

**Ministry of Health  
The Republic of Union of Myanmar**

**Myanmar Essential Health Services Access Project**

**Environmental Management Plan**

**Yangon, August, 2014**

## Introduction

This initial environmental assessment including health-care waste management provisions is linked to activities for the proposed Essential Health Services Access Project (EHSA) project in Myanmar implemented by the Ministry of Health (MoH) and financed by the World Bank/IDA loan. The project investments may cause some potential adverse environmental impacts associated with small 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 health-care 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 EHSA project's implementation could lead to an increase in site-specific environmental and health risks. This Environmental Management Plan (EMP) has been developed to meet the project recognized potential of health-care 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 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>1</sup>, direct observation of activities during field visits at selected health care facilities in Yangon region (Twantay Township) and Chin State (Paletwa and Ye Townships), and brief desk literature review. The health care facilities selected for site visits have been considered typical of the project coverage based on the MoH guidance. Special care was taken to include areas that could provide fair knowledge about the current practices in health-care waste management in various health care facilities. The samples drawn in the two provinces visited include the township hospitals, rural health centers<sup>2</sup> (RHCs), and health sub-centers<sup>3</sup>. The project has national coverage and will include all townships. Therefore, based on

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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. .

## Background

### Project Description

In support of Myanmar's move towards Universal Health Care as underlined in the legal framework of the new constitution enacted by the Republic of Union of Myanmar in May 2008, the Project Development Objective (PDO) of the first phase of World Bank Group support is to increase coverage of essential health services of adequate quality, with a focus on maternal, newborn and child health (MNCH). The Project components are:

Component 1: *Strengthening Service Delivery at the Primary Health Care Level (USD 92 million)*The central approach of this component would be to channel funds through the Ministry of Health to the States/Regions and to Townships and below for operational expenses. About 90% of the USD 92 million allocated to component 1 is expected to flow to townships and below. The funds will be used to (i) assist basic health staff and medical officers to expand outreach, supervision, communications, and engagement with communities; (ii) keep facilities, vehicles, furniture and equipment functioning and maintained; and (iii) allow users of facilities have basic needs met, such as clean water, appropriate foods and emergency travel costs. Funds would be provided to Township Medical Officers (TMOs), for onward disbursement to Rural Health Centers (RHC), Sub-Centers (SC) and Maternal and Child Health (MCH) Clinics, based on Standard Operating Procedures (SOPs), for eligible expenditures (to be discussed and agreed between Government and WBG).

The allocation of resources across facilities will be determined by a simple formula which results in a payment. The formula is designed with the following principles in mind: simplicity, transparency (formula is easy to understand and based on data that are easily available and beyond dispute), equity (with larger allocation to facilities in hardship townships) and predictability (in terms of the facility amounts and their timing). The formula may evolve over time as more data become available.

The project is nationwide in scope. The increased funds for operational costs would complement inputs already being provided, by MOH and development partners, at the primary health care units. These inputs include ensuring adequate supply of essential drugs, supply chain management, well-maintained equipment, and skilled workforce.

Inputs provided to the State / Regional Health Departments would help strengthen supervision, coordination and oversight functions of these departments, and help build their emerging/evolving new role in the health system in Myanmar, such as addressing health workforce gaps. Over the project life, a total of US\$ 12 million will be allocated to State and Region Health Departments according to Operations Manual.

Community empowerment: Through existing mechanisms, such as health committees at village and township levels, network of grassroots volunteers and women's groups, communities would be informed of efforts to improve service delivery, empowered to demand services, mobilized to participate in planning processes. Their role in providing feedback and oversight would be enhanced.

Component 2: *Systems Strengthening, Capacity-building and Program Support* would focus on strengthening of systems and institutions that are needed for effective service delivery at the primary health care level.

*Systems Strengthening*: will consist of the development of strategies, plans, SOPs, checklists and guidelines. Key outputs of this support will be the definition and costing of an EPHS, the development of a comprehensive health financing strategy for UHC, strategy for addressing convergence of health provision by Government and by ethnic minority authorities, the preparation of health care waste management guidelines, and development of quality score card for township and below, and SOPs for financial management and internal audit, among others. These activities are critical to the long-term system-building for the health sector in Myanmar, especially in the context of the country's aspiration for UHC.

*Capacity-building*: include training, courses, South-South learning, workshops and seminars. It will also support a career development fund for basic health staff, who are recognized for their outstanding performance, and for Ministry of Health officials for further studies in health economics, financing and management, and other areas critical for universal health coverage. Criteria for selecting training programs, institutions and the trainees, and other relevant details about this fund are included in the OM,

*Program support* includes preparatory work for the implementation of Component 1, such as strengthening of M&E arrangements, including studies and surveys, and TA for independent verification.

### Scope of EMP

The project is expected to provide direct financing to existing operational budget linked primarily to operation and maintenance of health care facilities in Myanmar. No new construction or expansion of existing health facilities will be financed under this project although the basic health services (e.g., number of rural health centers, sub-centers, and urban health centers) would need to have the minimum requirements at the level of country which are believed not to be met now. Construction of new HCFs are funded by MoH (from the existing operational budget) or by other development partners.

The project may include only financing for small-scale rehabilitation of existing health care facilities within the same foot print or financial support for new health care equipment for primary care use (e.g., syringes, bags and bins for health care waste). Such support might generate minor temporary site-specific environment impacts (e.g., dust, noise) and/or contribute to increased health waste, which needs proper management and disposal. General hazards to communities that are identified as being associated with poor health-care waste management include (i) injuries from sharp waste material to all categories of health workers and waste

handlers; (ii) risks of infections outside health care facility for waste handlers, scavengers and the general public, and spread of antibiotic resistance; and (iii) risks associated with hazardous chemicals, drugs, being disposed or managed improperly by those handling wastes at all levels.

Consequently, in line with the World Bank operational policy on environmental assessment the project has been proposed as category B since all physical works will take place within footprint of existing facilities with known limited impacts on surroundings and people. This EMP is developed by Ministry of Health (MOH) as part of the EHSA project preparation process to address potential impacts arising from project implementation and operation and in line with the relevant World Bank Safeguard Policies, occupational health and safety provisions, and the latest Burmese environmental and health regulations.

## **Environmental institutional, policies and legislative framework applicable to the project**

### **Myanmar health policy framework**

In line with the National Comprehensive Development Plan (Health Sector) (2011-12 to 2030-31), the current policy and institutional reform in the health sector includes development of priority areas in seven programs including health system strengthening (policy and legislation; universal health coverage, and strengthening information health systems). Yet, the existing legislation does not adequately address issues of health-care waste management. Also, coordination and supervision of health care wastes at all levels in the country is not clearly developed and needs further strengthening while a National Action Plan should be implemented to manage practices at all levels in an integrated health system.

National legislation on the management of hazardous wastes - including other categories of hazardous wastes, such as pesticides, certain industrial wastes, etc., is not clearly developed and national guidelines for the management of medical wastes are still to be formulated to complement standards on clinical policies and procedures and to follow monitoring practices.

**Relevant legislation addressing environmental health issues:** There are 15 legislations pertinent to environmental health in Myanmar such as:

- a) Forestry Law (1992)
- b) Protection of wildlife and Wild Plants and Conservation of Natural Areas Law (1994)
- c) *Public Health Law (1972)*
- d) Factory Act (1951)
- e) Territorial Sea and maritime Zone Law (1977)
- f) *National Environment Policy (1994)*
- g) *Draft Environment Law (2000)*
- h) Mines Law (1994)
- i) Plan Pest Quarantine Law (1993)
- j) Freshwater Fisheries Law (1991)
- k) Marine Fisheries Law (1990)
- l) Pesticide Law (1990)
- m) Law on Aquaculture (1989)

- n) Law on Fishing Rights of Foreign Fishing Vessels (1989)
- o) Irrigation Laws and Regulations (1982)

In addition, the law on *Environmental Impact Assessment* drafted in 2004 is currently under revision including its affiliated guidelines. Further, a list of national existing laws relevant to the health sector is presented in [Annex 1](#). Finally, Myanmar is a party to a number of international agreements related to environment and environmental health.

### **Institutional arrangements**

The National Health Committee (NHC) was formed on 28 December 1989 as part of the policy reforms. It is a high level inter-ministerial and policy making body concerning health matters.

The health matters are under the responsibility of the Ministry of Health (MoH). The MoH is headed by a Union Minister who is assisted by two Deputy Ministers. There are seven departments within the MoH, each responsible for different aspects of health care, such as: Department of Health (responsible for provision of health services and deployment of health workers); Department of Health Planning (responsible for developing the National Health Plan and managing the health information system); Department of Medical Sciences (responsible for the production of health workers); Departments of Medical Research for Lower Myanmar, and Upper Myanmar (responsible for conducting medical research and provide evidence based data for policy making); Department of Traditional Medicine (responsible for the development of Myanmar Traditional Medicine); and Department of Food and Drug Administration (responsible for the safety and quality of food, drugs, medical devices and cosmetics).

