



**Lao People's Democratic Republic**  
**Peace Independence Democracy Unity Prosperity**

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**Ministry of Health**  
**Department of Planning and Cooperation**  
**Health and Nutrition Services Access Project**

## **ENVIRONMENTAL MANAGEMENT FRAMEWORK**

**October 22, 2019**

## TABLE OF CONTENTS

<b>1. INTRODUCTION AND OBJECTIVES .....</b>	<b>4</b>
1.1 PROJECT DESCRIPTION .....	4
<i>Project Development Objective</i> .....	4
<i>Description of Project components</i> .....	4
<i>Project Location</i> .....	5
<i>Project Implementation agency</i> .....	6
1.2 OBJECTIVE AND SCOPE OF ESMF.....	6
<b>2. ENVIRONMENTAL POLICIES APPLICABLE TO THE PROJECT .....</b>	<b>7</b>
2.1 NATIONAL ENVIRONMENTAL REGULATIONS .....	7
2.2 WORLD BANK ENVIRONMENTAL SAFEGUARD POLICIES .....	7
<b>3. BASELINE INFORMATION ABOUT ENVIRONMENTAL HYGIENE IN HEALTH FACILITIES .....</b>	<b>8</b>
<b>4. POTENTIAL ENVIRONMENTAL IMPACTS .....</b>	<b>10</b>
4.1 POTENTIAL ENVIRONMENTAL IMPACTS DUE TO MINOR RENOVATION ACTIVITIES .....	10
4.2 POTENTIAL ENVIRONMENTAL IMPACTS DURING THE OPERATIONAL PHASE .....	10
<b>5 TYPICAL MITIGATION MEASURES .....</b>	<b>11</b>
5.1 MEASURES TO MITIGATE IMPACTS DUE TO RENOVATION ACTIVITIES .....	11
5.2 MEASURES TO MITIGATE IMPACTS FROM HEALTHCARE WASTE .....	13
<b>6. ENVIRONMENTAL MANAGEMENT .....</b>	<b>14</b>
6.1 INSTITUTIONAL ARRANGEMENT .....	14
6.2 MONITORING AND REPORTING .....	15
6.3 TRAINING AND CAPACITY BUILDING .....	16
6.4 BUDGET .....	16
<b>7. PUBLIC CONSULTATION AND DISCLOSURE .....</b>	<b>17</b>
<b>8. ANNEX .....</b>	<b>18</b>
ANNEX 1: POSITIVE AND NEGATIVE LIST OF GOODS, SERVICES AND WORKS UNDER THE CREC. 18	
Annex 2 : Sharp waste management guidelines (see document attached to this).....	18
ANNEX 3: WBG GOOD PRACTICE NOTE: ASBESTOS: OCCUPATIONAL AND COMMUNITY HEALTH ISSUES .....	19
Annex 4: Minutes Meeting Note.....	61
Annex 5: List of participant on meeting in October 31 <sup>st</sup> , 2019.....	65
<b>9. REFERENCES.....</b>	<b>70</b>

## Abbreviations

ACM	Asbestos containing materials
AFN	Agriculture for nutrition
CIEH	Centre for Information and Education for Health
DCDC	Department of communicable diseases control
DHHP	Department for Hygiene and Health Promotion
DPC	Department of Planning and Cooperation
DPCO	District Project Coordination Office
DHP	Department of Health Personnel
DHIS2	District Health Information Software (System) version 2
DHR	Department of Health Care and Rehabilitation
DTR	Department of research and training
DOF	Department of Finance
DHO	District Health Office
DFD	Department of Food and Drug
DH	District hospital
DLI	Disbursement Linked Indicator
DoS	Department of Statistics
EGDP	Ethnic Group Development Plan
ESMF	Environmental and social management framework
ECOPs	Environmental Code of Practice
EHS	Environmental Health and Safety
FRM	Feedback and Response Mechanism
HANSA	Health and Nutrition Services Access
HC	Health Center
HCWM	Health Center Waste Management
HCF	Health Care Facilities
HGNDP	Health Governance and Nutrition Development Project
HSIP-AF	Health Services Improvement Project – Additional Financing
IEC	Information education and communication
INGOs	International Non-Government Organization
IPC	Infection Prevent and Control
IFAD	International Fund for Agricultural Development
Lao PDR	Lao People’s Democratic Republic
LFNC	Lao Front for National Construction
LWU	Lao Women’s Union
LTU	Lao Trade Union
MCHC	Maternal and Child Health Centre
MNCH	Maternal, New born and Child Health
MOH	Ministry of Health
MPI	Ministry of Planning and Investment
NHIB	National Health Insurance Bureau
NHI	National Insurance Scheme
NC	Nutrition Centre
NPCO	National Project Coordination Office
PDO	Project Development Objective
PFM	Public Financial Management
PPCO	Provincial Project Coordination office
PLFNC	Provincial Lao Front for National Construction
PLTU	Provincial Lao Trade Union (PLTU)
PLWU	Provincial Lao Women’s Union

QPS	Quality Performance Scorecard
SBCC	Social and Behaviour Change Communication
WASH	Water Sanitation and Hygiene
WB	World Bank

## **1. Introduction and Objectives**

### **1.1 Project description**

#### *Project Development Objective*

The overall project development objective (PDO) is to improve access to quality health and nutrition services in targeted areas of Lao PDR.

#### *Description of Project Components*

The Health and Nutrition Services Access Project (HANSA) builds upon and aims to sustain the gains achieved under the Health Governance and Nutrition Development Project (HGNDP). The project has a particular focus on the four northern provinces in Lao PDR, which have been chosen for multiple, simultaneous and mutually reinforcing investments by the Government of Lao PDR and the World Bank, as these provinces represent the most ethnically diverse, remote and disadvantaged geographical locations in Lao PDR. Several nutrition-centric interventions under HANSA, such as DLIs for SBCC, integration outreach and for growth monitoring and growth promotion, are concentrated in these four provinces. Other interventions, which will eventually roll out nationwide over the lifetime of HANSA, such as the quality performance scorecard (QPS), the public finance management (PFM) capacity building of Health Centers (HC), and the direct data entry under district health information system version 2.0 (DHIS2), also commence in these four provinces first, and therefore will see the longest duration of investment effort in these provinces.

***Component 1: Integrating Service Delivery Performance with National Health Insurance Payments:*** This component will finance Quality and Performance linked payments to health centers, using the existing channel that provides fixed capitation payments from the national health insurance system. Through an objective assessment of the health center performance across key dimensions of quality of service delivery, verified by an independent institution, this top-up payment will create performance linkages to the capitation payments and providing additional resources to the primary healthcare level.

***Component 2: Service Delivery and Nutrition Convergence:*** This component will use a combination of disbursement linked indicators (DLIs) prioritized toward the four convergence provinces in northern Lao PDR, and other DLIs with a nationwide footprint. It will continue the legacy of results-based instruments focused on service delivery improvements from the predecessor HGNDP, adapted to the nutrition convergence approach and to the changing health system configuration in the Lao PDR. DLIs will also be instrumental in the delivery of the HANSA design, to organize and implement the quality assessment system, for public financial management improvements directed at the health facility level, and to strengthen the integration and sustainability of priority public health programs.

***Component 3: Adaptive Learning and Project Management:*** This component will finance capacity building, research, monitoring and evaluation, regulatory strengthening, strengthening of waste management guideline and practice, investment in information systems and overall project coordination and management.

***Component 4: Contingency Emergency Response Component: (CREC):*** The objective of the contingency emergency response component, with a provisional zero allocation, is to allow for the reallocation of financing in accordance with the International Development Association (IDA) Immediate Response Mechanism in order to provide an immediate response to an eligible crisis or emergency, as needed. This component will finance expenditures on a positive list\* of

goods and/or specific works, goods, services and emergency operation costs required for emergency recovery.

An Operational Manual for this component will detail the eligible situation when the CERC can be triggered, financial management, procurement, safeguard and any other necessary implementation arrangements, to be submitted to and accepted by the World Bank Group (WBG) prior to the disbursement for this component of IDA funds.

### *Project Location*

For component 1 of project: the initial roll out of this performance-based payment to health centers will take place in the four northern priority provinces: Oudomxay, Phongsaly, Huaphan and Xiengkhuang. After then, the expectation is for this mechanism to be rolled out in other provinces with a perspective to cover nationwide, adding 4 provinces in each six monthly cycle. An operational manual of this performance-based mechanism will be developed within one month after project effectiveness. It is expected that for the first roll out of the performance score cards, around 220 health centers in these four provinces will be assessed.

For component 2, the coverage of DLIs will depend on the nature of DLI content as detailed below:

- Two DLIs (G and H) related to nutrition specific service will be focused on the 4 nutrition priority provinces.
- Other two DLIs (J and K) related to Global Fund (GF) funded will depend on discussion between CHAS<sup>1</sup> and GF which will be finalized during project appraisal in January 2020.
- For DLI A which directly linked to Project Component 1 on QPS will initial at 4 convergence provinces in year 1 and then will add more 4 provinces each year so that by year 4 will cover nationwide in which 90% of health center in the country will receive timely quality assessment and verification visits
- For DLI B on timely receipt of National Health Insurance Bureau (NHIB) payment at health center level and increase in the number of health centers received free maternal and child health (MCH) services will cover all provinces except Vientiane Capital
- For DLI C on availability of essential drugs and supplies at health center level improved the scope is similar to DLI A
- For DLI D on number of provinces in which the number of health centers without a clinical health worker has been reduced the scope is similar to DLI A and C
- For DLI E on financial management capacity at health center level improved the scope is similar to DLI A, C and D
- For DLI F on increase coverage and correctness of event capture report the scope is similar to DLI A, C, D, and E
- For DLI I on EPI the scope is focus on 50 priority districts of all provinces based on DHIS2 system to generate Penta 3 and SBA
- For DLI L on increase national readiness for health security in responding to pandemics and health emergency at international boundaries (airports and ground crossings) the scope is similar to DLI A, C, D, E and F

For Component 3, the scope of project is nationwide from effectiveness to closure of the project

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<sup>1</sup> CHAS requested to the project that will be the same 4 nutrition convergence provinces because these provinces despite low prevalence of HIV but received little support from development partners while GF want to focus on province in the south where GF has already supported just continue project activities.

For Component 4, the project will cover the areas where the CERC is triggered. The most likely situation to be triggered for emergency response would be the natural disaster e.g. flood and landslide or pandemic. The project is highly likely exposed to flooding in the four project provinces in the south and flashing flood or landslide in the four project provinces in the north in very near future. Extreme flooding may lead to damage of health facility, water supply system, and road which will directly impact the access of health and nutrition of the target beneficiaries. In addition, some kinds of pandemic of human influenza or zoonosis disease could spread through in the national disaster areas or cross border. The potential impact on component 2 is highly likely. The right kind of capacity building measures could increase preparedness and longer-term resilience to unexpected natural disaster risks. Understanding the climate and geophysical risks need to be explored.

### *Project Implementation Agency*

The Project will be implemented by the MOH through the Department of Planning and Cooperation (DPC), MOH technical departments and the provincial health offices (PHOs) and district health offices (DHOs). The DPC is expected to remain the main coordination body building upon the mechanism already in place under Health Governance and Nutrition Development Project (HGNDP). For sustainability and greater use of government systems, the preparation will explore the possibility of Department of Finance (DOF) in a larger fiduciary role, potentially taking on some of the procurement and financial management responsibilities that are currently carried out by National Project Coordination Office (NPCO).

At the national level, the existing NPCO in the DPC will be responsible for overall project management and administration, implementation of project activities and achievement of DLIs in close coordination with MOH technical departments and those PHOs and DHOs participating in the project and M&E. The NHIB and the Department of Health Care and Rehabilitation (DHR) will play a central role in the design and implementation of the component 1, in close coordination with other technical departments including Department of Foods and Drugs (DFD), Department of Communicable Diseases Control (DCDC), DPC and Department of Hygiene and Health Promotion (DHHP), as well, as centers under these departments who will likewise play a critical role in the implementation of activities in their respective key areas. Each department and centre will nominate a focal point supported by a core group from DPC for the preparation and implementation of the project.

At subnational level, the PHOs and DHOs will continue to assume the roles for monitoring and supervision, especially in the implementation of DLIs and quality supervisory checklists. Enhanced coordination between provincial levels and district levels is critical. PHOs will be responsible for: (a) the implementation of Project activities and achievement of DLIs at the provincial level; (b) the monitoring and reporting to the MOH of Project activities and achievement of DLIs at the provincial level; and (c) the provision of technical support to DHOs in the implementation of Project activities at the district level and village level. The DHOs will be responsible for: (a) the implementation of Project activities including the six monthly quality assessments at the district and village level and reporting to the PHO on said activities; and (b) the supervision and provision of technical support to health facilities in their delivery of reproductive, maternal and child health, and nutrition services.

## **1.2 Objective and scope of ESMF**

The ESMF will provide (a) identification of all anticipated environmental risks, (b) guidance for screening and managing potential environmental impacts; (c) an Environmental Code of Practices (ECOPs) to be implemented by contractors (or those responsible) for health care facilities renovation/refurbishment activities; (d) a guideline for safe management of healthcare

waste with a focus on sharps waste to be followed by health care facilities; and (e) capacity building, monitoring and evaluation to be carried by project implementing agencies.

## **2. Environmental policies applicable to the Project**

### **2.1 National environmental regulations**

- Law on Environmental Protection (Amended) No.29/NA
- Law on Immunization No.093/NA (2018)
- Decree on Waste Management from Health Care Facilities No.1706/MOH (2004)
- Regulation on Drugs and Medical Waste Disposal No.1862/MH (2016)
- Regulation on Pharmaceutical and Medical Product Establishment (Amended) No.2684/16 DFD;
- Infection Control Guideline for Health Facilities (2016)
- Instruction on hazardous waste management No.0744/MORE (2015)
- Laos PDR National Implementation Plan under Stockholm Convention (2016)
- Sharp Waste Management Guidelines approved by Department of Planning and Cooperation under the Health Governance and Nutrition Development Project (2019)

### **2.2 World Bank environmental safeguard policies**

- OP/BP 4.01 Environmental Assessment
- OP/BP 4.10 Indigenous People
- Public Consultations and Information Disclosure
- The World Bank Group Environment, Health and Safety (EHS) General Guidelines
- World Bank Group Good Practice Note: Asbestos: Occupational and Community Health Issues



### 3. Baseline information about environmental hygiene in health facilities

The information presented in Table 3.1, 3.2 and 3.3 is downloaded from DHIS2 system as a result of provincial DLI6 under the HGNDP to monitor the application of quality checklist to district hospital and health center by provincial and district health office to assess the quality of services and health facilities readiness. In the current HNGDP this information is used for just the checklist has been applied and quality scored is just need to be over 50%, but this information (DLI6) has never been use for to assess the condition of water and sanitation, waste management and infection control at health facilities.

**Table 3.1. Water and sanitation in health facilities at 14 project provinces**

Province name		Phongsaly	Luangnamtha	Oudomxay	Bokeo	Luangprabang	Huaphanh	Xayabury	Xiengkhuang	Savannakhet	Saravane	Sekong	Champasack	Attapeu	Xaysomboun	Total
Water supply	Running water available or at least 20 litres for each delivery	26	36	40	36	75	70	58	47	112	62	20	55	26	13	676
	% per total HC	57%	88%	74%	90%	91%	95%	74%	84%	72%	87%	71%	73%	72%	72%	79%
	Facility has running water or water containers available	36	38	49	36	76	72	66	50	128	67	27	60	26	16	747
	% per total HC	78%	93%	91%	90%	93%	97%	85%	89%	82%	94%	96%	80%	72%	89%	87%
	Facility has water chlorine treated	4	23	17	13	16	15	21	24	50	34	7	39	19	2	284
Latrine	% per total HC	9%	56%	31%	33%	20%	20%	27%	43%	32%	48%	25%	52%	53%	11%	33%
	HC has at least 1 toilets/latrines	39	38	51	40	82	74	69	52	141	66	27	65	31	16	791
	% per total HC	85%	93%	94%	100%	100%	100%	88%	93%	90%	93%	96%	87%	86%	89%	93%
	Toilets/latrines can be flushed with running water or sufficient quantity of water in container with scoop	29	37	43	39	75	70	59	51	117	64	23	61	31	16	715
	% per total HC	63%	90%	80%	98%	91%	95%	76%	91%	75%	90%	82%	81%	86%	89%	84%
Total number of HC		46	41	54	40	82	74	78	56	156	71	28	75	36	18	855

Table 3.1 indicated that 87% of health center in 14 project provinces are existing running water or water container which provide condition to health center to use for clearing facilities and disinfection medical equipment. Very high percentage of health center having at least 1 latrines reaching 93% in 14 project provinces, especially 3 provinces including Bokeo, Luangprabang and Huaphan all health center have latrine.

**Table 3.2. Healthcare waste management at the facility level.**

Province name	Phongsaly	Luangnamtha	Oudomxay	Bokeo	Luangprabang	Huaphanh	Xayabury	Xiengkhuang	Savannakhet	Saravane	Sekong	Champasack	Attapeu	Xaysomboun	Total
Availability of a garbage bin with lid in courtyard for patients and visitors – not full	33	36	36	33	63	66	54	44	107	63	18	61	25	13	652
% per total HC	72%	88%	67%	83%	77%	89%	69%	79%	69%	89%	64%	81%	69%	72%	76%
Evacuation of waste water in sewage system or sanitary pit	35	38	43	35	76	71	53	49	118	61	25	60	27	15	706
% per total HC	76%	93%	80%	88%	93%	96%	68%	88%	76%	86%	89%	80%	75%	83%	83%
Facility drains water on city sewage system or has waste water collection system	27	37	40	32	56	71	28	47	76	61	20	47	22	12	576
% per total HC	59%	90%	74%	80%	68%	96%	36%	84%	49%	86%	71%	63%	61%	67%	67%
Incinerator to burn medical, non-medical waste is functional and clean	4	7	9	12	30	17	17	16	31	22	4	14	14	7	204
% per total HC	9%	17%	17%	30%	37%	23%	22%	29%	20%	31%	14%	19%	39%	39%	24%
Incinerator to burn medical, non-medical waste with well-built fence around with door locked	4	8	6	8	12	17	7	15	21	10	1	12	6	4	131
% per total HC	9%	20%	11%	20%	15%	23%	9%	27%	13%	14%	4%	16%	17%	22%	15%
No medical waste and dangerous objects in courtyard such as needles, syringes, gloves, used compresses, etc.	40	38	51	36	78	73	63	53	126	64	28	63	30	16	759
% per total HC	87%	93%	94%	90%	95%	99%	81%	95%	81%	90%	100%	84%	83%	89%	89%
Total number of HC	46	41	54	40	82	74	78	56	156	71	28	75	36	18	855

Table 3.2 shows that 89% of health center at 14 project provinces indicate no medical waste and dangerous objects in courtyard, However, there only 24% of Health Center having incinerator to burn medical and non-medical waste.

