

**The Republic of Union of Myanmar**

**Ministry of Health and Sports**

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**Myanmar Essential Health Services Access Project**

**Additional Financing**

# **ENVIRONMENTAL MANAGEMENT PLAN**

**Yangon, May 2019**

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## 1. Introduction and Objective

### 1.1 Project description

The Additional Financing of Essential Health Services Access Project (EHSAP-AF) will continue to build on the Government's commitment to Universal Health Coverage (UHC) and the implementation of the National Health Plan (NHP). The NHP aims to expand access to essential services for everyone without undue financial burden. The Additional Financing (AF), which shares the objective of ongoing EHSAP, ***aims to support NHP by increasing access to basic package of essential health services of adequate quality, with a focus on maternal, newborn and child health.***

The Global Financing Facility (GFF) was launched in July 2015 to accelerate progress on the Sustainable Development Goals (SDGs), with a specific focus on the health and nutrition outcomes of women, children, and adolescents. The global objective of GFF is: to increase funding and improve services, coverage and equity for reproductive, maternal, neonatal, child and adolescent health and nutrition (RMNCAH-N). GFF approaches this objective by addressing wider health service delivery and health financing challenges. In Myanmar, a GFF grant of US\$10 million will complement the proposed Additional Financing from IDA to tackle key service delivery bottlenecks that are systemic and institutional in nature to improve RMNCAH-N outcomes. In addition, using resources beyond the \$10 million grant, the GFF will support technical work on agreed priorities outlined below, complementing project investments.

#### ***Project Development Objective***

To increase coverage of basic essential package of health services of acceptable quality, focusing on health and nutritional outcomes of women and children.

#### ***Description of Project components***

The proposed project has three components: (i) Strengthening Service Delivery at the Primary Health Care (PHC) level; (ii) Expanded Mobile Health Services in Under-Served And Conflict-Affected Areas; (iii) Systems Strengthening, Innovations and Project Management; and (iv) Contingent Emergency Response.

#### **Component 1: Strengthening Service Delivery at the PHC Level (US\$ 60M)**

Component 1 focuses on fully functional health service delivery infrastructure (FFHSDI). It aims to improve supply side readiness of health care services at fixed facilities as a critical pre-requisite for achieving Myanmar's aspiration to achieve UHC by 2030. Recognizing that adequate infrastructure is necessary for supply side readiness but insufficient without other inputs, it was agreed that ***such health infrastructure does not merely consist of buildings, rather they include equipment, supplies of essential medical and non-medical consumables, water supply, electricity and such amenities, adequate operational & maintenance budget, and sufficient numbers of skilled personnel, i.e., FFHSDI.*** The facility layout, amenities and other inputs mentioned afore should be commensurate with the prescribed standards for the respective type of health facility, and match the service needs of the basic EPHS in accordance with the NHP. Investing in physical structures, without other inputs necessary for service delivery, is ineffective and highly inefficient. The IDA funds would finance the capital investments in infrastructure (buildings, equipment & furniture), and the Government would ensure adequate financing from its own budget for the recurrent costs of human resources, operational expenses and essential medicines and supplies. In view of the significant amount of civil works and other hardware procurement, this sub-component would use input-based disbursement.

**Geographic Prioritization:** Considering the large financing needs across the country (NHP estimates the total cost of building, operating and maintaining FFHSDI at about US\$600 million), ***the AF of US\$110 million (of which roughly \$60 million is available for this sub-***

*component) over 4 years would be able to finance only a fraction of such needs.* Therefore, Ministry of Health and Sports (MOHS), in discussion with the World Bank Group (WBG) team, reviewed available evidence on needs and capacity to prioritize townships that could be supported with the envelope of US\$60 million available for this sub-component under EHSAP-AF.

## **Component 2. Expanded Mobile Health Services In Under-Served And Conflict-Affected Areas (US\$ 15M)**

Component 2 is a new component added to align with the country's priority of fostering peace and ensuring UHC by increasing inclusiveness of service access. Given that NHP aims to improve access to basic essential package of health services for everyone in the country, this component will support approaches to bring basic essential health services in an inclusive manner to populations whose access to fixed health facilities is inadequate, be it due to geographic remoteness, difficult terrain and transportation challenges (e.g., Naga region, migrant workers camps) or displacement or other consequences of conflict (e.g., Kachin, Shan North, Rakhine, and Kayin).

The component will finance costs associated with delivering mobile health services such as - procurement of essential medicines, supplies, kits, equipment and if necessary vehicles for mobile clinics; operational costs (travel allowance and per diem) for deploying rapid response teams including local trained volunteers to the field; oversight, coordination and supervision by S/R departments including use of ICT tools to do timely monitoring and reporting on the activities; and other recurrent and maintenance costs. In addition, this sub-component will support the central level to develop a clear set of policies, guidelines, manuals and tools for planning, implementing, monitoring and reporting of mobile health service delivery for different contexts – e.g., conflict affected areas, geographically hard-to-reach areas, areas under-served for other reasons (language, culture, high migration, etc.), and areas needing rapid response due to disease outbreaks and natural or manmade disasters. Supporting regular coordination platforms at S/R level (such as S/R level health cluster meeting, regional level coordination meeting), capacity building of relevant MOHS teams at union and S/R level, and training and supervision of community volunteers at the local level will also be included under this sub-component.

## **Component 3: Systems Strengthening, Innovation, And Project Management (\$35 Million)**

This component is restructured from the original Component 2 on systems strengthening and capacity building; the component is being changed from input-based disbursement to DLI-based disbursement, to enhance the results focus and accountability. In addition, the proposed restructured component would include support for ICT-based innovation given the opportunity of rapid and transformative penetration of ICT. It is divided into two subcomponents: (i) Systems Strengthening (\$30M); and (ii) Program Management and Monitoring and Evaluation (\$5M).

### **Component 3.1. Systems Strengthening (\$30M)**

This sub-component focuses on eight areas of systems reforms highlighted in the NHP: (1) RMNCAH; (2) Health Financing and Public Financial Management; (3) Supply Chain and Procurement; (4) Human Resources; (5) Private Sector Engagement; (6) Health Care Waste Management; (7) Community Engagement; and (8) ICT based innovation.

### **Component 3.2: Program Management and Monitoring and Evaluation (\$5M)**

The component would support management functions, including planning, budgeting, reporting, as well as communication and coordination across the MOHS implementation units. The support would include functioning and operational costs of the Management and Operations Support Team (MOST), which would consist of MOHS designated staff and national consultants with expertise on financial management, procurement/contract management, M&E and

community engagement. MOST would be responsible for day to day management, including procurement and contract management, overseeing training – plan, organize, oversight of delivery—and provide annual progress reports.

#### **Component 4: Contingent Emergency Response (\$0)**

The proposed AF would continue to include a component on Contingent Emergency Response. It would remain the same as under the original credit, which allow the rapid reallocation of IDA credits proceeds to respond to unanticipated eligible crises or emergencies. Myanmar would also have access to the Pandemic Emergency Facility (PEF), a global window under WBG management, to provide surge financing to IDA-eligible countries for responding to pandemics, using the emergency response manual and mechanisms that have been established for the purposes of Component 3. While PEF only provides surge financing for pandemic emergency response, the Component 2 DLI on pandemic preparedness would also help strengthen the country's capacity to prevent or manage outbreaks early and in a timely manner.

#### ***Project Location***

To do geographic prioritization for Component 1 (FFHSDI), all 330 townships were ranked according to a composite index of social needs - measured by the multi-dimensional disadvantage index (MDI)<sup>1</sup>, infrastructure need, and implementation capacity measured by sanctioned human resources (HR) capacity<sup>2</sup>. From the list of townships ranked by the composite index, the MOHS team in consultation with the WBG team, preliminarily selected 19 townships (the number that could be covered with the available envelope of US\$60 million, based on the township-wise cost estimates from NHP), by selecting the topmost townships but omitting those which were difficult to access due to security constraints or under active conflict, and those which constituted less than 3 in one State/Region (to enhance operational feasibility, and ease of implementation and monitoring by ensuring that their distribution was not too scattered). Township level assessments will be carried out at these 19 selected townships which will determine the final list of locations and facilities which will be financed under Component 1.

The Component 2 has the dual objective of bridging geographic inaccessibility and enhancing inclusion in a conflict-sensitive manner. Any population without reasonable reach to fixed facilities would be eligible to receive support under this sub-component. The choice of specific locations and communities to receive essential health services through the mobile clinic modality would be informed by an analysis of available data on ethnic and linguistic distribution of the population, access to the area, and security situation to understand current factors of exclusion. For example, either due to geographic remoteness, difficult terrain and transportation challenges (such as in Naga region, migrant workers' camps) or due to displacement or other consequences of conflict (such as in Kachin, Shan North, Rakhine, and Kayin).

The Component 3 is at systems strengthening level and will benefit the whole nation, instead of a specific project location, whereas the project locations under Component 4 will depend on the nature and scope of the emergency.

#### ***Project Implementation agency***

The health matters are under the responsibility of the Ministry of Health and Sports (MoHS). The MoHS is headed by a Union Minister who is assisted by a Deputy Minister. There are seven departments within the MoHS, each responsible for different aspects of health care,

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<sup>1</sup> MDI is devised by the Ministry of Labor, Immigration and Population with assistance from the World Bank Group, and measures deprivation using indicators of education, employment, health, water, housing and assets.

