMP is based on a review of the ER documents Cambodia's environmental laws, regulations, policies and other relevant legislation to ensure that applicable environmental assessment requirements were fully addressed during project implementation.

1.1 PROGRAM DESCRIPTION

The original program (HSSP2):

HSSP2's development objective (DO) is to support the RGC Health Strategic Plan 2008-2015 to improve access to, and utilization of effective, efficient and quality health services to improve the health status of the Cambodia population by (a) strengthening primary health care and essential referral services, (b) strengthening health financing and social protection mechanisms for the poor; and (c) strengthening human resources and institutional capacity on the Ministry of Health.

The original HSSP2 has a health system strengthening focus, with four components that are aligned to the government's HSP2. It includes: (A) **Strengthening Health Service Delivery** through: (i) the provision of Service Delivery Grants (SDGs) and contracting for health services at provincial level and below and (ii) investments for the improvement, replacement, and extension of the health service delivery network. (B) **Improving Health Financing** which will support (i) health protection for the poor through the consolidation of Health Equity Funds (HEFs) under common management and oversight arrangements and expansion of health equity fund coverage; and (ii) supporting the development of health financing policies and institutional reforms. (C) **Strengthening Human Resources** will focus on (i) strengthening pre- and in-service training; (ii) strengthening human resource management in the Ministry of Health (MOH). (D) **Strengthening Health System Stewardship Function** by supporting (i) development of policy packages identified, strengthening the institutional capacity (in particular meeting the demands from Decentralization and Deconcentration); (ii) private sector regulation and partnerships; (iii) supporting governance and stewardship functions of the national programs and centers overseeing the three HSP2 strategic programs; and (iv) empowering new structures for increasing local accountability of health care providers to citizens.

The HSSP2 provides grants for service delivery (HEFs and SDGs), scaling up the health infrastructure, and providing training and technical assistance.

HSSP2 Additional Financing projects

1. The AF1 expanded coverage of HEFs and SDGs and other financing gaps.

2. AF2 will only support scaling up of HEFs and SDGs. Specifically:

- **Component A: Strengthening Health Service Delivery.** Additional financing from MDTF will continue financing of SDGs in 36 SOAs.

- **Component B: Improving Health Financing.** Additional financing from the MDTF will continue financing HEFs in 55 ODs and expansion into 6 additional ODs. These 61 ODs cover approximately 2.2 million people or nearly 80 percent of the poor in Cambodia. Support to further strengthening and developing an institutional framework for health financing, including making progress toward the establishment of national oversight institutions for HEFs and social health insurance is being supported by a new Programmatic Health AAA (P145030).

- **Component C: Strengthening Human Resources.** No additional funding is available for this Component.
- **Component D: Strengthening Health System Stewardship Functions.** No additional funding is available for this Component.

Continued financing of HEFs and SDGs is consistent with the program's development objective. As with the original project and the AF1, the AF2 is expected to have a positive impact on the lives of peoples throughout Cambodia, particularly the poorest, by improving their access to and utilization of effective and efficient health services. The AF2 will not affect any natural habitats, forests, or cultural resources. No new safeguard policies will be triggered by the AF2.

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2.0 ENVIRONMENTAL ASSESSMENT

2.1 Health Care Waste Management

Health care waste includes all wastes generated in the delivery of health care services. WHO (1999a) estimates that 75-90% of waste produced by HCF originates from non-risk or general sources (e.g., janitorial, kitchens, administration) and is comparable to domestic waste. The remaining 10-25% of HCW is classified as hazardous and poses a variety of potential health risks. Categories of HCW, as defined in WHO (1999a), which are considered of most concern in Cambodian HCF are summarized in Table 1.

Table 1 Health care waste characteristics and hazards profile.

