



The Republic of Union of Myanmar
Ministry of Health and Sports

Essential Health Services Access Project &
Additional Financing of Essential
Health Services Access Project

ENVIRONMENTAL MANAGEMENT PLAN

25 October 2019



The Republic of Union of Myanmar
Ministry of Health and Sports

Essential Health Services Access Project &
Additional Financing of Essential
Health Services Access Project

ENVIRONMENTAL MANAGEMENT PLAN

25 October 2019



Content

1	Introduction and Objective	3
1.1	Project description	4
1.2	Objective and scope of Environmental Management Plan	13
2	Environmental policies applicable to the Project	15
2.1	National environmental regulations	16
2.2	World Bank environmental safeguard policies	16
3	Baseline information about environmental status in health facilities	17
3.1	Environmental considerations in construction of health facilities (HCFs)	18
3.2	Healthcare waste management	19
4	Potential environmental impacts	21
4.1	Potential environmental impacts due to construction and renovation activities	22
4.2	Potential environmental impacts during the operational phase	22
5	Typical mitigation measures	25
5.1	Measures to mitigate impacts due to construction and renovation activities	26
5.2	Measures to mitigate impacts from healthcare waste	28
6	Environmental management	33
6.1	Institutional arrangement (roles and responsibilities)	34
6.2	Monitoring and reporting	35
6.3	Training and capacity building	36
6.4	Budget	36
7	Public consultation and disclosure	37
8	Annexes	39
8.1	SOPs of Health Care Waste Management for Township Hospitals	40
8.2	SOPs of Health Care Waste Management for Station Hospitals	44
8.3	SOPs of Health Care Waste Management for Urban Health Centers	48
8.4	SOPs of Health Care Waste Management for Rural Health Centers	52
8.5	SOPs of Health Care Waste Management for Rural Health Sub-centers	56
8.6	SOPs for Needle-Syringe Management at PHC Immunization Posts	60
8.7	Checklist for Application of HCWM SOPs in a Health Care Facility	64
8.8	WBG Good Practice Note: Asbestos: Occupational and Community Health Issues	67



1

Introduction and Objective

1. Introduction and Objective

1.1 Project description

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

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

Project Development Objective

The Project Development Objective (PDO) remains the same: to increase coverage of basic essential package of health services of acceptable quality, with a focus on maternal, newborn and child health. Key changes to the original design and scope are as follows:

1. Modifying Component 1 to add another dimension of strengthening service delivery at primary health care level—i.e., Component 1.2 on fully functional health service delivery infrastructure;
2. Modifying original Component 2 on Systems Strengthening, Capacity Building and Project Management Support, with two sub-components—2.1. that emphasizes systems strengthening to improve service delivery at PHC level; and 2.2. that finances innovations, project management and Monitoring and Evaluation (M&E);
3. Addition of GFF Trust Fund support to Myanmar's efforts on making greater strides in improving reproductive, maternal, newborn, child and adolescent health outcomes, in particular reduction of maternal and neonatal mortality through increased institutional deliveries and improved newborn care;
4. Modifying Component 3 on Contingent Emergency Response to enable rapid reallocation of unused IDA funds under the AF to respond to health needs arising from unanticipated eligible crisis or emergency; and access to the Pandemic Emergency Facility (PEF), a global window

that provides surge financing to IDA countries to provide timely funds to respond to pandemics;

5. Improvement of implementation arrangements based on lessons learnt thus far, inter alia, the establishment of a Project Management and Operations Support Team (P-MOST) at the central level and additional human resources for planning and financial management at the selected region/state level;
6. Updating the Results Framework, including PDO indicators and DLIs, to reflect the changes in the project activities, and to incorporate lessons learned from the project implementation so far;
7. Changing the disbursement modality of the components—Component 1.2 and Component 2.2 would adopt an input-based disbursement modality; and Component 1.1 and 2.1 would use results-based financing, using DLIs;
8. Extension of the life of the project by revising the Closing Date from March 31, 2021 to September 30, 2024.

Description of Project components

Component 1: Strengthening Service Delivery at the PHC Level

Component 1 of AF project will continue, as under EHSAP, to improve the readiness of PHC facilities to deliver essential health services, especially for women, and children including newborns, this being a prerequisite for achieving Myanmar's aspiration to achieve UHC by 2030. It is now organized into two sub-components to give clarity and distinction between the focus of this component under the OC and the AF: (1.1) Health Facility Funds; and (1.2) Fully Functional Health Service Delivery Infrastructure.

Sub Component 1.1 - Health Facility Funds (USD 84 Million of IDA under OC): Under OC, this sub component focused on increasing operational budget to health facilities in all townships through Health Facility Funds to address the lack of adequate and predictable fund flow for operational expenses at the frontlines. Having implemented for four years (FY 15/16 to FY18/19) and disbursements made based on the achievement of DLI targets, this subcomponent is now completed.

Sub Component 1.2 – Fully Functional Health Service Delivery Infrastructure (USD 65 Million of IDA under AF): Under AF, this sub component will invest in fully functional health service delivery infrastructure (FFHSDI) in selected disadvantaged townships in Ayeyarwady Region and Shan State. These two geographical areas bear a large burden of health and nutrition gaps in Myanmar, in part due to population size, aggravated by difficult terrain, and conflict in the latter case. A nationwide assessment of vulnerability carried out in Myanmar found that Ayeyarwady Region and Shan State have the largest populations of vulnerable persons in the country (MIMU 2018).

EHSAP has been supporting supply side readiness by helping to provide timely and flexible

operational funds to the primary health care facilities, i.e., at Township level and below. Recognizing that the operational funds can be effective only if adequate infrastructure is available, AF proposes to respond to the Government request for infrastructure financing; it has been agreed that such infrastructure does not merely consist of buildings; rather they would include equipment, supplies of essential medical and non-medical consumables, water supply, electricity and such amenities, adequate operational & maintenance budget, and sufficient numbers of skilled personnel, i.e., fully functional health service delivery infrastructure (FFHSDI). The facility layout, amenities and other inputs mentioned afore should be commensurate with the prescribed standards for the respective type of health facility, and match the service needs of the basic Essential Package of Health Services (EPHS) in accordance with the National Health Plan (NHP).