<sup>2</sup> Infrastructure need and HR capacity were taken from the Health Inputs Scoring Index (HISI) developed for the purposes of the National Health Plan (NHP), by the NHP Implementation Monitoring Unit.

such as: Department of Public Health and Department of Medical Services (responsible for provision of health services and deployment of health workers); Departments of Medical Research (responsible for conducting medical research and provide evidence based data for policy making); Department of Human Resources for Health (responsible for production of health workforce); Department of Traditional Medicine (responsible for the development of Myanmar Traditional Medicine); Department of Food and Drug Administration (responsible for the safety and quality of food, drugs, medical devices and cosmetics) and Department of Sports and Physical Education (responsible for mass sports).

## **1.2 Objective and scope of Environmental Management Plan**

With reference to the initial environmental assessment of EHSAP and the discussion with Occupational and Environmental Health Department of Ministry of Health and Sports, the project investments may cause some potential adverse environmental impacts associated with new construction activities and small/big scale renovation activities planned for selected health care facilities and provision of medical equipment that can generate waste. The document aims to guide the project implementation agencies towards meeting good practice on environmental management aspects during the implementation of the proposed project activities, including improving the hygiene conditions linked to the handling and disposal of healthcare wastes, and those environmental risks concerning mismanagement of waste management in general.

The Government of Myanmar (GoM) and the World Bank evaluated that some aspects of the EHSAP-AF project's implementation could lead to an increase in site-specific environmental and health risks. This Environmental Management Plan (EMP) has been amended to meet the project recognized potential of healthcare activities in creating additional waste that may be hazardous to human health and the environment. In this respect, it is important to ensure that when such waste is generated by the project activities there must be safe and reliable methods for its handling to avoid any public health consequences and any significant impact on the environment. Overall, this calls for public awareness strengthening and for sound waste management system to be put in place at the project area of intervention.

The EMP includes two main parts: (i) An Environmental Codes of Practice (ECOPs) to be implemented by contractors (or those responsible) for health care facilities construction, renovation/refurbishment activities financed by the project; and (ii) A general waste management plan to be followed by health care facilities (HCFs) receiving relevant financing under the project as described in project components and within the project main development objective.

The methodology used to provide the information in this document has been based on person-to-person interviews of relevant stakeholders<sup>3</sup>, the review of existing EMP of EHSAP project, and brief desk literature review. The project has selected geographical coverage under Component 1 for infrastructure investment and will include some townships from Ayeyarwaddy region and Shan state. Therefore, based on this document, and the feedback that will be captured during the continuous consultative process with stakeholders as part of project implementation, simple site-specific EMPs including actual site assessment and additional relevant information may need to be developed during project implementation.

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<sup>3</sup> Township Health Department Medical Officer; Environmental Health Personnel; Health Visitor from local Maternal and Child Health Center; Mon Women Network; Deputy Medical Director; Deputy Director of Nay Pyi Taw City Development Committee for waste management sector, Deputy Director of Medical Care; Basic Health Staff, etc.

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

### **2.1 National environmental regulations**

National and international legal tools which are relevant to environmental management in the project are;

- Environmental Conservation Law
- National Environment Policy (Draft)
- National Health Policy
- Chemical Safety Law
- CDC Laws
- Environmental Conservation Rules
- Public Health Law<sup>4</sup>
- Private Health Care Law
- Hospital Guidelines
- Hospital infection Control Guidelines
- International Conventions
  - Stockholm
  - Basel
  - Minamata

### **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 status in health facilities**

### **3.1 Environmental considerations in construction of health facilities (HCFs).**

*Design of HCFs.* Department of Public Health (DPH) under MOHS has pre-approved designs for Rural Health Centers (RHC) and Sub Rural Health Centers (sub-RHC), which are considered inadequate from the perspective of environmental requirements of health infrastructure. The Table 1 summarizes insufficiencies in the current approved designs of health facilities in comparison to an international benchmark (e.g., UNOPS's designs). Effort is ongoing to revise the designs of RHC and Sub-RHC to include placenta pits.

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<sup>4</sup> Existing 1972 Law and new draft



**Table 1: Comparison of UNOPS's and MOHS's designs of HCF**

Facilities	UNOPS's design	MOH's design
<b>Rural health center design</b>		
Standard Size Staff Rooms	✓	✓
Examination Room	✓	✓
Separate Maternity Service and OPD with Waiting Rooms	✓	✓
Hand washing facilities in the GE and Post Delivery Rooms	✓	✗
Generator Room (Solar Controller Room)	✓	✗
Drainage System in Deliver Room	✓	✓
Access for the disabled (barrier free)	✓	✓
Rainwater harvesting system	✓	✗
Toilets – 2Nos - external with hand washing facilities	✓	✗
Internal Floor – Ceramic Tiles	✓	✗
Maximum use of daylight and air circulation/ ventilation	✓	✗
Residential Accommodation for staff	✓	✓
Tube well fitted with Water Pump	✓	✓
Overhead and underground storage tank	✓	✓
Boundary Fencing and Gate	✓	✓
Landscaping (Footpath and some plantation)	✓	✗
Placenta Pit	✓	✗
Incinerator	✓	✗
Solar Power System	✓	✗
<b>Sub-rural health center design</b>		
Post delivery room added	✓	✗
One additional WC in the main building	✓	✗
Fire exit door	✓	✗
Rain water harvesting system	✓	✗
Hand washing facilities in the GE and Post Delivery Rooms	✓	✗
Two external toilets provided with hand washing facilities	✓	✗
Internal Floor – Ceramic Tile	✓	✗
Provision of Drainage & Water in the Delivery Room	✓	✗
Generator room (Solar Controller Room)	✓	✗
Boundary Fencing and Gate	✓	✓
Placenta Pit	✓	✗
Incinerator	✓	✗
Solar Power System	✓	✗

Note: ✓ in place ✗ not in place

*Use of asbestosis.* Asbestos is one of the most known occupational carcinogens, causing about half of the deaths from occupational cancers. The largest users are now those from developing and transition economies in Asia. Asbestos was widely used in the construction sector in Myanmar until the 1990s and is still imported and produced. Old health facilities could contain asbestos materials in the roofs, posing health risks to the construction workers.

### **3.2 Healthcare waste management**

In general, regulatory, policy and administrative guidelines and framework for health care waste management (HCWM) exist to smaller extent in written form (e.g., as part of the hospital guideline). However, dissemination of printed materials in easy to access and readily available manner to all levels of health staff, and communication and understanding of these framework and guidelines among primary care level health staff as well as consistent implementation of such guidelines still need significant improvement and capacity building. There are ongoing efforts to strengthen the existing guidelines for better formalization, to be more comprehensive and in line with good practices, and to have better compliance of health staff to the guidelines. Under EHSAP, MOHS is developing a healthcare waste management guidelines and standardized operating procedures of healthcare waste management for HCFs at township level and below.

The brief assessment carried out as part of the project preparation pointed out various limitations in the current health sector relevant to project activities as listed below:

- Inadequacies in the legal, regulatory, policy and administrative framework of healthcare waste management and treatment;
- Incomplete information about current health legislation, technical guidelines and other policies linked to possible environmental impacts (and their management) generated by health care activities in Myanmar;
- Relatively simple/minimal health-care waste management practices in health care facilities with regard to handling inclusive of waste pre-treatment, collection, storage, transportation and final disposal;
- Health-care waste at the source of generation is not being segregated according to its type for easy treatment and final disposal;
- Poor compliance with health-care waste characterization related waste quantities and composition and limited information on waste generation;
- Lack of segregation of waste according to categories;
- Insufficient knowledge on and practice of health-care waste minimization, reuse and recycling approach at township and sub-levels;
- Lack of regional/centralized disposal facility to handle large quantities of healthcare waste;
- Low level of awareness of and poor compliance with code of conduct, universal precaution and technical guidelines for safety measures;
- Lack of written standards for waste operation procedures
- Insufficient resources for training of health care personnel and education and public awareness in link to healthcare waste management, required in future Comprehensive Township Health Plan.

Further, availability of appropriate equipment and technologies to deal with health-care waste treatment and final disposal in country is limited and almost non-existent. Small scale incinerators including brick incinerators and single chamber incinerators are still used commonly in Township hospitals while numerous deficiencies in design, siting, operational and management result in poor performance. Open burning and dumping are being applied in both RHCs and sub-RHCs.

## **4. Potential environmental impacts**

### **4.1 Potential environmental impacts due to construction and renovation activities**

The project will finance construction, renovation and refurbishing of HCFs. Without proper design, basic environmental hygiene facilities (hand washing facilities, toilets and waste

disposal facility) may be neglected. The construction and renovation activities 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 construction and renovation works. The HCFs staff or those who will be carrying out these works will be responsible to implement the ECOPs.

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

The project will improve the capacity of healthcare providers at the local level and provide them with basic health items and medical instruments (e.g., syringe, needles, and drugs). Therefore, healthcare waste and relevant wastewater will be increased slightly.

The majority of healthcare waste is general waste which is similar to household waste. Only 10-25% of solid healthcare waste is regarded as “hazardous waste” including 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.

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 healthcare waste are potentially at risk, including those within healthcare 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.

However, amount of healthcare waste generated from a health center is expected to be small. If segregated correctly, generation of hazardous healthcare waste is 0.1 kg/bed/day at health centre and 0.12 kg/bed/day at district hospital<sup>5</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.

Given the small amount of healthcare waste and wastewater from PHC facilities, potential impacts on the environment are deemed to be minor, site specific, and for which mitigation measures can be readily designed. Under EHSAP, healthcare waste management guideline has been developed for HCFs at township level and below, and HCFs financed in AF project will follow this guideline.

## **5 Typical mitigation measures**

### **5.1 Measures to mitigate impacts due to construction and renovation activities**

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<sup>5</sup> Soulivanh Phengxay et al (2005). Health-care waste management in Lao PDR: a case study. *Waste Manage Res* 2005; 23: 571–581

Prior to the construction/renovation execution, the design of HCF should be reviewed and approved by authorized and competent agencies. Basic environmental hygiene facilities such as hand washing facilities in the General Examination room and post delivery room, external toilets with hand washing facilities, and waste disposal facility (placenta pit) shall be included in the HCF design.