Overall, the Department of Health Planning is responsible for formulation, monitoring and evaluation of the National Health Plan and Department of Health has primary responsibility for health service provision for the entire population of the country. Department of Health Planning obtains information from various sources within the Ministry of Health and other stakeholders and disseminates the information through regular publications and consultations.

In Myanmar, health services are provided by the public, private and non-government organization (NGO) sectors. The health system is decentralized, with services being offered to patients at the village, township, district, state/regional and national level. The health system is networked by 1,558 rural health centers (RHC) under the administration of the Township Medical Officer (TMO). Each township serves approximately 100,000 to 200,000 people and is responsible for providing primary and secondary care services. At each RHC, about 20,000 people are served by a team of health workers known as Basic Health Staff (BHS). Within each township, there is one Township hospital with 16, 25 or 50 beds; at least 1-2 Station hospitals; and 4-7 RHC.

In line with the National Health Policy NGOs, both national and international, are also taking some share of service provision and their roles are also becoming important as the needs for collaboration in health become more prominent.

### **World Bank Group Safeguard Policies and regulations applicable to this project**

- 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

### **Environmental Safeguard screening**

The investment financed by this project will not include:

- new construction activity;
- renovation activity that is not done in the same existing building; within the same footprint, or within the extension of the respective building (e.g., addition of the any story and/or floor)
- items that would generate radioactive healthcare waste during operation (e.g., biomedical equipment) or use of pesticides such as for control of vector-borne diseases (e.g., malaria, dengue).

### **Current situation in health sector relevant to project activities**

The safe management of biomedical and health care waste is essential for community health. In order to tackle solid waste management effectively, it is essential for policy makers at Ministry of Health to pay special attention to sources of waste generation, segregation by type, coding, storage, transportation, treatment including pre-treatment, disposal of residues including flue emissions from incinerators, occupational health safety, stakeholder and community awareness. Although the portfolio for solid waste management does not directly fall under MoH responsibility, it is important for MoH to be involved and consult with other stakeholders because of health-care waste which inadvertently reaches the municipal waste.

In general, regulatory, policy and administrative guidelines and framework for health care waste management 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 constant 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. 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 inexistent. It is known worldwide that improved management of segregating waste within health care facilities can result in reduction of the proportional amount of waste requiring special treatment and disposal costs. In addition, technologies worldwide are available to treat and disinfect biomedical and health-care wastes so that the waste can finally be disposed of with low risk to both human health and the environment. Therefore, good international practices should be made available and followed to strengthen the country health care waste management capacity including infrastructure and staff skills and public awareness, in addition to development of appropriate policy, institutional strengthening and monitoring systems.

It is important for GoM to develop a system in which basic environmental permits and licenses must be obtained for all health care facilities in order to help managing better environmental impacts of health-care waste including among others air pollution, land degradation/soil pollution, health impacts and water pollution (e.g., environmental standards).

### **General observations during the field visit – baseline information**

Overall, the practices in health-care waste management are not satisfactory thus, individuals handling health-care waste, health care personnel and communities are potentially at risk. However, there is some awareness at all levels, which aims at protecting health workers, visitors to health care facilities and communities living within the vicinity of health-care waste generation. The majority of the health care facilities visited do try to make an effort and take responsibility with limited resources for the waste they generate to the environment and the public to ensure safe, sustainable and culturally acceptable methods for collection, storage, and transportation, much less on pre-treatment and final disposal both within and outside their premises.



Type of waste produced at the visited HCFs include: (i) non-risk health care waste or domestic waste made of all waste that are not contaminated with infectious or pathogen agents (food residues, paper, cardboard and plastic wrapping); (ii) Pathological waste, infectious waste as well as items that have been used for medical care; (iii) Sharps, mainly, but not exclusively, auto-disable or disposal syringes with needles that are collected in general in separate cardboard boxes; (iv) pharmaceutical waste that consists in outdated drugs or expired unfinished drug solution, and (v) chemical waste (from disposal of chemical reagent from laboratory inside hospital).

Infectious wastes are generated from infectious diseases like cholera, TB, dysentery, enteric fever, diphtheria, hepatitis, and human papilloma virus as well as from other STI infection. They were produced by cultures from laboratories in hospital, or waste from surgeries and autopsies on patients with infectious diseases. The hazardous waste in the hospitals visited were solid and liquid form (blood, secretion, piece of placenta, retained pieces of appendicitis, reagents from bio-chemical test, waste from bed net impregnated tablets, waste test kits etc.) provided by activities from treatment, nursing, labor, injection or procedure rooms as well as from laboratories.

Current health-care waste including infectious wastes such as swabs, syringes, blades, old medicine, contaminated gloves and other medical care waste, are sometimes either dumped in pits or simply thrown behind the facilities. Some of the wastes are burnt (e.g., disposable syringes, parts of human body) while others are simply buried. There is no segregation of waste and all is mixed and kept in plastic bags. Due to this infectious nature of the waste, the possibility of occupational infections seems high. There is no proper mechanism of disposal of pressured containers (e.g. inert gas, oxygen, aerosol cans) although there is awareness of the danger from explosion if accidentally punctured during burning in incinerator. The blood waste is packed in bottles and thrown in the common pit with other type of waste. Generally, facilities for management and disposal of waste observed vary from one health facility to another ranging from outdated incinerators to open air burning sites as there are no air pollution abatement facilities; placental pits, as well as open ditches; and use of public sewers lines for infectious liquid disposal.

The health care facilities visited were relatively clean but had modest or inadequate old equipment (pressure and temperature gauges containing mercury; electric cooking pots, and hospital beds). Asbestos containing materials were not observed at these sites, yet there could be old facilities with asbestos roofs in the country. In the absence of adequate infrastructures and equipment, some of the medical waste (drugs, vials) is dropped into a pit without segregation, and burnt periodically. The disposal of sharps is usually a big issue but it was found to be generally satisfactory. However, staff from hospital experienced cuts or puncture of skin while handling sharp disposal cases. There is a protocol for post exposure prophylaxis (PEP) of HIV as part of the hospital guideline. However, access to PEP kit including rapid tests is not widely available at the township level and below. In addition, basic health staff has low perceived risk of HIV transmission from the sharp injury. It is important to develop a culture in all health care facilities that will encourage appropriate behavioral change among health staff, communities, and all stakeholders.

Further, MOH does not have the full information of the current levels of waste production. This information is essential for the development of future local health waste national plans. Consequently, a comprehensive survey is essential for planning an effective health care waste management program. The HCFs have township health profile information available in forms of brochures or maps with graphs and tables placed on the walls. Such profiles include information on nutrition, reproductive health, prevention and control of common childhood diseases, expanded program on immunization, leprosy, tuberculosis and malaria (percentage of cases), health impact indicators, and hospital service and administrative indicators. The environmental health situation of the respective township is reported as percentage of coverage of sanitary latrines in urban and rural areas.

The water supply needed for HCFs activities is an issue; the water source is primarily rain water or lakes/ponds therefore communities are encouraged to ration their water use. In Twantay township health facility the local authority allocated budget to dig well water; however, the quality is not suitable for use since it is very salty. Also, there is no constant monitoring to verify the water quality. The Environmental Health Office in NPT has the responsibility to verify the water quality, which is analyzed twice annually. However, reporting is provided verbally without a written record. In practice, there is a lack of monitoring of the management of health care waste due to: 1) scarce knowledge on HCWM in the country; 2) limited financial resources; 3) incomplete legal and regulatory provisions, and 4) the understaffed health authorities.

The hospitals and HCFs lack proper waste water management system from latrines. Septic tanks are insufficient especially in the case where HCFs capacity has expanded (e.g., more beds). The health waste system at Township should be developed in line with the UN agenda for Environment and developed to prevent and minimize waste production, to reuse or recycle; to treat waste by safe and environmentally sound methods and to dispose of final residues by landfill in confined and carefully designed sites.