The IDA investment under the sub component 1.2 would finance the capital investments in infrastructure (buildings, equipment, water, sanitation & furniture) such as well-functioning delivery rooms and newborn care facilities in township and station hospitals, and reconstruction and renovation of health centers below the township level, such as rural health centers (RHCs) and sub-RHCs; and the Government would ensure adequate financing from its own budget for the recurrent costs of human resources, operational expenses and essential medicines. At the same time, MOHS will ensure that the sanctioned positions for essential health workers are filled in these facilities.

Specifically, putting in place FFHSDI contributes to maternal and newborn health and enables institutional deliveries and adequate post-natal care for women and newborns. As institutional delivery is identified as the best-known intervention in reducing maternal and neonatal mortality, pregnant mothers having access to institutions (i.e., health facilities) with FFHSDI, is an essential component to bringing down the maternal and neonatal deaths.

Table 1: Description of proposed works

Type of Facility	Estimated No. Facilities (Comp 1)	Description	Proposed Works	Mitigation
Township Hospital	About 12 to 15	50 to 100 beds; <ul style="list-style-type: none"> - usually staffed by 8 to 29 doctors (some specialists, such as dentist, optometrist) - Basic Health Staff (Health Assistants, Midwives, Nurses) - Technician(s) 	No new hospitals. Works may involve expansion and improvement (renovation and equipping) of the labor room, operation theater, lab, and neonatal care room, water and sanitation, wheel chair access, and electricity.	ECOPs/SOPs
Station Hospitals	About 30	Up to 25 beds <ul style="list-style-type: none"> - usually staffed by 2-6 doctors (no specialist) - basic health staff (Health Assistant, Midwives, Nurses) 		ECOPs/SOPs

Type of Facility	Estimated No. Facilities (Comp 1)	Description	Proposed Works	Mitigation
Rural Health Centers (pls see below some examples of new RHCs in MM)	About 200	No Beds; has 2-4 rooms, including one labor room <ul style="list-style-type: none"> - No doctor - Only basic health staff (Health Assistant, Midwives, Lady Health Visitor) 	Rebuilding and refurbishment of entire facility.	ECOPs/SOPs
Sub-Rural Health Centers		No Beds; 1 or 2 room <ul style="list-style-type: none"> - No doctor, no Health Assistant - Only one midwife and in some places also a public health supervisor, who is responsible for environmental sanitation 	Rebuilding and refurbishment of entire facility.	ECOPs/SOPs

MOHS will contract United Nations Office for Project Services (UNOPS) to oversee and manage the implementation of this sub component 1.2. UNOPS has extensive experience developing rural health infrastructure in diverse settings across the country, working with a variety of stakeholders, including EHOs, and has a solid track record of producing results appreciated by the government, providers, and communities. In view of the significant amount of civil works (construction, renovations and refurbishment of existing health facilities at township level and below) and other hardware procurement, this component would use input-based disbursements.

Component 2: Systems Strengthening, Innovation, and Project Management

Under EHSAP, this component supported development of strategies, guidelines and standard operating procedures (SOPs), capacity building, and project management activities. With AF, the component will scale up or deepen health systems strengthening activities that were initiated under OC, support project management and expand innovation that takes advantage of the rapid penetration of ICT in Myanmar and the MOHS digital tablet platform for frontline providers. The component is now organized into two sub-components: (2.1) Systems Strengthening (USD 36 million); and (2.2) Innovation, Project Management Support and M&E (USD 9 million).

Component 2.1. Systems Strengthening (USD 29 million of IDA and USD 7 million of GFF under AF)

This sub-component, which uses DLIs or Performance-Based Conditions as a disbursement modality, focuses on deepening and scaling up health systems activities that began under the EHSAP. They include (i) implementing a quality readiness checklist for MNCH care; (ii) extending human resources to the community level that provide integrated outreach and services; (iii) expanding infection prevention and control and health care waste management; (iv) institutionalizing inclusive mechanisms at the R/S level for multi-stakeholder collaboration and coordination; and better and more timely data on (v) public finances and (vi) supply chain.

Complementing Rural Health Infrastructure in Ayeyarwady and Shan

Quality of MNCH care. Under EHSAP, skills building of midwives in Basic Emergency Obstetric and Neonatal Care (BEmONC) and Integrated Management of Childhood Illnesses (IMCI) were scaled up nationwide. Under AF, MOHS would institutionalize the use of these skills according to the quality checklist to be applied to providers and facilities at township level and below.

Human Resources at the Community Level. MOHS has developed a Community-Based Health Worker (CBHW) Strategy. The strategy is in the process of being endorsed and its implementation will require both operational and financial support. CBHW is a critical link between the households, namely women and children, and the health providers. The AF has identified key milestones related to implementation of CBWH strategy that will facilitate expansion of essential MNCH and nutrition services at the frontlines in Ayeyarwady and Shan.

Infection Control and Health Care Waste Management. The AF will build on HCWM work already done under EHSAP and will help ensure effective HCWM and infection prevention and control measures are applied at the PHC facilities. This effort would help to curb and prevent sepsis deaths. In Myanmar, sepsis causes about 11% of all maternal deaths (both direct and indirect), and about 8% of all neonatal deaths. Specific benchmarks towards implementation of adequate HCWM and infection prevention and control (per national guidelines) have been designed as a DLI.

Strengthening mechanisms at the region/state level for multi-stakeholder collaboration and coordination to promote inclusion and peace

Strengthening mechanisms at the region/state level for multi-stakeholder collaboration and coordination to promote inclusion and peace. The project will not finance direct service delivery in conflict affected areas, as they are being financed by Access to Health Fund (ACCESS), WHO and NGOs. EHSAP supported health departments at the Region and State level with skills building, supervision, community engagement and convening of stakeholders. AF would build on that support by strengthening institutional mechanisms and processes for greater dialogue, collaboration and coordination between MOHS and other key providers—private, NGOs, CSOs and ethnic health providers. AF would support Health Departments in regions/states to conduct Joint Annual Reviews and learning events to discuss progress and bottlenecks of services and interventions. Guidelines and templates for multi-stakeholder collaboration and coordination will be developed. This support is intended to build trust, promote dialogue and build consensus, thereby helping to promote peace and inclusion in conflict affected areas and in remote places. Institutionalizing the collaboration through multi-stakeholder platforms at the R/S level would also benefit interventions and direct service delivery in conflict-affected areas financed by Access to Health Fund, WHO and NGOs.