**Table 3.3. Infection Control at the facility level**

Province name	Phongsaly	Luangnamtha	Oudomxay	Bokeo	Luangrabang	Huaphanh	Xayabury	Xiangkhuang	Savannakhet	Saravane	Sekong	Champasack	Attapeu	Xaysomboun	Total
Non-contaminated objects waste pit fenced	9	19	9	23	31	46	13	10	48	17	7	23	9	6	270
% per total HC	20%	46%	17%	58%	38%	62%	17%	18%	31%	24%	25%	31%	25%	33%	32%
Non-contaminated objects waste pit minimum 3 meter deep	21	30	31	29	56	47	21	31	85	45	11	39	19	13	478
% per total HC	46%	73%	57%	73%	68%	64%	27%	55%	54%	63%	39%	52%	53%	72%	56%
Non-contaminated objects waste pit without infected non-decomposable objects	29	37	37	32	60	66	21	40	83	47	20	40	22	12	546
% per total HC	63%	90%	69%	80%	73%	89%	27%	71%	53%	66%	71%	53%	61%	67%	64%
Total number of HC	46	41	54	40	82	74	78	56	156	71	28	75	36	18	855

There are 3 indicators related to infected control at health facilities that being collected using DLI6 **presented** in table 3.3 above. Only 64% present to be non-contaminated objects waste pit without infected non-decomposable objects

For the HANSA project will use sharp waste management guideline as a tool for infectious control. Monitoring and reporting of the implementation the IPC will be included in the quality performance score card which are now being develop by DHR and DTR. Provision of training and relevance IEC materials will be done during the implementation of HANSA The guideline is annex in the ESMS

**Use of small-scale incinerators for healthcare waste treatment.** Laos is a signatory of Stockholm Convention on Persistent Organic Pollutants (POPs). The national implementation plan under Stockholm Convention is approved but actions for reducing and eliminating the release of unintentionally proceeded POPs have not yet implemented.<sup>2</sup> Existing healthcare waste incinerator design, which is described in the MOH's Agreement No 480/MH dated 14/2/2014 on community hospital standard, no longer meet modern emission standards. According to MONRE's inventory, hospital/medical waste incineration is the 2<sup>nd</sup> largest source of emission of dioxins and furans to the air in Laos.

**Use of asbestosis.** Asbestos is one of the most known occupational carcinogens, causing about half of the deaths from occupational cancers. Chrysotile which is called white asbestos is still widely used in some countries, with approximately 90 per cent being employed in asbestos building materials. The largest users are now those from developing and transition economies in Asia. Chrysotile asbestos is being used widely in Laos in the construction industry; the amount of imported asbestos has been increasing year to year and it has reached over 8000 tons in 2013. Alarmingly, the asbestos profile revealed that Lao PDR is the highest among Asia-Pacific countries, in terms of asbestos consumption per person. The National Asbestos Profile recently developed by the Lao Government with support from the APHEDA, showed that there were 16 factories producing asbestos-containing roof tile. The national consumption of asbestos fiber increased almost 240% in just 3 years between 2010 and 2013<sup>3</sup>.

In case of health emergencies, third-party declarations will be considered for activating, such as the World Health Organization (WHO) Risk Assessment<sup>4</sup> level 2 grade and greater as described

<sup>2</sup> MONRE (2016). Laos PDR National Implementation Plan under Stockholm Convention.

<sup>3</sup> <http://www.wpro.who.int/laos/mediacentre/releases/2018/20180305-asbestos-related-diseases/en/>

<sup>4</sup> As described in WHO Emergency Response Framework (2013) <http://www.who.int/hac/about/erf.pdf>.

by the WHO Emergency Response Framework; or an equivalent grading by other international agencies such as World Organization for Animal Health (OIE), United Nations Environment Program (UNEP), or the Food and Agriculture Organization (FAO).

#### **4. Potential environmental impacts**

##### **4.1 Potential environmental impacts due to minor renovation activities**

The project will not finance any new construction. Health care facilities (HCF) may be able to use earnings from health insurance capitation payments for minor repair. The renovation and refurbishing activities are minor and would be done in the same existing buildings, within the same footprint and without the extension of the respective buildings. These activities are considered minor civil works which may generate limited adverse environmental impacts such as dust, noise, vibration, waste, solid waste and safety issues. Also, there could be isolated health risks associated with exposure to asbestos containing materials in the case of old facilities that are using asbestos roofs. Additionally, in the case of building renovation activities including changes of internal layout (e.g., walls), there is a potential risk on the structure and safety of the existing buildings.

These impacts are assessed to be of small scale, localized, in short-term period and manageable if good design and construction practices are followed. In this project case, specific Environmental Code of Practices (ECOPs) will be followed to avoid any possible impacts during such renovation works. The HCFs staff or those who will carry out these works will be responsible to implement these ECOPs.

##### **4.2 Potential environmental impacts during the operational phase**

The project will support mother and child health services, nutrition, immunization, and communicable diseases prevention and control as per the country's essential service package. Increased utilization of health services will result in increased generation of healthcare waste at health facilities.

The generation of healthcare waste has been studied and documented by World Health Organization (WHO), World Bank and other institutions. According to WHO's guideline on safe management of waste generated from healthcare activities, between 75% and 90% of the waste produced by health-care providers is comparable to domestic waste. The remaining 10 - 25% of health-care waste is regarded as "hazardous" and may pose a variety of environmental and health risks. A large part of the wastewater from health-care facilities is of a similar quality to domestic wastewater and poses the same risks<sup>5</sup>. Findings from published studies and from World Bank financed "Hospital Waste Management Support Project" are similar. Infectious waste generation primary health unit is 0,02-0.03 kg/patient/day; from maternity is 2.9 kg/patient/day; from district hospital is 0.1-0.15 kg/bed/day. In Vietnam, generation of wastewater from hospital is 0.4 m<sup>3</sup> of wastewater per bed per day. In Laos PDR, generation of hazardous healthcare waste is 0.1 kg/bed/day at health centre and 0.12 kg/bed/day at district hospital<sup>6</sup>. Wastewater from health centre has insignificant weight approximately 1m<sup>3</sup> per day and has the same basic component as the domestic wastewater.

The 10-25% of solid healthcare waste regarded as "hazardous waste" includes sharps waste, infectious waste, pathological waste, pharmaceutical waste, cytotoxic waste, chemical waste, radioactive waste. At primary healthcare settings, hazardous healthcare wastes are mainly sharps, infectious wastes, anatomical waste (placenta) and small amount of pharmaceutical waste.

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<sup>5</sup> [https://www.who.int/water\\_sanitation\\_health/publications/wastemanag/en/](https://www.who.int/water_sanitation_health/publications/wastemanag/en/)

<sup>6</sup> Soulivanh Phengxay et al (2005). Health-care waste management in Lao PDR: a case study. *Waste Manage Res* 2005; 23: 571-581

Pathogens in infectious waste and wastewater may enter the human body by a number of routes: through a puncture, abrasion, or cut in the skin; through the mucous membranes; by inhalation; by ingestion. Sharps represent a double risk. They may not only cause physical injury but also infect these wounds if they are contaminated with pathogens. There is concern about infection with human immunodeficiency virus (HIV) and hepatitis viruses B and C, for which there is strong evidence of transmission from injury by syringe needles contaminated by human blood. Additionally, the general public is very sensitive about the visual impact of anatomical waste, that are recognizable human body parts including placenta.

All individuals exposed to hazardous health-care waste are potentially at risk, including those within health-care establishments and those outside these sources. The main groups at risk are the following: health staff, patients, patient relatives and visitors, workers in waste disposal facilities including scavengers.

The project will continue to promote good practices in healthcare waste management given its hazards to environment and health as well as public sensitivity. Potential impacts of healthcare waste to environment and health are deemed to be site specific, manageable and for which mitigation measures can be readily designed. In Health Governance and Nutrition Development Project, a sharp waste management guideline has been developed in line with MOH's regulations and international guidelines, and healthcare facilities in HANSA project will follow this guideline.

## 5 Typical mitigation measures

### 5.1 Measures to mitigate impacts due to renovation activities

Prior to the renovation/refurbishment execution, the participating HCFs will ensure to prepare and review the design for renovation/refurbishing units where applicable. The designs for these renovations shall be approved by HCF management and or local competent agencies in line with the relevant legislation. During works the HCF staff shall be responsible for following the Environmental Code of Practices (ECOPs) (see Table 1).

***Table 1: Environmental Code of Practices***

Environmental issue	Mitigation measures
Dust, noise and vibration generated from rehabilitation or minor civil works	<ul style="list-style-type: none"> <li>- The HCF staff is responsible for compliance with relevant national legislation with respect to ambient air quality, noise and vibration</li> <li>- The HCF Staff and the contractor(s) undertaking works shall ensure that the generation of dust is minimized and implement a dust control plan to maintain a safe working environment and minimize disturbances for patients, staff and surrounding community</li> <li>- The HCF Staff and the contractor(s) undertaking works shall implement dust suppression measures (e.g. water paths, covering of material stockpiles, etc.) as required. Materials used shall be covered and secured properly during transportation to prevent scattering of soil, sand, materials, or generating dust. Exposed soil and material stockpiles shall be protected against wind erosion</li> <li>- The HCF Staff shall ensure onsite latrine be properly operated and maintained to collect and dispose waste water from those who do the works</li> <li>- The HCF Staff should not carry out construction activities generating high level of noise during HCF activities, especially when services are</li> </ul>

	being delivered to the clients.
Solid waste generated from rehabilitation or minor civil	<ul style="list-style-type: none"> <li>- The HCF Staff shall develop and follow a brief site-specific solid waste control procedure (storage, provision of bins, site clean-up, bin clean-out schedule, etc.) before commencement of any financed rehabilitation works;</li> <li>- The HCF Staff shall use litter bins, containers and waste collection facilities at all places during works.</li> <li>- The HCF Staff may store solid waste temporarily on site in a designated place prior to off-site transportation and disposal through a licensed waste collector</li> <li>- The HCF Staff shall dispose of waste at designated place identified and approved by HCF management or local authority. Open burning or burial of solid waste at the HCF premises shall not be allowed. It is prohibited for the HCF Staff to dispose of any debris or construction material/paint in environmentally sensitive areas (including watercourse)</li> <li>- Recyclable materials such as wooden plates for trench works, steel, scaffolding material, site holding, packaging material, etc shall be segregated and collected on-site from other waste sources for reuse or recycle (sale).</li> </ul>
Asbestos containing materials (ACM) generated from renovation or minor civil works	<ul style="list-style-type: none"> <li>- The asbestos audit will be undertaken as required prior to / at the beginning of refurbishment.</li> <li>- Safe removal of any asbestos-containing materials or other toxic substances shall be performed and disposed of by specially trained workers in line with the WBG guidelines on asbestos management (Annex 3). Because specific regulation has not yet been developed in Lao PDR, International occupational health and safety guidelines will be applied during removal of ACM from HCF undergoing Renovation.</li> <li>- If ACM at a given HCF is to be removed or repaired, the PMU will stipulate required removal and repair procedures in the contractor's contract.</li> <li>- Contractors will remove or repair ACM strictly in accordance with their contract. Removal personnel will have proper training prior to removal or repair of ACM.</li> <li>- All asbestos waste and products containing asbestos is to be buried at an appropriate landfill and not to be tampered or broken down to ensure no fibers are airborne. Disposal of waste containing asbestos should be agreed with MOH.</li> <li>- No ACM will be used for renovation works.</li> </ul>
Safety risks during works, health staff, patients and their relatives	<ul style="list-style-type: none"> <li>- The HCF Staff shall comply with all national and good practice regulations regarding workers' safety.</li> <li>- The HCF Staff shall prepare and implement a simple action plan to cope with risk and emergency (e.g., fire, earthquake, floods)</li> <li>- The HCF Staff shall have or receive minimum required training on</li> </ul>

	<p>occupational safety regulations and use of personal protective equipment</p> <ul style="list-style-type: none"> <li>- Occupational Health and Safety (OHS) management plans will be developed by the contractors where ECOPs don't suffice. This OHS management plans will include OHS trainings, OHS monitoring at the construction site and maintaining records of work related injury statistics and follow up on corrective actions.</li> <li>- The HCF Staff shall provide safety measures as appropriate during works such as installation of fences, use of restricted access zones, warning signs, lighting system to protect hospital/HCF staff and patients against falling debris and other risks.</li> </ul>
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## 5.2 Measures to mitigate impacts from healthcare waste

Sharp waste management guideline has been prepared to provide guidance for managing sharps and infectious waste generated from primary healthcare activities (see Annex 4). The guideline is directed towards health care facilities staff, administrators, regulatory agencies, hospital service organizations, consulting firms and environmental compliance personnel.

HCF shall prepare a Healthcare waste management plan, which reflects mainly good practice methods on how to properly manage and contain solid healthcare waste generated during common activities in HCFs. These methods are indicated in the table below:

***Table 2: Healthcare waste management***

<b>Environmental issue</b>	<b>Mitigation measures</b>
Risks associated with exposure to hazards in health environment	All health providers and workers will be provided with labor protection items. HCF staff are trained and follow procedures to solve unexpected situations such as injuries caused by needles (see Annex 4)
Solid healthcare waste, especially sharps, generated from healthcare activities	<p>HCFs will develop the management process of solid healthcare waste including: segregation, containment, handling and storage, treatment and disposal of solid HCW. The principals of solid health care wastes management are described in accordance with MOH's regulation on drugs and medical waste disposal as bellow. Detailed instructions are presented in <b>Annex 4</b>.</p> <p>Segregation of solid HCW:</p> <ul style="list-style-type: none"> <li>- Need to segregate the waste immediately at the place of waste generation</li> <li>- Healthcare solid waste shall be segregated into 5 categories: infectious waste (sharp, non-sharp, highly infectious and anatomical waste), hazardous chemical waste, pressurized containers and general waste.</li> </ul> <p>Containment of solid HCW</p> <ul style="list-style-type: none"> <li>- Each HCF has to specify the location of waste containers for each type of healthcare waste where they are generated</li> </ul>

	<ul style="list-style-type: none"> <li>- The location of waste containers must have the instruction of waste classification and collection.</li> <li>- Each group of healthcare waste must contain in the bag or box fitted the code color and the technical standard which is suitable for the Regulations on healthcare waste management</li> </ul> <p>Treatment and Disposal of solid HCW:</p> <p>HCF can apply one or several treatment options as below:</p> <ul style="list-style-type: none"> <li>- Transporting to the nearest disposed place</li> <li>- Incinerating at high temperature</li> <li>- Treating by friendly environment methods such as autoclave and needle shredder, concrete tank, bury pit</li> </ul>
Wastewater generated from medical facilities	<p>Wastewater shall be collected separately from rainwater.</p> <p>Hygienic latrines shall be available and accessible to patients, health staff and visitors in HCFs.</p> <p>Waste water from healthcare facilities should be disposed according to the reference of WBG EHS guidelines for the Health Care Facilities and WHO's guidelines for safe management of waste from healthcare activities. All facilities should have simple and cost effective pre-treatment facility and waste water should be treated before discharge to any natural water body.</p>
Occupational Health issues among healthcare staff	<p>Occupational Health and Safety training program has been developed under the HGNDP and provided to healthcare providers at some HCFs on aspects linked to sharp waste management. The project will continue delivery of the training and provide guidance and training to Provincial Health Department staff, District health staff, and HCF staff on health care waste management. Further, a Training of Trainers (ToT) program will be developed under the project to reach all primary stakeholders involved in HCFs. Component 3 would finance activities over the four-year period, which include among other aspects, capacity building for health care waste management targeting the strengthening of related procedures and regulations; skills of staff, and providing initial supplies to allow proper implementation of procedures in facilities.</p>

## 6. Environmental management

### 6.1 Institutional arrangement

*The primary healthcare teams and HCFs* will ensure that health care waste generated from healthcare activities will be properly managed through the adoption of the health care waste management guidelines. HCFs are encouraged to apply non-burn technologies for treatment and disposal of sharps and infectious waste. No new small-scale incinerators will be financed by the project. Existing incinerators will be properly maintained to ensure that medical waste is treated and disposed of according to the guidelines, and surrounding communities/residents will not be disturbed from smell and smoke. HCFs having renovation works will follow the basic design of health centers and/or hospitals and ECOPs described in Table 1. It will ensure that civil works

contracts contain a clause on good environmental practice and proper housekeeping measures, including adherence by contractors to the use of asbestos-free construction materials.

***National Project Coordination Office (NPCO) at Ministry of Health.*** NPCO will ensure that mitigation measures proposed in the ESMF are implemented in line with national regulatory framework and the Bank's safeguard policies. Roles and responsibilities of the NPCO include, but not limited to the followings:

- Prepare annual work plan and budget plan for implementing the mitigation measure as proposed in the ESMF; ensure adequate budget (operation costs) for relevant costs affiliated with compliance with ESMF provisions and overall environmental safeguards implementation.
- Coordinate with MOH's key technical departments involves in environmental and social health in order to provide technical support in healthcare waste management and Infection Prevention and Control (IPC).
- Implementing activities in collaboration with Provincial and District Project Coordination Office (PPCO and DPCO) to fulfill social and environmental safeguard requirements;
- Organize training of trainers on HCWM and IPC, work together with the provincial health office (PHO) and provincial coordinators to provide training HCFs and monitoring the compliance of mitigations measures set out in this EMP in all project provinces.
- Ensure that the IEC and training materials produced by the Project address environmental safeguard issues;
- Conduct supervision visits to HCFs
- Produce safeguard consultation report with the project oversight committee to address issues or concerns received from the consultations;
- Collect and review environmental safeguards reports from PPCOs;
- Prepare semi-annual report on environmental safeguards in agreed form and submit to the World Bank prior to its supervision missions;
- Develop Feedback and Response Mechanism (FRM) that is appropriate to the local context;

***Provincial Project Coordination Office (PPCO)*** will take the following responsibilities:

- Prepare annual work plan and budget plan for implementing the mitigation measure in their provinces
- Organize training of HCFs on HCWM and IPC
- Conduct supervision visits to HCFs to monitor the implementation status of ECOPs and healthcare waste management
- Prepare quarterly, semi-annual and annual reports on environmental safeguards

***The World Bank project team*** will provide guidance and technical assistance to Project Coordination Office on project implementation including safeguard execution; will monitor compliance by the borrower and the health care facility operators of the environmental measures to address environmental and health issues.

## **6.2 Monitoring and reporting**

***Monitoring of healthcare waste management.*** Quality and Performance Scorecards (QPS) cover HCW and IPC criteria in line with MOH's guidelines, and will provide direct incentives and



resources to HFs to improve their compliance. Monitoring and reporting on HCWM and IPC are integrated into QPS verification. The standard supervisory checklist will be developed by Department of Health Care and Rehabilitation during project preparation based on existing supervisory checklist under current HGNDP project and the new quality model of five goods-one satisfaction developed by DHR. The criteria for HCWM and IPC will be proposed and added to standard supervisory checklist. ***Monitoring of ECOPs implementation.*** During implementation of renovation and refurbishing activities, the HCFs will be responsible for day to day monitoring implementation of mitigation measures as specified in the ECOPs. The participating HCFs shall include the implementation of ECOPs in their progress reports. The civil work supervision team will monitor compliance to ECOPs by the civil work contractors during their regular site supervision. A renovation site supervision checklist will be developed by Department of Health Care and Rehabilitation during project preparation. The civil work supervision team will incorporate the implementation status of ECOPs into the quarterly, semi-annual and annual civil work progress reports.

**A reporting scheme** where the implementation of mitigation measures is incorporated into quarterly, semi-annual and annual reports will be established and followed by the implementing agencies. These requirements will be included as part of the project Implementation Operation Manual.