Classification	Characteristics/Associated Hazards
Infectious	Comprises waste that is suspected to contain pathogens including laboratory cultures, surgery and autopsy wastes from patients with infectious diseases, bodily wastes from patients in infectious disease wards, and miscellaneous waste such as disposable gloves, tubing and towels generated during treatment of infectious patients). Pathogens from infectious waste may enter the human body through puncture of skin cuts, mucous membranes, inhalation or ingestion.
Pathological	Consists of tissue, organs, body parts, blood and body fluids. Pathological wastes are considered a sub-category of infectious wastes and pose the same hazards.
Sharps	Describes items that could cause cuts or puncture wounds, including hypodermic needles, scalpel, and broken glass. Because sharps can not only cause cuts and punctures but also infect these wounds if they are contaminated with pathogens, this sub-category of infectious wastes is considered very hazardous.
Chemical	Consists of discarded solid, liquid and gaseous chemicals with toxic, corrosive, flammable, reactive, and genotoxic properties. Chemicals most commonly used in HCF include formaldehyde, photographic chemicals, heavy metals such as mercury from broken clinical equipment, solvents, organic and inorganic chemicals, and expired, used or spilt pharmaceuticals. Hazards from chemical and pharmaceutical waste include intoxication as a result of acute or chronic exposure from dermal contact, inhalation or ingestion and contact burns from corrosive or reactive chemicals.
Radioactive	Includes solid, liquid and gaseous materials contaminated with radio nuclides; produced as a result of procedures such as *in-vitro* analysis of body tissue and fluid, *in-vivo* organ imaging and various investigative and therapeutic practices. Because radioactive waste is genotoxic, health workers in handling active sources and contaminated surfaces must take extreme care.

A wide number of persons are potentially at risk from HCW, both inside and outside of HCF. Exposure to hazardous HCW can result in disease or injury to:

- Medical doctors, nurses – Occupation health risks to health care workers are numerous and varied with the greatest risk being infection (e.g., HIV/AIDS and hepatitis B and C) through injuries from contaminated sharps.
- Auxiliary and maintenance staff – Hospital workers such as janitors are at significant risk of infection or injury due to improper handling of infectious and chemical wastes at HCF.
- Patients and visitors – Although risks of exposure to hazardous waste are considered lower than for hospital staff there is a potential for accidental exposure to infectious sharps and chemical waste (e.g., children accompanying families during extended stays at HCF are particularly at risk).
- Workers at waste disposal facilities (e.g., incinerators and landfills) – Waste management workers are at significant risk of infection or injury from hazardous wastes; particularly scavengers at open landfills who are either not aware or ignore risks and often do not wear even rudimentary protective clothing.

Generally accepted strategies for HCWM encompass: (i) waste minimization, recycling, and reuse; (ii) proper handling, storage and transportation of HCW; and (iii) treatment of waste by safe and environmentally sound methods. These strategies are intended for tiered application – initially focusing on managing waste generation before moving on to actual disposal. Significant reductions in waste generated by HCF can be achieved through source reduction, use of recyclable products, and good management and control practices. Of these measures, waste segregation – careful sorting of waste matter into different categories – is critical to minimization of health care wastes; resulting in significant reduction of hazardous waste that needs to be handled and treated. Although safety concerns necessarily limit opportunities to reuse medical equipment (i.e., aside from items that are intended to be reusable), segregation and subsequent recycling of materials such as plastics, metal, paper and glass is often practical and can represent an income source for HCF.

Segregation of HCW is intended to ensure that wastes are properly identified and separated and that different waste streams are handled and disposed of correctly. It typical involves sorting different wastes into color-coded plastic bags or containers at source. Recommended handling and disposal practices for different categories of HCW will vary according the resources available to HCF. Examples of WHO (1999a) recommended HCW handling practices appropriate for HCF that apply minimal waste management programs are:

- General HCW (in black bags or containers) should join the domestic refuse stream for disposal.
- Sharps should be collected together into puncture-proof yellow safety boxes and held for high-temperature incineration. Encapsulation and disposal to a secure landfill is a suitable alternative for sharps.

- Highly infectious waste should be sterilized by autoclaving as soon as possible. For other infectious waste, disinfection is sufficient to reduce microbial content. Treated infectious waste should then be deposited in yellow bags and containers marked with the international infectious substance symbol. Incineration is the preferred method for disposal of infectious waste although land filling is also appropriate. Blood should be disinfected before discharge to the sewer system or wastewater treatment plant, if available, or may be incinerated.
- Large quantities of chemical wastes should be packed in chemical-resistant containers and sent to specialized treatment facilities. Small quantities of chemical waste can be held in leak proof containers and enter the infectious waste stream for incineration or land filling. It is noted that incineration at low temperatures may be insufficient to destroy thermally-resistant pharmaceuticals.
- Waste containing high heavy metal concentrations should be collected separately in brown containers and sent to specialized treatment facilities.
- Low-level radioactive waste should be collected to yellow bags or containers for incineration. High-level radioactive waste must be sent to specialized disposal facilities.