In addition, R/SHDs will be supported to build their capacity for community engagement. EHSAP already has a Community Engagement Planning Framework. In the context of the AF, this CEPF has been updated, with a focus on increased inclusion. Additional resources will be provided to conduct community engagement as part of the project implementation and its monitoring and oversight. In the Regions, the emphasis will be to ensure coordinated and effective service delivery in hard

to reach and remote areas. In the States, the focus will be on inclusion of ethnic health providers and other stakeholders involved in service delivery in conflict affected areas. It will complement the support from ACCESS, which has commenced its support to State Health Departments of Chin, Kachin, Kayah, Kayin, Rakhine, and Shan to strengthen functions of planning, supervision, and capacity building.

Improving Health Systems Efficiency

Public Finance Management. Under the ongoing EHSAP project as well as complementary technical assistance and analytics using Bank-executed trust fund/grant over the last four years, significant investments have been made to laying the foundations for modernizing and strengthening the public finance management (PFM) system and skills in the MOHS, particularly at the central, R/S and township departments of public health and medical services. Under the sub-component, investments will continue primarily to (i) roll out and nurture the nascent system strengthening tools piloted and introduced earlier so that their application is nationwide, uniform and systemic across the health sector at all levels; (ii) develop and strengthen institutional capacity within central and R/S departments to address the FM skills gap (especially at subnational levels) and FM data management and analysis skills (at central level); (iii) undertake initiatives and institute mechanisms for better information sharing, collaboration, harmonized planning and budgeting processes and timelines across various programs/units and finance units in the departments of public health and medical services; and (iv) procure necessary equipment and software. The PFM DLI will focus on interventions at the systems levels, with the union level taking the primary responsibility for implementation.

Supply Chain and Procurement. The success in delivery of essential health services depends on the timely, uninterrupted, and adequate supply of medicines, vaccines, and other essential commodities at the various service delivery points. With thousands of rural health centers and sub-centers spread across the country, procuring the medical and non-medical consumables essential for minimum acceptable quality of health care, and distributing the appropriate quantities to all the health facilities, managing the stock inventory and ordering replenishments in a timely fashion, and ensuring accountability to prevent misuse, are all daunting tasks without an efficient procurement and logistics system. Myanmar has developed a National Health Supply Chain Strategy for medicines, medical supplies, and equipment spanning 2015-2020, but it is yet to be fully adopted and implemented. The project will support a component of this strategy related to establishing the e-logistics information systems and performance monitoring. This DLI will focus on interventions at the systems levels, with the union level taking the primary responsibility for implementation.

Component 2.2: Innovation, Project Management and M&E

Under EHSAP, this sub component supported development of strategies, guidelines and standard operating procedures (SOPs), capacity building, and project management activities. With AF, the sub component will scale up activities that were initiated under EHSAP, support project management and expand innovation that takes advantage of the rapid penetration of ICT in Myanmar and the MOHS digital tablet platform for frontline providers. The sub component will be jointly financed by the proceeds from OC (USD 16 million IDA) and AF (USD 6 million IDA and USD 3 million GFF).

Innovation

ICT-based innovations: This sub-component would finance activities related to ICT based innovations. MOHS has demonstrated commitment to applying ICT to improve service delivery. Health staff and providers at the township and below are provided with tablet PCs / handheld devices with SIM cards. This ICT infrastructure provides an enormous opportunity to scale up innovations using smartphones and internet. ICT will be employed to train providers, track progress on infrastructure development, collect and report data from the field, communicate messages to consumers (both for behavior change, such as adopting healthy lifestyles and for seeking care), send reminders to attend antenatal care sessions, or immunizations for children, and to seek feedbacks from the community.

Telehealth. AF would finance pilots and scaling up of telehealth that will improve quality of care and bring health services closer to the community and to populations whose access to fixed health facilities is limited. Teleconsultations is already being tested in Myanmar. For example, the Parami Hospital (privately owned) has been implementing a program of teleradiology service in the Mon State. in cooperation with MOHS. Telehealth interventions hold great promise towards bringing much needed input to improving access and quality of health services to under-served areas and for benefiting frontline providers in the public sector as well as with NGOs and EHOs working in remote and conflict-affected areas. As such, AF would finance an assessment for introducing telehealth in Myanmar at scale and finance two pilots (one in Ayeyarwady and the other in Shan). The pilots would focus on providing medical and technical support to front line providers.

Private Sector Engagement. The private sector can bring resources, expertise and innovations to support improvement of health outcomes. The MOHS would like to expand its engagement with private sector health actors in Myanmar. Dialogue with key stakeholders has highlighted the need for a systematic plan of public-private engagement underpinned by comprehensive analytical work on private sector and public-private dialogue through workshops and seminars. The GFF will support using additional funds for an assessment, establishment of a private-public dialogue platform, capacity building within MOHS, and a public-private partnership.

Project Management and M&E

Project Management. This sub-component would support project related management functions, including planning, budgeting, reporting, as well as communication and coordination across the MOHS implementation units. It would include operational costs of the Management and Operations Support Team (MOST), which would consist of MOHS designated staff and national consultants with expertise on financial management, procurement/contract management, M&E, and community engagement. MOST would be primarily responsible for day-to-day management, including procurement and contract management, work planning and budgeting, overseeing training. It would also provide semi-annual progress reports and annual DLI reports. In addition, MOST would be responsible for building capacity related to the project, such as the DLIs, and on other specific topics, such as conflict sensitivity and medical ethics. In addition, it will oversee the project grievance mechanism for AF and seek beneficiary feedback on a proactive basis using ICT.

M&E. This sub-component would support independent verification of DLI achievement, implementation of the project grievance mechanism, and regular stakeholder feedback. In addition, it will finance household surveys (baseline, midline, and endline) and facility assessment (baseline, midline, and endline) in selected townships receiving FFHSDI. ICT will be used across the various activities to improve the quality, reliability, and timeliness of data collected. With the support of a dedicated M&E specialist within MOST, Project Oversight Committee will be presented with data that has been reviewed, analyzed in a timely manner and in a user-friendly form. Review meetings by senior management (both at the central and at the R/S levels) will be held regularly to ensure greater utilization of the relevant data. This would enable problem-solving and mid-course corrections.