During civil works, the HCF staff or contractor shall be responsible for following the Environmental Code of Practices (ECOPs) to mitigate environmental impacts (see Table 1).

**Table 1: Environmental Code of Practices**

Environmental issue	Mitigation measures
Dust, noise and vibration generated from construction, rehabilitation or minor civil works	<ul style="list-style-type: none"> <li>- The HCF staff or the contractor(s) 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 or the contractor(s) 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 or the contractor(s) should not carry out construction activities generating high level of noise during HCF activities, especially when services are being delivered to the clients.</li> </ul>
Solid waste generated from construction, rehabilitation or minor civil works	<ul style="list-style-type: none"> <li>- The HCF Staff or the contractor(s) 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 or the contractor(s) shall use litter bins, containers and waste collection facilities at all places during works.</li> <li>- The HCF Staff or the contractor(s) 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 or the contractor(s) 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 or the contractor(s) 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</li> </ul>

	segregated and collected on-site from other waste sources for reuse or recycle (sale).
Asbestos containing materials (ACM) generated from construction, renovation or minor civil works	<ul style="list-style-type: none"> <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 8.10). Because specific regulation has not yet been developed in Myanmar, 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.</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 or the contractor(s) shall comply with all national and good practice regulations regarding workers' safety.</li> <li>- The HCF Staff or the contractor(s) shall prepare and implement a simple action plan to cope with risk and emergency (e.g., fire, earthquake, floods)</li> <li>- The HCF Staff or the contractor(s) shall have or receive minimum required training on occupational safety regulations and use of personal protective equipment</li> <li>- The HCF Staff or the contractor(s) shall provide safety measures as appropriate during works such as installation of fences, use of restricted access zones, warning signs, lighting system to protect HCF staff and patients against falling debris and other risks.</li> </ul>

## 5.2 Measures to mitigate impacts from healthcare waste

Under the ongoing EHSAP, healthcare waste management SOPs, Guideline and training modules were developed by MOHS to provide guidance for managing waste generated from healthcare activities (see Annex 8.1-8.6). The guideline is directed towards health care facilities staff, administrators, regulatory agencies, hospital service organizations, consulting firms and environmental compliance personnel. The training modules are directed towards managerial level health professionals and operational level health professionals, distinguished into knowledge-based and skill-based training modules.

HCF shall implement a healthcare waste management plan including standardized operating procedures, 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 (HCWM) guidelines**

Environmental issue	Mitigation measures
Solid healthcare waste, especially sharps and infectious waste generated from healthcare activities	<p>HCFs will implement standard operating procedures of solid healthcare waste including: minimization, segregation, storage, transport, treatment and final disposal of solid HCW. The principals of solid health care waste management are described in accordance with MOHS's healthcare waste management guidelines. Standard operating procedures are presented in annex 8.1-8.6.</p> <p><b><u>Waste Minimization:</u></b> Quantity of HCW should be minimized through;</p> <p><b><i>Reducing</i></b></p> <ul style="list-style-type: none"> <li>• Quantifying the waste produced.</li> <li>• Examining each work process steps to determine where wastes are produced and to devise measures for waste prevention or reduction.</li> <li>• Devising ways of reducing waste with employees.</li> <li>• Partnering with relevant stakeholders to assist waste minimization.</li> </ul> <p><b><i>Reusing</i></b></p> <ul style="list-style-type: none"> <li>• Reusing drums, cartridges and containers where possible.</li> <li>• Selling or donating reusable waste to other organizations.</li> </ul> <p><b><i>Recycling</i></b></p> <ul style="list-style-type: none"> <li>• Segregating wastes wherever possible to aid recycling and provide an indication of why waste is forming.</li> <li>• Diverting recyclable wastes from the general waste, identifying recyclers and organizing regular collections.</li> </ul> <p><b><u>Segregation of HCW:</u></b></p> <ul style="list-style-type: none"> <li>• All health care waste should be segregated as soon as it is generated.</li> <li>• Each type of waste should be contained in designated bags and containers.</li> <li>• Sharp waste should be segregated into sharp containers or red color bags.</li> <li>• Infectious waste, pathological waste, anatomical waste should be segregated into separate yellow color bags with appropriate labels and logos.</li> <li>• Separate pharmaceutical and chemical waste into brown color bags or containers.</li> <li>• Double yellow bags should be used for high risk infectious waste.</li> <li>• General waste should be segregated into black color waste.</li> </ul> <p><b><i>Labeling</i></b></p> <ul style="list-style-type: none"> <li>• All bags and containers must be identified at the point of production and should be clearly marked with biohazard symbol.</li> <li>• Name/department of the waste generator should be included in the label.</li> <li>• The date when the scheduled wastes are first generated should be posted onto the container with appropriate label for storage of waste.</li> <li>• Labelling can be done in a number of ways, at least writing the information on the bag or container.</li> <li>• Clinical waste requiring autoclaving or other equivalent treatment should be labelled accordingly.</li> </ul> <p><b><u>Storage of HCW:</u></b></p> <ul style="list-style-type: none"> <li>• Different health care waste should be streamed separately in standard</li> </ul>

storage equipment.

- Storage time of health care waste should not exceed 48 hours.
- Anatomical waste should be buried or disposed daily.
- Storage room or place and equipment should be cleaned and disinfected at least once a week.
- Specific areas should be for the initial storage of wastes, in the wards and departments, near the source of waste.
- Location of central storage area should be away from food preparation, public access and exit route.
- Central storage area should be separated from general waste storage areas.
- Waste for landfill and waste for incineration should be stored separately in the central storage area.

**Transportation of HCW:**

- Waste bags and containers from initial storage area should be removed regularly.
- Manual handling of waste bags should be minimized.
- All waste bags should be handled by the neck.
- Discard syringes with attached needles into sharp containers as one unit.
- Internal transport routes from initial storage to central store through patient care areas and other clean areas should be minimized.
- Dedicated wheeled containers, trolleys or carts should be used to transport the waste containers to central storage area. These vehicles should be reserved only for the transportation of clinical waste.
- Wheeled containers, trolleys or carts should be cleaned and disinfected regularly and immediately after spillage or accidental discharge.

**Central Storage Facility for HCW:** The central storage area must be:

- Located separately from the general waste storage areas.
- Should be clearly identifiable.
- Away from food preparation, public access and egress route.
- Arranged to store waste for landfill and waste for incineration waste separately.
- Locked when access is not required and should be accessible only to authorized persons.
- Well ventilated and well lit.
- Located on well drained, impervious hard-standing.
- Provided facilities for washing down and disinfection.
- Should be sufficient for storage capacity.

**Treatment of HCW:**

- Infectious waste should be autoclaved wherever possible before disposal.
- Non-autoclave infectious waste should be disinfected chemically by using bleaching powder, lime solution, calcium oxide or other chemical disinfectants.
- Needle cutter should be used to displace needles from syringes.
- Disinfect defanged syringes by 2% chlorine solution in order to be recycled.

**Autoclave:** Commonly used for the treatment of highly infectious waste, such as

	<p>microbial cultures or sharps. Small amount of waste (about 5-8 kg) requires a 60 minute cycle at 121°C (minimum) and 1 bar (100 kPa). Validation of autoclave should be conducted and microbial inactivation efficacy of autoclaves should be checked periodically by using color-changing indicator strips.</p> <p><u>Chemical Disinfection:</u> 0.5% Chlorine solution, 5% sodium hypochlorite, 30% hydrogen peroxide, bleaching powder, lime solution, calcium oxide or other chemical disinfectants can be used for non-autoclavable infectious waste.</p> <p><b><u>Disposal of HCW:</u></b></p> <ul style="list-style-type: none"> <li>• Placenta and small anatomical waste should be disposed to placenta pit where there is no effective incinerator.</li> <li>• Pharmaceutical waste should be encapsulated or inertized.</li> <li>• General waste, sharp waste and treated waste should be disposed to municipal waste collecting system.</li> <li>• Sharp waste should be disposed to sharp pit where there is no municipal waste collecting system.</li> <li>• General waste and treated waste should be disposed to controlled land filling where there is no municipal waste collecting system.</li> <li>• Large anatomical waste should be buried in appropriate site.</li> </ul> <p><u>Standardized Incinerator:</u> Two-chambered incinerators with proper temperature, required chimney heights should be used. The temperature must be at least of 850°C to ensure minimal emission of toxic gases at the primary chamber. High chimney (higher than nearby roofs) is required. Appropriate location (at least of 500 meters away from populated areas) is required. Ash disposal facilities is also required. Pressured gas containers, radioactive wastes, radiographic wastes, halogenated plastics like PVC, mercury, cadmium and ampoules of heavy metals should never be incinerated.</p> <p><u>Sanitary Land Filling:</u> Sanitary landfills are easy access to the site and working areas for waste delivery. Landfill site should be at least 50 meters away from the water sources. The landfill site must be protected with fence to prevent from unauthorized persons and animals. Lining of the base and sides of the sites must be adequately sealed to minimize the movement of waste water. Final cover must be constructed to prevent or minimize rain water infiltration.</p> <p><u>Encapsulation and Inertization:</u> It is usually suitable disposal method for the pharmaceuticals and incinerated ash with heavy metal content. When containers are three quarters filled with pharmaceutical and chemical waste, a mixture of cement, lime and water is poured into it. The material is allowed to be dried and the container is sealed and disposed safely. Alternatively, the formed homogeneous mixture in liquid state can be transported to a landfill and poured safely.</p> <p><u>Sharp pit and Placenta pit:</u> The attached designs in annexes should be constructed.</p>
Wastewater generated from medical facilities	<p><u>Waste Water Disposal:</u> Waste water from healthcare facilities should be disposed according to the reference of safe management of waste from healthcare activities developed by WHO.</p>



## **6. Environmental management**

### **6.1 Institutional arrangement (roles and responsibilities)**

*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 construction and 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.