Local communities are encouraged to undertake monitoring and provide feedbacks through existing community mechanisms which will be strengthened as part of the project. If there are complaints from local project-affected groups, the National and Provincial Project Coordination Offices and the HCFs should assess in a timely manner the validity of complaints and take any necessary actions to remedy the situation.

### **6.3 Training and capacity building**

A training program will be developed under the project and provided healthcare professionals at HCFs with essential aspects related to HCWM and Infection Prevention and Control (IPC) as follows:

- Segregation, containment, handling and storage, transport, treatment and disposal of healthcare waste, especially sharps;
- Essential aspects of IPC: handwashing, disinfection and sterilization, use of personal protective equipment, prophylaxis treatment of exposures
- ECOPs in renovation of HCFs.

The NPCO will hire a consultant with HCWM and IC skills that will provide guidance and training of trainers (TOT) at the provincial and district levels. The trained trainers will provide guidance and training to all primary stakeholders involved in HCFs. The following aspects will be covered by the training program. If required, consultant with knowledge of environmental safeguards implementation (e.g. ECOPs and EMF/EMP provisions) will be hired to assist NPCO and PPCO in providing implementation support and monitor compliance with the project environmental safeguards instruments.

In addition, Information Education Communication (ICE) materials on the correct segregation, containment, handling and disposal of health care wastes will be developed to build awareness among health care workers. Awareness raising activities will also be undertaken to inform the general public of the risks of unhygienic conditions and mismanagement of health care wastes.

### **6.4 Budget**

A budget of US\$300,000 for technical assistance, training of trainers, and development of ICE materials over the four-year period will be included in the component 3. Quality and Performance Scorecards (QPS) cover HCW and IPC criteria in line with MOH's guidelines, and

will provide direct incentives and resources to HFs to improve their compliance. Monitoring and reporting on HCWM and IPC are integrated into QPS verification. Overall annual investment and operations cost (including training of healthcare professionals, procurement of equipment and materials, operation and maintenance of HCWM system, etc) should be factored in and estimated by beneficiary HCFs when they prepare the annual plan for their facilities.

## **7. Public consultation and disclosure**

The mitigation measures reflected in the Environmental and Social Management Framework (ESMF) were introduced and consulted with MOH departments and provincial DOHs in the provincial consultative workshop on May 28, 2019.

## **8. Annexes**

**Annex 1: Positive and negative list of goods, services and works under the CREC**

**Annex 2 : Sharp waste management guidelines (see document attached to this)**

**Annex 3: WBG Good Practice Note: Asbestos: occupational and Community Health Issues**

**Annex 4: Minutes Meeting Note**

**Annex 5: List of participant on meeting in October 31<sup>st</sup>, 2019**

## Annex 1: Positive and negative list of goods, services and works under the CREC

### Positive list of goods, services and works\*

Item
<b>Goods</b>
<ul style="list-style-type: none"> <li>• Medical and laboratory equipment</li> <li>• Essential drugs and supplies (including first-aid kits and insect repellents)</li> <li>• Non-perishable foods, bottled water and containers</li> <li>• Tents for advanced medical posts, temporary housing, and health facility substitution</li> <li>• Equipment and supplies for temporary housing (gas stoves, utensils, tents, beds, sleeping bags, mattresses, blankets, hammocks, mosquito nets, personal and family hygiene kits, etc.)</li> <li>• Gasoline and diesel (for air, land and sea transport) and engine lubricants and oil</li> <li>• Spare parts, equipment and supplies for engines, transport, construction vehicles</li> <li>• Lease of vehicles (Vans, trucks and SUVs)</li> <li>• Equipment, machinery, supplies for construction (roofing, cement, iron, stone, blocks, etc.)</li> <li>• Equipment and supplies for communications and broadcasting (radios, antennas, batteries)</li> <li>• Water pumps and tanks for water storage</li> <li>• Equipment, materials and supplies for disinfection of drinking water and repair/rehabilitate of black water collection systems</li> <li>• Water, air, and land transport equipment, including spare parts</li> <li>• Temporary toilets</li> <li>• Groundwater boreholes, cargos, equipment to allow access to affected site, storage units</li> <li>• Any other item agreed on between the World Bank and the Recipient (as documented in an Aide-Memoire or other appropriate formal Project document)</li> </ul>
<b>Services</b>
<ul style="list-style-type: none"> <li>• Consulting services related to emergency response including, but not limited to urgent studies and surveys necessary to determine the impact of the disaster and to serve as a baseline for the recovery and reconstruction process, and support to the implementation of emergency response activities</li> <li>• Feasibility study and technical design;</li> <li>• Works supervision</li> <li>• Technical Assistance in developing terms of references (TORs.), preparing Technical Specifications and drafting tendering documents (Bidding Documents, ITQ, Request For Proposal).</li> <li>• Non-consultant services including, but not limited to information and awareness campaigns</li> <li>• Non-consultant services to deliver any of the activities described in the “Goods” section of this table (e.g., debris removal, dump trucks)</li> <li>• Re-stock intended equipment damaged by the event</li> </ul>
<b>Works</b>
<ul style="list-style-type: none"> <li>• Repair of damaged infrastructure including, but not limited to: water supply and sanitation systems, access roads, bridges and transportation systems, energy and power supply, telecommunication, and other infrastructure damaged by the event</li> <li>• Re-establish of the urban and rural solid waste system, water supply and sanitation (including urban drainage)</li> <li>• Repair, restoration, rehabilitation of damaged clinics, hospitals, health centres, offices</li> </ul>

- Removal and disposal of debris associated with any eligible activity
- Rehabilitation of any infrastructure which facilitates accessibility to the built healthcare facility
- Repair intended equipment damaged by the event

#### **Training**

- Conduct necessary training related to emergency response including, but not limited to the Implementation of EAP
- Training on rapid needs assessment and other related assessments

#### **Emergency Operating Costs**

- Incremental expenses by the Government for a defined period related to early recovery efforts arising as a result of the impact of an eligible emergency. This includes, but is not limited to:
- Costs of staff attending emergency response, operational costs and rental of equipment
- Emergency transportation of the seriously sick and injured, etc.
- Evacuation of hospitals, nursing homes, and other care facilities
- Delivery of medical emergency services to large number of injured persons

*\*Needs to be discussed and agreed with the CERC implementing agency*

#### **Negative list**

##### **Sub-projects with the following potential impacts will not be eligible for financing under the CERC**

- involve the significant conversion, clearance or degradation of critical natural habitats, forests, environmentally sensitive areas, significant biodiversity and/or protected conservation zones;
- cause, or have the potential to result in, permanent and/or significantly damage to nonreplicable cultural property, irreplaceable cultural relics, historical buildings and/or archaeological sites;
- negatively affect rare or endangered species;
- result in involuntary land acquisition or resettlement;
- do not meet minimum design standards with poor design or construction quality, particularly if located in vulnerable areas;
- require or involve:
  - purchase, application or storage of pesticides or hazardous materials (e.g. asbestos) or controlled chemicals;
  - building a dam, structures that will alter coastal process or disrupt breeding sites of protected/endangered species;
  - sand mining or land reclamation;
  - land that has disputed ownership, tenure or user rights.

**Annex 2: Sharp waste management guidelines (see document attached to this)**



Lao People's Republic  
Peace Independence Democracy Unity Prosperity  
\*\*\*\*\*000\*\*\*\*\*

Ministry of Health  
Department of Planning and Cooperation  
Health Governance and Nutrition Development Project

Sharps Waste  
Management  
Guidelines

Vientiane Capital, September 2019

## Foreword

In order to make waste disposal of rubbish out of the craft is properly carried out according to the law. The goal is to avoid harmful effects on environmental health and ensure safety location of services across the country.

On the one hand, the development of the Immunization Law Act No. 093/NA dated on June 25<sup>th</sup>, 2018, article 30 refers to the destruction of vaccines and immunization equipment. The destruction of immunization equipment such as syringes and the impotent immunization needles and used needles have to follow the principle and international standard by using specific incinerator with the heat over 800 degrees Celsius and other stipulated in other regulation.

At the same time, Health Governance and Nutrition Development Project (HGNDP), Department of Planning and Cooperation (DPC), together with the Department of Hygiene and Health Promotion (DHHP) are created this instruction to guide the relevant stakeholders, particularly the executives who are actual working in this area has been realized and understood, including the proper implementation of this task in the technical filed simultaneously potential impacts on the environment and health.

We are hoped this instruction will greatly benefit the improvement of the waste management especially the sharps waste management instruction from public health facilities will likely be shared. Hand-over of all parties involved in improving this work has been a great success.

Vientiane Capital, Dated...../10.OCT.2019.....  
Director General of DPC



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## I. Sharps Waste Overview

### 1.1 Definition and generation of sharps waste



Between 75% and 90% of the waste produced by healthcare providers is comparable to domestic waste and usually called “non-hazardous” or “general health-care waste”. The remaining 10-25% of health-care waste is regarded as “hazardous waste” including sharps waste, infectious waste, pathological waste, pharmaceutical waste, cytotoxic waste, chemical waste, radioactive waste.

Sharps are items that could cause cuts or puncture wounds, including needles, hypodermic needles, scalpels and other blades, knives, infusion sets, saws, broken glass and pipettes. Whether or not they are infected, such items are usually considered highly hazardous health-care waste and should be treated as if they were potentially infected (WHO, 2013).

**Table 1: Examples of sharps waste from different sources**

Sources	Sharps waste
Medical ward	Hypodermic needles, intravenous set needles, broken vials, and ampoules
Operating theatre	Needles, intravenous sets, scalpels, blades, saws
Laboratory	Needles, broken glass, Petri dishes, slides and cover slips, broken pipettes
Vaccination campaigns	Needles and syringes
Physicians’ and dental offices	Needles and syringes, broken ampoules and vials
Home health care	Lancets and insulin injection needles

## **1.2 Risks associated with sharps waste**

Sharps represent a double risk. They may not only cause physical injury but also infect these wounds if they are contaminated with pathogens. There is concern about infection with human immunodeficiency virus (HIV) and hepatitis viruses B and C, for which there is strong evidence of transmission from injury by syringe needles contaminated by human blood.

Healthcare workers, cleaning personnel and waste handlers in healthcare facilities are the main groups at risk of sharps injury. It is estimated that more than two million health-care workers are exposed to percutaneous injuries with infected sharps every year (Pruss-Ustun et al., 2005). Many injuries are caused by recapping of hypodermic needles before discarding to sharp containers and by unsafe handling and disposal of sharps waste. In the year 2000, sharps injuries to health-care workers were estimated to have caused about 66 000 hepatitis B (HBV), 16 000 hepatitis C (HCV) and 200–5000 HIV infections among health-care workers. For health-care workers, the fractions of these infections that are due to percutaneous occupational exposure to HBV, HCV and HIV are 37%, 39% and 4%, respectively.

Scavengers on waste disposal sites are also at significant risk from used sharps. The risk of a sharps exposure among patients and the public is much lower. It was reported that the unsafe reuse of injection equipment could lead to outbreaks of HIV and HBV in some locations (WHO, 2013).

## **II. Healthcare worker safety**

### **2.1 Prevention of needle stick injuries**

Needle-stick injuries can happen at any time, particularly during and immediately after an injection. This risk is increased when health workers recap needles or walk around carrying used needles, and when sharps waste is managed unsafely, leaving people and/or animals exposed to used needles and syringes.

The following is precaution from getting needle stick injuries:

- Don't touch the shaft, the bevel and the adapter of the needle
- Don't recap the needle
- Don't leave the needle in the top of vaccine vial
- Don't carry used syringes and needles around the work site for any reason
- Don't manually sort needles and syringes
- Discard needles and syringes in safety box and/or sharp container
- Handle, store, transport, treat and dispose sharps waste properly (see chapters 3 - 7)
- Use personal protective equipment properly

## 2.2 Use of personal protective equipment (PPE)

The type of PPEs used will depend to an extent upon the risk associated with the sharps waste, but the following should be made available to all personnel who collect or handle waste:

- Disposable gloves: protect medical staff from exposure to blood
- Heavy-duty gloves: protects any cuts on hands and helps protect against needle sticks
- Industrial boots: protect waste workers from sharp injuries and accidental spills to the foot
- Industrial aprons: protect waste workers from accidental spills to clothes
- Goggles: protect the eyes from accidental splashes
- Masks: protect waste workers from respiratory infections hazards and particulates from burning waste
- Helmets, with or without visors: protect waste workers from accidental spills to the hair.

**Figure 1: Examples of PPEs for a healthcare waste worker in Vietnam**



*Photo credit: Le Minh Sang/World Bank*

## 2.3 Post-exposure prophylaxis

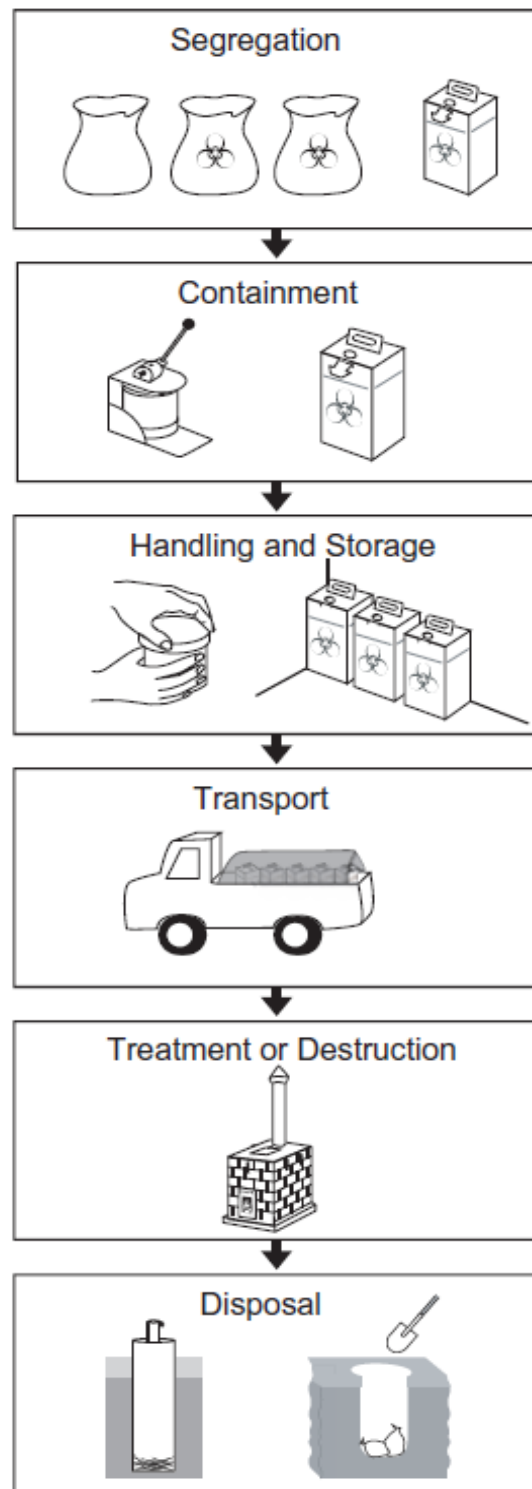
Post-exposure prophylaxis should be offered, and initiated as early as possible within the first few hours and no later than 72 hours after exposure, to all individuals with exposure that has the potential for HIV, HBV, HCV transmission. Critical steps to take following a needle stick injury are as follows:

- Treat the exposure site: Flush the wound with tap water, let the wound bleed for a short time 3 – 5 minutes, do not squeeze; clean the wound thoroughly with soap and water; disinfect wound by disinfectants (alcohol 70°) in at least 5 minutes.
- Report to the manager and complete the report form: Indicate the date, time and the context of exposure, describe the wound and assess the level of risk.
- Assess the risk of transmission:
  - Determine the HIV, HBV, HCV status of the source of exposure
  - Determine the HIV, HBV, HCV status of the exposed person
- Take post-exposure prophylaxis medicine if needed
- Carry out follow-up testing and monitoring for exposed person

## III. Sharps waste management planning

Planning defines the key actions for improving sharps waste management, assignment of roles and responsibilities, and allocation of resources.

**Figure 2: Key steps in sharps waste management**



Source:  
PATH

The following are some common responsibilities for managing sharps waste:

**Managers**

- Obtain and be familiar with national waste management policies.

- Develop facility waste management plan (goal, budget, personnel, roles, supervision, training, reporting).
- Ensure supply of safety boxes, needle removers, or other sharps containers; designate appropriate and secure storage for used sharps.
- Identify and budget for final disposal method including transport and fees.
- Create climate of support for needle stick injury reporting.
- Develop protocol for management of needle stick injury.
- Advocate for health worker safety.

### **Injection Providers**

- Follow waste management policies.
- Follow color-coded waste segregation system.
- Place sharps containers properly.
- Immediately dispose of sharps in closed container.
- Record keeping-record number of filled sharps containers, identify supply needs, report stock outs.
- Store sharps waste in secure location.

### **Waste Handlers**

- Know color-coding system.
- Collect filled sharps containers.
- Ensure waste is securely stored until disposal.
- Use protective equipment when handling sharps.
- Provide waste to waste collection vehicle or service.

### **Waste Carriers**

- Maintain segregation.
- Remove waste from facility.
- Ensure a clean environment at the facility.
- Safely transport waste to final disposal site.

### **Incinerator or autoclave operators:**

- Follow incinerator/autoclave operations procedure.
- Use protective equipment when handling waste.
- Ensure supply of fuel.
- Record weight and type of waste received.
- Ensure payments received, as appropriate.
- Follow regular maintenance schedule for incinerator or autoclave.
- Ensure regular transport of ash to landfill.



#### IV. Segregation of sharps waste

- Segregation should be carried out by the producer of the waste as close as possible to its place of generation to separate sharps waste, infectious waste and general waste.
- Sharps waste is discarded in the safety box or sharp containers. Safety boxes should be placed within reach of the staff administering injections so that needles and syringes can be disposed of immediately in the safety box without recapping.
- Posters showing the type of waste that should be disposed of in each container should be posted on walls to guide staff and reinforce good habits, as show in the Figure 3.