An important aspect of the M&E is to measure whether the project benefits are reaching the populations who are at risk of exclusion. The project will seek to measure the inclusiveness in the following way: (i) inclusion in the decision making process at the subnational level (e.g., annual plans developed and reviewed with active participation from ethnic health providers, CSOs and non-government health organizations at subnational level; biannual review meetings between MOHS and ethnic health providers/ NGOs at subnational level; membership of ethnic providers/ CSOs/NGOs in township investment planning committees with a dedicated role assigned to them); (ii) inclusion in the improved coverage of services resulting from investments in FFHSDI. A baseline, midline and endline in the selected townships receiving FFHSDI investments to track and monitor the beneficiaries including beneficiary satisfaction, for which the data would be disaggregated by gender, age groups, language, and residence.

For the verification of results from Component 2.1, it is proposed to have the Department of Medical Research (DMR) continue with the independent verification. DMR has no role in implementation of project activities and is under the supervision of an independent and external verification oversight committee comprising eminent private individuals. A third-party agency will also be recruited using grant financing (separate and external to the project), executed by WBG to monitor inclusion and conflict-sensitivity of the project interventions.

Component 3: Contingent Emergency Response (\$0)

This is a provisional zero-amount component that allows for rapid reallocation of credit proceeds during an eligible emergency, disaster, or catastrophic event, with implementation guided by the Emergency Response Manual (ERM). In such an event, MOHS would be able to respond to health problems and issues arising out of eligible crises or emergencies. ERM for the CERC will be an Annex to the revised Operations Manual. In the event the component is triggered, the Results Framework will be revised through formal restructuring to include appropriate indicators related to the emergency response activities. Component 3 has no allocation and no financing unless an emergency is declared. Capped at 10% of the allocated amount, the proceeds of the credit allocated to Component 2.2 will be used in the event that the CERC is triggered. Under the original EHSAP, CERC was triggered to address the impact of flooding and landslide in Chin using the Immediate Response Mechanism. Under AF, however, CERC would finance activities to be implemented only by MOHS to address health related consequences of a natural disaster (such as flooding, landslide, or earthquake) and to respond to epidemics and outbreaks. CERC would

finance procurement of goods, services, works, and incremental operating costs related to such emergency responses by MOHS (see Annex). In case of a national emergency related to a disease outbreak or epidemic, AF would be re-structured to enable Myanmar to access funds from the Pandemic Emergency Facility (PEF), a global window to provide surge financing to IDA countries to provide timely funds to respond to pandemics.

Project Location

To do geographic prioritization for Component 1 (FFHSDI), all 330 townships were first ranked according to a composite index of welfare needs - measured by the multi-dimensional disadvantage index (MDI)¹, infrastructure need, and implementation capacity measured by sanctioned human resources (HR) capacity². From the list of townships ranked by the composite index, 19 townships (the number that could be covered with the available resource envelope of US\$65 million, based on the township-wise cost estimates from NHP) were identified by including the topmost townships. Townships under prolonged active conflict were omitted, as were the townships numbering less than three within a R/S (clustering the townships would enhance operational feasibility and better oversight and monitoring). Of the selected townships, all seven in Ayeyarwady are government controlled, while in Shan about 6 of the 12 contain non-government-controlled areas, which include Self-Administered Zone/Division and other EAO-controlled areas.

Assessment of FFHSDI gaps. For each of the selected townships, a new needs assessment would be carried out, as the existing cost estimates are very rough. The assessment includes two steps. The first would be a review of MOHS data on the current condition of facilities and the second would consist of site visits and interviews with key stakeholders and the use of an ICT tool developed to capture the baseline of FFHSDI needs and gaps. The assessment in Shan State will be conducted to include input from relevant EHOs and NGOs.

The Component 2 systems strengthening, innovations and M&E activities have both targeted support in Ayeyarwady and Shan as well as other national level systems strengthening activities that will benefit the whole nation, instead of a specific project location. The project locations under Component 3 will depend on the nature and scope of the emergency.

Project Implementation agency

The health matters are under the responsibility of the Ministry of Health and Sports (MoHS). The MoHS is headed by a Union Minister who is assisted by a Deputy Minister. There are seven departments within the MoHS, each responsible for different aspects of health care, such as: Department of Public Health and Department of Medical Services (responsible for provision of health services and deployment of health workers); Departments of Medical Research (responsible for conducting medical research and provide evidence based data for policy making); Department of Human Resources for Health (responsible for production of health workforce); Department

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

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

of Traditional Medicine (responsible for the development of Myanmar Traditional Medicine); Department of Food and Drug Administration (responsible for the safety and quality of food, drugs, medical devices and cosmetics) and Department of Sports and Physical Education (responsible for mass sports).

MOHS will contract United Nations Office for Project Services (UNOPS), an agency with successful track record, to oversee and manage the delivery of rural health infrastructure including safeguards. This sub-component would involve an output-based contract between MOHS and UNOPS, with direct payment to be made from WB to UNOPS. UNOPS has experience in managing and implementing the large development funds in Myanmar, including the Livelihoods and Food Security Trust Fund (LIFT), Access to Health Fund (ACCESS) and the Joint Peace Fund (JPF). Furthermore, UNOPS is the Principal Recipient for the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) in Myanmar and manages the Regional Artemisinin-Resistance Initiative Towards Elimination of Malaria (RAI2E). UNOPS has extensive experience developing rural health infrastructure in diverse settings across the country, working with a variety of stakeholders, including ethnic health providers, and has a solid track record of producing results appreciated by the government, providers, and communities. UNOPS had to-date built over 140 rural health facilities across the country, of which 46 are in conflict-affected areas including in Shan. The inclusion of an experienced agency (UNOPS) and their agreement to implement project safeguards policy requirements will add capacity and assist with mitigation of risks associated with Component One fully functional health service delivery infrastructure. UNOPS advised that its environmental management systems are ISO 14001 certified.