HCFs should apply Standard Operating Procedures (SOPs) for HCWM to ensure safe management of hazardous wastes which are generated by health care facilities. All health care facilities should have special infrastructures and necessary equipment and consumables for HCWM. For government health care facilities, department concerned should draw a budget line to ensure separate allotment for expenses of proper HCWM. A complete infrastructure and a strong financial mechanism should be developed to ensure sustainability of effective and proper HCWM for each health care facility. HCF should establish HCWM committee or team. All health care providers and workers of health care facilities should attend the prescribed HCWM training courses. Training curriculum on HCWM for township level and below has been developed under EHSAP and will be used in the Additional Financing.

*The third party firm with the support of MOHS staff from the Construction Divisions and Occupational and Environmental Health Section* under the guidance of the Director General of Departments of Public Health and Medical Services (at central level) and Township Medical Officers (at township level) will coordinate activities to ensure that the project investments comply with national environmental management requirements and the World Bank's safeguard policies, including provisions of this EMP. Responsibilities of the third party firm, the Construction Divisions, Occupational and Environmental Health Section, DPH, DMS and TMOs will include, but are not limited to the following tasks:

- Supervise safeguard implementation by HCFs (with help of technical consultants);
- Implement safeguards training plan to HCFs and relevant staff involved in safeguards implementation;
- Ensure adequate budget (operation costs) for relevant costs affiliated with compliance with EMP provisions and overall environmental safeguards implementation.

*The World Bank project team* will provide guidance and technical assistance to the third-party firm, the Construction Divisions and Occupational and Environmental Health Section, DPH, DMS and TMOs on project implementation including safeguard execution.

### **6.2 Monitoring and reporting**

During implementation of civil works - new construction, renovation and refurbishing activities, the HCFs and local (township/village tract/village) health communities will be responsible for day to day supervision on implementation of mitigation measures as specified in the ECOPs. They will be guided in this task by contracted third party firm, designated staff from Construction Divisions and Occupational and Environmental Health Section of DPH and DMS, and technical consultants hired by the project with the primary role to enhance safeguards capacity and environmental management during the entire period of project implementation. The

participating HCFs shall include if necessary on the safeguard implementation to Director General of DPH and DMS and TMOs as part of their progress reports.

The health committees, Construction Divisions and Occupational and Environmental Health Section under DG of DPH and DMS, and TMOs are responsible for supervising the implementation of HCWM plans by the HCFs (see *Annex 6* checklist). This Checklist is a general tool designed for observation and review of records in the assessment of healthcare waste management. If necessary, it could be revised during implementation to reflect any additional aspects relevant to each facility.

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 Project Steering Committee at union level, the State/Region Health Departments, Township Health Departments, and the HCFs should assess in a timely manner the validity of complaints and take any necessary actions to remedy the situation.

Construction Divisions, Occupational and Environmental Health Section of DOH and Project Steering Committee are responsible to provide technical guidance as needed to the third-party firm, State and Regional Health Directors, TMOs/SMOs and HCFs to enable them in fulfilling their supervision responsibilities and related reporting and documentation requirements. Consequently, Director General of DPH and DMS and Project Steering Committee is responsible to ensure that the project supports specialists (national or international) that have relevant technical skills on health care waste management and safeguards implementation in order to provide adequate guidance and training as necessary to local HCFs staff and others involved in project safeguards implementation.

The Construction Divisions has been using the construction supervision checklist and completion checklist to manage construction of health facilities. These checklists should be supplemented with additional criteria associated to environment, health and safety.

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

Solid healthcare waste and Occupational Health and Safety training program has been developed under the EHSAP and provided to healthcare providers at some HCFs on aspects linked to Medical Waste Management and Occupational Health and Safety. Consultants with knowledge of environmental safeguard implementation (e.g., ECoPs and EMP provisions) will be hired to provide implementation support and monitor compliance with the project safeguard instruments.

The project will hire consultant(s) with health care waste management skills that will provide guidance and training to Occupation and Environmental Health Staff at DPH and DMS (central level), State/Region Health Department staff, Township and Station Medical Officers, 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.

### **6.4 Budget**

The cost for safeguard implementation is estimated under project component 3. Overall annual operations cost (e.g., sludge management, waste disposal, transportation, maintenance and replacement, etc.) should be factored in and estimated by beneficiary HCFs when they prepare the annual workplan and budget for their facilities.

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

To be included after the public consultations are completed.

DRAFT

## 8. Annex – detailed guidelines

### 8.1 SOPs of Health Care Waste Management for Township Hospitals

(Logo)  Township Hospital	Standard Operating Procedures	Document No.	
	Health Care Waste Management	Date issued	
		Date reviewed	

#### 1. Standard Operating Procedure of Waste Segregation

##### 1.1. Purpose

This procedure is issued to ensure correct segregation of health care waste in the township hospital.

##### 1.2. Scope of Application

All rooms of township hospital in which health care waste is generated shall apply this procedure.

##### 1.3. Responsibility

All persons who generate health care waste in township hospital (including all hospital staff, patients, attendants and visitors) shall apply this procedure.

##### 1.4. Equipment and Supplies

- Color-coded waste bags
- Labels
- Color-coded waste containers
- Sharp containers

##### 1.5. Method

- Segregate health care waste as soon as it is generated.
- Contain each type of waste in designated bags and containers.
- Segregate sharp waste into sharp containers or red color bags or containers.
- Segregate infectious waste, pathological waste and anatomical waste into separate yellow color bags with appropriate labels and logos.
- Segregate pharmaceutical and chemical waste into brown color bags or containers.
- Use double yellow bags for high risk infectious waste.
- Segregate general waste into black color bags or containers.<sup>6</sup>

#### 2. Standard Operating Procedure of Waste Storage

##### 2.1. Purpose

This procedure is issued to ensure correct storage of health care waste in the township hospital.

##### 2.2. Scope of Application

Storage room or place for health care waste shall apply this procedure.

##### 2.3. Responsibility

Person in charge of health care waste storage room or place shall apply this procedure.

##### 2.4. Equipment and Supplies

- Storage room or place of a size appropriate to the volume of waste produced
- Storage equipments and containers (bins, drums, cans, etc)
- Labels

##### 2.5. Method

<sup>6</sup> Or in accordance with responsible municipal instruction.

<sup>2</sup> If the infectious waste collecting bags are torn or leak and contaminated clean the containers immediately, place it under the direct sunlight.

- Store different health care waste streams separately in standard storage equipment and specific storage containers such as bins, drums, cans etc.
- Ensure storage time of health care waste should not exceed 48 hours.
- Bury or dispose anatomical waste daily.
- Clean and disinfect storage room or place and equipment at least once a week.
- Locate specific areas for the initial storage of wastes, in the wards and departments, near the source of waste generation.
- Locate central storage area away from food preparation, public access and exit route.
- Locate central storage area separately from general waste storage areas.
- Do not mix landfill and incinerable waste in the central storage area.

### **3. Standard Operating Procedure of Waste Transportation**

#### **3.1. Purpose**

This procedure is issued to ensure correct transportation of health care waste in the township hospital.

#### **3.2. Scope of Application**

All transportation of health care waste onsite and offsite the township hospital shall apply this procedure.

#### **3.3. Responsibility**

Person in charge of health care waste transportation shall apply this procedure.

#### **3.4. Equipment and Supplies**

- Basket
- Bins
- Wheeled trolleys
- Carts

These are not used for any other purposes and meet the following specifications;

- ✓ Easy to load and unload
- ✓ No sharp edges that could damage waste bags or containers during loading and off loading
- ✓ Easy to clean

#### **3.5. Method**

- Remove bags and containers from initial storage area regularly.
- Minimize manual handling of waste bags.
- Handle all waste bags by the neck.
- Plan internal transport routes from initial storage to central store to minimize the passage of waste through patient care areas and other clean areas.
- Use dedicated wheeled containers, trolleys or carts to transport the waste containers to central storage area. Reserve these vehicles only for the transportation of clinical waste.
- Clean and disinfect wheeled containers, trolleys or carts regularly and immediately after spillage or accidental discharge.

### **4. Standard Operating Procedure of Treatment of Waste**

#### **4.1. Purpose**

This procedure is issued to ensure correct treatment of health care waste in the township hospital.

#### **4.2. Scope of Application**

Storage room or place for health care waste shall apply this treatment procedure before disposal.

#### **4.3. Responsibility**

Person in charge of treatment of health care waste shall apply this procedure.

- 4.4. Equipment and Supplies
  - Autoclave
  - Needle cutter / Hub cutter
  - Chemicals: Bleaching powder, Lime solution, Calcium oxide, Aseptol/ Dettol
- 4.5. Method
  - Autoclave autoclavable infectious waste before disposal.
  - Disinfect non-autoclavable infectious waste chemically by using bleaching powder, lime solution, calcium oxide or others (Aseptol/ Dettol).
  - Use needle cutter to displace needles from syringes.
  - Disinfect defanged syringes by 2% chlorine solution in order to be recycled.