*Figure 3: Instruction for healthcare waste segregation*

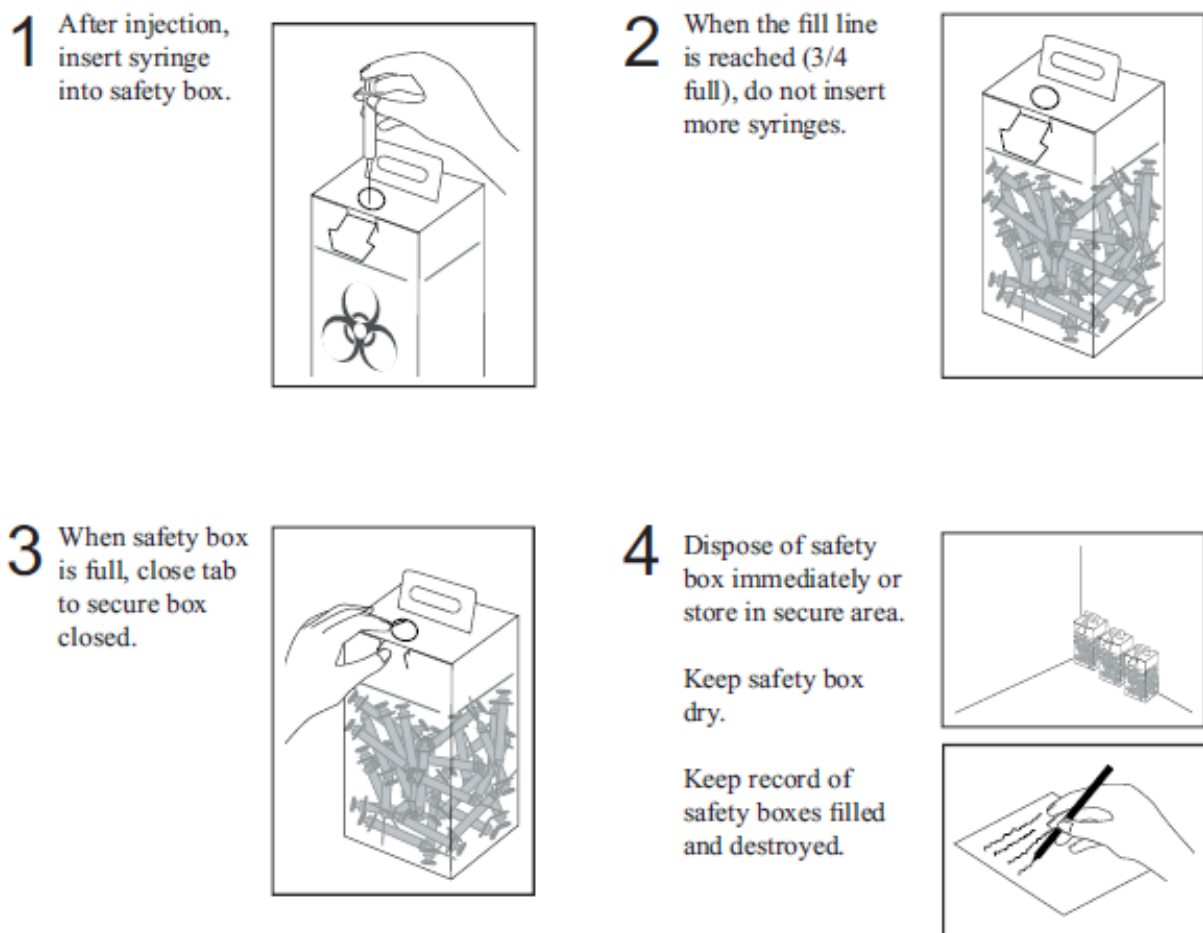


*Source: Vietnam Ministry of Health*



- After giving the injection, used syringe put immediately into the safety box. A five-liter safety box can hold about 100 syringes and needles.
- Safety boxes should be placed within reach of the staff administering injections so that needles and syringes can be disposed of immediately.
- Don't handle or shake the safety box unnecessary. Never squeeze, sit or stand on safety box.
- When the safety box is not in use, close the opening on the top.
- Safety boxes should be closed when they are three quarters full and send it for burning in incineration.
- Keep safety box in a dry, safe and secure location, away from medical supplies and out of the reach of the children and general people (a locked room is best).
- Store safety boxes no more than one week (or according to facility guidelines).
- Take extra care when carrying safety boxes to disposal sites. Hold the box by the handle on top.

**Figure 6: Instruction for use of safety box**



Source: PATH



### 5.3 Central storage of sharps waste

Hospital should establish a central storage of sharps waste and infectious waste that should meet the following requirements:

- be located away from fresh food stores and food preparation areas and patient wards
- has a roof, has an impermeable and hard-standing floor with good drainage;
- has easy access for staff and waste vehicles but be lockable to prevent access from unauthorized people,
- be inaccessible to animals and insects;
- Be marked “infectious waste” with biohazard symbol;
- has water supply, washing basin, lighting and ventilation;
- has a supply of cleaning equipment, waste bags and containers, spillage containment equipment located conveniently close to the storage area.

**Storage containers** for sharps waste should meet the following requirements:

- have lid and thick, rigid wall;
- be made of high density plastic;
- be yellow color coded;
- be marked “sharps waste” with bio-hazard symbol

*Figure 7: Example of sharps waste storage in Vietnam*



*Photo credit: Le Minh Sang/World Bank*

## **VI. Transport of sharps waste**

### **6.1 Transport within health facility**

Sharps waste and infectious waste should be collected daily (or as frequently as required) and transported to the designated central storage site. Collection times should be fixed. Hazardous waste, should never be transported by hand due to the risk of accident or injury from infectious material or incorrectly disposed sharps. Sharps waste and non-sharp infectious waste should be transported within premises by wheeled trolleys, containers or carts, which are not used for any other purpose. Means for transport of sharp and infectious waste should be easy to load and unload, have no sharp edges that could damage waste bags or containers during loading and unloading, be easy to clean, be yellow color coded and marked “Infectious waste” with biohazard symbol.

*Figure 8: different means for transport of sharps waste within health facility*



### **6.2 Transport to outside treatment and disposal facility**

Sharps waste and infectious waste can be transported to outside treatment and disposal facility. Transporting hazardous healthcare waste on the public streets away from a healthcare facility should comply with national regulation on hazardous waste management. The minimum measures for transporting sharps waste to outside treatment and disposal facility are as follows:

- The vehicle is able to carry wastes in a closed or covered container, keeping safety boxes protected from rain, leakage and spillage.
- Vehicle and containers are labelled according to the type of waste that is being transported.
- Transport staff receives appropriate training about risks and handling of hazardous waste as well as emergency response to an accident or incident during transportation.
- Transport documentation (waste tracking note) is prepared, carried by transport staff and kept by health facility. Documentation should include the following information: waste classes, sources, date, destination, number of safety boxes/containers or volume, etc.
- Transport vehicles and containers are maintained and cleaned regularly

*Figure 9: Examples of vehicles for transporting sharps waste in Vietnam*



Photo credit:  
Le Minh Sang/World Bank

## VII. Treatment of sharps waste

Today there are no systems without disadvantages and the final choice of the best technology available is dependent on local conditions rather than global policy. This document introduces three applicable methods for treatment of sharps waste in Laos including needle remover/cutter, incineration, and autoclaving and shredding.

### 7.1 Needle remover or needle cutter

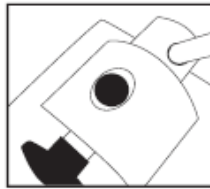
A manually operated needle remover/cutter comprises a removing/cutting device and a needle container which allows health workers to make used syringes safe and harmless at the point of use immediately after administering an injection. Needles or needle residues are stored until the needle container is filled up to its designed maximum fill line, at which point the container must be removed, capped, and either disposed of or emptied.

*Figure 10: Examples of needle remover and needle cutters*

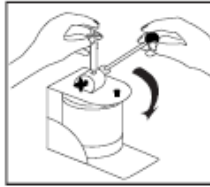


*Figure 11: Instruction for use of needle cutter*

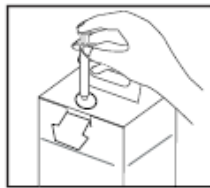
- 1 Move handle so that the insertion hole is fully open.



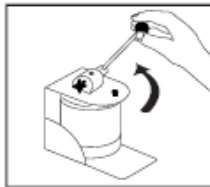
- 2 Insert needle completely into hole and use other hand to push the handle down until cutting is complete.



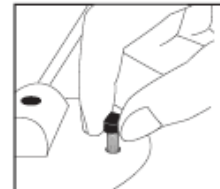
- 3 Place syringe into safety box or infectious waste bag.



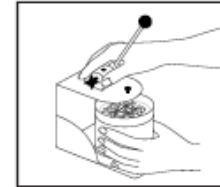
- 4 Move handle up to realign insertion hole; detached needle will fall into the needle container.



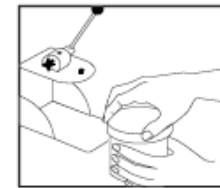
- 5 When container is full, unscrew container retention screw to full up position.



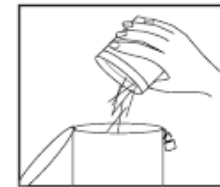
- 6 Squeeze the sides of the container and gently slide out of device mount, taking care not to spill contents.



- 7 Immediately place lid on top of container and screw on securely.



- 8 Empty the container into protected sharps pit.



Source: PATH

## 7.2 Incineration

Incineration is a high-temperature burning process that eliminates pathogens, destroys combustible waste and reduces waste volume. The Immunization Law No. 093/NA requires to use specific incinerator with the heat over 800 degrees Celsius to destroy needles and syringes according to international principles and standards.

**Dual-chamber incinerator** can meet the requirement set-forth in the Immunization Law. It comprises the primary chamber to burn waste at medium temperature of 800-900°C and the secondary chamber to burn gases produced in the primary chamber at high temperature of 1100-1600°C. Several provinces in Laos have installed pyrolytic incinerators for healthcare waste treatment in the centralized model. Health centers and district hospitals are recommended to transport sharps waste to these incinerators for treatment.

*Figure 12: Example of dual-chamber incinerator for healthcare waste treatment*



**Single-chamber, drum and brick incinerators** cannot meet the best available technology requirements of the Stockholm Convention on Persistent Organic Pollutants, of which Laos is signatory. Emissions of toxic and persistent organic pollutants (dioxin, furans, etc) from these small-scale incinerators may result in human exposure at levels associated with adverse health risks. When small-scale incinerators are used, the health facility should ensure that only sharps waste and infectious waste are incinerated and avoid burning PVC plastics and other chlorinated waste. Other key elements associated with design, construction, siting, operational and management of incinerators should be promoted to minimize occupational and public health risks.

*Figure 13: Examples of single chamber and brick incinerators*





Photo credit: Le Minh Sang/World Bank

**Key elements for proper operation of incinerator are as follows:**

- Clear operation procedures posted near the incinerator.
- Trained operator.
- Reliable segregation system so only infectious and nonpolluting materials are incinerated.
- Reliable transport system to get waste to the incinerator.
- Ash pit to safely dump the incinerator ash.
- Maintenance schedule.
- Adequate supply of fuel.

**Critical maintenance steps are as follows:**

A qualified official must inspect the incinerator every six months.

- Masonry inspection and repair: check for loose bricks and cracks in mortar interior and exterior; repair or replace damaged bricks.
- Metal inspection and repair: check doors, hinges, grate and chimney cap; replace if bent or damaged.
- Chimney: clean soot from inside of chimney.
- Site maintenance: clear brush from area around incinerator.
- Ash pit: if ash pit is full, cover and dig new pit

### 7.3 Autoclaving and Shredding

**Autoclaving:** is a low-heat thermal process that uses steam at high pressure and temperature to disinfect waste. The operation of autoclaves requires the proper combination of temperature/pressure and exposure time to achieve disinfection. In the past, a minimum recommended temperature exposure time criterion of 121 °C for 30 minutes under pressure of 205 kPa or 2.05 bar was suggested. Recently, temperature exposure time of 134 °C for 60 minutes is recommended for treating prions. Autoclaving is environmentally safe.

**Shredding:** since sharps waste from an autoclave retains its physical appearance, a mechanical process such as shredding or compaction is used to make them unrecognizable. Shredding cuts sharps into small pieces, making them safe for handling and disposal and reducing the volume of waste.

*Figure 14: Example of autoclaving and shredding in Tanzania*



*Source: UNDP and GEF*

**A typical operation for an autoclave** comprises the following steps:

- Waste collection
- Pre-heating
- Waste loading
- The entry (or charging) door is closed, sealing the chamber.
- Air evacuation
- Steam treatment
- Steam discharge
- Unloading
- Documentation

**After autoclaving, disinfected waste is fed into shredder**, making them non-hazardous and safe for disposal in a municipal landfill. Shredding before disinfection can only be done in a closed system to avoid releasing any pathogens into the air. Integrated steam-based systems, which incorporate internal shredding combine steam treatment with shredding before, during or after steam treatment

Autoclaves and shredders can last for many years if properly maintained. Healthcare facilities should work with equipment vendors and manufacturers to develop a detailed preventive maintenance schedule. A typical preventive maintenance schedule of autoclave involves the following:

- Daily maintenance by operator: check for leaks, cleanliness of the chamber, filter screen and door seal
- Weekly maintenance by operator: check indicator lights, compare temperature & pressure gauges with recordings
- Monthly maintenance by operator: check door gasket or O-ring, conduct microbiological tests (by lab personnel)
- Quarterly maintenance by the engineer: checking valves, pipes, joints, strainers, drains; checking control system, interlocks and electricals; testing air removal efficiency
- Annual maintenance by the engineer: check for corrosion and wear, check thermocouples, water level indicators, gauges, relief valves and other safety devices, and control functions

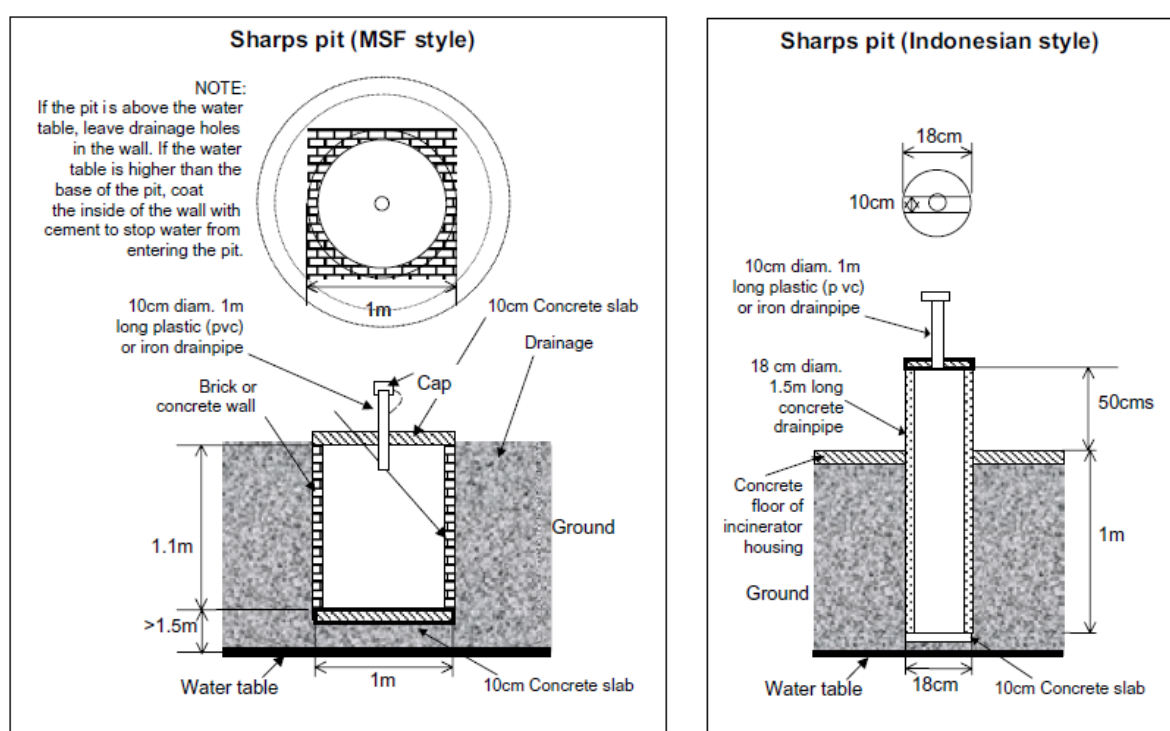




The following procedures for constructing and using a protected sharp pit are recommended:

- Identify the appropriate site, which locates away from the groundwater supply sources.
- Dig a pit (minimum size of 1mx1mx1m depth), enough to accommodate sharps and syringes for an estimated period of time without reaching the groundwater level.
- Construct brick or concrete walls and slabs of the vault, following the design drawing below. Provide slab with hole and drainpipe for deposition of removed needles.
- Lid of drainpipe should be kept closed when not in use.
- Deposit the needles into the opening in the top of the sharps pit. A one cubic meter pit will safety contain over 1 million used needles when correctly used.
- Install a fence around the concrete vault to prevent unauthorized access

**Figure 16: Design of protected sharp pits**



Source: PATH

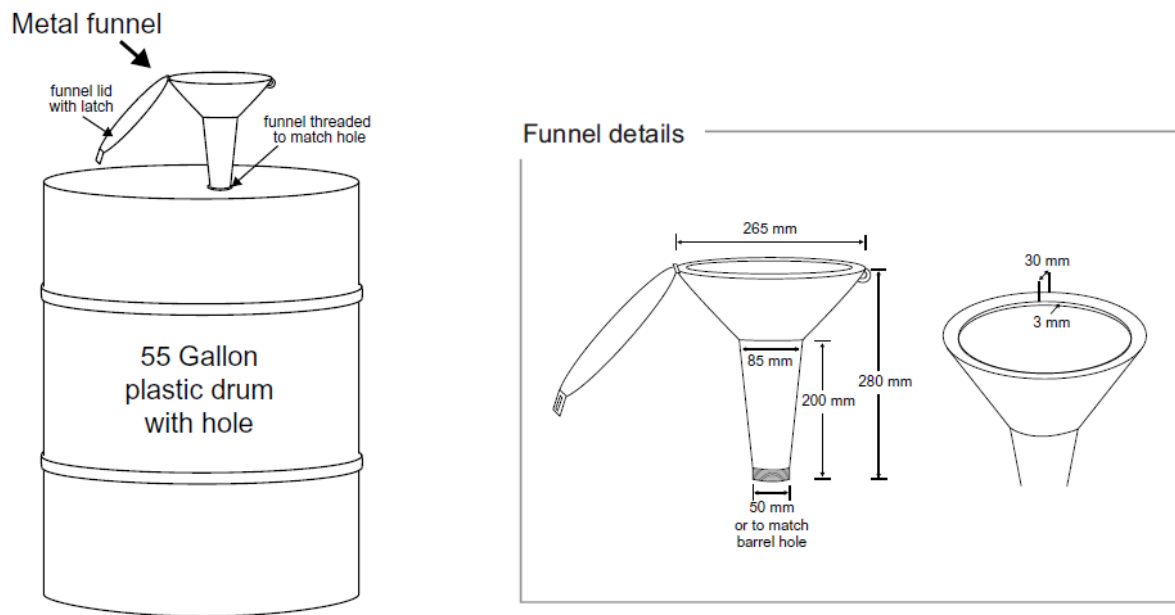
## 8.2.2 Design, construction and use of a protected sharps barrel

The following procedures for constructing and using a protected sharp pit are recommended:

- Manufacture a funnel: identify a manufacturer to make the funnel following the design drawings below.
- Select a barrel: barrels should be plastic, as metal barrels could rust over time.
- Identify an appropriate site for the barrel, which should be dry, secure, and convenient.
- Attach the funnel to the sharps barrel: screw the metal funnel into the hole on top of barrel.
- Rubber cement or other sealant may be used to help secure connection if needed.
- Funnel lid should be kept closed and locked when not in use.
- Deposit the needles into the opening in the top of the barrel. A barrel will safety contain over 150,000 used needles used needles when correctly used.