1.2 Objective and scope of Environmental Management Plan

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

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

calls for public awareness strengthening and for sound waste management system to be put in place at the project area of intervention.

The EMP defines measures to (i) identify all anticipated significant environmental risks, and (ii) describe with technical details mitigation framework.

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

The methodology used to provide the information in this document has been based on person-to-person interviews of relevant stakeholders³, the review of existing EMP of EHSAP project, and brief desk literature review. The project has selected geographical coverage under Component 1 for infrastructure investment and will include some townships from Ayeyarwady region and Shan state. Therefore, based on this document, and the feedback that will be captured during the continuous consultative process with stakeholders as part of project implementation, simple site-specific EMPs including actual site assessment and additional relevant information may need to be developed during project implementation.

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



2

Environmental policies applicable to the Project

2. Environmental policies applicable to the Project

2.1 National environmental regulations

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

- Environmental Conservation Law
- National Environment Policy (Draft)
- National Health Policy
- Chemical Safety Law
- CDC Laws
- Environmental Conservation Rules
- Public Health Law⁴
- Private Health Care Law
- Hospital Guidelines
- Hospital infection Control Guidelines
- International Conventions
 - o Stockholm
 - o Basel
 - o Minamata

2.2 World Bank environmental safeguard policies

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

4 Existing 1972 Law and new draft



3

Baseline information about environmental status in health facilities

3. Baseline information about environmental status in health facilities

3.1 Environmental considerations in construction of health facilities (HCFs)

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

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

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

Facilities	UNOPS's design	MOH's design
Rural health center design		
Standard Size Staff Rooms	√	√
Examination Room	√	√
Separate Maternity Service and OPD with Waiting Rooms	√	√
Hand washing facilities in the GE and Post Delivery Rooms	√	×
Generator Room (Solar Controller Room)	√	×
Drainage System in Deliver Room	√	√
Access for the disabled (barrier free)	√	√
Rainwater harvesting system	√	×
Toilets – 2Nos - external with hand washing facilities	√	×
Internal Floor – Ceramic Tiles	√	×
Maximum use of daylight and air circulation/ ventilation	√	×
Residential Accommodation for staff	√	√

Facilities	UNOPS's design	MOH's design
Tube well fitted with Water Pump	√	√
Overhead and underground storage tank	√	√
Boundary Fencing and Gate	√	√
Landscaping (Footpath and some plantation)	√	X
Placenta Pit	√	X
Incinerator	√	X
Solar Power System	√	X
Sub-rural health center design		
Post delivery room added	√	X
One additional WC in the main building	√	X
Fire exit door	√	X
Rain water harvesting system	√	X
Hand washing facilities in the GE and Post Delivery Rooms	√	X
Two external toilets provided with hand washing facilities	√	X
Internal Floor – Ceramic Tile	√	X
Provision of Drainage & Water in the Delivery Room	√	X
Generator room (Solar Controller Room)	√	X
Boundary Fencing and Gate	√	√
Placenta Pit	√	X
Incinerator	√	X
Solar Power System	√	X

Note: √ in place X not in place

The HCF designs in Table include environmental hygiene facilities such as toilets and drainage system for wastewater collection and treatment, as well as placenta pit and incinerator for infectious waste disposal. However, they don't cover Life and Fire Safety measures.

3.2 Healthcare waste management

In general, regulatory, policy and administrative guidelines and framework for health care waste management (HCWM) exist to smaller extent in written form (e.g., as part of the hospital guideline). However, dissemination of printed materials in easy to access and readily available manner to all levels of health staff, and communication and understanding of these framework and guidelines

among primary care level health staff as well as consistent implementation of such guidelines still need significant improvement and capacity building. There are ongoing efforts to strengthen the existing guidelines for better formalization, to be more comprehensive and in line with good practices, and to have better compliance of health staff to the guidelines. Under EHSAP, MOHS is developing a healthcare waste management guidelines and standardized operating procedures of healthcare waste management for HCFs at township level and below.

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

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

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



4

Potential environmental impacts

4. Potential environmental impacts

4.1 Potential environmental impacts due to construction and renovation activities

The project will finance construction, renovation and refurbishing of HCFs with the boundary of existing health facilities. Without proper design, basic environmental hygiene facilities (hand washing facilities, toilets and waste disposal facility) may be neglected. The construction and renovation activities may generate limited adverse environmental impacts such as dust, noise, vibration, waste, solid waste and safety issues. Also, there could be isolated health risks associated with exposure to asbestos containing materials in the case of old facilities that are using asbestos roofs. Additionally, in the case of building renovation activities including changes of internal layout (e.g., walls), there is a potential risk on the structure and safety of the existing buildings.

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

4.2 Potential environmental impacts during the operational phase

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

The generation of healthcare waste has been studied and documented by World Health Organization (WHO), World Bank and other institutions. According to WHO's guideline on safe management of waste generated from healthcare activities, between 75% and 90% of the waste produced by health-care providers is comparable to domestic waste. The remaining 10 - 25% of health-care waste is regarded as "hazardous" and may pose a variety of environmental and health risks. A large part of the wastewater from health-care facilities is of a similar quality to domestic wastewater and poses the same risks⁵. Findings from published studies and from World Bank financed "Hospital Waste Management Support Project" are similar. Infectious waste generation primary health unit is 0,02-0.03 kg/patient/day; from maternity is 2.9 kg/patient/day; from district

5 https://www.who.int/water_sanitation_health/publications/wastemanag/en/

hospital is 0.1-0.15 kg/bed/day. In Vietnam, generation of wastewater from hospital is 0.4 m³ of wastewater per bed per day.

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

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

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

The project will continue to promote good practices in healthcare waste management given its hazards to environment and health as well as public sensitivity. Potential impacts of healthcare waste to environment and health are deemed to be site specific, manageable and for which mitigation measures can be readily designed. Under EHSAP, healthcare waste management guideline has been developed for HCFs at township level and below, and HCFs financed in AF project will follow this guideline.