## 5. Standard Operating Procedure of Disposal of Waste

- 5.1. Purpose
 

This procedure is issued to ensure correct disposal of health care waste in the township hospital.
- 5.2. Scope of Application
 

Storage room or place for health care waste shall apply this disposal procedure after treatment.
- 5.3. Responsibility
 

Person in charge of disposal of health care waste shall apply this procedure.
- 5.4. Equipment and Supplies
  - Standardized Incinerator
  - Sharp pit
  - Placenta pit
  - Materials for encapsulation and inertization
  - Sanitary Land Fill
- 5.5. Method
  - Incinerate non-treated infectious waste, placenta and small anatomical waste (by combustion or pyrolysis and gasification).
  - Dispose placenta and small anatomical waste to placenta pit where there is no effective incinerator.
  - Encapsulate or inertize the pharmaceutical waste. If feasible send back expired unused pharmaceutical products to the supplier or the provider.
  - Dispose general waste, sharp waste and treated waste to municipal waste collecting system.
  - Dispose general waste and treated waste to sanitary land filling where there is no municipal waste collecting system.
  - Dispose sharp waste to sharp pit if there is no municipal waste collecting system.
  - Bury large anatomical waste in appropriate site.
  - Dispose waste water according to the reference of safe management of waste from healthcare activities developed by WHO.
  - Dispose laboratory waste according to the reference of instructions developed by National Health Laboratory, Myanmar.

## 6. Issuance

	Name	Title	Signature	Date
Prepared by				
Checked by				
Approved by				

## **8.2. SOPs of Health Care Waste Management for Station Hospitals**

(Logo)  Station Hospital	Standard Operating Procedures	Document No.	
	Health Care Waste Management	Date issued	
		Date reviewed	

### **1. Standard Operating Procedure of Waste Segregation**

#### **1.1. Purpose**

This procedure is issued to ensure correct segregation of health care waste in the station hospital.

#### **1.2. Scope of Application**

All rooms of station hospital in which health care waste is generated shall apply this procedure.

#### **1.3. Responsibility**

All persons who generate health care waste in station hospital (including all hospital staff, patients, attendants and visitors) shall apply this procedure.

#### **1.4. Equipment and Supplies**

- Color-coded waste bags
- Labels
- Color-coded waste containers
- Sharp containers

#### **1.5. Method**

- Segregate health care waste as soon as it is generated.
- Contain each type of waste in designated bags and containers.
- Segregate sharp waste into sharp containers or red color bags or containers.
- Segregate infectious waste, pathological waste and anatomical waste into separate yellow color bags or containers with appropriate labels and logos.
- Segregate pharmaceutical and chemical waste into brown color bags or containers.
- Use double yellow bags for high risk infectious waste.
- Segregate general waste into black color bags or containers.

### **2. Standard Operating Procedure of Waste Storage**

#### **2.1. Purpose**

This procedure is issued to ensure correct storage of health care waste in the station hospital.

#### **2.2. Scope of Application**

Storage room or place for health care waste shall apply this procedure.

#### **2.3. Responsibility**

Person in charge of health care waste storage room or place shall apply this procedure.

#### **2.4. Equipment and Supplies**

Storage room or place of a size appropriate to the volume of waste produced

Storage equipments and containers (bins, drums, cans, etc)

Labels

#### **2.5. Method**

- Store different health care waste streams separately in standard storage equipment and specific storage containers such as bins, drums, cans etc.
- Ensure storage time of health care waste should not exceed 48 hours.
- Bury or dispose anatomical waste daily.
- Clean and disinfect storage room or place and equipment at least once a week.

- Locate specific areas for the initial storage of wastes, in the wards and departments, near the source of waste.
- Locate central storage area away from food preparation, public access and exit route.
- Locate central storage area separately from general waste storage areas.
- Do not mix landfill and incinerable waste in the central storage area.

### **3. Standard Operating Procedure of Waste Transportation**

#### **3.1. Purpose**

This procedure is issued to ensure correct transportation of health care waste in the station hospital.

#### **3.2. Scope of Application**

All transportation of health care waste of the station hospital shall apply this procedure.

#### **3.3. Responsibility**

Person in charge of health care waste transportation shall apply this procedure.

#### **3.4. Equipment and Supplies**

- Basket
- Trolley
- Cart

These are not used for any other purposes and meet the following specifications

- ✓ Easy to load and unload
- ✓ No sharp edges that could damage waste bags or containers during loading and off loading
- ✓ Easy to clean

#### **3.5. Method**

- Remove bags and containers from initial storage area regularly.
- Minimize manual handling of waste bags.
- Handle all waste bags by the neck.
- Plan internal transport routes from initial storage to central store to minimize the passage of waste through patient care areas and other clean areas.
- Use dedicated wheeled containers, trolleys or carts to transport the waste containers to central storage area. Reserve these vehicles only for the transportation of clinical waste.
- Clean and disinfect wheeled containers, trolleys or carts regularly and immediately after spillage or accidental discharge.

### **4. Standard Operating Procedure of Treatment of Waste**

#### **4.1. Purpose**

This procedure is issued to ensure correct treatment of health care waste in the station hospital.

#### **4.2. Scope of Application**

Storage room or place for health care waste shall apply this treatment procedure before disposal.

#### **4.3. Responsibility**

Person in charge of treatment of health care waste shall apply this procedure.

#### **4.4. Equipment and Supplies**

- Autoclave
- Needle cutter / Hub cutters
- Chemicals: Bleaching powder, Lime solution, Calcium oxide, Aseptol/Dettol

#### **4.5. Method**

- Autoclave autoclavable infectious waste before disposal.



- Disinfect non-autoclavable infectious waste chemically by using bleaching powder, lime solution, calcium oxide or others (Aseptol/ Dettol).
- Use needle cutter to displace needles from syringes.
- Disinfect defanged syringes by 2% chlorine solution in order to be recycled.

## 5. Standard Operating Procedure of Disposal of Waste

### 5.1. Purpose

This procedure is issued to ensure correct disposal of health care waste in the station hospital.

### 5.2. Scope of Application

Storage room or place for health care waste shall apply this treatment procedure before disposal.

### 5.3. Responsibility

Person in charge of disposal of health care waste shall apply this procedure.

### 5.4. Equipment and Supplies

- Standardized Incinerator<sup>7</sup>
- Sharp pit
- Placenta pit
- Materials for encapsulation and inertization
- Sanitary Land Fill

### 5.5. Method

- Incinerate non-treated infectious waste, placenta and small anatomical waste (by combustion or pyrolysis and gasification).
- Dispose placenta and small anatomical waste to placenta pit where there is no effective incinerator.
- Encapsulate or inertize the pharmaceutical waste. If feasible send back expired unused pharmaceutical products to the supplier or the provider.
- Dispose general waste, sharp waste and treated waste to municipal waste collecting system.
- Dispose general waste and treated waste to sanitary land filling where there is no municipal waste collecting system.
- Dispose sharp waste to sharp pit where there is no municipal waste collecting system.
- Bury large anatomical waste in appropriate site.
- Dispose waste water according to the reference of safe management of waste from healthcare activities developed by WHO.
- Dispose laboratory waste according to the reference of instructions developed by National Health Laboratory, Myanmar.

## 6. Issuance

	Name	Title	Signature	Date
Prepared by				
Checked by				
Approved by				

<sup>7</sup> Most of the station hospital does not have incinerator.

### **8.3. SOPs of Health Care Waste Management for Urban Health Centers**

(Logo) Urban Health Center Address	Standard Operating Procedures	Document Number	
	Health Care Waste Management	Date issued	
		Date reviewed	

#### **1. Standard Operating Procedure of Waste Segregation**

##### **1.1. Purpose**

This procedure is issued to ensure correct segregation of health care waste in the urban health center.

##### **1.2. Scope of Application**

All rooms of urban health center in which health care waste is generated shall apply this procedure.

##### **1.3. Responsibility**

All persons who generate health care waste in urban health center (including all staff, patients, attendants and visitors) shall apply this procedure.

##### **1.4. Equipment and Supplies**

- Color-coded waste bags
- Labels
- Color-coded waste containers
- Sharp containers

##### **1.5. Method**

- Segregate health care waste as soon as it is generated.
- Contain each type of waste in designated bags and containers.
- Segregate sharp waste into sharp containers or red color bags or containers.
- Segregate infectious waste, pathological waste and anatomical waste into separate yellow color bags or containers with appropriate labels and logos.
- Segregate pharmaceutical and chemical waste into brown color bags or containers.
- Use double yellow bags for high risk infectious waste.
- Segregate general waste into black color bags or containers.

#### **2. Standard Operating Procedure of Waste Storage**

##### **2.1. Purpose**

This procedure is issued to ensure correct storage of health care waste in the urban health center.

##### **2.2. Scope of Application**

Storage room or place for health care waste shall apply this procedure.

##### **2.3. Responsibility**

Person in charge of health care waste storage room or place shall apply this procedure.

##### **2.4. Equipment and Supplies**

- Storage room or place of a size appropriate to the volume of waste produced
- Storage equipments and containers (bins, drums, cans, etc)
- Labels

##### **2.5. Method**

- Store different health care waste streams separately in standard storage equipment and specific storage containers such as bins, drums, cans etc.
- Ensure storage time of health care waste should not exceed 48 hours.
- Bury or dispose anatomical waste daily.
- Clean and disinfect storage room or place and equipment at least once a week.

- Locate specific areas for the initial storage of wastes near the source of waste.
- Locate central storage area away from food preparation, public access and exit route.
- Locate central storage area separately from general waste storage areas.

### **3. Standard Operating Procedure of Waste Transportation**

#### **3.1. Purpose**

This procedure is issued to ensure correct transportation of health care waste in the urban health center.

#### **3.2. Scope of Application**

All transportation of health care waste onsite and offsite the urban health center shall apply this procedure.

#### **3.3. Responsibility**

Person in charge of health care waste transportation shall apply this procedure.