- Install a fence around the concrete vault to prevent unauthorized access

**Figure 17: Design of a protected sharp barrel**



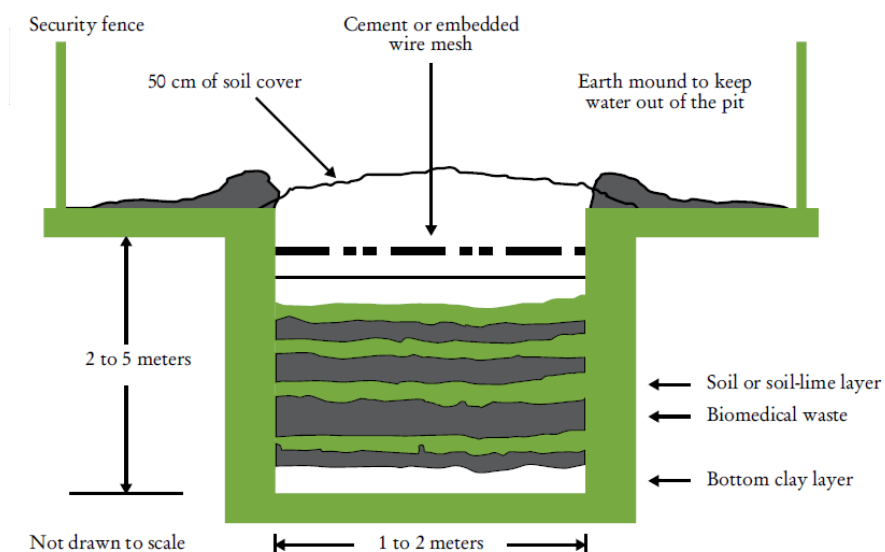
Source: PATH

### 8.3 Safe burial of sharps waste in controlled bury pit

This is the minimal approach to sharps waste disposal, which should be used only in remote and underdeveloped areas. Even in difficult circumstance, the health facility should establish the following basic principles:

- Locates the burial site away from the groundwater supply sources
- Restrict access to the disposal site by unauthorized persons
- Line the burial site with a material of low permeability, such as clay, dung and river silt, if available, to prevent pollution of shallow groundwater and nearby wells.
- Bury sharps waste and infectious waste only
- Each layer of waste should be covered by a layer of soil to prevent odors, rodents and insects.

**Figure 18: Design of controlled bury pit**



Source: World Bank

**Figure 19: Examples of controlled bury pits in health facilities in Luang Prabang**



*Photo credit: Le Minh Sang/World Bank*

#### **8.4 Encapsulation of sharps waste**

Disposal of untreated sharps waste in municipal landfills is not advisable. However, if the healthcare facility has no other option, the sharps waste should be contained through encapsulation, which involves filling containers with waste, adding an immobilizing material, and sealing the containers. This process is appropriate for establishments for the disposal of sharps but not a long-term solution. The main advantage of the process is its effectiveness in reducing the risk of scavengers gaining access to the hazardous health-care waste (WHO, 2003).

The encapsulation process is described as follows:

- Fill containers with sharps waste up to three quarters level. Use either cubic boxes made of high-density polyethylene or metallic drums.
- Add an immobilizing material (such as plastic foam, bituminous sand, cement mortar, or clay material)
- Seal the container after the medium has dried
- Dispose the block containing sharps into landfill sites.



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## **Good Practice Note: Asbestos: Occupational and Community Health Issues**

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### **1. SUMMARY**

The purpose of this Good Practice Note is to increase the awareness of the health risks related to occupational asbestos exposure, provide a list of resources on international good practices available to minimize these risks, and present an overview of some of the available product alternatives on the market. The need to address asbestos-containing materials (ACM) as a hazard is no longer under debate but a widely accepted fact.

Practices regarding asbestos that are normally considered acceptable by the World Bank Group (WBG) in projects supported through its lending or other instruments are addressed in the WBG's General Environmental, Health and Safety (EHS) Guidelines.<sup>1</sup> This Good Practice Note provide background and context for the guidance in the WBG EHS Guidelines.

Good practice is to minimize the health risks associated with ACM by avoiding their use in new construction and renovation, and, if installed asbestos-containing materials are encountered, by using internationally recognized standards and best practices (such as those presented in Appendix 3) to mitigate their impact. In all cases, the Bank expects borrowers and other clients of World Bank funding to use alternative materials wherever feasible.

ACM should be avoided in new construction, including construction for disaster relief. In reconstruction, demolition, and removal of damaged infrastructure, asbestos hazards should be identified and a risk management plan adopted that includes disposal techniques and end-of-life sites.

### **2. ASBESTOS AND HEALTH RISKS**

#### **2.1. What is Asbestos, and Why are We Concerned with its Use?**

Asbestos is a group of naturally occurring fibrous silicate minerals. It was once used widely in the production of many industrial and household products because of its useful properties, including fire retardation, electrical and thermal insulation, chemical and thermal stability, and high tensile strength. Today, however, asbestos is recognized as a cause of various diseases and cancers and is considered a health hazard if inhaled.<sup>2</sup> The ILO estimates that over the last several decades 100,000 deaths globally have been due to asbestos exposure,<sup>3</sup> and the WHO states that 90,000 people die a year globally because of occupational asbestos exposure.<sup>4</sup>

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<sup>1</sup> [http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui\\_EHSGuidelines2007\\_GeneralEHS/\\$FILE/Final+-+General+EHS+Guidelines.pdf](http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/$FILE/Final+-+General+EHS+Guidelines.pdf) (pp. 71, 91, 94) .

<sup>2</sup> [http://www.who.int/occupational\\_health/publications/draft.WHO.policy.paper.on.asbestos.related.diseases.pdf](http://www.who.int/occupational_health/publications/draft.WHO.policy.paper.on.asbestos.related.diseases.pdf).

See also Stayner L, et al., "Exposure-Response Analysis of Risk of Respiratory Disease Associated with Occupational Exposure to Chrysotile Asbestos." *Occupational Environmental Medicine*. 54: 646-652 (1997).

<sup>3</sup> [http://www.ilo.org/wow/Articles/lang--en/WCMS\\_081341](http://www.ilo.org/wow/Articles/lang--en/WCMS_081341)

<sup>4</sup> [http://www.who.int/occupational\\_health/publications/asbestosrelateddiseases.pdf](http://www.who.int/occupational_health/publications/asbestosrelateddiseases.pdf)

Over 90% of asbestos<sup>5</sup> fiber produced today is chrysotile, which is used in asbestos-cement (A-C) construction materials: A-C flat and corrugated sheet, A-C pipe, and A-C water storage tanks. Other products still being manufactured with asbestos content include vehicle brake and clutch pads, roofing, and gaskets. Though today asbestos is hardly used in construction materials other than asbestos-cement products, it is still found in older buildings in the form of friable surfacing materials, thermal system insulation, non-friable flooring materials, and other applications. The maintenance and removal of these materials warrant special attention.

Because the health risks associated with exposure to asbestos are now widely recognized, global health and worker organizations, research institutes, and some governments have enacted bans on the commercial use of asbestos (see Box 1), and they urge the enforcement of national standards to protect the health of workers, their families, and communities exposed to asbestos through an International Convention.<sup>6</sup>

#### **BOX 1. BANS ON THE USE OF ASBESTOS AND ASBESTOS PRODUCTS**

A global ban on commercial use of asbestos has been urged by the Building and Wood Workers Federation (IFBWW), the International Metalworker's Federation, the International Trade Union Confederation, the government of France, and the distinguished scientific group Collegium Ramazzini. All member states of the European Union and over 40 countries worldwide (see Appendix 1) have banned all forms of asbestos, including chrysotile.<sup>7</sup> In June 2006, the General Conference of the ILO adopted a resolution to "promote the elimination of all forms of asbestos and asbestos-containing materials."

- Landrigan PJ, Soffritti M. "Collegium Ramazzini Call for an International Ban on Asbestos." *Am. J. Ind. Med.* 47: 471-474 (2005).
- The International Ban Asbestos Secretariat keeps track of national asbestos bans. [http://ibassecretariat.org/lka\\_alpha\\_asb\\_ban\\_280704.php](http://ibassecretariat.org/lka_alpha_asb_ban_280704.php)
- General Conference of the International Labor Organization, "Resolution Concerning Asbestos," *Provisional Record*, International Labor Conference, Ninety-fifth Session, Geneva, 2006, Item 299, pp. 20/47-48.
- World Health Organization: [http://www.who.int/occupational\\_health/publications/asbestosrelateddiseases.pdf](http://www.who.int/occupational_health/publications/asbestosrelateddiseases.pdf)

### **2.2. Health Concerns Linked to Asbestos-Containing Products**

Health hazards from breathing asbestos dust include asbestosis, a lung scarring disease, and various forms of cancer (including lung cancer and mesothelioma of the pleura and peritoneum).<sup>8</sup> These diseases usually arise decades after the onset of asbestos exposure. Mesothelioma, a signal tumor for asbestos exposure, occurs among workers' family members

<sup>5</sup> Asbestos defined in Castleman, B. *Asbestos: Medical and Legal Aspects* 5<sup>th</sup> Ed. New York: Aspen, 2005, 894 pp.

<sup>6</sup> ILO Asbestos Convention No. 162, (see <http://www.ilo.org/ilolex> or [http://www.itcilo.it/actrav/osh\\_es/m%F3dulos/legis/c162.htm](http://www.itcilo.it/actrav/osh_es/m%F3dulos/legis/c162.htm))

<sup>7</sup> [http://www.who.int/occupational\\_health/publications/asbestosrelateddiseases.pdf](http://www.who.int/occupational_health/publications/asbestosrelateddiseases.pdf). Directive 2003/18/EC of the European Council and Parliament amending Council Directive 83/477/EEC, and Directive 99/77/EEC

<sup>8</sup> [http://www.euro.who.int/document/aic/6\\_2\\_asbestos.pdf](http://www.euro.who.int/document/aic/6_2_asbestos.pdf)

from dust on the workers' clothes and among neighbors of asbestos air pollution point sources.<sup>9</sup> Some experimental animal studies show that high inhalation exposures to all forms of asbestos for only hours can cause cancer.<sup>10</sup> Very high levels of airborne asbestos have been recorded where power tools are used to cut A-C products and grind brake shoes. For chrysotile asbestos, the most common variety, there is no threshold (non-zero) of exposure that has been shown to be free from carcinogenic risks. Construction materials are of particular concern, because of the large number of workers in construction trades, the difficulty of instituting control measures, and the continuing threat posed by in-place materials that eventually require alterations, repair, and disposal.<sup>11</sup> Renovations and repairs in buildings containing A-C materials can also endanger building occupants. In addition to the problems from products made with commercial asbestos, asbestos also occurs as a contaminant in some deposits of stone, talc, vermiculite, iron ore, and other minerals. This can create health hazards for workers and residents at the site of excavation and in some cases in the manufacture and use of consumer products the materials are used to make. While asbestos is a known carcinogen when inhaled, it is not known to be carcinogenic when ingested, as through drinking water,<sup>12</sup> although pipe standards have been issued for asbestos-cement pipes conducting "aggressive" water.<sup>13</sup>

From the industrial hygiene viewpoint, asbestos creates a chain of exposure from the time it is mined until it returns to the earth at landfill or unauthorized disposal site. At each link in the chain, occupational and community exposures coexist. Workers in the mines are exposed to the fibers while extracting the ore; their families breathe fibers brought home on work clothes; workers in the mills and factories process the fiber and manufacture products with it; and their families are also secondarily exposed. Communities around the mines, mills, and factories are contaminated with their wastes; children play on tailings piles and in contaminated schoolyards; transportation of fiber and products contaminates roads and rights-of-way.<sup>14</sup> Tradesmen who install, repair and remove ACM are exposed in the course of their work, as are bystanders in the absence of proper controls. Disposal of asbestos wastes from any step in this sequence not only exposes the workers handling the wastes but also local residents when fibers become airborne because of insufficient covering and erosion control. Finally, in the absence of measures to remove ACM from the waste stream and dispose of them properly, the cycle is often repeated when discarded material is scavenged and reused.<sup>15</sup>

<sup>9</sup> "Asbestos." *World Health Organization IARC Monographs on the Evaluation of Carcinogenic Risks to Humans/Overall Evaluations of Carcinogenicity: An Updating of IARC Monographs 1 to 42*, Suppl. 7. Lyon: International Agency for Research on Cancer, 1987, pp. 106-116.

<sup>10</sup> Wagner JC, Berry G, Skidmore JW, Timbrell V. "The Effects of the Inhalation of Asbestos in Rats." *Br. J. Cancer* 29: 252-269 (1974).

<sup>11</sup> International Program on Chemical Safety, "Conclusions and Recommendations for Protection of Human Health," *Chrysotile Asbestos*, Environmental Health Criteria 203. Geneva: World Health Organization, 1998, p. 144.

<sup>12</sup> [http://whqlibdoc.who.int/hq/2000/a68673\\_guidelines\\_3.pdf](http://whqlibdoc.who.int/hq/2000/a68673_guidelines_3.pdf)

<sup>13</sup> [http://whqlibdoc.who.int/hq/2000/a68673\\_tech\\_aspects\\_4.pdf](http://whqlibdoc.who.int/hq/2000/a68673_tech_aspects_4.pdf)

<sup>14</sup> Jones, Robert "Living in the Shadow of the Asbestos Hills (The Need for Risk Based Cleanup Strategies for Environmental Asbestos Contamination in South Africa)." Environmental Exposure, Crisis Preparedness and Risk Communication, Global Asbestos Congress, Tokyo, Japan, November 19 - 21, 2004. [http://park3.wakwak.com/~gac2004/en/index\\_abstract\\_e.html](http://park3.wakwak.com/~gac2004/en/index_abstract_e.html). See also Oberta, AF "Case Study: An Asbestos Cement Plant in Israel -- Contamination, Clean-up and Dismantling." Hellenic Asbestos Conference, Athens, Greece, October 29 - 31, 2002. [http://www.ibas.btiinternet.co.uk/Frames/f\\_ika\\_hellen\\_asb\\_conf\\_rep.htm](http://www.ibas.btiinternet.co.uk/Frames/f_ika_hellen_asb_conf_rep.htm)

<sup>15</sup> Boer, A.M., L.A. Daal, J.L.A. de Groot, J.G. Cuperus "The Combination of the Mechanical Separator and the Extraction Cleaner Can Process the Complete Asbestos-containing Waste-stream and Make it Suitable for Reuse."



### 2.3. Increasing Use of Asbestos Fiber

There is evidence that, after a decline in the 1990s, the use of asbestos fiber is increasing globally. A recent study<sup>16</sup> shows that a 59% increase in metric tons was consumed in 12 countries from 2000 to 2004.

## 3. INTERNATIONAL CONVENTION AND STANDARDS FOR WORKING WITH ASBESTOS

### 3.1. International Convention

The International Labor Organization (ILO) established an Asbestos Convention (C162) in 1986 to promote national laws and regulations for the “prevention and control of, and protection of workers against, health hazards due to occupational exposure to asbestos.”<sup>17</sup> The convention outlines aspects of best practice: Scope and Definitions, General Principles, Protective and Preventive Measures, Surveillance of the Working Environment, and Workers’ Health. As of March 4, 2008, 31 countries had ratified the Convention;<sup>18</sup> 17 of them have banned asbestos.

Some of the ILO asbestos convention requirements:

- work clothing to be provided by employers;
- double changing rooms and wash facilities to prevent dust from going home on street clothes;
- training of workers about the health hazards to themselves and their families;
- periodic medical examinations of workers,
- periodic air monitoring of the work environment, with records retained for 30 years;
- development of a work plan prior to demolition work, to protect workers and provide for proper waste disposal; and
- protection from “retaliatory and disciplinary measures” of workers who remove themselves from work that they are justified in believing presents a serious danger to health.

Standard considerations for working with and procuring ACM are common to most projects. An overview of some basic ones is provided in Appendix 5.

### 3.2. International Standards and National Regulations

Standards and regulations for work involving ACM have been published by nongovernmental organizations and government agencies. Appendix 3 provides a listing of some resources, including international organizations (e.g., WHO, ISO, ASTM) and national governments (e.g., UK, US, Canada, South Africa). The resources range from manuals to individual standards and cover a variety of work guidelines, including surveys, identification, inspection, maintenance, renovation, repair, removal, and disposal. Some of the key issues discussed in these standards and regulations are as follows:

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European Conference on Asbestos Risks and Management, Rome, Italy, December 4 -6, 2006.

<http://venus.unive.it/fall/menu/Boer.pdf>

<sup>16</sup> R. Virta, US Geological Survey, 2007.

<sup>17</sup> [www.ilo.org/ilolex](http://www.ilo.org/ilolex)

<sup>18</sup> <http://www.ilo.org/ilolex/english/convdisp1.htm>



- **The scale of occupational hazards.** The health risk is not simply a function of the properties of the ACM, but also reflects the type of work being done and the controls used. Although A-C products, for example, may seem to intrinsically present less of a risk than fire-proofing, air monitoring has shown that cutting dry A-C sheet with a power saw can release far greater amounts of airborne fibers than scraping wet, saturated fireproofing off a beam. The relationship between the nature of A-C products, the work being done and the controls used to control the release of fibers and debris is important (as discussed in ASTM E2394 and HSG189/2<sup>19</sup>).
- **Controlling exposure to airborne fibers.** Because asbestos fibers are primarily an inhalation hazard, the basic purpose of the regulations and standards is to control the concentration of asbestos fibers in the air inhaled by workers or others. Concentration limits have been set by regulations in numerous countries for workers whose duties involve contact with ACM; however, they do not purport to totally eliminate the risk of asbestos disease, but only to reduce it. Exposure limits for individuals other than workers, including occupants of buildings and facilities and the community, are lower than those for workers in deference to the very young and old as well as the physically compromised.
- **Measuring exposure to airborne fibers.** Compliance with exposure limits is demonstrated by air sampling in workers' breathing zone or in the space occupied by the affected individuals, with analysis of the sample by optical or electron microscopy, as explained in Appendix 3. Abatement protocols determine whether a building can be reoccupied after asbestos abatement.
- **Proper disposal.** Proper disposal of ACM is important not only to protect the community and environment but also to prevent scavenging and reuse of removed material. ACM should be transported in leak-tight containers to a secure landfill operated in a manner that precludes air and water contamination that could result from ruptured containers. Similar requirements apply to remediation of sites such as mines, mills, and factories where asbestos fiber was processed and products manufactured. (See EPA NESHAP regulations, Appendix 3.)
- **Transboundary movement of waste.** Waste asbestos (dust and fibers) is considered a hazardous waste under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. The Basel Convention imposes use of a prior informed consent procedure for movement of such wastes across international borders. Shipments made without consent are illegal. Parties have to ensure that hazardous waste is disposed of in an environmentally sound manner (ESM). Strong controls have to be applied from the moment of generation, to its storage, transport, treatment, reuse, recycling, recovery and final disposal<sup>20</sup>
- **Identifying asbestos products.** A-C products include flat panels, corrugated panels used for roofing, water storage tanks, and pressure, water, and sewer pipes. In some countries asbestos

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<sup>19</sup> See Appendix 3.

<sup>20</sup> See Basel Convention Secretariat <http://www.basel.int/>

may still be used in making wallboard, heat-resistant gloves and clothes for industrial use, and brake and clutch friction elements and gaskets used in vehicles.<sup>21</sup> Thermal insulation containing asbestos and sprayed asbestos for insulation and acoustic damping were widely used through the 1970s and should be looked for in any project involving boilers and insulated pipes. Insulation dating from before 1980 should be presumed to contain asbestos unless analyzed and found not to. The microscopic methodology for analyzing bulk samples for the presence of asbestos is widely available in industrialized countries and is not expensive; it is less available in developing countries. In a developing country samples may have to be mailed out for testing; alternatively, training may be available for a laboratory in the country.

- **Training.** It is impossible to overemphasize the importance of training for working with ACM in any capacity—whether it involves inspections, maintenance, removal, or laboratory analysis. The duration of the training as well as the course content depends on the type of work the individual will be doing. Quality control and proficiency testing for laboratories and individual analysts are also important.