5

Typical mitigation measures

5 Typical mitigation measures

5.1 Measures to mitigate impacts due to construction and renovation activities

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

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

Table 1: Environmental Code of Practices

Environmental issue	Mitigation measures
Design of HCF does not include environmental hygiene facilities and Life and Fire Safety (L&FS) measures	<ul style="list-style-type: none"> • The MOHS should review the current design of rural health center and sub-rural health center and make sure that hygiene and waste management facilities are included. • L&FS master planning should be included in the design of the new facilities. hospitals in line with GIIP + national legal requirements. For the refurbished hospitals, MOHS should insure that all national legal L&FS requirements are met, upon completion of the construction.
Dust, noise and vibration generated from construction, rehabilitation or minor civil works	<ul style="list-style-type: none"> • The HCF staff or the contractor(s) is responsible for compliance with relevant national legislation with respect to ambient air quality, noise and vibration • 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 • 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 • The HCF Staff or the contractor(s) shall ensure onsite latrine be properly operated and maintained to collect and dispose waste water from those who do the works • The HCF Staff or the contractor(s) should not carry out construction activities generating high level of noise during HCF activities, especially when services are being delivered to the clients.

Environmental issue	Mitigation measures
Solid waste generated from construction, rehabilitation or minor civil works	<ul style="list-style-type: none"> • The HCF Staff or the contractor(s) shall develop and follow a brief site-specific solid waste control procedure (storage, provision of bins, site clean-up, bin clean-out schedule, etc.) before commencement of any financed rehabilitation works; • The HCF Staff or the contractor(s) shall use litter bins, containers and waste collection facilities at all places during works. • The HCF Staff or the contractor(s) may store solid waste temporarily on site in a designated place prior to off-site transportation and disposal through a licensed waste collector. Transport management plan in line with WBG good practice should be developed. • The HCF Staff or the contractor(s) shall dispose of waste at designated place identified and approved by HCF management or local authority. Open burning or burial of solid waste at the HCF premises shall not be allowed. It is prohibited for the HCF Staff or the contractor(s) to dispose of any debris or construction material/ paint in environmentally sensitive areas (including watercourse). • 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).
Asbestos containing materials (ACM) generated from construction, renovation or minor civil works	<ul style="list-style-type: none"> • The asbestos audit will be undertaken as required prior to / at the beginning of refurbishment. • Safe removal of any asbestos-containing materials or other toxic substances shall be performed and disposed of by specially trained workers in line with the WBG guidelines on asbestos management (Annex 8.10). Because specific regulation has not yet been developed in Myanmar, International occupational health and safety guidelines will be applied during removal of ACM from HCF undergoing Renovation. • If ACM at a given HCF is to be removed or repaired, the PMU will stipulate required removal and repair procedures in the contractor's contract. • Contractors will remove or repair ACM strictly in accordance with their contract. Removal personnel will have proper training prior to removal or repair of ACM. • All asbestos waste and products containing asbestos is to be buried at an appropriate landfill and not to be tampered or broken down to ensure no fibers are airborne. Disposal of waste containing asbestos should be agreed with MOHS. • No ACM will be used for renovation works.

Environmental issue	Mitigation measures
Safety risks during works, health staff, patients and their relatives	<ul style="list-style-type: none"> • The HCF Staff or the contractor(s) shall comply with all national and good practice regulations regarding workers' safety. • The HCF Staff or the contractor(s) shall prepare and implement a simple action plan to cope with risk and emergency (e.g., fire, earthquake, floods) • The HCF Staff or the contractor(s) shall have or receive minimum required training on occupational safety regulations and use of personal protective equipment • Occupational Health and Safety (OHS) management plans will be developed by the contractors where ECOPs don't suffice. This OHS management plans will include OHS trainings, OHS monitoring at the construction site and maintaining records of work related injury statistics and follow up on corrective actions. • The HCF Staff or the contractor(s) shall provide safety measures as appropriate during works such as installation of fences, fire extinguishers, first aid kits, restricted access zones, warning signs, overhead protection against falling debris, lighting system to protect HCF staff and patients against construction risks.

5.2 Measures to mitigate impacts from healthcare waste

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

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

Table 2:

HealthCare Waste Management (HCWM) guidelines

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

Environmental issue	Mitigation measures
	<p>Storage of HCW:</p> <ul style="list-style-type: none"> • Different health care waste should be streamed separately in standard storage equipment. • Storage time of health care waste should not exceed 48 hours. • Anatomical waste should be buried or disposed daily. • Storage room or place and equipment should be cleaned and disinfected at least once a week. • Specific areas should be for the initial storage of wastes, in the wards and departments, near the source of waste. • Location of central storage area should be away from food preparation, public access and exit route. • Central storage area should be separated from general waste storage areas. • Waste for landfill and waste for incineration should be stored separately in the central storage area. <p>Transportation of HCW:</p> <ul style="list-style-type: none"> • Waste bags and containers from initial storage area should be removed regularly. • Manual handling of waste bags should be minimized. • All waste bags should be handled by the neck. • Discard syringes with attached needles into sharp containers as one unit. • Internal transport routes from initial storage to central store through patient care areas and other clean areas should be minimized. • Dedicated wheeled containers, trolleys or carts should be used to transport the waste containers to central storage area. These vehicles should be reserved only for the transportation of clinical waste. • Wheeled containers, trolleys or carts should be cleaned and disinfected regularly and immediately after spillage or accidental discharge. <p>Central Storage Facility for HCW: The central storage area must be:</p> <ul style="list-style-type: none"> • Located separately from the general waste storage areas. • Should be clearly identifiable. • Away from food preparation, public access and egress route. • Arranged to store waste for landfill and waste for incineration waste separately. • Locked when access is not required and should be accessible only to authorized persons. • Well ventilated and well lit. • Located on well drained, impervious hard-standing. • Provided facilities for washing down and disinfection. • Should be sufficient for storage capacity.