Incineration is a widely used treatment method for most hazardous waste generated by HCF. Incinerators can range from simply, single-chamber combustion units to sophisticated, high-temperature plants. WHO (1999a) notes that all types of incinerator, if operated properly, eliminate pathogens from waste and reduce the waste to ash. Used correctly, incineration allows for a very significant reduction of waste volume and weight and is typically selected to treat wastes that cannot be recycled, reused or safely disposed of to landfills. The key to environmentally-safe incineration is proper segregation of waste streams within HCF – inappropriate waste types include large volumes of chemicals, photographic and radioactive wastes, PVC plastics, and waste with a high mercury or cadmium content. Incineration of these wastes causes the release of toxic emissions to the atmosphere if insufficiently high incineration temperatures are attained or in the absence of adequate emission controls.

Land filling of wastes that cannot be safely incinerated is regarded as an acceptable disposal option if proper precautions are taken to minimize potential exposure to infectious wastes. Disposal of HCW to open landfills is not acceptable. Open landfills are characterized by the uncontrolled and scattered deposit of wastes at a site which can lead to groundwater and surface water pollution and a high risk to scavengers working at the landfill. Instead, HCW should only be deposited to sanitary landfills that are designed to prevent contamination of soil, surface water, and groundwater and limit air pollution, odors and direct contact with the public. In the absence of sanitary landfills – which may not be feasible for cost and technical reasons – HCW can be safely disposed of to landfills that provide for controlled dumping; including measures to control leachate release from the site, confined disposal of wastes, and rapid burial to avoid human or animal contact.

Recognizing that sanitary or engineered landfills are unlikely to be available in remote locations, another option is safe burial of HCW on HCF premises. On-site disposal represents an acceptable disposal option only if certain requirements are met as follows:

- Restricted access to disposal site by authorized personnel only
- Lining of burial site with a material of low permeability such as clay to prevent groundwater pollution
- Limit use to hazardous materials which cannot safely be incinerated to maximize the lifetime of a landfill

Guidelines under the existing Health Care Waste Generation and Management Plan are deemed adequate and compliance during HSSP2 has been good. The Guidelines incorporate best HCW management practices and are intended for practical application at health care facilities. Training on the Guidelines has been provided to health facility staff all over Cambodia by Department of Hospital Services (DHS) at provincial level. Maintenance of incinerators at health facility level remains the area for improvement and will be monitored by the task team during the project implementation.

Specific findings include: national infection prevention and control guidelines for health care facilities have been finalized and widely disseminated. The Department of Hospital Services of the MOH trained health facility staff on HCW collection and disposal. Potential risks to environmental and human health associated with hospital wastes, particularly hazardous chemical and infectious wastes were well-defined and managed through the adoption of proper policy practices of HCW Management. Health facilities were generally clean and equipped with waste containers for both normal and infectious wastes. Segregation of general, non-hazardous wastes from infectious and hazardous wastes (as well as used syringes) was observed. Solid, non-infectious wastes were collected, stored and properly transported to local landfill. Incinerators in the hospitals were used to burn infectious wastes. A system has been established to safely collect sharp wastes from health facilities for incineration in the designated high temperature incinerators (Sicsim). The lack of adequate management and resource for the maintenance of incinerators remained a concern, which will be addressed through health facility maintenance plan. In theory, facilities should be using part of the revenue they generate from HEFs and SDGs to cover the cost of waste management.

At the provincial and district referral hospitals, liquid waste is discharged into a septic lagoon or an open pit. The liquid waste is diluted and within safe limits for disposal in septic tanks/sewer lines. For the construction of the NLDQC, the environmental impact assessment was conducted and the environmental management plan (EMP) was prepared and cleared by the World Bank, and the chemical waste treatment tank was constructed to store and treat chemical waste

water. There was no evidence that the water supply, especially from water wells, for health centers has been regularly tested to confirm free microbial and arsenic content. Water filter has been installed at some HCs by different NGOs and clean water has been available for most referral hospitals, however.

Likely waste management issues under AF2 are:

1. Wastewater

Wastewater from HCF represents a sub-category of HCW that should be addressed in planning construction and rehabilitation as part of the HSSP2. WHO (1999a) notes that although wastewater from HCF is typically of a similar quality to urban wastewater, it may also contain potentially hazardous components. Microbiological pathogens introduced into the wastewater stream by patients being treated for enteric diseases are of most concern. Lesser hazards are posed by small quantities of hazardous chemicals, pharmaceuticals, and other pollutants commonly found in HCF wastewater. Adherence to the hazardous waste segregation practices described in the preceding section provides assurances that chemicals and pharmaceuticals are not entering the wastewater stream.