## **Potential Environmental Impacts and mitigation measures**

### ***1. Potential impacts due to minor renovation activities***

The project will have some adverse impacts associated with the renovation and refurbishing activities of the HCFs financed under project component 1. The renovation and refurbishing activities are minor and would be done in the same existing buildings, within the same footprint and without the extension of the respective buildings. These activities are considered minor civil works which may generate limited adverse environmental impacts such as dust, noise, vibration, waste, solid waste and safety issues. Also, there could be isolated health risks associated with exposure to asbestos containing materials in the case of old facilities that are using asbestos roofs. Additionally, in the case of building renovation activities including changes of internal layout (e.g., walls), there is a potential risk on the structure and safety of the existing buildings. These impacts are assessed to be of small scale, localized, in short-term period and manageable if good design and construction practices are followed. In this project case, specific Environmental Code of Practices (ECOPs) will be followed to avoid any possible impacts during such renovation works. The HCFs staff or those who will carry out these works will be

responsible to implement these ECOPs (see *Annex 2*). The ECOPs are also incorporated into the Operations Manual (-OM).

## ***2. Potential impacts during project operation 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.

**Solid healthcare waste:** the majority of healthcare waste is general waste which is similar to domestic waste; only about 20% of the solid healthcare waste is hazardous. MoH does not have clear information on generation of hazardous healthcare waste (HzHCW) from HCFs in Myanmar<sup>4</sup>.

At HCFs, hazardous healthcare waste is mainly infectious wastes including the following groups:

- Sharp waste: waste that can cut, puncture including needles, scalpels, knives, nails, bladders, broken glass and other sharp objects used in health care activities;
- Non-sharp infectious waste is waste in contact with blood and body fluids such as bandages,
- Anatomical waste includes parts of human body, tissues, placentae and animal carcasses

**Healthcare wastewater** generated from HCFs activities is estimated approximately 1m<sup>3</sup> per day and has the same basic component as the domestic wastewater. The principal area of concern of healthcare wastewater is high content of enteric pathogens, which are easily transmitted through water.

**Risks of healthcare waste** Exposure to hazardous health-care waste can result in disease or injury. All individuals exposed to hazardous health-care waste are potentially at risk, including those within health-care establishments and those outside these sources. The main groups at risk are: health staff (doctors, nurses, technicians); patients, their relatives and visitors; workers at waste disposal sites including scavengers; and nearby communities.

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; or by ingestion. The existence in HCFs of bacteria resistant to antibiotics and chemical disinfectants may also contribute to the hazards created by poorly managed health-care waste. Sharps may not only cause cuts and punctures but also infect these wounds if they are contaminated with pathogens. Sharp injuries are most popular accidents in health facilities. Sharp injury is the main transmission way of several dangerous infectious diseases such as HIV, HBV, and HCV. About 80% of occupational infections of HIV, HBV, and HCV are resulted from injuries by contaminated needles and sharps.

If fundamental hygienic measures are not applied such as application of aseptic measures is not practiced when waste containers are handled and transported within the wards or outside; the waste containers are not lined with adequate bags or not regularly disinfected; lids are

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<sup>4</sup> A survey taken in Vietnam concluded that there are about 0.08kg/bed/day HzHCW generated in HCFs, about 0.5 kg HzHCW/day while a sub-center generates from 1-2 kg HzHCW/day.

manipulated with no specific precaution, this obviously results in an increase of the risk of transmitting infections.

In addition to health and environmental impacts, the general public is very sensitive about the visual impact of anatomical waste, which is recognizable human body parts, including fetuses. It is prohibited to dispose of anatomical waste inappropriately.

The inappropriate off-site transportation, the disposal of clinical waste with the domestic waste in dumpsites and the absence of control procedures increase the risk for scavengers and communities to be contaminated. The use of incinerator especially with improper operation and/or maintenance generates release of air pollutants (PCI, heavy metals, etc.) and further constitutes an environmental health threat. Waste disposal by non-burn technologies will be provided by the project through public awareness and training to staff involved in health care management.

Unless healthcare wastes are managed strictly, they easily cause pollution of environment and health impacts. Given the relatively small amount of HzHCW and wastewater expected to be produced from HCFs, the environmental and health impacts of the project are considered localized and manageable.

### ***3. Typical Mitigation Measures***

#### **Standard mitigation measures for the HCFs renovation activities**

Prior to the renovation/refurbishment execution, the participating HCFs will ensure to prepare and review the design for renovation/refurbishing units where applicable. The designs for these renovations shall be approved by HCF management and or local competent agencies in line with the relevant legislation. During works the HCF staff shall be responsible for following the Environmental Code of Practices (ECOPs) (see *Annex 2*). Implementation of these ECoPs will be supervised and monitored by Occupational and Environmental Health Staff under guidance of DG, Department of Health and technical consultants that will be hired by project to help TMOs and Basic Health Staff in their overall responsibility with this EMP compliance.

#### **Standard Mitigation measures on waste management during project operation phase - development of General simple Waste Management Plan (WMP)**

This plan has been prepared to provide information on general health-care waste guidelines with options to minimize hazardous waste in selected waste streams. The plan is directed towards health care facilities staff, administrators, regulatory agencies, hospital service organizations, consulting firms and environmental compliance personnel.

The WMP will reflect 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:

Environmental issues	Mitigation measures	Applicable regulations
Solid healthcare waste (HCW) generated from healthcare activities	<p>HCFs will follow a healthcare waste process including: segregation, collection, treatment and disposal of solid HCW. The proposed standardized processes for HCW management are presented in <i>Annex 3</i>.</p> <p><u>Segregation of solid HCW:</u> Need to distinguish the waste immediately at the place of waste generation. Healthcare solid waste shall be segregated into 5 categories: infectious waste (sharp, non-sharp, highly infectious and anatomical waste), hazardous chemical waste, pressurized containers and general waste.</p> <p><u>Collection of solid HCW</u> Each HCF has to specify the location of waste containers for each type of healthcare waste where they are generated. The location of waste containers must have the instruction of waste classification and collection. Each group of healthcare waste must contain the bag or box fitted with the color code and suitable technical standard.</p> <p><u>Treatment and Disposal of solid HCW:</u> HCFs can apply one or several treatment options as below:</p> <ul style="list-style-type: none"> <li>• Transportation to the nearest disposal site;</li> <li>• Handling of waste immediately by friendly environment methods such as needle shredder machine, concrete tank, labeled bin;</li> <li>• Use of incinerators is not encouraged given the possible air pollution impacts and need of proper maintenance</li> </ul> <p><i>Annex 4</i> introduces applicable good practice methods for healthcare wastes treatment and disposal.</p>	Good international practice and regulations on healthcare waste management; national law
Wastewater generated from medical facilities	<p>Wastewater shall be collected separately from rainwater.</p> <p>Hygienic latrines shall be available and accessible to patients, health staff and visitors in HCFs.</p> <p>Wastewater shall be treated by on-site primary treatment facilities and disinfected before discharge</p>	National technical regulation on Hygienic conditions for Latrines; WHO requirements and standards

	into environment. Effluent shall meet national regulation on healthcare wastewater or WHO provisions.	
Risks associated with exposure to hazards in health environment	All health providers and workers will be provided with labor protection items.  Solving unexpected situations (injuries caused by needles, see <i>Annex 5</i> )	National and international guidelines; WHO

## Environmental management – institutional arrangements and safeguard implementation aspects

### Role and responsibility

*The primary healthcare teams and facilities* receiving funds for renovation works will follow ECoPs (Annex 2) during implementation of these activities; those facilities receiving capacity building and health items/medical equipment are responsible for developing simple healthcare waste management and implementing this plan during operation phase. The plan will cover segregation; collection, treatment and disposal of healthcare waste as well as responses to occupational exposure to hazardous materials (annex 3-4 present sample HCWM plan/procedures).

Occupational and Environmental Health Staff under the guidance of the DG, DOH (at central level) and TMOs (at township level) will coordinate activities to ensure that the project investments comply with national environmental management requirements and the Bank’s safeguard policies, including provisions of this EMP. Responsibilities of the Occupational and Environmental Health Staff, DOH, and TMOs will include, but are not limited to the following tasks:

- Supervise safeguard implementation by HCFs (with help of technical consultants);
- Manage 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 Occupational and Environmental Health Section , DOH and TMOs on project implementation including safeguard execution.

### Monitoring and reporting

During implementation of 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 designated Occupational and Environmental Health Staff of DOH 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 DG, DOH and TMOs as part of their progress reports.

The health committees, Occupational and Environmental Health Staff under DG, DOH 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 health-care 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 led by DG, DOH and the HCFs should assess in a timely manner the validity of complaints and take any necessary actions to remedy the situation.

Occupational and Environmental Health Staff of DOH and Project Steering Committee led by DG, DOH are responsible to provide technical guidance as needed to TMOs and HCFs to enable them fulfill their supervision responsibilities and related reporting and documentation requirements. Consequently, DG DOH 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.