Environmental issue	Mitigation measures
	<p>Treatment of HCW:</p> <ul style="list-style-type: none"> • Infectious waste should be autoclaved wherever possible before disposal. • Non-autoclave infectious waste should be disinfected chemically by using bleaching powder, lime solution, calcium oxide or other chemical disinfectants. • Needle cutter should be used to displace needles from syringes. • Disinfect defanged syringes by 2% chlorine solution in order to be recycled. <p>Autoclave: Commonly used for the treatment of highly infectious waste, such as microbial cultures or sharps. Small amount of waste (about 5-8 kg) requires a 60 minute cycle at 121°C (minimum) and 1 bar (100 kPa). Validation of autoclave should be conducted and microbial inactivation efficacy of autoclaves should be checked periodically by using color-changing indicator strips.</p> <p>Chemical Disinfection: 0.5% Chlorine solution, 5% sodium hypochlorite, 30% hydrogen peroxide, bleaching powder, lime solution, calcium oxide or other chemical disinfectants can be used for non-autoclavable infectious waste.</p> <p>Disposal of HCW:</p> <ul style="list-style-type: none"> • Placenta and small anatomical waste should be disposed to placenta pit where there is no effective incinerator. • Pharmaceutical waste should be encapsulated or inertized. • General waste, sharp waste and treated waste should be disposed to municipal waste collecting system. • Sharp waste should be disposed to sharp pit where there is no municipal waste collecting system. • General waste and treated waste should be disposed to controlled land filling where there is no municipal waste collecting system. • Large anatomical waste should be buried in appropriate site. <p>Standardized Incinerator: Two-chambered incinerators with proper temperature, required chimney heights should be used. The temperature must be at least of 850°C to ensure minimal emission of toxic gases at the primary chamber. High chimney (higher than nearby roofs) is required. Appropriate location (at least of 500 meters away from populated areas) is required. Ash disposal facilities is also required. Pressured gas containers, radioactive wastes, radiographic wastes, halogenated plastics like PVC, mercury, cadmium and ampoules of heavy metals should never be incinerated.</p> <p>To minimize gas emission, the project will encourage the application of non-burn technologies rather than incinerator. The project will not finance new small scale onsite incinerator. If existing on-site incinerators are used, mitigation measures will be taken to control emissions to air in line with WBG EHS for healthcare facilities and WHO's guidelines for safe management of waste generated from healthcare activities. The good practices as follow:</p>

Environmental issue	Mitigation measures
	<ul style="list-style-type: none"> - Waste reduction and segregation to minimize quantities of waste to be incinerated; - Siting incinerators away from patient wards, residential areas or where food is grown; - A clearly described method of operation to achieve the desired combustion conditions and emissions; for example, appropriate start-up and cool-down procedures, achievement and maintenance of a minimum temperature before waste is burned, use of appropriate loading/charging rates (both fuel and waste) to maintain appropriate temperatures, proper disposal of ash and equipment to safeguard workers; - Periodic maintenance to replace or repair defective components; <p>Improved training for operators and improved management including the availability of an operating and maintenance manual, visible management oversight, and regular maintenance schedules.</p> <p>Sanitary Land Filling: Sanitary landfills are easy access to the site and working areas for waste delivery. Landfill site should be at least 50 meters away from the water sources. The landfill site must be protected with fence to prevent from unauthorized persons and animals. Lining of the base and sides of the sites must be adequately sealed to minimize the movement of waste water. Final cover must be constructed to prevent or minimize rain water infiltration.</p> <p>Encapsulation and Inertization: It is usually suitable disposal method for the pharmaceuticals and incinerated ash with heavy metal content. When containers are three quarters filled with pharmaceutical and chemical waste, a mixture of cement, lime and water is poured into it. The material is allowed to be dried and the container is sealed and disposed safely. Alternatively, the formed homogeneous mixture in liquid state can be transported to a landfill and poured safely.</p> <p>Sharp pit and Placenta pit: The attached designs in annexes should be constructed.</p>
Wastewater generated from medical facilities	<p>Waste Water Disposal: Waste water from healthcare facilities should be disposed according to the reference of WBG EHS guidelines for the Health Care Facilities and WHO's guidelines for safe management of waste from healthcare activities All facilities should have simple and cost effective pre-treatment facility and waste water should be treated before discharge to any natural water body.</p>
Occupational Health issues among healthcare staff	<p>Occupational Health and Safety training program has been developed under the EHSAP and provided to healthcare providers at some HCFs on aspects linked to Medical Waste Management and Infection Control. The project will continue delivery of the training and provide guidance and training to Occupation and Environmental Health Staff at DPH and DMS (central level), State/Region Health Department staff, Township and Station Medical Officers, and HCF staff on health care waste management. Further, a Training of Trainers (ToT) program will be developed under the project to reach all primary stakeholders involved in HCFs. Component 2 would finance activities over the four-year period, which include among other aspects, capacity building for health care waste management targeting the strengthening of related procedures and regulations; skills of staff, and providing initial supplies to allow proper implementation of procedures in facilities.</p>



6

Environmental management

6. Environmental management

6.1 Institutional arrangement (roles and responsibilities)

The primary healthcare teams and HCFs will ensure that health care waste generated from healthcare activities will be properly managed through the adoption of the health care waste management guidelines. HCFs are encouraged to apply non-burn technologies for treatment and disposal of sharps and infectious waste. No new small-scale incinerators will be financed by the project. Existing incinerators will be properly maintained to ensure that medical waste is treated and disposed of according to the guidelines, and surrounding communities/residents will not be disturbed from smell and smoke. HCFs having construction and renovation works will follow the basic design of health centers and/or hospitals and ECOPs described in Table 1. It will ensure that civil works contracts contain a clause on good environmental practice and proper housekeeping measures, including adherence by contractors to the use of asbestos-free construction materials.

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

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

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

MOHS will contract United Nations Office for Project Services (UNOPS), an ISO 14001 certified agency with successful track record, to oversee and manage the delivery of rural health infrastructure.

This sub-component would involve an output-based contract between MOHS and UNOPS, with direct payment to be made from WB to UNOPS. The safeguard responsibilities of UNOPS will include, but not limit to, the following: (i) risk screening or impact assessment for each HCF, (ii) site-specific EMP for each HCF to mitigate potential impacts, (iii) site-specific EHS performance monitoring and supervision, (iv) training and communication, (v) auditing and monitoring, etc. Detailed safeguard responsibilities of UNOPS be described in the TOR of the contract they will sign with the Government. UNOPS has extensive experience developing rural health infrastructure in diverse settings across the country, working with a variety of stakeholders, including ethnic health providers, and has a solid track record of producing results appreciated by the government, providers, and communities. UNOPS had to-date built over 140 rural health facilities across the country, of which 46 are in conflict-affected areas including in Shan. The inclusion of an experienced agency (UNOPS) and their agreement to implement project safeguards policy requirements will add capacity and assist with mitigation of risks associated with Component One fully functional health service delivery infrastructure. The Bank will continue providing compliance supervision, capacity building and operational support to the implementation of the Project, including safeguards, and UNOPS will be required to follow World Bank safeguards policy in their contractual arrangements entered for the fully functional health service delivery infrastructure.