## 4. ALTERNATIVES TO ASBESTOS-CONTAINING MATERIALS

### 4.1. Growing Marketplace

Safer substitutes for asbestos products of all kinds are increasingly available (see Appendix 4). These include fiber-cement products using combinations of local vegetable fibers and synthetic fibers, as well as other products that serve the same purposes.<sup>22</sup> The WHO is actively involved in evaluating alternatives.<sup>23</sup>

### 4.2. Cost and Performance Issues

Fiber-cement roof panels using polyvinyl alcohol (PVA) or polypropylene combined with cellulose now cost 10-15% more to manufacture than A-C sheets. Polypropylene-cellulose-cement roofing, a new product, is made at a cost of about 12 percent more than A-C roofing and has superior impact resistance. The non-asbestos fiber-cement panels are lighter, less brittle, and have improved nailability over A-C. The increase in the overall cost of building construction that such products represent is to some degree offset by the obviation of special hygiene measures in installation/maintenance/renovation, the lack of a continuing hazard to building workers and occupants, and reduced costs of waste removal and disposal. Micro concrete tiles are cheaper than A-C to produce, and can be made in a basic workshop near the building site with locally available small contractors and materials, lowering transport costs. Compared with A-C pipes, iron pipes can be transported and installed with less difficulty and breakage, take greater compression loading and last longer.

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<sup>21</sup> In 2004, Russia, China, India, Kazakhstan, Thailand, and Ukraine together accounted for about three-quarters of world asbestos consumption. Other major consumers of asbestos are Iran, Brazil, Vietnam, and Indonesia.

<sup>22</sup> 7. The U.K. Health and Safety Executive commissioned a report that concluded that the main replacement fibrous materials for asbestos in fiber-cement products and brakes are less hazardous than chrysotile asbestos. See Harrison PTC, *et al.* "Comparative Hazards of Chrysotile Asbestos and Its Substitutes: A European Perspective." *Envir. Health Persp.* 107: 607-611 (1999). <http://www.ehponline.org/members/1999/107p607-611harrison/harrison-full.html>

<sup>23</sup> <http://www.who.int/ipcs/assessment/asbestos/en/>

## 5. WORLD BANK GROUP APPROACH TO ASBESTOS HEALTH RISK

The WBG EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP).<sup>24</sup> When one or more members of the WBG are involved in a project, the EHS Guidelines are applied as required by their respective policies and standards.

The WBG's EHS Guidelines<sup>25</sup> specify that the use of ACM should be avoided in new buildings and construction or as a new material in remodeling or renovation activities. Existing facilities with ACM should develop an asbestos management plan that clearly identifies the locations where the ACM is present, its condition (e.g., whether it is in friable form or has the potential to release fibers), procedures for monitoring its condition, procedures to access the locations where ACM is present to avoid damage, and training of staff who can potentially come into contact with the material to avoid damage and prevent exposure. The plan should be made available to all persons involved in operations and maintenance activities. Repair or removal and disposal of existing ACM in buildings should be performed only by specially trained personnel<sup>26</sup> following host country requirements or, if the country does not have its own requirements, internationally recognized procedures.<sup>27</sup> Decommissioning sites may also pose a risk of exposure to asbestos that should be prevented by using specially trained personnel to identify and carefully remove asbestos insulation and structural building elements before dismantling or demolition.<sup>28</sup>

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<sup>24</sup> Defined as the exercise of professional skill, diligence, prudence, and foresight that would be reasonably expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally. The circumstances that skilled and experienced professionals may find when evaluating the range of pollution prevention and control techniques available to a project may include, but are not limited to, varying levels of environmental degradation and environmental assimilative capacity as well as varying levels of financial and technical feasibility

<sup>25</sup> [http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui\\_EHSGuidelines2007\\_GeneralEHS/\\$FILE/Final+-+General+EHS+Guidelines.pdf](http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/$FILE/Final+-+General+EHS+Guidelines.pdf) (pp. 71, 91, 94)

<sup>26</sup> Training of specialized personnel and the maintenance and removal methods applied should be equivalent to those required under applicable regulations in the United States and Europe (examples of North American training standards are available at: <http://www.osha.gov/SLTC/asbestos/training.html>)

<sup>27</sup> Examples include the ASTM International E1368 - Standard Practice for Visual Inspection of Asbestos Abatement Projects; E2356 - Standard Practice for Comprehensive Building Asbestos Surveys; and E2394 - Standard Practice for Maintenance, Renovation and Repair of Installed Asbestos Cement Products.

<sup>28</sup> [http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui\\_EHSGuidelines2007\\_GeneralEHS/\\$FILE/Final+-+General+EHS+Guidelines.pdf](http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/$FILE/Final+-+General+EHS+Guidelines.pdf) (pp. 71, 91, 94)

## **APPENDIX 1. COUNTRIES THAT HAVE BANNED THE USE OF ASBESTOS**

1. Argentina
2. Australia
3. Austria
4. Belgium
5. Bulgaria
6. Chile
7. Cyprus
8. Czech Republic
9. Denmark
10. Egypt
11. Estonia
12. Finland
13. France
14. Gabon
15. Germany
16. Greece
17. Honduras
18. Hungary
19. Iceland
20. Ireland
21. Italy
22. Japan
23. Jordan
24. Kuwait
25. Latvia
26. Lithuania
27. Luxembourg
28. Malta
29. Netherlands
30. Norway
31. Poland
32. Portugal
33. Republic of Korea
34. Romania
35. Saudi Arabia
36. Seychelles
37. Slovakia
38. Slovenia
39. South Africa
40. Spain
41. Sweden
42. Switzerland
43. United Kingdom
44. Uruguay



## APPENDIX 2. WORLD BANK GROUP ASBESTOS REFERENCES

<i>Policy guidance</i>	<i>References</i>
<p>ACM should be avoided in new buildings or as new material in remodeling or renovation</p> <ul style="list-style-type: none"> <li>Existing buildings: ACM Survey and management plan needed</li> <li>Disposal of ACM shall be carried out by specially trained individuals only following host country requirements, or in their absence, internationally recognized procedures</li> </ul>	<p><i>Guidance: General Environment Health and Safety Guidelines April 2007, p 34 and 71.</i></p>
<p>Some examples of project requirements:</p> <ul style="list-style-type: none"> <li>risk assessment to determine extent of problem; surveys to abate asbestos exposure; management plan; removal by trained personnel; prohibition of ACM; procedures for handling, removal, transport, and disposal of asbestos.</li> </ul>	<ul style="list-style-type: none"> <li>Ukraine -Equal Access to Quality Education (Project ID PO77738)</li> <li>KH- Health Sector Support (Project ID: P070542)</li> <li>ID- Health Workforce and Services (Project. ID: P073772)</li> <li>Changchun, China -TBK Shili Auto Parts Co., (IFC, 2005)</li> </ul>

### APPENDIX 3. LIST OF RESOURCES FOR ASBESTOS STANDARDS AND REGULATIONS

NOTE: this listing is not meant to be all-inclusive, but is a sample of available information.

<b>INTERNATIONAL STANDARDS</b>
<b>WHO Policy and Guidelines (www.who.org)</b> <ul style="list-style-type: none"> <li>www.searo.who.int/LinkFiles/Publications_and_Documents_prevention_guidelines.pdf(p. 70)</li> <li>www.searo.who.int/en/Section23/Section1108/Section1835/Section1864_8658.htm</li> </ul>
<b>International Organization for Standardization (ISO) (www.iso.org)</b> <ul style="list-style-type: none"> <li>ISO 10312 (1995): Ambient air -- Determination of asbestos fibres -- Direct transfer transmission electron microscopy method. [Method similar to ASTM D6281]</li> <li>ISO 13794 (1999): Ambient air – Determination of asbestos fibres – Indirect-transfer transmission electron microscopy method.</li> <li>ISO/FDIS 16000-7: Indoor air – Part 7: Sampling strategy for determination of airborne asbestos fibre concentrations.</li> <li>ISO 8672: Air quality -- Determination of the number concentration of airborne inorganic fibres by phase contrast optical microscopy -- Membrane filter method (1993) [Method similar to AIA RTM1]</li> </ul>
<b>Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal</b> <ul style="list-style-type: none"> <li>Basel Convention Secretariat (www.basel.int)</li> </ul>
<b>International Labour Organization (www.ilo.org)</b> <ul style="list-style-type: none"> <li>Chemical Safety Card, ICSC 0014: www.ilo.org/public/english/protection/safework/cis/products/icsc/dtasht/_icsc00/icsc0014.htm</li> </ul>
<b>European Union</b> (europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=32003L0018&model=guichett) <ul style="list-style-type: none"> <li>Directive 2003/18/EC amending Council Directive 83/477/EEC on the Protection of Workers from the Risks Related to Exposure to Asbestos at Work. (March 2003). Provides regulations including: worker protection, training and medical surveillance; inspections for asbestos-containing materials; notification of asbestos work; air sampling; exposure limits of 0,1 fibres per cm<sup>3</sup> (8-hr TWA) measured by Phase Contrast Microscopy.</li> </ul>
<b>NATIONAL STANDARDS</b>
<b>ASTM International (www.astm.org)</b> <ul style="list-style-type: none"> <li>Manual on Asbestos Control: Surveys, Removal and Management – Second Edition (March 2005). Author: Andrew F. Oberta, MPH, CIH. Discusses in detail how E2356, E2394 and E1368 are used to support an asbestos management program.</li> <li>E2356 Standard Practice for Comprehensive Building Asbestos Surveys. July, 2004. Covers baseline surveys for management of ACM and includes assessment protocols to make and prioritize removal vs. maintenance decisions. ASTM E2356 provides information for long-term management of ACM in a Baseline Survey and for preparation of the plans and specifications for a removal project. It contains detailed procedures and equipment (mostly ordinary hardware items) needed to take bulk samples of common types of suspect ACM. Once materials have been identified as asbestos-containing, an assessment is made as to which can be left in place. Quantitative assessment of the Current Condition and Potential for</li> </ul>

Disturbance of all friable and non-friable materials allows removal priorities to be tabulated and graphically displayed. Budgetary estimates for removal can be established on the basis of the quantitative assessments.

- E2394 Standard Practice for Maintenance, Renovation and Repair of Installed Asbestos Cement Products (October 2004). Describes materials, hazardous operations, necessary precautions and infrastructure requirements with detailed procedures in appendices. Not intended for installation of asbestos-cement products in new construction or renovation.
- E1368 Standard Practice for Visual Inspection of Asbestos Abatement Projects (May 2005). Provides an approach to managing a removal project to enhance prospects of passing final inspections and clearance air sampling. Describes preparation, removal and inspection procedures and criteria.
- E2308 Standard Guide on Limited Asbestos Screens of Buildings (2005). Provides the minimum amount of information needed to facilitate a real estate transaction.
- D6281 Standard Test Method for Airborne Asbestos Concentration in Ambient and Indoor Atmospheres as Determined by Transmission Electron Microscopy Direct Transfer (TEM). A method for distinguishing asbestos from non-asbestos fibers on an air sample filter and identifying and quantifying smaller and thinner fibers than Phase Contrast Microscopy
- D7201: Practice for Sampling and Counting Airborne Fibers, Including Asbestos Fibers, in the Workplace, by Phase Contrast Microscopy (with an Option of Transmission Electron Microscopy)
- Combines methodology of NIOSH 7400 and 7402

#### **Australia**

([www.ascc.gov.au/ascc/AboutUs/Publications/NationalStandards/ListofNationalCodesofPractice.htm](http://www.ascc.gov.au/ascc/AboutUs/Publications/NationalStandards/ListofNationalCodesofPractice.htm))

- Safe Removal of Asbestos 2<sup>nd</sup> edition [NOHSC: 2002 (2005)]
- Code of Practice for the Management and Control of Asbestos in the Workplace [NOHSC: 2018 (2005)]

#### **U. K. Health and Safety Executive** (<http://www.hse.gov.uk/asbestos/index.htm>)

- Asbestos Regulations (<http://www.opsi.gov.uk/si/si2006/20062739.htm>)
- Asbestos Essentials (<http://www.hse.gov.uk/asbestos/essentials/index.htm>). Includes sections on manager Tasks and methods and equipment.

Publications include:

- Working with Asbestos in Buildings INDG289 08/01 C600. An overview (16 pages) of asbestos hazards and precautions
- MDHS100 Surveying, sampling and assessment of asbestos containing materials (2001). Contains many illustrations and examples of asbestos-containing products as well as sampling and analytical methods. MDHS100 is comparable in thoroughness to ASTM in its discussion of bulk sampling techniques and equipment, organizing a survey and assessment of ACM using a numerical algorithm based on the product type, extent of damage, surface treatment and type of asbestos fiber. The document contains numerous photographs of typical ACM found in buildings.
- HSG189/2 Working with asbestos cement (1999). Describes asbestos-cement products and methods of repairing and removing them, including fiber concentrations for controlled and uncontrolled operations.
- The Control of Asbestos at Work Regulations (2002). Requirements for the protection of

<p>people being exposed to asbestos, including the requirement for those with responsibility for the maintenance and/or repair of non-domestic premises, to identify and manage any risk from asbestos within their premises</p>
<p><b>National Institute of Building Sciences</b> (<a href="http://www.nibs.org/pubsasb.html">http://www.nibs.org/pubsasb.html</a>)</p> <ul style="list-style-type: none"> <li>▪ Guidance Manual: Asbestos O&amp;M Work Practices, Second Edition (1996). Contains procedures for small-scale work on friable and non-friable ACM including asbestos-cement products.</li> <li>▪ Asbestos Abatement and Management in Buildings: Model Guide Specification. Third Edition (1996). Contains information on project design and surveillance as well as applicable US regulations, plus removal contractor requirements for abatement work in specification format.</li> </ul>
<p><b>Austrian Standards Institute</b> (<a href="http://www.on-norm.at/index_e.html">http://www.on-norm.at/index_e.html</a>)</p> <p>ONORM M 9406, Handling of products containing weakly bound asbestos, 01 08 2001. Contains a protocol and algorithm for assessing the condition and potential fiber release from friable asbestos-containing materials.</p>
<p><b>International Chrysotile Association</b> (<a href="http://www.chrysotile.com">www.chrysotile.com</a>). <i>[Please note this organization represents asbestos industries and businesses]</i></p> <ul style="list-style-type: none"> <li>▪ Recommended Technical Method No. 1 (RTM1), Reference Method for the determination of Airborne Asbestos Fibre Concentrations at workplaces by light microscopy (Membrane Filter Method). Method using Phase Contrast Microscopy for counting fibers on an air sampling filter that does not distinguish asbestos from other fibers</li> <li>▪ Recommended Technical Method No. 2 (RTM2) Method for the determination of Airborne Asbestos Fibres and Other Inorganic Fibres by Scanning Electron Microscopy. Method that identifies smaller fibers than Phase Contrast Microscopy and can distinguish types of asbestos fibers.</li> </ul>
<p><b>U.S. National Institute for Occupational Safety and Health</b> (<a href="http://www.cdc.gov/niosh/topics/asbestos">www.cdc.gov/niosh/topics/asbestos</a>)</p> <ul style="list-style-type: none"> <li>▪ Occupational Safety and Health Guidelines for Asbestos (<a href="http://www.cdc.gov/niosh/pdfs/0041.pdf">www.cdc.gov/niosh/pdfs/0041.pdf</a>)</li> <li>▪ Recommendations for Preventing Occupational Exposure (<a href="http://www.cdc.gov/niosh/topics/asbestos/#prevention">www.cdc.gov/niosh/topics/asbestos/#prevention</a>)</li> <li>▪ Method 7400, Asbestos and other fibers by PCM (1994). Phase Contrast Microscopy method similar to AIA RTM1 that counts all fibers greater than 5µm long with a 3:1 aspect ratio</li> <li>▪ Method 7402 Asbestos by TEM (1994). Method using Transmission Electron Microscopy that identifies and counts asbestos fibers greater than 5µm long and greater than 0.25µm in diameter with a 3:1 aspect ratio</li> </ul>
<p><b>U.S. Environmental Protection Agency</b> (<a href="http://www.epa.gov/asbestos">www.epa.gov/asbestos</a>)</p> <ul style="list-style-type: none"> <li>▪ Resources include managing asbestos-containing materials in buildings, schools, and the automotive industry. Includes procedures for inspection, analysis of bulk samples, assessment of friable ACM, response actions (removal, encapsulation, enclosure), Operations and Maintenance, and clearance air sampling.</li> <li>▪ National Emission Standards for Hazardous Air Pollutants: Subpart M - Asbestos. 40 CFR Part 61. (1990). Regulations include: definitions of friable and non-friable asbestos-containing materials; notification requirements for renovation and demolition of buildings and facilities containing ACM; work practices to prevent visible emissions; disposal of ACM and waste material in approved landfills; and operation and closure of landfills.</li> <li>▪ 20T-2003 Managing Asbestos in Place: A Building Owner's Guide to Operations and Maintenance Programs for Asbestos-Containing Materials "Green book" (1990)</li> </ul>



<ul style="list-style-type: none"> <li>▪ Guidance document covering: organizing an Operations and Maintenance (O&amp;M) program including training O&amp;M workers; recognizing types of O&amp;M; work practices and precautions for O&amp;M work.</li> <li>▪ EPA-600/R-93/116 Method for the Determination of Asbestos in Bulk Building Materials (1993) Polarized Light Microscopy, Gravimetry, X-ray diffraction and Transmission Electron Microscopy methods of identifying and quantifying asbestos fibers in bulk building materials. The identification of materials as containing asbestos is done by analysis of bulk samples, usually with Polarized Light Microscopy. The analytical procedures described and the equipment to perform the analyses is similar to that found in academic or commercial geology laboratories, but specialized training to identify and quantify asbestos fibers in bulk building materials is needed as well as quality control and proficiency testing programs.</li> <li>▪ Polarized Light Microscopy, Gravimetry, X-ray diffraction and Transmission Electron Microscopy methods of identifying and quantifying asbestos fibers in bulk building materials</li> </ul>
<p><b>U. S. Occupational Safety and Health Administration (Department of Labor)</b>  <b>(<a href="http://www.osha.gov/SLTC/asbestos">www.osha.gov/SLTC/asbestos</a>) / (<a href="http://www.osha.gov/SLTC/asbestos/standards.html">www.osha.gov/SLTC/asbestos/standards.html</a>)</b></p> <ul style="list-style-type: none"> <li>▪ Occupational Exposure to Asbestos (Construction Industry Standard) 29CFR1926.1101. (1994). Regulations for: Permissible Exposure Limits of 0.1 f/cc over a full shift (8 hr time-weighted average) and short-term exposure limit of 1.0 f/ml for 30 minutes; employee exposure monitoring for compliance with the PELs; work practices for friable and non-friable ACM; respiratory protection; worker decontamination and hygiene facilities; notification of employees and other employers of employees; medical surveillance; record-keeping and training.</li> <li>▪ OSHA Method ID 160 Asbestos in Air (1994). Phase Contrast Microscopy method similar to NIOSH 7400</li> </ul>
<p><b>Ontario Ministry of Labour (Canada)</b>  <b>(<a href="http://www.e-laws.gov.on.ca/DBLaws/Source/Regs/English/2005/R05278_e.htm">www.e-laws.gov.on.ca/DBLaws/Source/Regs/English/2005/R05278_e.htm</a>)</b></p> <ul style="list-style-type: none"> <li>▪ Ontario regulation 278/05 Designated Substance — asbestos on construction projects and in buildings and repair operations (2005). Regulations covering: respiratory protection and work procedures; inspections for asbestos; management of friable and non-friable asbestos; advance written notice; asbestos bulk sampling and analysis; glove bag requirements and procedures; negative air enclosures; and clearance air testing requirements (0.01 f/cc by Phase Contrast Microscopy).</li> </ul>
<p><b>WorkSafe British Columbia (Canada)</b>  <b>(<a href="http://www2.worksafebc.com/publications/OHSRegulation/Part6.asp">www2.worksafebc.com/publications/OHSRegulation/Part6.asp</a>)</b></p> <ul style="list-style-type: none"> <li>▪ Part 6 Substance Specific Requirements: Asbestos. Regulations covering: identification of asbestos-containing materials; substitution with non-asbestos materials; worker training; exposure monitoring; containment and ventilation of work areas; work practices; decontamination; respirators and protective clothing.</li> </ul>
<p><b>Republic of South Africa, Department of Labour (<a href="http://www.acts.co.za/ohs/index.htm">www.acts.co.za/ohs/index.htm</a> - type 'asbestos' in search box)</b></p> <ul style="list-style-type: none"> <li>▪ Occupational Health and Safety Act, 1993; Asbestos Regulations, 2001. Regulations covering: notification; assessment and control of exposure; Occupational Exposure Limit of 0.2 f/cc - 4 hr TWA measured by Phase Contrast Microscopy; training; air monitoring; medical surveillance; non-employee exposure; respirators, personal protective equipment and facilities; asbestos building materials including asbestos cement sheeting and related products; disposal.</li> </ul>