Typically sewage discharged from HCF is greatly diluted and as such no significant health risks should be expected if effluents are treated in municipal wastewater treatment plants (WWTP). In more remote locations where it is not feasible to connect to municipal WWTP then appropriate precautions must be taken to avoid health risks associated with untreated or inadequately treated sewage to the receiving environment (e.g., wetlands or agricultural lands immediately adjacent to a HCF). Where possible, HCF should be connected to municipal systems. Where there are no sewage systems, technically sound on-site sanitation should be provided. Recommended mitigation measures covering wastewater from HCF are elaborated in Section 3.1 – Environmental Management Plan.

2. Dengue Vector Control

1. Pesticide Use

Larvicides intended for use in dengue vector control programs as part of the HSSP2 are summarized in Table 3. All products have successfully passed WHO's Pesticide Evaluation Scheme (WHOPES). The WHOPES was set up in 1960 to promote and coordinate the testing and evaluation of pesticides for public health. WHOPES reviews and recommendations are based on methodologies developed through extensive consultation with the international community and should be considered authoritative.

Table 2 Larvicides to be used in vector control programs.

Insecticide/Larvicide Intended for Use and Specifications	Quantity Required (estimate/year)	Purpose	Comments on Environmental Safety
Temephos (Abate®1% sand granules) applied in a dosage of 1g/10 liter	160 metric tons x 5 years	Larvicide of choice for *Aedes aegypti* control in portable water containers	Successfully passed by WHOPES

AF2 will not finance any new larvicides though the dengue program will continue during the AF2. Malaria commodities were not financed under HSSP2

2. Human Health Risks

The larvicide Temephos (commonly known by the trade name Abate® in Cambodia) used in dengue vector control is classed as an orgnophosphate. This pesticide has a very low toxicity to humans. Potential exposure routes are ingestion, inhalation of dust and to some extent dermal contact (i.e., skin contact is considered insignificant because absorption is inherently slow). The Temephos formulation used in HSSP1 and 2 (i.e., 1% sand granules) is thought to present minimal risk to humans – no adverse effects have been observed during occupational handling or in the general population using treated water over extended periods. Similarly, no poisoning in humans as a result of accidental exposure has been documented (WHO, 2001; 1999b; 1975).

The original project and the AF1 financed larvicides (Abate and BTI) that were certified by WHO's Pesticide Evaluation Scheme (WHOPES) for dengue control. The products were transported in safe containers provided by the venders and used containers were disposed of according to the best practice; they were not used for storage or other purposes. Insecticide suppliers provided spoons to ensure proper quantity of insecticide put in water jars.

3. Environmental Risks

The toxicity of the pesticides intended for use in malaria and dengue vector control programs in Cambodia to non-target species varies widely. Laboratory and field tests indicate that Deltamethrin is only slightly toxic to birds but is moderately to very highly toxic to fish. Temephos has been shown to be highly toxic to some bird species but moderately toxic to others. It is considered highly toxic to bees and moderately to highly toxic to fish. Both Deltamethrine and Temephos have been shown to be very highly toxic to aquatic invertebrates (WHO, 1999b; 1984; 1975).

Environmental risks to non-target species, particularly aquatic organisms, can result from the unintentional release of these pesticides through improper handling or disposal. Although Deltamethrin and Temephos are highly toxic to aquatic organisms, under normal circumstances negligible quantities are likely to be released into ponds, streams and rivers. In assessing potential toxicity to non-target organisms it is important therefore to recognize that risk is a product of toxicity and exposure (i.e., there is little or no risk even at high concentrations if no exposure actually occurs). Exposure, if any, is likely to be short-term because: (i) these pesticides break down rapidly to products that are non toxic to aquatic organisms; (ii) rapid dilution will occur in flowing waters; and (iii) products typically are rapidly adsorbed to suspended solids and bottom sediments.

3.0 ENVIRONMENTAL MITIGATION MEASURES

3.1 ENVIRONMENTAL MANAGEMENT PLAN

The intent of an EMP is to recommend feasible and cost-effective measures to prevent or reduce significant adverse impacts to acceptable levels. For purposes of the AF2 for which environmental impacts are expected to be limited gauging from HSSP1 and HSSP2 experience (Category B), particular attention is given to outlining best management practices and design measures which should be put in place to ensure that environmental impacts are minimized during civil works activity and that human health and environmental concerns are fully addressed on an ongoing basis during project implementation. Best management practices and mitigation measures are detailed by activity in the following sections.