### **Safeguards related Training and Capacity Building Plan**

Solid healthcare waste and Occupational Health and Safety training program will be developed under the project and provided to healthcare providers at 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 a consultant with health care waste management skills that will provide guidance and training to Occupation and Environmental Health Staff at DOH (central level), State/Region Health Department staff, TMOs, and HCFs 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 2 would finance activities over the four year period, which include among other aspects capacity building for health care waste management (US 1 million) targeting strengthening of related procedures and regulations; skills of staff, and providing initial supplies to allow proper implementation of procedures in facilities.

### **Cost for environmental safeguard implementation**

The cost for safeguard implementation is estimated as part of project component 2 overall costs. 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 plan for their facilities.

### **Public Consultation and Disclosure**

Public consultation on draft EMP (version of June 2014) was held by MoH representatives on July 7 in Yangon and July 8 in Mawlamyine. World Bank representatives attended discussions as observers. The meeting was opened by Dr. Yin Thandar Lwin, Director of Public Health from DOH, MOH, who welcomed participants and introduced the purpose of the meeting – to seek inputs and feedbacks from the participants on the project design and the draft safeguard documents. Short relevant PowerPoint presentations were provided on project safeguards documents including the content of draft EMP.

Main relevant suggestions on project environmental management aspects received during discussions included the need for the project investments and design to consider integration of health care waste minimization methods as well as to raise awareness on environmental impacts from the unsafe use of burners/stoves or incinerators currently employed in some HCFs for health care waste disposal and treatment. The current revised EMP and the project documentation reflects the suggestions received during the meeting. A summary of the public meetings is attached in Annex 7.



## **Annex 1 List of Legislations, Laws, Notification and Orders**

Existing health laws may be categorized as: health laws for promoting or protecting health of the people, health laws concerned with standard, quality and safety of care and laws relating to social organization. Some of them are in revision:

### **Leadership and Governance**

Myanmar Maternal and Child Welfare Association Law (1990) (Revised in 2010)  
The Myanmar Red Cross Society Act

### **Service Delivery**

Public Health Law (1972)  
Prevention and Control of Communicable Diseases Law (1995) (Amended in 2011)  
Epidemic Diseases Act  
Notification of formation of National Disaster Central Committee  
Notification of formation of National Disaster Work Management Committee  
The City of Yangon Municipality Act 263  
The Development Committees Law  
The Yangon Development Committee Law  
The Environmental Conservation Law 2012  
The Law Relating to Private Health Care Services (2007)  
The Control of Smoking and Consumption of Tobacco Product Law (2006)  
Narcotic Drugs and Psychotropic Substances Law (1993)  
National Food Law (1997)  
Eye Donation Law (1996)  
Blood and Blood Products Law (2003)  
Body Organ Donation Law (2004)

### **Health Workforce**

University Act 1963  
Myanmar Medical Council Law (2000)  
Dental and Oral Medicine Council Law (1989), (Revised in 2011)  
Traditional Medicine Council Law (2000)  
Law relating to the Nurse and Midwife (1990), (Revised in 2002)  
Principles of Medical Ethics  
Ethical Misconduct  
Myanmar Medical Council Guidelines for General Medical Doctors

### **Access to Essential Medicine and Technology**

Nation Drug Law (1992)  
Traditional Drug Law (1996)

### **Health Information and Research**

Myanmar Medical Research Council Act

**Health Financing** Social Security Law 2012

## Annex 2 - Environmental Codes of Practices (ECoPs)<sup>5</sup>

Environmental issues	Mitigation measures
Dust, noise and vibration generated from rehabilitation/minor works	<ul style="list-style-type: none"> <li>- The HCF staff is responsible for compliance with relevant national legislation with respect to ambient air quality, noise and vibration</li> <li>- The HCF Staff and the contractor(s) undertaking works shall ensure that the generation of dust is minimized and implement a dust control plan to maintain a safe working environment and minimize disturbances for patients, staff and surrounding community</li> <li>- The HCF Staff and the contractor(s) undertaking works shall implement dust suppression measures (e.g. water paths, covering of material stockpiles, etc.) as required. Materials used shall be covered and secured properly during transportation to prevent scattering of soil, sand, materials, or generating dust. Exposed soil and material stockpiles shall be protected against wind erosion</li> <li>- The HCF Staff shall ensure onsite latrine be properly operated and maintained to collect and dispose waste water from those who do the works</li> <li>- The HCF Staff should not carry out construction activities generating high level of noise during HCF activities, especially when services are being delivered to the clients.</li> </ul>
Solid waste generated from rehabilitation works	<ul style="list-style-type: none"> <li>- The HCF Staff shall develop and follow a brief site specific solid waste control procedure (storage, provision of bins, site clean-up, bin clean-out schedule, etc.) before commencement of any financed rehabilitation works;</li> <li>- The HCF Staff shall use litter bins, containers and waste collection facilities at all places during works.</li> <li>- The HCF Staff may store solid waste temporarily on site in a designated place prior to off-site transportation and disposal through a licensed waste collector</li> <li>- The HCF Staff shall dispose of waste at designated place identified and approved by HCF management or local authority. Open burning or burial of solid waste at the HCF premises shall not be allowed. It is prohibited for the HCF Staff to dispose of any debris or construction material/paint in environmentally sensitive areas (including watercourse)</li> <li>- Recyclable materials such as wooden plates for trench works, steel, scaffolding material, site holding, packaging material, etc shall be segregated and collected on-site from other waste sources for reuse or recycle (sale).</li> </ul>

<sup>5</sup> To be followed by those who are doing the renovation works in HCFs, e.g. HCF staff

	<ul style="list-style-type: none"> <li>- The 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).</li> </ul>
<p>Safety risks during works, health staff, patients and their relatives</p>	<ul style="list-style-type: none"> <li>- The HCF Staff shall comply with all national and good practice regulations regarding workers' safety.</li> <li>- The HCF Staff shall prepare and implement a simple action plan to cope with risk and emergency (e.g., fire, earthquake, floods)</li> <li>- The HCF Staff shall have or receive minimum required training on occupational safety regulations and use of personal protective equipment</li> <li>- The HCF Staff shall provide safety measures as appropriate during works such as installation of fences, use of restricted access zones, warning signs, lighting system to protect hospital/HCF staff and patients against falling debris and other risks.</li> </ul>

### Annex 3 - Sample Standardized Operating Procedures: Segregation of Health Care Waste

Health Care Facility (Name...)	STANDARDIZED OPERATING PROCEDURE SEGREGATION OF HEALTH CARE WASTE	Location	
		Township	
		Date	

1. **Purpose:** ensure correct segregation of health care waste
2. **Scope of application:** all rooms in HCFs generating health care waste shall apply this procedure.
3. **Responsibility:** all persons working in HCFs (including staff, medical students, patients and their relatives) generating health care waste shall apply this procedure.
4. **Equipments and supplies:**

**Waste bags** shall meet certain requirements: color coding (yellow, green, white, black); Yellow and black waste bags must be made of PE or PP (do not use PVC bags); Health care waste bags' minimum thickness is 0,1mm, bag capacity is appropriate to waste volume, maximum capacity is 0,1 m<sup>3</sup>; The outside of bags must have horizontal line at level ¾ and have the sentence "DO NOT CONTAIN WASTE OVER THIS LEVEL"; Waste bags must comply with regulations of color system and be used in the right way.

The outside of hazardous or recycled health care waste bags must include the suitable logo for each type of waste as follows: *Yellow* bags and containers for infectious waste must have logo of hazardous biological waste; *White* bags, containers for recycled waste must have logo of recycled waste

**Sharp containers** shall meet the following requirements: Hard wall and bottom are hardly penetrable, leak-proof capacity, suitable size, the lid easy to open/close, the opening is big enough to contain sharp items without propulsive force; have to be marked with the inscription "for sharp items only"; should have a horizontal line running at the height of 3/4 of the bag with the inscription of "no storing beyond this line", yellow color, with handle or enclosed with fixation system so that sharp items inside are not lost during transportation.

#### 5. **Methods:**

##### **Definition of healthcare waste**

Waste generated from HCF should be classified into the following categories: infectious waste, chemical waste, and general waste.

Infectious waste includes 4 groups as follows:

- Sharp waste (group 1A): is waste that can cut, puncture including: needles, syringe, scalpels, knives, nails, bladders, broken glass and other sharp objects used in health activities.
- Infectious non-sharp waste (group 1B): is waste in contact with blood, humor and waste generated from sterile rooms.
- Highly infectious waste (group 1C): generates from laboratories such as: autopsies and tools in contact with autopsies

- Anatomical waste (group 1D): includes parts of human body, tissues, placentae, foetus and animal carcasses.