#### **3.4. Equipment and Supplies**

- Basket
- Trolley
- Cart

These are not used for any other purposes and meet the following specifications

- ✓ Easy to load and unload
- ✓ No sharp edges that could damage waste bags or containers during loading and off loading
- ✓ Easy to clean

#### **3.5. Method**

- Remove bags and containers from initial storage area regularly.
- Minimize manual handling of waste bags.
- Handle all waste bags by the neck.
- Clean and disinfect waste containers regularly and immediately after spillage or accidental discharge.

### **4. Standard Operating Procedure of Treatment of Waste**

#### **4.1. Purpose**

This procedure is issued to ensure correct treatment of health care waste in the urban health center.

#### **4.2. Scope of Application**

Storage room or place for health care waste shall apply this treatment procedure before disposal.

#### **4.3. Responsibility**

Person in charge of treatment of health care waste shall apply this procedure.

#### **4.4. Equipment and Supplies**

- Needle cutter / Hub cutter
- Chemicals: Bleaching powder, Lime solution, Calcium oxide, Aseptol/Dettol

#### **4.5. Method**

- Disinfect infectious waste chemically by using bleaching powder, lime solution, calcium oxide or others (Aseptol/ Dettol).
- Use needle cutter to displace needles from syringes.
- Disinfect defanged syringes by 2% chlorine solution in order to be recycled.

### **5. Standard Operating Procedure of Disposal of Waste**

#### **5.1. Purpose**

This procedure is issued to ensure correct disposal of health care waste in the urban health center.

- 5.2. Scope of Application  
Storage room or place for health care waste shall apply this treatment procedure before disposal.
- 5.3. Responsibility  
Person in charge of disposal of health care waste shall apply this procedure.
- 5.4. Equipment and Supplies
- Sharp pit<sup>8</sup>
  - Placenta pit<sup>9</sup>
  - Sanitary land fill
- 5.5. Method
- Dispose placenta and small to placenta pit.
  - Dispose general waste, sharp waste and treated waste to municipal waste collecting system.
  - Dispose general waste and treated waste to sanitary land filling where there is no municipal waste collecting system.
  - Dispose sharp waste to sharp pit where there is no municipal waste collecting system.
  - Transport pharmaceutical waste to Township Hospital or Station Hospitals in order to be encapsulated and inertized.

**6. Issuance**

	Name	Title	Signature	Date
Prepared by				
Checked by				
Approved by				

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<sup>8</sup> Where there is enough space.

<sup>9</sup> Where there is enough space.

#### **8.4. SOPs of Health Care Waste Management for Rural Health Centers**

(Logo) Rural Health Center Address	Standard Operating Procedures	Document Number	
	Health Care Waste Management	Date issued	
		Date reviewed	

##### **1. Standard Operating Procedure of Waste Segregation**

###### **1.1. Purpose**

This procedure is issued to ensure correct segregation of health care waste in the rural health center.

###### **1.2. Scope of Application**

All rooms of rural health center in which health care waste is generated shall apply this procedure.

###### **1.3. Responsibility**

All persons who generate health care waste in rural health center (including all staff, patients, attendants and visitors) shall apply this procedure.

###### **1.4. Equipment and Supplies**

- Color-coded waste bags
- Labels
- Color-coded waste containers
- Sharp containers

###### **1.5. Method**

- Segregate health care waste as soon as it is generated.
- Contain each type of waste in designated bags and containers.
- Segregate sharp waste into sharp containers or red color bags or containers.
- Segregate infectious waste, pathological waste and anatomical waste into separate yellow color bags or containers with appropriate labels and logos.
- Segregate pharmaceutical and chemical waste into brown color bags or containers.
- Use double yellow bags for high risk infectious waste.
- Segregate general waste into black color bags or containers.

##### **2. Standard Operating Procedure of Waste Storage**

###### **2.1. Purpose**

This procedure is issued to ensure correct storage of health care waste in the rural health center.

###### **2.2. Scope of Application**

Storage room or place for health care waste shall apply this procedure.

###### **2.3. Responsibility**

Person in charge of health care waste storage room or place shall apply this procedure.

###### **2.4. Equipment and Supplies**

- Storage room or place of a size appropriate to the volume of waste produced
- Storage equipments and containers (bins, drums, cans, etc)
- Labels

###### **2.5. Method**

- Store different health care waste streams separately in standard storage equipment and specific storage containers such as bins, drums, cans etc.
- Ensure storage time of health care waste should not exceed 48 hours.

- Bury or dispose anatomical waste daily.
- Clean and disinfect storage room or place and equipment at least once a week.
- Locate specific areas for the initial storage of wastes near the source of waste.
- Locate health care waste storage area separately from general waste storage areas.

### **3. Standard Operating Procedure of Waste Transportation**

#### **3.1. Purpose**

This procedure is issued to ensure correct transportation of health care waste in the rural health center.

#### **3.2. Scope of Application**

All transportation of health care waste of rural health center shall apply this procedure.

#### **3.3. Responsibility**

Person in charge of health care waste transportation shall apply this procedure.

#### **3.4. Equipment and Supplies**

- Basket
- Trolley
- Cart

These are not used for any other purposes and meet the following specifications

- ✓ Easy to load and unload
- ✓ No sharp edges that could damage waste bags or containers during loading and off loading
- ✓ Easy to clean

#### **3.5. Method**

- Remove bags and containers from initial storage area regularly.
- Minimize manual handling of waste bags.
- Handle all waste bags by the neck.
- Clean and disinfect waste containers regularly and immediately after spillage or accidental discharge.

### **4. Standard Operating Procedure of Treatment of Waste**

#### **4.1. Purpose**

This procedure is issued to ensure correct treatment of health care waste in the rural health center.

#### **4.2. Scope of Application**

Storage room or place for health care waste shall apply this treatment procedure before disposal.

#### **4.3. Responsibility**

Person in charge of treatment of health care waste shall apply this procedure.

#### **4.4. Equipment and Supplies**

- Needle cutter / Hub cutter
- Chemicals: Bleaching powder, Lime solution, Calcium oxide, Aseptol/Dettol

#### **4.5. Method**

- Disinfect infectious waste chemically by using bleaching powder, lime solution, calcium oxide or others (Aseptol/ Dettol).
- Use needle cutter to displace needles from syringes.
- Disinfect defanged syringes by 2% chlorine solution in order to be recycled.

### **5. Standard Operating Procedure of Disposal of Waste**

#### **5.1. Purpose**

This procedure is issued to ensure correct disposal of health care waste in the rural health center.

#### **5.2. Scope of Application**

Storage room or place for health care waste shall apply this treatment procedure before disposal.

5.3. Responsibility

Person in charge of disposal of health care waste shall apply this procedure.

5.4. Equipment and Supplies

- Sharp pit
- Placenta pit
- Sanitary land fill

5.5. Method

- Dispose placenta to placenta pit.
- Dispose sharp waste to sharp pit
- Dispose general waste and treated waste to sanitary land filling.
- Transport pharmaceutical waste to Township Hospital or Station Hospitals in order to be encapsulated and inertized.

**6. Issuance**

	Name	Title	Signature	Date
Prepared by				
Checked by				
Approved by				

## **8.5. SOPs of Health Care Waste Management for Rural Health Sub-centers**

(Logo) Rural Health Sub-center Address	Standard Operating Procedures	Document Number	
	Health Care Waste Management	Date issued	
		Date reviewed	

### **1. Standard Operating Procedure of Waste Segregation**

#### **1.1. Purpose**

This procedure is issued to ensure correct segregation of health care waste in the rural health sub-center.

#### **1.2. Scope of Application**

All rooms of rural health sub-center in which health care waste is generated shall apply this procedure.

#### **1.3. Responsibility**

All persons who generate health care waste in rural health sub-center (including all staff, patients, attendants and visitors) shall apply this procedure.

#### **1.4. Equipment and Supplies**

- Color-coded waste bags
- Labels
- Color-coded waste containers
- Sharp containers

#### **1.5. Method**

- Segregate health care waste as soon as it is generated.
- Contain each type of waste in designated bags and containers.
- Segregate sharp waste into sharp containers or red color bags or containers.
- Segregate infectious waste, pathological waste and anatomical waste into separate yellow color bags or containers with appropriate labels and logos.
- Segregate pharmaceutical and chemical waste into brown color bags or containers.
- Use double yellow bags for high risk infectious waste.
- Segregate general waste into black color bags or containers.

### **2. Standard Operating Procedure of Waste Storage**

#### **2.1. Purpose**

This procedure is issued to ensure correct storage of health care waste in the rural health sub-center.

#### **2.2. Scope of Application**

Storage room or place for health care waste shall apply this procedure.

#### **2.3. Responsibility**

Person in charge of health care waste storage room or place shall apply this procedure.

#### **2.4. Equipment and Supplies**

- Storage room or place of a size appropriate to the volume of waste produced
- Storage equipments and containers (bins, drums, cans, etc)
- Labels

#### **2.5. Method**

- Store different health care waste streams separately in standard storage equipment and specific storage containers such as bins, drums, cans etc.



- Ensure storage time of health care waste should not exceed 48 hours.
- Bury or dispose anatomical waste daily.
- Clean and disinfect storage room or place and equipment at least once a week.
- Locate specific areas for the initial storage of wastes near the source of waste.
- Locate health care waste storage area separately from general waste storage areas.

### **3. Standard Operating Procedure of Waste Transportation**

#### **3.1. Purpose**

This procedure is issued to ensure correct transportation of health care waste in the rural health sub-center.

#### **3.2. Scope of Application**

All transportation of health care waste of rural health sub-center shall apply this procedure.

#### **3.3. Responsibility**

Person in charge of health care waste transportation shall apply this procedure.