Health Care Waste Management

Guidelines have been developed by the MOH for use by HCF in handling and disposal of HCW. These guidelines are intended to supplement WHO's comprehensive HCWM guidelines (WHO, 2000; 1999a) and focus on practical aspects of safe hospital waste management, including waste minimization, collection, segregation, storage, transportation, and disposal. Additional guidelines on injection safety have also been developed by the MOH to provide specific guidance to HCF on the distribution, use, collection and safe destruction of disposable syringes and safety boxes.

Feedback from WHO and UNICEF safe injection experts obtained in completing the ER indicated that the guidelines reflect best practices but that attention should be given to ensuring their proper application by HCF. Notwithstanding the availability of HCWM guidelines, it is apparent that there is considerable scope for adopting more rigorous HCWM practices in health centers and referral hospitals. Although training on HCWM has been provided to health facility staff throughout the country, there is still uneven application of guidelines regarding proper waste handling and disposal. To address this weakness it is recommended that the AF2 will monitor waste management practices at HCF as part of improved overall quality of care, where it is applicable. MOH Recognizing that sustaining adequate waste management practices at HCF ultimately depends on auxiliary staff, it is highly recommended that waste management responsibilities be clearly defined and linked with performance based monitoring and evaluation.

Adequate waste handling and disposal infrastructure and management systems should be put in place at HCF. A standard HCWM package intended to improve HCW handling at HCF would encompass: (i) color-coded waste plastic bags and containers; and (ii) safety boxes for disposal of syringes. Additional assessment of available HCW disposal options is required before finalizing recommended disposal practices. Preliminary findings of the ER suggested that incineration and disposal to landfills are preferred disposal options. However, it is necessary to fully evaluate the appropriateness of all disposal strategies within the context of overall HCWM in finalizing guidance to HCF concerning best practices. The segregation of waste at source to minimize mixed waste must be practiced as it would improve the waste disposal system. Therefore an appropriate system and management should be put in place to ensure waste segregation at the point of generation itself.

Safe disposal practices for wastewater as specified in the MOH's Waste Management Guidelines should be followed in handling of sanitary wastes from HCF. Specific mitigation measures to ensure environmentally-safe disposal of wastewater from HCF are also described in WHO (1999a). Recommended practices include:

- Where possible, hospitals should be connected to municipal WWTP.
- Hospitals that are not connected to municipal WWTP should install compact on-site sewage treatment (i.e., primary and secondary treatment, disinfection) to ensure that wastewater discharges meet applicable permit requirements. This should continue to be monitored by the project
- HCF in remote locations should provide for minimal treatment of wastewater through affordable means such as lagooning; the system should comprise two successive lagoons to achieve an acceptable level of purification, followed by infiltration of the effluent to the land.
- Sewage from HCF should never be used for agricultural or aquacultural purposes.
- Sewage should not be discharged into or near water bodies that are used for drinking water supply or for irrigation purposes (i.e., infiltration to soil must take place outside of the catchment area of aquifers).
- Convenient washing and sanitation facilities should be available for patients and their families, and HCF staff to minimize the potential for unregulated wastewater discharge.
- Where septic tanks are used for the treatment and disposal of toilet waste it should be ensured that the septic tanks do not leak and appropriate management systems are identified for them. The septic tanks should also be of appropriate size to handle all the waste they are supposed to receive.

3.2 PESTICIDE MANAGEMENT AND MONITORING PLAN

The intent of the Pesticide Management and Monitoring Plan (PMMP) is to summarize mitigation measures and best management practices with a view to minimizing or avoiding any potential adverse human health or environmental effects that have been identified for malaria and dengue vector control programs to be funded under the AF.

Recognizing that all pesticides are toxic to some degree, it is paramount to ensure that proper care and handling practices form an integral part of any program involving their use. In formulating management practices, it is necessary to take into account both the nature of the pesticides being used (i.e., their formulation and the proposed methods of application) and any existing safeguards that have been incorporated into programs to address potential occupational safety and environmental concerns. Guidelines and training materials have already been developed for the dengue programs, and few improvements are considered necessary to ensure the continued safety of these activities.

Dengue

Larviciding programs inherently pose fewer occupational health and environmental risks due to the pesticide formulations used, their controlled application, and the lower potential for exposure of health care workers involved in program implementation. Notwithstanding these factors, extensive safeguards have been developed by the CNM and WHO to minimize or avoid potential human health and environmental problems.