Chemical waste includes Pharmaceuticals that are expired, low-graded or no longer needed; and harmful chemical substances in health care activities

General waste which does not contain hazardous agents include non-recyclable waste and recyclable waste

**Waste Segregation:**

- Health care waste must be segregated as soon as it is generated
- Each type of waste must be contained in specialized bags and containers with suitable logos
- Infectious waste is segregated into yellow color bags
- Sharp waste is segregated into sharp containers
- Chemical waste is segregated into black color bags
- General waste is segregated into green color bags
- Recyclable waste is segregated into white color bags

**Annex 4 - Sample Standardized Operating Procedures: Storage of Health Care Waste**

<b>Health Care Facility (Name...)</b>	<b>STANDARDIZED OPERATING PROCEUDRES STORAGE OF HEALTH CARE WASTE</b>	<b>Location</b>	
		<b>Township</b>	
		<b>Date</b>	

1. **Purpose:** ensure correct storage of health care waste.
2. **Scope of application:** The area/department of storage in HCF
3. **Responsibility:** persons in charge of healthcare waste storage area in HCF
4. **Equipments and supplies:**

Storages place shall meet the following requirements: be far from food-preparing places, patients, crowded sites and public paths; have roofs, doors and locks to prevent animals, rodents and unassigned persons from freely penetrating therein; the area is suitable to the waste volumes generated from the HCFs; be built with water drainage systems, water -resistant floor and wall, good ventilation.

Storage equipments for sharp waste are containers made of high density plastic, having thick and rigid wall. The container’s outside is marked with bio-hazard symbol, inscription of “sharp waste only”, a line at level of 3/4 and inscription of "not storing beyond this line".

5. **Methods:**
  - Different waste streams are stored separately.
  - Healthcare waste is stored in standard storage equipment
  - Storage time of healthcare waste should not exceed 48 hours.
  - Anatomical waste must be buried or disposed daily.
  - Storage area and equipment must be cleaned and disinfected regularly

## ANNEX 4.1. Guidance for selecting methods of HCW treatment and disposal

### Treatment technologies

While incineration is adequate to many types of healthcare waste, non-incineration technologies are adequate to certain types of waste. Disinfection by steam, microwave or chemicals is applicable to most of infectious waste, but not suitable to treat anatomical waste, sharps and chemical waste. Concrete bury pit is only applied to anatomical waste and sharps. Innertization is only adequate to chemical and pharmaceutical waste (*see Table 1*). Based on socio-economic conditions and availability of technologies, the FCH should select the treatment technologies which are most suitable to its specific circumstances (*see Table 2*).

**Table 1: Treatment and disposal methods suitable for different categories of healthcare waste**

	Pyrolytic incinerator	Wet thermal disinfection	Microwave irradiation	Chemical disinfection	Safe burying	Innertization	Others
<b>Infectious waste</b>							
Sharps	Yes	Yes	Yes	Yes	Yes	No	-
Non-sharps	Yes	Yes	Yes	Yes	Yes	No	-
Highly infectious	Yes	Yes	Yes	Yes	Yes	No	-
Anatomical	Yes	No	No	No	Yes	No	-
<b>Chemical waste</b>							
Pharmaceuticals	For small quantities	No	No	No	Yes	Yes	Return supplier

**Table 2: Main advantage and disadvantages HCW treatment technologies**

Technology	Advantages	Disadvantages
<b>Non-incineration technologies</b>		
Needle cutter	<ul style="list-style-type: none"> <li>- Prevent needle reuse</li> <li>- Easy to operate, low cost</li> <li>- Syringe can be recycled</li> </ul>	- Needles need further treatment after cut and separated
Needle destroyer	<ul style="list-style-type: none"> <li>- Needle is disinfected and destroyed by electricity</li> <li>- Easy to operate, low cost</li> <li>- Syringe can be recycled</li> </ul>	<ul style="list-style-type: none"> <li>- Require electricity</li> <li>- Stem of needle still exists after destroying.</li> </ul>
Innertization	<ul style="list-style-type: none"> <li>- Applicable to chemical waste and pharmaceutical waste</li> <li>- Simple to operate, low cost</li> </ul>	- Not applicable to other waste
Cement bury pit	<ul style="list-style-type: none"> <li>- Applicable to sharps and pathological waste</li> <li>- Simple to operate, low cost</li> </ul>	<ul style="list-style-type: none"> <li>- Requires land and space</li> <li>- Potential impact to underground water if poor design, construction</li> </ul>
Safe burying	<ul style="list-style-type: none"> <li>- Relatively safe if access to site is restricted and where natural infiltration is limited.</li> <li>- Low investment and operation cost</li> </ul>	- Only apply to hospitals in mountainous and rural area
Disinfection by steam (autoclave) and/or microwave	<ul style="list-style-type: none"> <li>- Highly efficient disinfection</li> <li>- Reduction in waste volume if shredder available</li> </ul>	- Inadequate for anatomical, pharmaceutical and chemical waste, and waste that is not readily





**Annex 5 - Sample Standardized Operating Procedures for treatment of accident due to sharp waste**

Health Care Facility (Name...)	STANDARDIZED OPERATING PROCEUDRES TREATMENT OF ACCIDENT DUE TO SHARP WASTE	Location	
		Township	
		Date	

1. *Purpose:* Ensure effective propphylaxis treatment of injury due to sharp waste.
2. *Scope of application:* all staff in the HCFs shall be responsible for applying this procedure

3. *Responsibility:*

Injured person shall be responsible for treating wound site, reporting to the supervisor and complete the report form, complying with testing and post-exposure prophylaxis treatment.

Head of department/HCF: send completed report form to Occupational and Environmental Health Staff under Department of Health and will be responsible for either directly providing or referring for counselling and anti-retroviral therapy.

Head of department/HCF: update the incident and take measures to prevent similar exposure.

4. *Equipments and supplies:* First aids tools for treatment of exposure site; Equipment for HIV, HBV, HCV testing; Antiretrovirus treatment drugs

5. *Methods:*

*Step 1: Treat the exposure site:* Flush the wound with tap water; Let the wound bleed for a short time 3 – 5 minutes, do not squeeze; clean the wound thoroughly with soap and water; disinfect wound by disinfectants (Dakin, Javel 1/10, alcohol 70<sup>0</sup>) in at least 5 minutes.

*Step 2: Report to the manager and complete the report form:* Indicate the date, time and the context of exposure, describe the wound and assess the level of risk. Get the signatures of the witnesses and the supervisor.

*Step 3: Assess the risk of exposure*

*Risk presents with:* Bleeding percutaneous wounds caused by containing blood needles: the risk is higher in case of deep wounds caused by large-bore needle containing a lot of blood compared with that of shallow wounds from fine needles with less blood; Deep percutaneous wounds caused by broken tubes containing patient's blood and body fluids; Existing lesions, ulcers or scratches on the skin or mucus membranes exposed to patient's blood and body fluids (even when the status of ulcers is unclear): the risk is higher with large ulcers or scratches.

*No risk:* normal skin exposed to patient's blood or body fluids.

*Step 4: Determine the HIV, HBV, HCV status of the source of exposure:* If the source patient is HIV (+), HbsAg (+), Anti HCV (+): get information on the use of and response to ARV treatment; If the HIV, HBV, HCV status of the source is unknown: provide counseling and perform HIV, HBV, HCV tests. In some cases it is impossible to identify the HIV status of the source (being exposed while on duty, the subject ran away), treat as HIV (+), HbsAg (+), Anti HCV (+) cases.

+ *Step 5: Determine the HIV, HBV, HCV status of the exposed person:* Provide pre-test and post-test counseling as regulated. If the exposed person has positive test result right after the exposure incident: HIV, HBV or HCV infection occurred before, not due to the exposure incident; If HIV (-), HBV (-), HCV (-) then HIV, HBV or HCV test is required after 3 months and 6 months.

+ *Step 6: Counsel the exposed person on.* Risk of infection with HIV, HBV, HCV; Information and services of the prophylaxis, its benefits and risks; Side effects of ARV and signs of primary HIV infection: fever, rash, nausea or vomiting, anemia, lymphadenopathy, etc; Prevention of HIV transmission to others: exposed person may transmit HIV to others even if the test is negative (the window period) and they, therefore should practice all prevention measures; Adherence to treatment and psychological support.

+ *Step 7: ARV prophylaxis for the exposed person:* Provide ARV treatment as soon as possible, best within 2 – 6 hours after and before 72 hours after the exposure to all exposure cases with risk. At the same time, assess the HIV status of the source of exposure and the exposed person. If the source of exposure is HIV (+): continue the treatment. If the source of exposure is HIV (-): it is possible to discontinue the treatment. If the source is suspected as having risk factor and is in the period window, the treatment should be continued. If the exposed person is HIV (+): do not provide prophylaxis, refer for follow-up and provide treatment as a normal HIV positive case. If the exposed person is HIV (-): continue the treatment; Exposure with no risk: no treatment is needed; If the HIV status of the source of exposure cannot be determined: treat as a case of exposure to the HIV (+) source.