#### **3.4. Equipment and Supplies**

- Basket
- Trolley
- Cart

These are not used for any other purposes and meet the following specifications

- ✓ Easy to load and unload
- ✓ No sharp edges that could damage waste bags or containers during loading and off loading
- ✓ Easy to clean

#### **3.5. Method**

- Remove bags and containers from initial storage area regularly.
- Minimize manual handling of waste bags.
- Handle all waste bags by the neck.
- Clean and disinfect waste containers regularly and immediately after spillage or accidental discharge.

### **4. Standard Operating Procedure of Treatment of Waste**

#### **4.1. Purpose**

This procedure is issued to ensure correct treatment of health care waste in the rural health sub-center.

#### **4.2. Scope of Application**

Storage room or place for health care waste shall apply this treatment procedure before disposal.

#### **4.3. Responsibility**

Person in charge of treatment of health care waste shall apply this procedure.

#### **4.4. Equipment and Supplies**

- Needle cutter
- Chemicals: Bleaching powder, Lime solution, Calcium oxide, Aseptol/Dettol

#### **4.5. Method**

- Disinfect infectious waste chemically by using bleaching powder, lime solution, calcium oxide or others (Aseptol/ Dettol).
- Use needle cutter to displace needles from syringes.
- Disinfect defanged syringes by 2% chlorine solution in order to be recycled.

### **5. Standard Operating Procedure of Disposal of Waste**

#### **5.1. Purpose**

This procedure is issued to ensure correct disposal of health care waste in the rural health sub-center.

5.2. Scope of Application

Storage room or place for health care waste shall apply this treatment procedure before disposal.

5.3. Responsibility

Person in charge of disposal of health care waste shall apply this procedure.

5.4. Equipment and Supplies

- Sharp pit
- Placenta pit
- Sanitary land fill

5.5. Method

- Dispose placenta to placenta pit.
- Dispose sharp waste to sharp pit
- Dispose general waste and treated waste to sanitary land filling.
- Transport pharmaceutical waste to Township Hospital or Station Hospitals in order to be encapsulated and inertized.

6. Issuance

	Name	Title	Signature	Date
Prepared by				
Checked by				
Approved by				

## **8.6 SOPs for Needle-Syringe Management at PHC Immunization Posts**

( Logo ) Sub RHC address	Standard Operating Procedure for Needle and Syringe waste Management	Document No:	
		Date issue	
		Date Review	

### **1. Standard Operating Procedure of Waste Segregation**

#### **1.1. Purpose**

This procedure is issued to ensure correct segregation of needle and syringes waste in the immunization posts either outreach activities or within any health facilities

#### **1.2. Scope of Application**

All immunization posts under the coverage of any health facilities in which needle and syringe health care waste is generated shall apply this procedure.

#### **1.3. Responsibility**

All persons who generate health care waste during immunization activities within the jurisdiction of any health facilities (including all basic health staffs, patients, attendants and visitors) shall apply this procedure.

#### **1.4. Equipment and Supplies**

- Autos disable syringes and needles
- Needle/hub cutter
- Sharp containers
- Color-coded waste bags

#### **1.5. Method**

- Segregate health care waste as soon as it is generated.
- Segregate needles in needle/hub cutter container and other sharp wastes including syringes, used or empty vials and ampoules into sharp containers or red color bags.
- Segregate general waste into black color waste bags

### **2. Standard Operating Procedure of Waste Storage**

#### **2.1. Purpose**

This procedure aims to ensure correct storage of needles and immunization syringes at immunization posts of any health facilities or in the outreach activities.

#### **2.2. Scope of Application**

Storage bags, Storage containers, Storage room or place for immunization wastes and sharp wastes shall apply this procedure.

#### **2.3. Responsibility**

Persons dedicated to conduct outreach immunization activities and have a responsibility to bring back immunization wastes to their respective sub-rural health facilities and shall apply the storage procedure of respective health facilities.

#### **2.4. Equipment and Supplies**

- Color-coded bags and puncture proof containers
- Back packs

#### **2.5. Method**

- Store immunization wastes such as needles, syringes initially in color-coded bags and puncture proof containers
- Store general wastes in black color bags
- Clean and disinfect storage equipment at least once a week.

### **3. Standard Operating Procedure of Waste Transportation**

#### **3.1. Purpose**

This procedure is issued to ensure correct transportation of immunization wastes such as, syringes, vaccine vials and ampoules from immunization posts and after completion of outreach immunization activities to the respective health facilities

3.2. Scope of Application

All kind of transportation of immunization waste at/ to any health facilities shall apply the procedure on transportation of their respective health facilities.

3.3. Responsibility

Person in charge of health care waste transportation shall apply this procedure.

3.4. Equipment and Supplies

- Bags
- Basket
- Back packs

3.5. Method

- Remove bags and containers regularly.
- Minimize manual handling of waste bags.
- Handle all waste bags by the neck.
- Discard defanged syringes into separate containers
- Clean and disinfect waste containers regularly and immediately after spillage or accidental discharge.

**4. Standard Operating Procedure of Treatment of Waste**

4.1. Purpose

This procedure is issued to ensure correct treatment of immunization wastes such as needles, syringes, vaccine vials and ampoules in any health facilities

4.2. Scope of Application

Storage containers, room or place for health care waste shall apply the treatment procedure of their respective health facilities before disposal.

4.3. Responsibility

Person in charge of storage, transport and treatment of health care waste shall apply this procedure.

4.4. Equipment and Supplies

- Chemicals: Bleaching powder, Lime solution, Calcium oxide, 2% Chlorine solution, Hydrogen peroxide, Aseptol/Dettol

4.5. Method

**Syringes**

- Use needle/hub cutter to displace needles from syringes
- Disinfect defanged syringes by 2% chlorine solution in order to be recycled.

**Vaccine vials**

- It should be applied according to the instructions developed by Central Expanded Program of Immunization Division.

**5. Standard Operating Procedure of Disposal of Waste**

5.1. Purpose

This procedure is issued to ensure correct disposal of immunization wastes in any health facilities.

5.2. Scope of Application

Storage room or place for health care waste shall apply this procedure for disposal.

5.3. Responsibility

Person in charge of management of health care waste shall apply this procedure.

5.4. Equipment and Supplies

- Sharp pit
- Standardized Incinerator

- Autoclave
- Secured burial pit
- Sanitary land fill

#### 5.5. Method

- Dispose sharp waste to sharp pit
- Dispose general waste and treated waste to sanitary land filling.
- Dispose vaccine vials according to the instructions developed by Central Expanded Program of Immunization Division, high temperature incineration or secured burial pits.

### **8.7 Checklist for Application of HCWM SOPs in a Health Care Facility**

Name of the Health Facility:

Address:

Name of the Head of Health Facility:

Name and Designation of Waste Management In-charge:

Date of Inspection:

Score: All Yes = 1 point, Any No = 0 point

Sr.		Yes	No	Score
<b>1</b>	<b>Establishment of SOP</b>			
	Have the SOPs been issued?			
	Are SOPs placed on Notice board?			
	Have all staff and workers read and signed the SOPs?			
	Has the in-charge of HCWM been assigned?			
<b>2</b>	<b>Segregation of HCW</b>			
	Do the staff and workers segregate the waste?			
	Do the staff and workers use colour coding?			
	Are waste containers placed properly?			
	Do the staff and workers use the color-coded waste bags?			
	Is there a needle cutter in injection room? (ignore if not supplied)			
	Do the staff practice needle cutting? (ignore if not supplied)			
	Is there sharp container in the injection room?			
<b>3</b>	<b>Storage of HCW</b>			
	Are different wastes stored differently?			
	Does storage time of health care waste not exceed 48 hours?			
	Is anatomical waste buried or disposed daily?			
	Is storage room and equipment cleaned and disinfected at least once a week?			
	Are there specific areas for the initial storage of wastes in the wards and departments or near the source of waste?			
	Is location of central storage area away from food preparation, public			

	access and exit route?			
	Is central storage area located separately from general waste storage areas?			
	Is there a practice of separating landfill waste and incinerable waste in the central storage area?			
<b>4</b>	<b>Transport</b>			
	Are waste bags and containers from initial storage removed regularly?			
	Is there an instruction to minimize manual handling of waste bags?			
	Is there a practice of handling all waste bags by the neck?			
	Is there a plan for internal transport routes from initial storage to central store?			
	Are there dedicated wheeled containers, trolleys or carts to transport the waste containers?			
	Is there a practice to clean and disinfect wheeled containers, trolleys or carts regularly?			
	Is there an instruction to clean and disinfect wheeled containers, trolleys or carts immediately after spillage or accidental discharge?			
<b>5</b>	<b>Treatment</b>			
	Is autoclavable infectious waste autoclaved before disposal?			
	Is non-autoclavable infectious waste disinfected by using chemicals before disposal?			
	Does staff use needle cutters? (if supplied)			
<b>6</b>	<b>Disposal</b>			
	Is an incinerator in use? (ignore if there is no incinerator)			
	Is non-treated infectious waste incinerated? (ignore if there is no incinerator)			
	Is small anatomical waste incinerated? (ignore if there is no incinerator)			
	Is placenta incinerated? (ignore if there is no incinerator)			
	Is a sharp pit in use? (ignore if there is an incinerator)			
	Is a placenta pit in use? (ignore if there is an incinerator)			
	Does a sanitary land filling practice? (ignore if there is an incinerator)			
<b>7</b>	<b>General</b>			
	Is there a record keeping system?			
	Have any training regarding health care waste management given?			
	Are equipment and supplies adequate?			

Total Score: (        ) out of 7.

Other Finding(s)

Is there a public participation on waste management?

Is there any experience of inspection on application of SOPs?

Impressing

Is overall compliance of waste management satisfactory?