Dengue programs undertaken in Cambodia are scheduled to coincide with the peak transmission period occurring during the rainy season. Two applications of Temephos are made each year in targeted provinces; in May-June and repeated in July-August. In preparation for field distribution, approximately 160 metric tons of Temperos is procured annually by the MOH for use in dengue programs. Purchased Temperos is securely stored in a government warehouse until immediately prior to program implementation at which time casual workers are employed to pre-package the granular product into 20g satchels. Pre-packaging is intended to facilitate field activities (i.e., addition of a 20g satchel of Temperos to a standard 200 liter water jar or two satchels to the alternative 400 liter container size provides the required dosage) and increase the efficacy of the chemical when placed in water containers. Although some safety precautions (e.g. children are not allowed to be involved or present) are taken in the packaging of Temperos, it is recommended that these safeguards be strengthened to address potential occupational health concerns. Specifically, strict precautions will be taken in handling the chemical such as: ensuring adequate building ventilation; wearing

protective gloves to avoid dermal contact; wearing protective masks to avoid inhalation of chemical dust; and washing of hands after handling.

Comprehensive guidelines have been developed by the CNM for Temephos larviciding programs to address potential human health and environmental concerns during field operations. Safeguards include:

- Tiered supervision by CNM, provincial and district health departments to closely track all aspects of inventory and distribution of stocks.
- Daily supervision of all field activities to ensure proper handling and household coverage.
- Water containers that are used frequently and those holding fish and other aquatic life are not treated.
- Households are educated on proper procedures for care and handling of water containers to which Temperos has been added (e.g., remove Temperos before washing containers).
- First aid procedures are explained for use if Temephos is accidentally ingested.

Safeguards developed by the CNM for dengue programs in Cambodia are considered to represent best available practices. With the exception of the need to strengthen occupational health practices during pre-packaging of Temperos into satchels, available guidelines are comprehensive and inclusive. Provision should be made for: (i) regular delivery of training to PHD and OD staff involved in program implementation to ensure that each person knows precisely what their responsibilities are; and (ii) ongoing monitoring and evaluation to ensure compliance with safeguards.

Institutional Arrangements

Ministry of Health. In line with the Project's implementation arrangements, the Planning and Health Information Department of MOH will ensure that all health care facilities supported under the Program follow the basic design parameters for health centers (i.e. building to have septic tank, water system and incinerator) and hospitals and also adopt and apply the HCW Management Guidelines for managing health care waste. The Hospital Service Department, which co-chairs health impact assessment committee, will supervise implementation of the EMP in line with the monitoring schedule of the Project operational plan.

Health Care Facilities. Each health care facility will ensure that HCW generated will be properly managed through the adoption of the HCW Management Guidelines.

Ministry of Environment (MOE). During Program implementation, the MOE will be consulted to review health care facility screening outcomes and other civil works activities that have environmental impacts and which will be covered by the Government's environmental impact assessment sub-decree.

World Bank. The World Bank through its Task Team will monitor compliance by the borrower and the health care facility operators of the environmental measures to address environmental and health care impacts.

Information on the proper management, storage and usage of pesticides must be given to the health workers involved in the program to ensure that minimum contamination and toxicity of the environment and in the HCF. An appropriate waste disposal system should also be identified for the waste generated from the pesticide program. This waste would largely consist of the pesticide containers and pesticide dispensers.

The EMP established to be applied for the original project was disclosed at the MOH website, the World Bank Infoshop, to all NGOs engaged with MOH through MEDICAM (NGO umbrella for health), and through HSSP2 dissemination workshop to all implementing units at national and subnational level. During the preparation process of AF1, it was re-disclosed at the MOH website and the World Bank Infoshop in September 2013. The updated EMP for the AF2 will be re-disclosed at the MOH website, the World Bank Infoshop, to all NGOs engaged with MOH through MEDICAM, to contractors and consultants who engage with construction and rehabilitation of health facilities financed by the AF2, and to the civil work supervision firms.

Cost Estimate for Monitoring EMP

No	Items	Unit	Rate	Quantity	Amount (US$)
1	Regular internal monitoring	Trip	5,000	6	30,000
2	Training and meeting	Round	2,000	3	6,000
A	**Sub-total**				**36,000**
B	Contingency		10%		3,600
C	**Grand-total**				**39,600**

Before project appraisal, the borrower sends the EMP to the World Bank for review. Once the World Bank accepts the document as providing an adequate basis for project appraisal, the World Bank makes it available to the public in accordance with the World Bank Policy on Disclosure of Information. The borrowers also make it available to the public through the MoH website and to all NGOs engaged with the Ministry of Health through an NGO umbrella (MEDICAM).