## Annex 6. CHECKLIST ON HEALTHCARE WASTE MANAGEMENT

### 1. Assessment of current situation

No	Criteria	Status	Observations
<b>1</b>	<b>Healthcare waste is correctly and safely segregated at generating source</b>		
1.1	Sharp waste is segregated correctly and safely at generating source	<input type="checkbox"/> Yes <input type="checkbox"/> No	
1.2	Infectious waste is segregated correctly and safely at generating source	<input type="checkbox"/> Yes <input type="checkbox"/> No	
1.3	Chemical waste is segregated correctly and safely at generating source	<input type="checkbox"/> Yes <input type="checkbox"/> No	
1.4	General waste is segregated correctly and safely at generating source	<input type="checkbox"/> Yes <input type="checkbox"/> No	
1.5	Recyclable waste is segregated correctly and safely at generating source	<input type="checkbox"/> Yes <input type="checkbox"/> No	
1.6	Visible pictures or posters instructing healthcare waste segregation in department	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>2</b>	<b>Healthcare waste is safely collected at HCF</b>		
2.1	HCF designates a dirty room or area for waste collection	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2.2	At collection place, there are visible instruction on waste collection	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2.3	Infectious waste is safely collected in HCF	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2.4	Chemical waste is safely collected in HCF	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2.5	General waste is collected safely in HCF	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2.6	Recyclable waste is safely collected in HCF	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2.7	Waste containers cleaned and disinfected daily or regularly so that there is not dirt and bad odor	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>3</b>	<b>Healthcare waste is safely stored in HCF</b>		
3.1	Healthcare waste storage area is in place	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3.2	Healthcare waste storage area, if available, meet the regulatory requirements	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3.3	Infectious waste is stored safely	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3.4	Chemical waste is stored safely	<input type="checkbox"/> Yes <input type="checkbox"/> No	

No	Criteria	Status	Observations
3.5	General waste is stored safely	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3.6	Waste storage area and equipment are cleaned and disinfected daily	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>4</b>	<b>Healthcare waste is safely treated and disposed on-site or off-site</b>		
4.1	In case of off-site treatment, hazardous healthcare waste is transported to legal treatment and disposal facilities by special means in a controlled manner and in line with hazardous healthcare waste management regulations.	<input type="checkbox"/> Yes <input type="checkbox"/> No	Applicability <input type="checkbox"/> Yes <input type="checkbox"/> No
4.2	In case of on-site treatment, infectious waste is sterilized and shredded, then continued to treat for disposal as general waste	<input type="checkbox"/> Yes <input type="checkbox"/> No	Applicability <input type="checkbox"/> Yes <input type="checkbox"/> No
4.3	In case of on-site treatment, some hazardous healthcare waste (anatomical waste, sharps, and some chemical waste) is encapsulated or isolated in concrete pits being designed and operated in line with regulations on hazardous waste management	<input type="checkbox"/> Yes <input type="checkbox"/> No	Applicability <input type="checkbox"/> Yes <input type="checkbox"/> No
4.4	In case of on-site treatment, chemical healthcare waste is inertized by cement, then transported to legal landfill for disposal	<input type="checkbox"/> Yes <input type="checkbox"/> No	Applicability <input type="checkbox"/> Yes <input type="checkbox"/> No
4.5	In case of on-site treatment, healthcare waste is safely treated by existing incinerator applied stringent pollution control measures so that secondary pollution due to incinerator's gas emission and bottom ash are avoided	<input type="checkbox"/> Yes <input type="checkbox"/> No	Applicability <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>5</b>	<b>Wastewater from HCF is collected and treated properly</b>		
5.1	Healthcare wastewater is collected separately from storming water in collection network	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5.2	Latrines are sufficient to health staff and patients. Latrines meet technical regulations on design, operation and maintenance of hygienic latrine	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5.2	Wastewater is treated properly before discharge into environment	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>6</b>	<b>Healthcare waste management procedures are developed correctly and systematically.</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>7</b>	<b>HCF's staff are provided with sufficient</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No	

No	Criteria	Status	Observations
	personal protective equipment and use them properly		

**2. Main findings and recommendations**

Main findings	Recommendations

## Annex 7. Summary of Public Consultations on the Proposed World Bank-Financed “Essential Health Services Access Project”

### I. Schedule of the public consultation meetings:

Date	Time	Venue	Participants
July 7	10:00 – 12:00 hrs	Yadanar 3, Park Royal Hotel, Yangon	Local NGOs and Civil society orgs
July 7	14:00 – 16:00 hrs	Yadanar 3, Park Royal Hotel, Yangon	International NGOs
July 8	14:00 – 16:00 hrs	Shwe Myint Mo Tun Hotel, Mawlamyine, Mon State	Local NGOs and Civil Society Orgs

**II. Purpose of the Meetings.** To consult and seek feedback from stakeholders’ on the Ministry of Health (MOH) proposed health project financed by the World Bank, and its safeguard draft documents on Social Assessment, Community Empowerment planning Framework (CEPF) and Environmental Management Plan (EMP).

**III. Participants.** Total 109 participants from local NGOs, Civil Society Organizations, International NGOs, Ministry of Health and World Bank (WB).

### IV. Presenters and Resource Panel

#### *Presenters*

- Dr. Yin Thandar Lwin, Director (Public Health), Department of Health (DOH), MOH
- Dr. Thuzar Chit Tin, Deputy Director (Public Health), DOH, MOH
- U Htay Win, Deputy Director, Occupational and Environmental Health, DOH, MOH

#### *Documenters*

Hnin Hnin Pyne and Nang Mo Kham from the World Bank. Summary of the Public Consultations was shared with MOH after the consultation meetings for their review and comment.

#### *Resource Panel*

(i) Thant Sin Htoo, Deputy Director (Planning), Department of Health Planning, MOH; (ii) Wut Mon, Deputy State Health Director, Mon State Health Department; (iii) Hnin Hnin Pyne, Task Team Leader, WB, (iv) Nang Mo Kham, Human Development Specialist, WB, and (v) Kyaw Soe Lynn, Communications Officer, WB.

### V. Program

- (1) **Welcoming Remarks:** Dr. Yin Thandar Lwin, Director of Public Health from DOH, MOH welcomed participants and introduced the purpose of the meeting – to seek inputs and feedbacks from the participants on the project design and the draft safeguard documents.
- (2) **Presentations:** Three presentations were given by the respective officials from MOH. The first presentation on the rationale and design of the project was given by Dr. Yin Thandar Lwin. The second presentation on preliminary social assessment report and draft Community Empowerment Planning Framework (CEPF) was delivered by Dr. Thuzar Chit Tin (see Annex 3 for powerpoint presentation). The third and last presentation on Environmental Management Plan was given by U Htay Win.

### (3) Summary of Comments/Suggestions and Discussions

Comments/Suggestions	Responses
<p><b><i>Convergence between government health service provision and ethnic authorities' health service provision.</i></b></p> <p>Does convergence issue falls within the scope of the project? If so, how will this project support MOH engagements with ethnic authorities' health departments to ensure better alignment, coordination and collaboration between these service providers?</p> <ul style="list-style-type: none"> <li>• Health committees at various levels should have representation of all key stakeholders in the respective geographical areas, not just the public sector.</li> <li>• Recognize personnel/workforce of ethnic health organizations.</li> <li>• Include personnel/workforce of ethnic health organizations in training</li> <li>• Allow some activities (Penta3 immunization) be delivered by NGOs</li> <li>• In townships which have areas under the control of ethnic authorities, there should be collaboration with respective ethnic health authorities.</li> <li>• If there are health plans of ethnic organizations, they should also be incorporated and converged into township health plans.</li> </ul>	<p>CEPF under the proposed project plans intends to support inclusion of ethnic minority organizations in the township health planning process (development of an integrated township health plans)</p> <p>At this time there is no one national policy on convergence. This is linked to the peace process. Progress has been made however at the local and state levels, for example with training and provision of vaccines and commodities. The feedback will be shared and conveyed to decision makers in MOH to determine how best to advance the collaboration with ethnic health organizations.</p>
<p><b><i>Role of private sector</i></b></p> <ul style="list-style-type: none"> <li>• What is the role of LNGOs, faith based groups, and private sector in this project?</li> <li>• Would there be a role for private sector in the capacity building component of the project?</li> <li>• How does MOH intend to orientate both internally and with private providers on the concept of Private Public Partnership (PPP)?</li> <li>• Does the Government plan to fund or contract NGOs for service delivery?</li> </ul>	<p>The proposed project focuses on the public sector, but recognizes the role of private sector organizations is important. Local organizations are included in the CEPF.</p> <p>Under the Strategic Directions for UHC, PPPs is one such direction. There will soon be a convening event to focus on PPPs.</p> <p>Contracting and funding NGOs under this project is unlikely, because most of the external aid funding goes directly to NGOs.</p>
<p><b><i>Representation of civil society in national mechanisms</i></b></p> <ul style="list-style-type: none"> <li>• Representation and participation of civil society organizations in National Health Committee is missing. Similarly in M-HSCC, changes are needed so that NGOs, who are representing community, could have a voice.</li> </ul>	<p>This message will be conveyed to MOH decision makers and M-HSCC Secretariat.</p>
<p><b><i>Revitalization of Health Committees</i></b></p>	<p>Operations Manual of the Project will describe</p>