#### APPENDIX 4. SOME ALTERNATIVES TO ASBESTOS-CONTAINING PRODUCTS

<i>Asbestos product</i>	<i>Substitute products</i>
Asbestos-cement corrugated roofing	<p>Fiber-cement roofing using synthetic fibers (polyvinyl alcohol, polypropylene) and vegetable/cellulose fibers (softwood kraft pulp, bamboo, sisal, coir, rattan shavings and tobacco stalks, etc.); with optional silica fume, fly ash, or rice husk ash.</p> <p>Microconcrete (Parry) tiles; galvanized metal sheets; clay tiles; vegetable fibers in asphalt; slate; coated metal tiles (Harveytile); aluminum roof tiles (Dekra Tile); extruded uPVC roofing sheets; recycled polypropylene and high-density polyethylene and crushed stone (Worldroof); plastic coated aluminum; plastic coated galvanized steel.</p>
Asbestos-cement flat sheet (ceilings, facades, partitions)	<p>Fiber-cement using vegetable/cellulose fibers (see above), wastepaper, optionally synthetic fibers; gypsum ceiling boards (BHP Gypsum); polystyrene ceilings, cornices, and partitions; façade applications in polystyrene structural walls (coated with plaster); aluminum cladding (Alucabond); brick; galvanized frame with plaster-board or calcium silicate board facing; softwood frame with plasterboard or calcium silicate board facing.</p>
Asbestos-cement pipe	<p><i>High pressure:</i> Cast iron and ductile iron pipe; high-density polyethylene pipe; polyvinyl chloride pipe; steel-reinforced concrete pipe (large sizes); glass-reinforced polyester pipe.</p> <p><i>Low pressure:</i> Cellulose-cement pipe; cellulose/PVA fiber-cement pipe; clay pipe; glass-reinforced polyester pipe; steel-reinforced concrete pipe (large diameter drainage).</p>
Asbestos-cement water storage tanks	Cellulose-cement; polyethylene; fiberglass; steel; galvanized iron; PVA-cellulose fiber-cement
Asbestos-cement rainwater gutters; open drains (mining industry)	Galvanized iron; aluminum; hand-molded cellulose-cement; PVC

## **APPENDIX 5. CONSIDERATIONS FOR WORKING WITH ASBESTOS MATERIALS IN EXISTING STRUCTURES**

### **A. Evaluation of alternatives**

1. Determine if the project could include the installation, replacement, maintenance or demolition of:
  - Roofing, siding, ducts or wallboard
  - Thermal insulation on pipes, boilers, and ducts
  - Plaster or fireproofing
  - Resilient flooring materials
  - Other potentially asbestos-containing materials
2. If the use of asbestos-containing materials (ACM) has been anticipated for new construction or renovation, provide information about alternative non-asbestos materials and their availability. For new construction, determine the expected difference for the entire project—on initial and operating costs, employment, quality, expected service life, and other factors—using alternatives to ACM (including consideration of the need for imported raw materials).
3. In many cases, it can be presumed that ACM are part of the existing infrastructure that must be disturbed. If there is a need to analyze samples of existing material to see if it contains asbestos, provide information on how and where can that be arranged.
4. Once the presence of ACM in the existing infrastructure has been presumed or confirmed and their disturbance is shown to be unavoidable, incorporate the following requirements in tenders for construction work in compliance with applicable laws and regulations.

### **B. Understanding the regulatory framework**

1. Review the host country laws and regulations and the international obligations it may have entered into (e.g., ILO, Basel conventions) for controlling worker and environmental exposure to asbestos in construction work and waste disposal where ACM are present. Determine how the qualifications of contractors and workers who maintain and remove ACM are established, measured, and enforced.
2. Determine whether licensing and permitting of the work by authorities is required.
3. Review how removed ACM are to be disposed of to minimize the potential for pollution, scavenging, and reuse.
4. Incorporate the following requirements in tenders involving removal, repair, and disposal of ACM.

## **C. Considerations and possible operational requirements related to works involving asbestos**

### **1. Contractor qualification**

- Require that contractors demonstrate having experience and capability to observe international good practice standards with asbestos, including training of workers and supervisors, possession of (or means of access to) adequate equipment and supplies for the scope of envisioned works, and a record of compliance with regulations on previous work.

### **2. Related to the technical requirements for the works**

- Require that the removal, repair, and disposal of ACM shall be carried out in a way that minimizes worker and community asbestos exposure, and require the selected contractor to develop and submit a plan, subject to the engineer's acceptance, before doing so.
- Describe the work in detail in plans and specifications prepared for the specific site and project, including but not limited to the following:
  - Containment of interior areas where removal will occur in a negative pressure enclosure;
  - Protection of walls, floors, and other surfaces with plastic sheeting;
  - Construction of decontamination facilities for workers and equipment;
  - Removing the ACM using wet methods, and promptly placing the material in impermeable containers;
  - Final clean-up with special vacuums and dismantling of the enclosure and decontamination facilities;
  - Disposal of the removed ACM and contaminated materials in an approved landfill;<sup>29</sup>
  - Inspection and air monitoring as the work progresses, as well as final air sampling for clearance, by an entity independent of the contractor removing the ACM.
- Other requirements for specific types of ACM, configurations and characteristics of buildings or facilities, and other factors affecting the work shall be enumerated in the plans and specifications. Applicable regulations and consensus standards shall be specifically enumerated.

### **3. Related to the contract clauses**<sup>30</sup>

- Require that the selected contractor provide adequate protection to its personnel handling asbestos, including respirators and disposable clothing.

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<sup>29</sup> Alternative guidance for circumstances where approved landfills are not available for disposal of hazardous substances, such as asbestos, guidance is provided in the EHS General Guideline, reference above as well as in the Guideline on Waste Management Facilities.  
[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui\\_EHSGuidelines2007\\_WasteManagement/\\$FILE/Final+-+Waste+Management+Facilities.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_WasteManagement/$FILE/Final+-+Waste+Management+Facilities.pdf)

<sup>30</sup> Standard contract clauses for asbestos work exist but are too extensive for this short note. To view an example, the U.S. National Institute of Building Sciences "Asbestos Abatement and Management in Buildings: Model Guide Specification" has a complete set – in copyright form – and the clauses and instructions for using them fill a two-inch binder.

- Require that the selected contractor notifies the relevant authorities of the removal and disposal according to applicable regulations as indicated in the technical requirements and cooperates fully with representatives of the relevant agency during all inspections and inquiries.

#### **4. Related to training and capacity building**

- Determine whether specialist industrial hygiene expertise should be hired to assure that local contractors learn about and apply proper protective measures in work with ACM in existing structures.

Originator: World Bank, Operations Policy and Country Services



**Health Governance and Nutrition Development Project and Health and Nutrition Services Access Project Preparation with line departments, relevant Centers and target 14 provinces on October 31<sup>st</sup>, 2019**



**Lao People's Democratic Republic**  
**Peace Independence Democracy Unity Prosperity**

Ministry of Health  
Department of Planning and Cooperation

No.            /DPC  
Vientiane Capital, Date....

**Minutes Meeting Note**  
**On DLIs implementation result launching in year 4<sup>th</sup> of Health Governance and Nutrition Development Project and Health and Nutrition Services Access Project Preparation with line departments, relevant Centers and target 14 provinces on October 31<sup>st</sup>, 2019 in National ASEM Hall.**

According Ministry of Health's decree No. 3354/MoH in October 30<sup>th</sup>, 2019 for DLIs implementation result launching in 4<sup>th</sup> year of Health Governance and Nutrition Development Project and Health and Nutrition Services Access Project Preparation with line departments, relevant Centers and target 14 provinces to be president by Deputy Assistant Professor Bounkong Sihavong, Minister of Health including Several Department Director, Centers Head and Deputy Head and Provincials Health Office from 14 target provinces with technical staff and World Bank staff totally 90 participants (participant's annex).

Minister of Health addressed the critical implementation through project review, efficient & effective of DLIs approach, to enhance the health's 14 target beneficiary, otherwise, it might all sectors from central and provincial health office level to solve the previously weakness and other challenges and in coming year (2020) to rehabilitate from last disaster as many provinces flooding and several indicators trend to not achieve such as delivery by skill birth attendant, child immunisation, water & sanitation and other indicators.

### **I. Purposes :**

- To launch the DLI implementation result in 4<sup>th</sup> year, challenges, lessons learnt from HGNDP project;
- To discuss on HANSA Project preparation;
- To consult the social and environmental safeguard of HANSA project.

### **III. planary discussion, consultation and recommendation:**

#### **A./ Health Governance and Nutrition Development Project implementation**

##### **Advices from Minister of health**

1. Request to all sectors from national and provincial level to summarize what activities funded by DLIs money, highlights, weakness and how much spent and fund rest because few assemblee's indicators don't achieve yet; especially nutrition and critical indicators to be paid attention thus immunisation, delivery by SBA, water and sanitation in 2020.
2. Request to cancel 5th year DLIs implementation and allocate budget to support last year disaster and unsuccesfull assemblee's indicators as consultation with World Bank.
3. Request to increase budget to boot immunisation for low EPI rate province.
4. Request all province to review which health facilities don't meet milestones.
5. Request who are responsible for project and relevant people on HANSA project preparation; particularly DLI to review on implementation plan before hand.
6. Request to Department of Planning and Cooperation to coordinate with MoH office in amendment dicument drafting of use DLIs in 5<sup>th</sup> year budget to combine for last disaster and unsucessful assemblee's indicators.

##### **Oudomxay Province**

1. Should have only one integrated MCH outreach book
2. Request to train on DLIs inpection, right, role & responsibilities of coordination committee.

##### **Nutrition Center**

- Request to department of food and drugs consider the nutritious drugs to national health insurance system that could purchase some in province level.

##### **Department of Hygiene and Health Promotion**

1. Request to whome are responsible for implementing to explore why it's not successful for few indicators.
2. To divisions who are responsible to manage the HGNDP implementation in each provinces such as budget is not adequated in MCH and prevention and health care section in provinces.
3. Use DLIs budget to boot the provinces priority issues throught detail budgeting, proposals and planning.

4. Request to Department of planning and cooperation to conduct the end line survey for DLIs implementation result.

#### **Department of food and drugs**

1. Over estimation number than real need, should minimize time to store
2. Sometimes, drug distribution for each time still not respect distribution mechanism (used but not lock out)
3. Delay planning for all sections, step of approval is also delayed, provincials food and drug don't receive the budget.
4. Request to financial filing for all sectors after inspection and accounted

#### **Department of Finance:**

1. Request to all sectors to review the indicators and milestones whether can achieve
2. Request to review the project preparation period or financial management of health center with fund flow.

#### **Xiengkhouang Province**

1. Request to departments, ministries to write the detail instruction ordering, orientate to implementation, 5<sup>th</sup> year DLIs money to ensure for auditors and implementation reference.

#### **Bokeo province**

1. Request to human resource capacity building for additional management and implementing for new recruitment of project committee.
2. Request to have ministry instruction order for policy, right, roles and responsibilities in each level.

#### **Luangprabang province**

1. However DLI money is flexible to use for other activities thus emergency response but it's essential to have narrative and financial report with relevant audit inspection and financial registration, control quotation and respect to defined plan.
2. Request to allocate the DLI money in 2020 that each provincial succeeded to relevantly use 5<sup>th</sup> year of DLI budget.

#### **Saravanh Province**

1. Request to have same standard of Health facilities assessment in each topics through what kind of HC fence, stove and other things.

#### **B./ HANSA Preparation**

1. Request to department of planning and cooperation for other sectors consultation with relevant sectors, ownership to project coordination and HCs role for DLI-C of HANSA project.
2. Defined the indicators, milestones, DLI inspection method to be verified by Ministry of Home Affairs in December 2019 to comment and modify before HANSA project need assessment.
3. Request to organise the meeting to agree for implementation as performance quality score card.
4. Request to review project implementation to classify the management related three build policy.

#### **C./ HANSA project Social and Environmental Safeguard including sharp waste management framework**



1. Before hand new project, ministry of health might focuss the project documents and target provinces consultation thus (1) Ethnic Group Development Framework to ensure that ethnic minirity population access to health services; (2) Social and Environmental Safeguard such as Helth facilities has safe water, sanitation and stove for medical equipment waste, constrution or renovate, whether population are satisfactory and get the maximun beneficiary from this project.
2. At present; this project finished draf all related documents and will share with provinces to add the comments before announcement in website or other social media as donors regulation.

The meeting closed at 16 o'clock with all success as well.

Meeting Chair

### Department of Planning and Cooperation

#### ANNEX 5: List of participant on meeting in October 31<sup>st</sup>, 2019










ລາຍຊື່ເຂົ້າຮ່ວມກອງປະຊຸມເພື່ອແກ້ໄຂບັນຫາຈັດຕັ້ງປະຕິບັດ DLI ປີທີ 4 ທີ່ທະນາຄານໂລກຮັບຮອງໄດ້ແລະ ແຜນການ DLI ປີທີ 5 ຮ່ວມກັບ ກົມ, ສູນທີ່ກ່ຽວຂ້ອງ ແລະ 14 ແຂວງເປົ້າໝາຍຂອງໂຄງການ ຜະ  
ປສພ, ວັນທີ 31/10/2019 ທີ່ ຫໍປະຊຸມແຫ່ງຊາດ.

ລ/ດ	ຊື່ ແລະ ນາມສະກຸນ	ເພດ		ຊັ້ນ	ຕາແຫ່ງ	E-Mail	ໂທລະສັບ	ລາຍເຊັນ
		ຊາຍ	ຍິງ					31/10/2019
ແຂວງ ຜົ້ງສາລີ								
1	ທ່ານ ບຸນເພັດ ຕັນສຸທິນ	✓			ຫົວໜ້າຫ້ອງການບໍລິຫານ	lounphed-asp@phn.com	9243 8859	
2	ທ່ານ ນ ວິໄລ ບຸນເຖິງ		✓		ຮອງຂະແໜງແຜນການ	vilay2@yahoo.com	55787043	
3	ທ. ສຸວພາຍ	✓			ຂັບລົດ		55155452	
ແຂວງ ຫຼວງນ້ຳທາ								
1	ທ່ານ ດຣ. ອຸ່ນເຮືອນ ພູດສະຫວັດ	✓			ຮອງຫົວໜ້າພະແນກສາທາ		99991014	
2	ທ່ານ. ວິລະເດດ ຂຽວສິມພອນ	✓			ຜູ້ປະສານການ	viladthkpr@yahoo.com	22970972	
3	ທ. ສົມພິດ	✓			ຂັບລົດ		5663488	
ແຂວງ ບໍ່ແກ້ວ								
1	ທ່ານ ດຣ. ດຳແດງ ດວງປະເສີດ	✓			ຜູ້ປະສານການ	Ed.doung@gmail.com	22381970	
2	ທ່ານ ດຣ. ຫອງແຫ່ງ ບຸນສີ	✓			ຫົວໜ້າຂະແໜງແຜນການ	thangthong2@yahoo.com	22383690	
3	ທ. ສົມພິດ ສົມພິດ	✓			ຂັບລົດ	ສົມພິດ ສົມພິດ	56134126	


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ລາຍຊື່ເຂົ້າຮ່ວມກອງປະຊຸມເລີຍແຜ່ແຜນຜົນການຈັດຕັ້ງປະຕິບັດ DLI ປີທີ 4 ທີ່ທະນາຄານໂລກຮັບຮອງໄດ້ແລ້ວ ແລະ ແຜນການ DLI ປີທີ 5 ຮ່ວມກັບ ກົມ, ສູນທີ່ກ່ຽວຂ້ອງ ແລະ 14 ແຂວງເປົ້າໝາຍຂອງໂຄງການ ຜ-ບສພ, ວັນທີ 31/10/2019 ທີ່ ຫໍປະຊຸມແຫ່ງຊາດ.








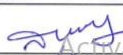

ລ/ດ	ຊື່ ແລະ ນາມສະກຸນ	ເພດ		ຊົນເຜົ່າ	ຕາແຫ່ງ	E-Mail	ໂທລະສັບ	ລາຍເຊັນ
		ຊາຍ	ຍິງ					31/10/2019
ແຂວງ ສາລະວັນ								
1	ທ່ານ ດຣ. ບົວໄລ ແສນເກື່ອມີກຳ	✓			ຫົວໜ້າພະແນກສາທາ		55648417	
2	ທ່ານ. ສິມພານ ສິລາວິ	✓			ແຜນການ	sampled@vptt.com	55431710	
3	ທ່ານ. ສິມພານ ສິລາວິ				ຂັບລົດ		99125553	
ແຂວງ ເຊກອງ								
1	ທ່ານ ດຣ. ພູຂັນ ຈັນທະວົງ	✓			ຫົວໜ້າພະແນກສາທາ		54429860	
2	ທ່ານ. ສຸລິພອນ ສິໄຕຕະນະທ 45-50 ປີ ກ່ຽວກັບ	✓			ວິຊາການແຜນການ ແຂວງເຊກອງ	hanykwan@xul.com	55099159	
3	ທ່ານ. ສຸລິພອນ ສິໄຕຕະນະທ	✓			ຂັບລົດ		55193232	
ແຂວງ ອັດຕະປື								
1	ທ່ານ ດຣ. ອອນຜົວ ໂພທິລາດ	✓			ຫົວໜ້າພະແນກສາທາ		55636269	
2	ທ່ານ. ໂພສີ ຫອງດີ	✓			ຫົວໜ້າຂະແໜງ ແຜນການ		95224551	
3	ທ່ານ. ສຸລິພອນ ສິໄຕຕະນະທ	✓			ຂັບລົດ		2201293	

ລາຍຊື່ເຂົ້າຮ່ວມກອງປະຊຸມເລີຍແຜ່ແຜນຜົນການຈັດຕັ້ງປະຕິບັດ DLI ປີທີ 4 ທີ່ທະນາຄານໂລກຮັບຮອງໄດ້ແລ້ວ ແລະ ແຜນການ DLI ປີທີ 5 ຮ່ວມກັບ ກົມ, ສູນທີ່ກ່ຽວຂ້ອງ ແລະ 14 ແຂວງ ຜ-ບສພ, ວັນທີ 31/10/2019 ທີ່ ຫໍປະຊຸມແຫ່ງຊາດ.