Instruction / Recommendation:

	Name	Designation	Signature	Date
Checked by				
Countersigned by				
Approved by				

## 8.8 WBG Good Practice Note: Asbestos: Occupational and Community Health Issues

### 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>10</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.

### ASBESTOS AND HEALTH RISKS

#### 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>11</sup> The ILO estimates that over the last several decades 100,000 deaths globally have been due to asbestos exposure,<sup>12</sup> and the WHO states that 90,000 people die a year globally because of occupational asbestos exposure.<sup>13</sup>

Over 90% of asbestos<sup>14</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 area now widely recognized, global health and worker organizations, research institutes, and some governments have enacted bans

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<sup>10</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>11</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>12</sup> [http://www.ilo.org/wow/Articles/lang--en/WCMS\\_081341](http://www.ilo.org/wow/Articles/lang--en/WCMS_081341)

<sup>13</sup> [http://www.who.int/occupational\\_health/publications/asbestosrelateddiseases.pdf](http://www.who.int/occupational_health/publications/asbestosrelateddiseases.pdf)

<sup>14</sup> Asbestos defined in Castleman, B. *Asbestos: Medical and Legal Aspects* 5th Ed. New York: Aspen, 2005, 894 pp.



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>15</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>16</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)

### **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>17</sup> These diseases usually arise decades after the onset of asbestos exposure. Mesothelioma, a signal tumor for asbestos exposure, occurs among workers' family members from dust on the workers' clothes and among neighbors of asbestos air pollution point sources.<sup>18</sup> Some experimental animal studies show that high inhalation exposures to all forms of asbestos for only hours can cause cancer.<sup>19</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>20</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,

<sup>15</sup> ILO Asbestos Convention No. 162, (see <http://www.ilo.org/ilolex> or [http://www.ilo.org/actrav/osh\\_es/m%F3dulos/legis/c162.htm](http://www.ilo.org/actrav/osh_es/m%F3dulos/legis/c162.htm))

<sup>16</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>17</sup> [http://www.euro.who.int/document/aig/6\\_2\\_asbestos.pdf](http://www.euro.who.int/document/aig/6_2_asbestos.pdf)

<sup>18</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>19</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>20</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.

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>21</sup> although pipe standards have been issued for asbestos-cement pipes conducting “aggressive” water.<sup>22</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>23</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>24</sup>

### **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>25</sup> shows that a 59% increase in metric tons was consumed in 12 countries from 2000 to 2004.

## **INTERNATIONAL CONVENTION AND STANDARDS FOR WORKING WITH ASBESTOS**

### **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>26</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>27</sup> 17 of them have banned asbestos.

<sup>21</sup> [http://whqlibdoc.who.int/hq/2000/a68673\\_guidelines\\_3.pdf](http://whqlibdoc.who.int/hq/2000/a68673_guidelines_3.pdf)

<sup>22</sup> [http://whqlibdoc.who.int/hq/2000/a68673\\_tech\\_aspects\\_4.pdf](http://whqlibdoc.who.int/hq/2000/a68673_tech_aspects_4.pdf)

<sup>23</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.btinternet.co.uk/Frames/f\\_ika\\_hellen\\_asb\\_conf\\_rep.htm](http://www.ibas.btinternet.co.uk/Frames/f_ika_hellen_asb_conf_rep.htm)

<sup>24</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.” European Conference on Asbestos Risks and Management, Rome, Italy, December 4 -6, 2006.

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

<sup>25</sup> R. Virta, US Geological Survey, 2007.

<sup>26</sup> [www.ilo.org/ilolex](http://www.ilo.org/ilolex)

<sup>27</sup> <http://www.ilo.org/ilolex/english/convdisp1.htm>

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.

### **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: 5

- **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 HSG189/219<sup>28</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.

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<sup>28</sup> See Appendix 3

- **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>29</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 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>30</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.

## ALTERNATIVES TO ASBESTOS-CONTAINING MATERIALS

### 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>31</sup> The WHO is actively involved in evaluating alternatives.<sup>32</sup>

<sup>29</sup> See Basel Convention Secretariat <http://www.basel.int/>

<sup>30</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>31</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>32</sup> <http://www.who.int/ipcs/assessment/asbestos/en/>

### **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.

### **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>33</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>34</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>35</sup> following host country requirements or, if the country does not have its own requirements, internationally recognized procedures.<sup>36</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>37</sup>

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

## 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 (<a href="http://www.who.org">www.who.org</a>)</b> <input type="checkbox"/> <a href="http://www.searo.who.int/LinkFiles/Publications_and_Documents_prevention_guidelines.pdf">www.searo.who.int/LinkFiles/Publications_and_Documents_prevention_guidelines.pdf</a> (p. 70) <input type="checkbox"/> <a href="http://www.searo.who.int/en/Section23/Section1108/Section1835/Section1864_8658.htm">www.searo.who.int/en/Section23/Section1108/Section1835/Section1864_8658.htm</a>
<b>International Organization for Standardization (ISO) (<a href="http://www.iso.org">www.iso.org</a>)</b> <input type="checkbox"/> ISO 10312 (1995): Ambient air -- Determination of asbestos fibres -- Direct transfer transmission electron microscopy method. [Method similar to ASTM D6281] <input type="checkbox"/> ISO 13794 (1999): Ambient air – Determination of asbestos fibres – Indirect-transfer transmission electron microscopy method. <input type="checkbox"/> ISO/FDIS 16000-7: Indoor air – Part 7: Sampling strategy for determination of airborne asbestos fibre concentrations. <input type="checkbox"/> 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]
<b>Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal</b> <input type="checkbox"/> Basel Convention Secretariat ( <a href="http://www.basel.int">www.basel.int</a> )
<b>International Labour Organization (<a href="http://www.ilo.org">www.ilo.org</a>)</b> <input type="checkbox"/> Chemical Safety Card, ICSC 0014: <a href="http://www.ilo.org/public/english/protection/safework/cis/products/icsc/dtasht/_icsc00/icsc0014.htm">www.ilo.org/public/english/protection/safework/cis/products/icsc/dtasht/_icsc00/icsc0014.htm</a>
<b>European Union</b> <a href="http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&amp;lg=EN&amp;numdoc=32003L0018&amp;model=guichett">europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&amp;lg=EN&amp;numdoc=32003L0018&amp;model=guichett</a> <input type="checkbox"/> 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.
<b>NATIONAL STANDARDS</b>
<b>ASTM International (<a href="http://www.astm.org">www.astm.org</a>)</b> <input type="checkbox"/> 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. <input type="checkbox"/> 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 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. <input type="checkbox"/> 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. <input type="checkbox"/> 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 2nd 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 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

#### **National Institute of Building Sciences (<http://www.nibs.org/pubsasb.html>)**

- Guidance Manual: Asbestos O&M Work Practices, Second Edition (1996). Contains procedures for small-scale work on friable and non-friable ACM including asbestos-cement products.
- 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.

#### **Austrian Standards Institute ([http://www.on-norm.at/index\\_e.html](http://www.on-norm.at/index_e.html))**

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.

**International Chrysotile Association ([www.chrysotile.com](http://www.chrysotile.com)).** [Please note this organization represents asbestos industries and businesses]



- 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
- 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.

**U.S. National Institute for Occupational Safety and Health  
([www.cdc.gov/niosh/topics/asbestos](http://www.cdc.gov/niosh/topics/asbestos))**

- Occupational Safety and Health Guidelines for Asbestos ([www.cdc.gov/niosh/pdfs/0041.pdf](http://www.cdc.gov/niosh/pdfs/0041.pdf))
- Recommendations for Preventing Occupational Exposure ([www.cdc.gov/niosh/topics/asbestos/#prevention](http://www.cdc.gov/niosh/topics/asbestos/#prevention))
- 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
- 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

**U.S. Environmental Protection Agency ([www.epa.gov/asbestos](http://www.epa.gov/asbestos))**

- 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.
- 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.
- 20T-2003 Managing Asbestos in Place: A Building Owner's Guide to Operations and Maintenance Programs for Asbestos-Containing Materials "Green book" (1990)
- Guidance document covering: organizing an Operations and Maintenance (O&M) program including training O&M workers; recognizing types of O&M; work practices and precautions for O&M work.
- 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.
- Polarized Light Microscopy, Gravimetry, X-ray diffraction and Transmission Electron Microscopy methods of identifying and quantifying asbestos fibers in bulk building materials

**U. S. Occupational Safety and Health Administration (Department of Labor)  
([www.osha.gov/SLTC/asbestos](http://www.osha.gov/SLTC/asbestos)) / ([www.osha.gov/SLTC/asbestos/standards.html](http://www.osha.gov/SLTC/asbestos/standards.html))**

- 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.
- OSHA Method ID 160 Asbestos in Air (1994). Phase Contrast Microscopy method similar to

NIOSH 7400

**Ontario Ministry of Labour (Canada)**

([www.e-laws.gov.on.ca/DBLaws/Source/Regs/English/2005/R05278\\_e.htm](http://www.e-laws.gov.on.ca/DBLaws/Source/Regs/English/2005/R05278_e.htm))

□ 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).

**WorkSafe British Columbia (Canada)**

([www2.worksafebc.com/publications/OHSRegulation/Part6.asp](http://www2.worksafebc.com/publications/OHSRegulation/Part6.asp))

□ 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.

**Republic of South Africa, Department of Labour ([www.acts.co.za/ohs/index.htm](http://www.acts.co.za/ohs/index.htm) - type 'asbestos' in search box)**

□ 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.

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

<i>Asbestos product</i>	<i>Substitute products</i>
Asbestos-cement corrugated roofing	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. 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.
Asbestos-cement flat sheet (ceilings, facades, partitions)	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.
Asbestos-cement pipe	<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. <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).
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>38</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>39</sup>

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

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<sup>38</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>39</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.