Comments/Suggestions	Responses
<ul style="list-style-type: none"> <li>• Project should clearly detail and outline the steps on how it proposes to revitalize the health committees.</li> <li>• 3MDG Fund, Global Fund etc are also strengthening the health committees through local NGOs and INGOs. TMOs should be supported to learn from these NGOs' experiences through study tour or exchange visit.</li> <li>•</li> </ul>	<p>the TORs of the committees at various levels.</p> <p>The proposed project would support learning from other initiatives.</p>
<p><b><i>Project Design</i></b></p> <ul style="list-style-type: none"> <li>• Clarify: (i) Rationale for choosing MNCH as the focus area? Has the actual package for MNCH been defined? Will task shifting be considered and included in the delivery? (ii) Amount of funds that will go to township level; (ii) Criteria for 'hardship' township; (iii) Poverty assessment data by township level should be used in the project.</li> <li>• How will the project support the improvements in demand side? Such as the voucher scheme.</li> <li>• How realistic is US\$100M to achieve UHC?</li> <li>• Will the project use money out of IDA loan for the technical assistance?</li> <li>• As the country is moving towards decentralization, state and region level should also be considered for support in the project.</li> </ul>	<p>MNCH is a priority area for the Government. It is a start in the long road to UHC.</p> <p>Hardship township are designated by Government for all sectors.</p> <ul style="list-style-type: none"> <li>• The proposed project would be linked to support for piloting demand side schemes.</li> <li>• US\$100 million is just to support the initial steps in UHC.</li> <li>• The proposed project funds TA, but TA will also be sought from grant sources.</li> <li>• The proposed project will support states and regions with funds.</li> <li>•</li> </ul>
<p><b><i>On Capacity and Focal Point</i></b></p> <ul style="list-style-type: none"> <li>• Ministry of Health has insufficient human resources. The available limited manpower has low motivation and insufficient time which might be consequences of low wages which are not sufficient to make a living. Too much centralization is also another weakness.</li> <li>• Caution is given however to take time to build systems and prepare the key players such as TMOs to be ready capacity-wise to take on the responsibility. Rushing it will cause burden and troubles for TMOs.</li> <li>• Who will be the focal point for the project within MOH for further contact and discussion?</li> </ul>	<p>Component 2 of the project focuses on staffing and building capacity of the staff at all levels, in particular township.</p> <p>Focal point for this project under the DOH will be Director General.</p> <p>In addition, Director at the International Health Division can also be reached for further details.</p>



Comments/Suggestions	Responses
<p><b><i>On Monitoring and Evaluation</i></b></p> <ul style="list-style-type: none"> <li>• How is the project going to measure the project outcomes?</li> <li>• Quality indicators should also be considered.</li> <li>• What is the purpose of data disaggregation by ethnicity (as recommended in CEPF)? Will it not lead to discrimination of certain ethnic groups?</li> <li>• What will WB do when deviations from SOPs are found during implementation?</li> <li>• How would the impact of the project be sustained beyond 4 years?</li> <li>• Does Demographic and Health Survey (funded by USAID) cover non-state ethnic authorities controlled areas?</li> </ul>	<ul style="list-style-type: none"> <li>• The proposed project document details the M&amp;E arrangements.</li> <li>• Disaggregated data will be collected by household surveys (not linked to delivery at the point of service).</li> <li>• WB financing is a small amount of what the Government spends on health and to the front lines, so financing can be sustained.</li> <li>• Info on DHS will need to be followed up by DHP responsible for DHS.</li> </ul>
<p><b><i>On Community Participation and Empowerment</i></b></p> <ul style="list-style-type: none"> <li>• How the project is going to make sure vulnerable groups are empowered through the project activities?</li> <li>• How will the project and MOH ensure the identification of needs by bottom-up approach?</li> <li>• How will the project and MOH identify the needs of the people in post-conflict setting?</li> </ul>	<p>CEPF will be institutionalized at the township level to ensure assessment of needs, in particular of vulnerable groups are included in planning and budgeting.</p>
<p><b><i>On Financial Management</i></b></p> <ul style="list-style-type: none"> <li>• Pouring money into the system will not really work unless there is synergy and collaboration at township level between all government structures. In some areas, administrative side does not pay attention or care at all about health even though TMO tries to engage.</li> <li>• Standard Operating Procedures (SOPs) should be developed as early as possible even before the money flows into the system.</li> </ul>	<p>Capacity building and additional staffing at township, state/region, and central levels will strengthen administrative and management.</p> <p>SOPs will be developed and staff trained prior to disbursement.</p>
<p><b><i>On Environmental Management</i></b></p> <ul style="list-style-type: none"> <li>• UNHCR supported clinics use burners to dispose waste. Project should consider how to do waste disposal without using burners or incinerators.</li> <li>• Waste minimization methods should also be considered.</li> </ul>	<p>The proposed project will support national guidelines on waste management (yet to be developed in line with good practice) and implementation of these guidelines at the township and below. The project EMP addresses these 2 concerns.</p>

Comments/Suggestions	Responses
<p><b><i>On Financial Protection</i></b></p> <ul style="list-style-type: none"> <li>In order to reduce financial burden due to health spending at household level, health insurance can play an important role. Does MOH have a policy on how to develop or encourage agencies that can provide health insurance?</li> </ul>	<p>The proposed project will finance development of the health financing strategy. This will lay out various options, including health insurance.</p>
<p><b><i>General Comments</i></b></p> <ul style="list-style-type: none"> <li>IDA loan for health sector is welcomed and congratulated MOH for preparing the project. However, MOH should pay attention to the difference between loan and grant agreements to ensure the successful implementation of the loan.</li> <li>Representatives from Health department of Karen ethnic authority welcomed the proposed project. The focus on township level is very relevant.</li> <li>Overall, the project design which based on the strengthening of township and grassroots level is good.</li> <li>Good to see focus on Primary Health Care (PHC). For a very long time, it was touted at least politically as the key approach for health for all in the country. But in reality, MOH has had hospital-centric approach in resource allocation. Even among doctors, those who work on PHC did not get much encouragement or support. Without prioritizing PHC, the country cannot achieve UHC.</li> </ul>	<p>Well noted</p>

**(4) Words of Thanks**

Ministry of Health and World Bank appreciated all comments and suggestions from the participants to help improve the project design and safeguard measures. Both promised to share the comments and suggestions with the wider MOH and World Bank team to take into account the inputs from the participants into the project design and implementation.

## **Annex 8 WBG Good Practice Note: Asbestos: occupational and Community Health Issues**

### **1. SUMMARY**

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

Practices regarding asbestos that are normally considered acceptable by the World Bank Group (WBG) in projects supported through its lending or other instruments are addressed in the WBG's General Environmental, Health and Safety (EHS) Guidelines.<sup>6</sup> This Good Practice Note provide background and context for the guidance in the WBG EHS Guidelines.

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

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

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

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

Asbestos is a group of naturally occurring fibrous silicate minerals. It was once used widely in the production of many industrial and household products because of its useful properties, including fire retardation, electrical and thermal insulation, chemical and thermal stability, and high tensile strength. Today, however, asbestos is recognized as a cause of various diseases and cancers and is considered a health hazard if inhaled.<sup>7</sup> The ILO estimates that over the last several decades 100,000 deaths globally have been due to asbestos exposure,<sup>8</sup> and the WHO states that 90,000 people die a year globally because of occupational asbestos exposure.<sup>9</sup>

Over 90% of asbestos<sup>10</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

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<sup>6</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>7</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>8</sup> [http://www.ilo.org/wow/Articles/lang--en/WCMS\\_081341](http://www.ilo.org/wow/Articles/lang--en/WCMS_081341)

<sup>9</sup> [http://www.who.int/occupational\\_health/publications/asbestosrelateddiseases.pdf](http://www.who.int/occupational_health/publications/asbestosrelateddiseases.pdf)

<sup>10</sup> Asbestos defined in Castleman, B. *Asbestos: Medical and Legal Aspects* 5th Ed. New York: Aspen, 2005, 894 pp.

insulation, non-friable flooring materials, and other applications. The maintenance and removal of these materials warrant special attention.