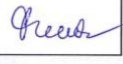

ລ/ດ	ຊື່ ແລະ ນາມສະກຸນ	ເພດ		ຊົນເຜົ່າ	ຕາແຫ່ງ	E-Mail	ໂທລະສັບ
		ຊາຍ	ຍິງ				
ແຂວງ ສະຫວັນນະເຂດ							
1	ທ່ານ ດຣ. ກົງຄຳ ອິນທະພູທອນ	✓			ຫົວໜ້າຂະແໜງແຜນການແລະການ ຮ່ວມມື	konqintp.tegk@gmail.com	97569558
2	ທ່ານ ດຣ ນ. ວົງສອນ ຈັນທະວົງ		✓		ຮອງຫົວໜ້າຂະແໜງ ອະນາໄມແລະ ສິ່ງເສີມ	sonevpc@gmail.com	55237608
3					ຂັບລົດ	ທ. ກົງຄຳ	56825599
ແຂວງ ໄຊສົມບູນ							
1	ທ່ານ ດຣ. ບົວເກດ ວົງປະເສີດ	✓			ວ່າການຫົວໜ້າພະແນກສາທາ	bkvongpaseru@thegonail.com	29919365
2	ທ່ານ ດຣ. ຢິງເຕັ້ງ	✓			ຫົວໜ້າຂະແໜງແຜນການ	tengyangsxn@thegonail.com	29806210
3	ທ. ວົງລໍ				ຂັບລົດ		58985860



ລາຍຊື່ເຂົ້າຮ່ວມກອງປະຊຸມເຜີຍແຜ່ແຜນຜັນການຈັດຕັ້ງປະຕິບັດ DLI ປີທີ 4 ທີ່ທະນາຄານໂລກຮັບຮອງແລ້ວ ແລະ ແຜນການ DLI ປີທີ 5 ຮ່ວມກັບ ກົມ, ສູນທີ່ກ່ຽວຂ້ອງ ແລະ 14 ແຂວງເປົ້າໝາຍຂອງ  
ໂຄງການ ຜ-ບສພ, ວັນທີ 31/10/2019 ທີ່ ຫໍປະຊຸມແຫ່ງຊາດ.

ລ/ດ	ຊື່ ແລະ ນາມສະກຸນ	ເພດ		ຊົນເຜົ່າ	ຕາແຫ່ງ	ໂທລະສັບ	E-Mail	ລາຍເຊັນ
		ຊາຍ	ຍິງ					31/10/2019
ກົມການສຶກສາ ສາທາລະນະສຸກ								
1	ທ່ານ ຮສ ດຣ. ນິລັນ ພູມິນ	✓			ຫົວໜ້າກົມ			
2	ທ່ານ ດຣ. ທອງພູດ ໄຊຊະນະ	✓			ຫົວໜ້າພະແນກບໍລິຫານ	020 2246 3590		
ກົມການເງິນ								
1	ທ່ານ ດຣ. ສິມພອນ ຜາງມະນີໄຊ	✓			ຫົວໜ້າກົມ			
2	ທ່ານ ດຣ. ວຽງໄຊ ວິລະວົງ	✓			ຫົວໜ້າພະແນກນະໂຍບາຍການເງິນ	020 2246 4545		
3	ທ່ານ ນ. ແສງມົນທາ ອຸດອງວົງ		✓		ຮອງຫົວໜ້າພະແນກບໍລິຫານ	020 9977 7811		
ກົມຈັດຕັ້ງ-ພະນັກງານ								
1	ດຣ. ພ. ພະນັນ ພິມມະສອນ	✓		ໜ	ວິຊາການ	020 2293 2293		
2	ທ. ບຸນ ພິມມະສອນ	✓			ທ/ພ ພະນັກງານ	020 2246 5530		
ສູນສະໜອງຢາ-ອຸປະກອນການແພດ								
1	ທ່ານ ດຣ. ນ. ມະນີສອນ ໄຊຍະສອນ		✓		ຫົວໜ້າພະແນກຈັດຊື້	020 5565 5782		
2	ທ. ດຣ. ວິໄລ ວົງວິໄລ	✓			ວິຊາການ	020 4042 4242		

ລາຍຊື່ເຂົ້າຮ່ວມກອງປະຊຸມເຜີຍແຜ່ແຜນຜັນການຈັດຕັ້ງປະຕິບັດ DLI ປີທີ 4 ທີ່ທະນາຄານໂລກຮັບຮອງແລ້ວ ແລະ ແຜນການ DLI ປີທີ 5 ຮ່ວມກັບ ກົມ, ສູນທີ່ກ່ຽວຂ້ອງ ແລະ 14 ແຂວງເປົ້າໝາຍຂອງ  
ໂຄງການ ຜ-ບສພ, ວັນທີ 31/10/2019 ທີ່ ຫໍປະຊຸມແຫ່ງຊາດ.

ລ/ດ	ຊື່ ແລະ ນາມສະກຸນ	ເພດ		ຊົນເຜົ່າ	ຕາແຫ່ງ	ໂທລະສັບ	E-Mail	ລາຍເຊັນ
		ຊາຍ	ຍິງ					31/10/2019
ກົມອະນາໄມ ແລະ ສົ່ງເສີມສຸຂະພາບ								
1	ທ່ານ ດຣ ນ. ລັດສະດາ ພະເມືອງ		✓		ຮອງຫົວໜ້າພະແນກແມ່ ແລະ ເດັກ	020 5548 5519		
2	ທ່ານ ດຣ ນ. ສຸວັນຄຳ ພິມມະສອນ		✓		ຮອງຫົວໜ້າພະແນກສົ່ງເສີມສຸຂະພາບ	020 5540 0439		
ກົມປົນປົງ ແລະ ພົ້ນສູງທຳອິດ								
1	ທ່ານ ດຣ. ປົວເທບ ພູມິນ	✓			ຮອງຫົວໜ້າກົມ			
2	ທ່ານ ດຣ. ວິໄຊຢາງ ໃຈຫວັງພັນ	✓			ຮອງຫົວໜ້າພະແນກກັນ ແລະ ຄວບຄຸມພະຍາດບໍ່ຕິດຕໍ່	95/44969	Vitayayong-cvm@gmail.com	
ກົມອາຫານ ແລະ ຢາ								
1	ທ່ານ ດຣ. ບຸນຊູ ແກ້ວຫາວົງ	✓			ຮອງຫົວໜ້າກົມ	55668439	khounsou@yahoo.com	
2	ທ່ານ ດຣ ນ. ບຸນຄຳ ພິມມະສອນ		✓			55659549	bounthamp@gmail.com	
ຫ້ອງການປະກັນສຸຂະພາບແຫ່ງຊາດ								
1	ທ່ານ ດຣ ນ. ປົວພັດ ພິນວິໄຊ		✓		ຮອງຫົວໜ້າຫ້ອງການປະກັນ	020 2286 4195		
2	ທ່ານ ດຣ. ພານທອງ	✓				55698822	Phanthong_b@yahoo	

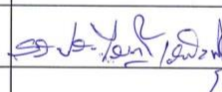

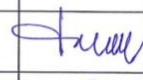

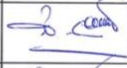

ລາຍຊື່ເຂົ້າຮ່ວມກອງປະຊຸມເຜີຍແຜ່ແຜນຜົນການຈັດຕັ້ງປະຕິບັດ DLI ປີທີ 4 ທີ່ທະນາຄານໂລກຮັບຮອງແລ້ວ ແລະ ແຜນການ DLI ປີທີ 5 ຮ່ວມກັບ ກົມ, ສູນທີ່ກ່ຽວຂ້ອງ ແລະ 14 ແຂວງເປົ້າໝາຍຂອງ  
ໂຄງການ ຜ-ບສພ, ວັນທີ 31/10/2019 ທີ່ ຫໍປະຊຸມແຫ່ງຊາດ.

ລ/ດ	ຊື່ ແລະ ນາມສະກຸນ	ເພດ		ຊົນເຜົ່າ	ຕາແຫ່ງ	ພາກສ່ວນ	E-Mail	ໂທລະສັບ	ລາຍເຊັນ
		ຊາຍ	ຍິງ						
1	ທ່ານ ຄຳເພັດ ມະນີວົງ	✓		ລາວລຸ່ມ	ຫົວໜ້າກົມແຜນການ	ກົມແຜນການ		020 9980 1744	✓
2	ທ່ານ ດຣ ຜຸນຄຳ ຮັດຕະນະວົງ	✓		ລາວລຸ່ມ	ຮອງຫົວໜ້າກົມແຜນການ	ກົມແຜນການ		020 5550 9676	
3	ທ່ານ ດຣ ນ. ຜາສຸກ ວົງວິຈິດ		✓	ລາວລຸ່ມ	ຮອງຫົວໜ້າກົມແຜນການ	ກົມແຜນການ		020 9919 8909	
4	ທ່ານ ດຣ ສຸດທະນຸ ນັນທະນິນຼີ	✓		ລາວລຸ່ມ	ຮອງຫົວໜ້າກົມແຜນການ	ກົມແຜນການ		020 5547 5129	✓
5	ທ່ານ ດຣ ຈັນສາລີ ພິມມະວົງ	✓		ລາວລຸ່ມ	ຮອງຫົວໜ້າກົມແຜນການ	ກົມແຜນການ		020 2200 2722	
6	ທ່ານ ປອ ດຣ ປະສົງສິດ ບຸບຜາ	✓		ລາວລຸ່ມ	ທີ່ປຶກສາອາວຸໂສ	ໂຄງການ ຜ-ບສພ		020 2222 2293	
7	ທ່ານ ຄຳແສນ ສຸດທິສັກ	✓		ລາວລຸ່ມ	DLI	ໂຄງການ ຜ-ບສພ		0202244 0909	
8	ທ່ານ ພຸດທະສອນ ແພງສິກດາ	✓		ລາວລຸ່ມ	DLI	ໂຄງການ ຜ-ບສພ		020 2345 6760	
9	ທ່ານ ພອນປະເສີດ ສຸພິດທອນ	✓		ລາວລຸ່ມ	DLI	ໂຄງການ ຜ-ບສພ		0205855 3373	
10	ທ່ານ ນ. ອຸໂລວັນ ຈັນທະວົງ		✓	ລາວລຸ່ມ	ບໍລິຫານ	ໂຄງການ ຜ-ບສພ		020 5560 5280	

ລາຍຊື່ເຂົ້າຮ່ວມກອງປະຊຸມເຜີຍແຜ່ແຜນຜົນການຈັດຕັ້ງປະຕິບັດ DLI ປີທີ 4 ທີ່ທະນາຄານໂລກຮັບຮອງແລ້ວ ແລະ ແຜນການ DLI ປີທີ 5 ຮ່ວມກັບ ກົມ, ສູນທີ່ກ່ຽວຂ້ອງ ແລະ 14 ແຂວງເປົ້າໝາຍຂອງ  
ໂຄງການ ຜ-ບສພ, ວັນທີ 31/10/2019 ທີ່ ຫໍປະຊຸມແຫ່ງຊາດ.




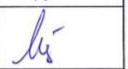

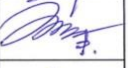


ລ/ດ	ຊື່ ແລະ ນາມສະກຸນ	ເພດ		ຊົນເຜົ່າ	ຕາແຫ່ງ	ໂທລະສັບ	E-Mail	ລາຍເຊັນ
		ຊາຍ	ຍິງ					31/10/2019
ສູນດ້ານເອດ ແລະ ພດພ								
1								
2								
ສູນຮັກສາສຸຂະພາບແມ່ ແລະ ເດັກ								
1	ທ່ານ ດຣ ນ. ປະນອມ ໄຊຍະມຸງຄຸນ		✓			030 5179 546		
2	ທ່ານ ດຣ ນ. ສິມພະໄທ ປິວທອງ	✓	ລູກ	ຮອງຫົວໜ້າຂະແໜງວິຊາການ	0561 4865	muckbouathong@hotmail.com		
3	ທ່ານ ດຣ ນ. ແພັງຈິອຍ ປັນຍາລັດ		✓	ວິຊາການ	55621782	pangyalathp@gmail.com		
4	ທ່ານ ດຣ ນ. ຂັນທອງ ສິຫາລາດ		✓					
ສູນຄວບຄຸມພະຍາດວັນະໂລກ								
1	ທ່ານ ນ. ພິດສະດາ ສີພັນທອງ		✓		ຮອງຫົວໜ້າຂະແໜງວິຊາການ	020 2220 8935	phitsada@yahoo.fr	
2								
ສູນໄພຊະນານານ								
1	ທ່ານ ດຣ ນ. ລັດທິພອນ ຄູລາ		✓		ຮອງຫົວໜ້າສູນ	020 5433 3790	rattiphone@yahoo.com	
2	ທ່ານ ດຣ ສຸພະໄຊ ຄຳພັນທອງ	✓				020 5665 1988		

ລາຍຊື່ເຂົ້າຮ່ວມກອງປະຊຸມເຜີຍແຜ່ແຜນຜັນການຈັດຕັ້ງປະຕິບັດ DLI ປີທີ 4 ທີ່ທະນາຄານໂລກຮັບຮອງແລ້ວ ແລະ ແຜນການ DLI ປີທີ 5 ຮ່ວມກັບ ກົມ, ສູນທີ່ກ່ຽວຂ້ອງ ແລະ 14 ແຂວງເປົ້າໝາຍຂອງ  
ໂຄງການ ຜ-ບສພ, ວັນທີ 31/10/2019 ທີ່ ຫໍປະຊຸມແຫ່ງຊາດ.

ລ/ດ	ຊື່ ແລະ ນາມສະກຸນ	ເພດ		ຊົນເຜົ່າ	ຕາແຫ່ງ	ພາກສ່ວນ	E-Mail	ໂທລະສັບ	ລາຍເຊັນ
		ຊາຍ	ຍິງ						
21		✓		ລາວ	ອຸ. ເຮງຊາ	ເກ. ປູ. - sanchanthing@phoumvan.com	852201		
22									
23	ທ. ປະເມ	✓		ລາວ	ອຸ. ເຮງຊາ	0155			
24	Chanhy Samuang	-			STC	WB	-	5097775	ສະເ
25	Vattkang Nakhana	✓			STC	WB		57471326	
26	ດຣ. ດຽງສາລາ		✓	ລາວ	ອຸ. ເຮງຊາ	ກົມ ປັບປຸງ	moviengsakthone@yahoo.com	55663579	
27	Sophaengk Thitsy		✓	ລາວ	Operations	WB	sphitsy@worldbank.org	57771388	
28									
29									
30									

Activat






ລາຍຊື່ເຂົ້າຮ່ວມກອງປະຊຸມເຜີຍແຜ່ແຜນຜັນການຈັດຕັ້ງປະຕິບັດ DLI ປີທີ 4 ທີ່ທະນາຄານໂລກຮັບຮອງແລ້ວ ແລະ ແຜນການ DLI ປີທີ 5 ຮ່ວມກັບ ກົມ, ສູນທີ່ກ່ຽວຂ້ອງ ແລະ 14 ແຂວງເປົ້າໝາຍຂອງ  
ໂຄງການ ຜ-ບສພ, ວັນທີ 31/10/2019 ທີ່ ຫໍປະຊຸມແຫ່ງຊາດ.

ລ/ດ	ຊື່ ແລະ ນາມສະກຸນ	ເພດ		ຊົນເຜົ່າ	ຕາແຫ່ງ	ພາກສ່ວນ	E-Mail	ໂທລະສັບ	ລາຍເຊັນ
		ຊາຍ	ຍິງ						
11	ທ່ານ ນ. ວຽງພິນ ບຸລິມະວົງ		✓	ລາວລຸ່ມ	ບໍລິຫານ	ໂຄງການ ຜ-ບສພ		020 5568 7878	
12	ທ່ານ ດຣ ປະວິດ ເຂັ້ມມະນິດ	✓		ລາວລຸ່ມ	ຫົວໜ້າບໍລິຫານກົມແຜນການ	ກົມແຜນການ		020 2206 0693	
13	ທ່ານ ວຽງທອງ ຈິງຫວາຊິງ	✓		ລາວລຸ່ມ	IT	ໂຄງການ ຜ-ບສພ		020 9113 2319	
14	ທ່ານ ຊິງຢ່ງ ບຸນມາ	✓		ລາວລຸ່ມ	IT	ໂຄງການ ຜ-ບສພ		020 9244 4414	
15	ທ່ານ ນ. ວິໄລລັດ ແສງສະຫວ່າງ		✓	ລາວລຸ່ມ	ບໍລິຫານ	ໂຄງການ ຜ-ບສພ		020 5678 7026	
16	ທ່ານ ສິນທະລາ ປະຖົມມະວົງ	✓		ລາວລຸ່ມ	ຮອງຫົວໜ້າບໍລິຫານກົມແຜນການ	ກົມແຜນການ		020 2222 8996	
17	ທ. ຟຸງສະພອນ ຊຽງເກີດ	-		ລາວ	ວິຊາ	-		58101035	
18	ທ. ພອນ ວິມະວະນາ				ວິຊາ	-		29116890	
19	ທ. ສິມສາລາ	✓		ລາວລຸ່ມ	ວິຊາ	-			
20									

Activat



ລາຍຊື່ເຂົ້າຮ່ວມກອງປະຊຸມເຜີຍແຜ່ແຜນຜັນການຈັດຕັ້ງປະຕິບັດ DLI ປີທີ 4 ທີ່ທະນາຄານໂລກຮັບຮອງແລ້ວ ແລະ ແຜນການ DLI ປີທີ 5 ຮ່ວມກັບ ກົມ, ສູນທີ່ກ່ຽວຂ້ອງ ແລະ 14 ແຂວງ  
ເປົ້າໝາຍຂອງໂຄງການ ຜ-ບສພ, ວັນທີ 31/10/2019 ທີ່ ຫໍປະຊຸມແຫ່ງຊາດ.

ລ/ດ	ຊື່ ແລະ ນາມສະກຸນ	ເພດ		ຊົນເຜົ່າ	ຕຳແໜ່ງ	E-Mail	ໂທລະສັບ	ລາຍເຊັນ
		ຊາຍ	ຍິງ					
ນັກຂ່າວ								
1	ຂ. ວິໄສ				ນັກຂ່າວ		09160115	
2	ທ. ແສງວິໄສ				ce		02056623061	
3	ທ. ຫວັດ ຄຳ				ce			
4	ທ. ພະສິນ				ce		99140959	
5	ທ. ດອນ				ຂັບລົດ		58656988	
6								
7								
8								
9								
10								

## 9. References

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Pruss-Ustun A, Rapiti E, Hutin Y (2005). Estimating the global burden of disease tributable to contaminated sharp injuries among health care workers. *American Journal of Industrial Hygiene*, 48(6):482–490

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World Health Organization (2013). Safe management of wastes from healthcare activities 2<sup>nd</sup> edition.