Because the health risks associated with exposure to asbestos are now widely recognized, global health and worker organizations, research institutes, and some governments have enacted bans on the commercial use of asbestos (see Box 1), and they urge the enforcement of national standards to protect the health of workers, their families, and communities exposed to asbestos through an International Convention.<sup>11</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>12</sup> In June 2006, the General Conference of the ILO adopted a resolution to "promote the elimination of all forms of asbestos and asbestos-containing materials."

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

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

Health hazards from breathing asbestos dust include asbestosis, a lung scarring disease, and various forms of cancer (including lung cancer and mesothelioma of the pleura and peritoneum).<sup>13</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>14</sup> Some experimental animal studies show that high

<sup>11</sup> ILO Asbestos Convention No. 162, (see <http://www.ilo.org/ilolex> or [http://www.itcilo.it/actrav/osh\\_es/m%F3dulos/legis/c162.htm](http://www.itcilo.it/actrav/osh_es/m%F3dulos/legis/c162.htm))

<sup>12</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>13</sup> [http://www.euro.who.int/document/aicq/6\\_2\\_asbestos.pdf](http://www.euro.who.int/document/aicq/6_2_asbestos.pdf)

<sup>14</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.

inhalation exposures to all forms of asbestos for only hours can cause cancer.<sup>15</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>16</sup> Renovations and repairs in buildings containing A-C materials can also endanger building occupants. In addition to the problems from products made with commercial asbestos, asbestos also occurs as a contaminant in some deposits of stone, talc, vermiculite, iron ore, and other minerals. This can create health hazards for workers and residents at the site of excavation and in some cases in the manufacture and use of consumer products the materials are used to make. While asbestos is a known carcinogen when inhaled, it is not known to be carcinogenic when ingested, as through drinking water,<sup>17</sup> although pipe standards have been issued for asbestos-cement pipes conducting “aggressive” water.<sup>18</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>19</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>20</sup>

### 2.3. Increasing Use of Asbestos Fiber

There is evidence that, after a decline in the 1990s, the use of asbestos fiber is increasing globally. A recent study<sup>21</sup> shows that a 59% increase in metric tons was consumed in 12 countries from 2000 to 2004.

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<sup>15</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>16</sup> International Program on Chemical Safety, “Conclusions and Recommendations for Protection of Human Health,” *Chrysotile Asbestos, Environmental Health Criteria 203*. Geneva: World Health Organization, 1998, p. 144.

<sup>17</sup> [http://whqlibdoc.who.int/hq/2000/a68673\\_guidelines\\_3.pdf](http://whqlibdoc.who.int/hq/2000/a68673_guidelines_3.pdf)

<sup>18</sup> [http://whqlibdoc.who.int/hq/2000/a68673\\_tech\\_aspects\\_4.pdf](http://whqlibdoc.who.int/hq/2000/a68673_tech_aspects_4.pdf)

<sup>19</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\\_lka\\_hellen\\_asb\\_conf\\_rep.htm](http://www.ibas.btinternet.co.uk/Frames/f_lka_hellen_asb_conf_rep.htm)

<sup>20</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>21</sup> R. Virta, US Geological Survey, 2007.

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

#### 3.1. International Convention

The International Labor Organization (ILO) established an Asbestos Convention (C162) in 1986 to promote national laws and regulations for the “prevention and control of, and protection of workers against, health hazards due to occupational exposure to asbestos.”<sup>22</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>23</sup> 17 of them have banned asbestos.

Some of the ILO asbestos convention requirements:

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

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

#### 3.2. International Standards and National Regulations

Standards and regulations for work involving ACM have been published by nongovernmental organizations and government agencies. Appendix 3 provides a listing of some resources, including international organizations (e.g., WHO, ISO, ASTM) and national governments (e.g., UK, US, Canada, South Africa). The resources range from manuals to individual standards and cover a variety of work guidelines, including surveys, identification, inspection, maintenance, renovation, repair, removal, and disposal. Some of the key issues discussed in these standards and regulations are as follows: 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>24</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

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<sup>22</sup> [www.ilo.org/ilolex](http://www.ilo.org/ilolex)

<sup>23</sup> <http://www.ilo.org/ilolex/english/convdisp1.htm>

<sup>24</sup> See Appendix 3

other than workers, including occupants of buildings and facilities and the community, are lower than those for workers in deference to the very young and old as well as the physically compromised.

- ⌚ **Measuring exposure to airborne fibers.** Compliance with exposure limits is demonstrated by air sampling in workers' breathing zone or in the space occupied by the affected individuals, with analysis of the sample by optical or electron microscopy, as explained in Appendix 3. Abatement protocols determine whether a building can be reoccupied after asbestos abatement.
- ⌚ **Proper disposal.** Proper disposal of ACM is important not only to protect the community and environment but also to prevent scavenging and reuse of removed material. ACM should be transported in leak-tight containers to a secure landfill operated in a manner that precludes air and water contamination that could result from ruptured containers. Similar requirements apply to remediation of sites such as mines, mills, and factories where asbestos fiber was processed and products manufactured. (See EPA NESHAP regulations, Appendix 3.)
- ⌚ **Transboundary movement of waste.** Waste asbestos (dust and fibers) is considered a hazardous waste under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. The Basel Convention imposes use of a prior informed consent procedure for movement of such wastes across international borders. Shipments made without consent are illegal. Parties have to ensure that hazardous waste is disposed of in an environmentally sound manner (ESM). Strong controls have to be applied from the moment of generation, to its storage, transport, treatment, reuse, recycling, recovery and final disposal.<sup>25</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>26</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.

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<sup>25</sup> See Basel Convention Secretariat <http://www.basel.int/>

<sup>26</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.

## 4. ALTERNATIVES TO ASBESTOS-CONTAINING MATERIALS

### 4.1. Growing Marketplace

Safer substitutes for asbestos products of all kinds are increasingly available (see Appendix 4). These include fiber-cement products using combinations of local vegetable fibers and synthetic fibers, as well as other products that serve the same purposes.<sup>27</sup> The WHO is actively involved in evaluating alternatives.<sup>28</sup>

### 4.2. Cost and Performance Issues

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

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

The WBG EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP).<sup>29</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>30</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

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<sup>27</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>28</sup> <http://www.who.int/ipcs/assessment/asbestos/en/>

<sup>29</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>30</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)



activities. Repair or removal and disposal of existing ACM in buildings should be performed only by specially trained personnel<sup>31</sup> following host country requirements or, if the country does not have its own requirements, internationally recognized procedures.<sup>32</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>33</sup>

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<sup>31</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>32</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>33</sup> [http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui\\_EHSGuidelines2007\\_GeneralEHS/\\$FILE/Final+-+General+EHS+Guidelines.pdf](http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/$FILE/Final+-+General+EHS+Guidelines.pdf) (pp. 71, 91, 94)

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

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

<b>APPENDIX 2. WORLD BANK GROUP ASBESTOS REFERENCES <i>Policy guidance</i></b>	<b><i>References</i></b>
<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.

<p><b>INTERNATIONAL STANDARDS</b></p> <p><b>WHO Policy and Guidelines (www.who.org)</b></p> <ul style="list-style-type: none"> <li><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)</li> <li><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></li> </ul> <p><b>International Organization for Standardization (ISO) (www.iso.org)</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> ISO 10312 (1995): Ambient air -- Determination of asbestos fibres -- Direct transfer transmission electron microscopy method. [Method similar to ASTM D6281]</li> <li><input type="checkbox"/> ISO 13794 (1999): Ambient air – Determination of asbestos fibres – Indirect-transfer transmission electron microscopy method.</li> <li><input type="checkbox"/> ISO/FDIS 16000-7: Indoor air – Part 7: Sampling strategy for determination of airborne asbestos fibre concentrations.</li> <li><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]</li> </ul> <p><b>Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Basel Convention Secretariat (<a href="http://www.basel.int">www.basel.int</a>)</li> </ul> <p><b>International Labour Organization (www.ilo.org)</b></p> <ul style="list-style-type: none"> <li><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></li> </ul> <p><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>)</p> <ul style="list-style-type: none"> <li><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.</li> </ul> <p><b>NATIONAL STANDARDS</b></p> <p><b>ASTM International (www.astm.org)</b></p> <ul style="list-style-type: none"> <li><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.</li> <li><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</li> </ul>
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non-friable materials allows removal priorities to be tabulated and graphically displayed. Budgetary estimates for removal can be established on the basis of the quantitative assessments.

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

#### **Australia**

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

- Safe Removal of Asbestos 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 ACBM, 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>34</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>35</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>34</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>35</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.