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

6.2 Monitoring and reporting

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

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

Local communities are encouraged to undertake monitoring and provide feedbacks through existing community mechanisms which will be strengthened as part of the project. If there are complaints from local project-affected groups, the Project Steering Committee at union level, the State/Region Health Departments, Township Health Departments, and the HCFs should assess in

a timely manner the validity of complaints and take any necessary actions to remedy the situation.

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

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

6.3 Training and capacity building

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

The project will hire consultant(s) with health care waste management skills that will provide guidance and training to Occupation and Environmental Health Staff at DPH and DMS (central level), State/Region Health Department staff, Township and Station Medical Officers, and HCF staff on health care waste management. Further, a Training of Trainers (ToT) program will be developed under the project to reach all primary stakeholders involved in HCFs.

Component 2 would finance activities over the four and a half year period, which include among other aspects, capacity building for health care waste management targeting the strengthening of related procedures and regulations; skills of staff, and providing initial supplies to allow proper implementation of procedures in facilities.

6.4 Budget

The cost for safeguard implementation is estimated under project component 1 (as part of the third party agency's responsibility for compliance with environmental safeguards standards during implementation) and under project component 2 (as part of the project management and M&E). Overall annual operations cost (e.g., sludge management, waste disposal, transportation, maintenance and replacement, etc.) should be factored in and estimated by beneficiary HCFs when they prepare the annual workplan and budget for their facilities, which are submitted to the central MOHS as part of their annual budget proposal.



7

Public consultation and disclosure

7. Public consultation and disclosure

Key stakeholders include: (i) MOHS and project implementing agencies; (ii) Region/State and Township authorities, including health administrators and local government; (iii) public health care providers (hospitals, health care centers); (iv) private sector, City Development Committees (Pollution Control and Cleansing Department), NGOs, CSOs, and ethnic health providers; (v) UN agencies, including UNOPS, donors—bilaterals and multilaterals; and (vi) private providers, ethnic health providers providing health services in some ethnic nationality/minority areas which are not covered by the Government; professional organizations; NGOs and civil society organizations with an interest in the health care sector; and local communities at township and village levels, including vulnerable and under-served population groups such as ethnic minorities.

In order to address the safeguard policy OP 4.01 requirements, MOHS updated the EMP that includes: (i) specific ECoPs to address impacts linked to planned minor refurbishment, renovation and works; and (ii) HCWM Plan and Standard Operating procedures adapted to the project that will ensure proper HCWM. During the revision of the EMP, meaningful consultations were conducted. Consultative workshops with stakeholders were held in April 2017 to discuss HCWM guidelines development.

The updated EMP, including the ECoPs and the HCWM Plan and CEPF, were disclosed in country on May 29, 2019. Public consultations were undertaken in Taunggyi, Shan State on 22 October 2019 and in Patheingyi, Ayeyarwady Region on 23 October 2019 to review the revised safeguards documents as well as non-technical summary of additional comments from Regional Safeguards. Participants suggested that the infrastructure supported under the project should be disability-friendly and should have a facility-appropriate healthcare waste management arrangement. No changes were required or made in the EMP/ECoP after the public consultations as participants' comments were already addressed in the updated version consulted during public consultations.

8

Annexes

8.1 SOPs of Health Care Waste Management for Township Hospitals

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

1. Standard Operating Procedure of Waste Segregation

1.1. Purpose

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

1.2. Scope of Application

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

1.3. Responsibility

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

1.4. Equipment and Supplies

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

1.5. Method

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

2. Standard Operating Procedure of Waste Storage

2.1. Purpose

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

⁶ Or in accordance with responsible municipal instruction. If the infectious waste collecting bags are torn or leak and contaminated clean the containers immediately, place it under the direct sunlight.

2.2. Scope of Application

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

2.3. Responsibility

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

2.4. Equipment and Supplies

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

2.5. Method

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

3. Standard Operating Procedure of Waste Transportation

3.1. Purpose

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

3.2. Scope of Application

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

3.3. Responsibility

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

3.4. Equipment and Supplies

- Basket
- Trolley
- Cart

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

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

3.5. Method

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

4. Standard Operating Procedure of Treatment of Waste

4.1. Purpose

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

4.2. Scope of Application

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

4.3. Responsibility

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

4.4. Equipment and Supplies

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

4.5. Method

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

5. Standard Operating Procedure of Disposal of Waste

5.1. Purpose

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

5.2. Scope of Application

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

5.3. Responsibility

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

5.4. Equipment and Supplies

- Standardized Incinerator
- Sharp pit
- Placenta pit
- Materials for encapsulation and inertization
- Sanitary Land Fill

5.5. Method

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

6. Issuance

	Name	Title	Signature	Date
Prepared by				
Checked by				
Approved by				

8.2 SOPs of Health Care Waste Management for Station Hospitals

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

1. Standard Operating Procedure of Waste Segregation

1.1. Purpose

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

1.2. Scope of Application

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

1.3. Responsibility

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

1.4. Equipment and Supplies

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

1.5. Method

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

2. Standard Operating Procedure of Waste Storage

2.1. Purpose

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

2.2. Scope of Application

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

2.3. Responsibility

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

2.4. Equipment and Supplies

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

2.5. Method

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

3. Standard Operating Procedure of Waste Transportation

3.1. Purpose

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

3.2. Scope of Application

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

3.3. Responsibility

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

3.4. Equipment and Supplies

- Basket
- Trolley
- Cart

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

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

3.5. Method

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

4. Standard Operating Procedure of Treatment of Waste

4.1. Purpose

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

4.2. Scope of Application

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

4.3. Responsibility

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

4.4. Equipment and Supplies

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

4.5. Method

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

5. Standard Operating Procedure of Disposal of Waste

5.1. Purpose

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

5.2. Scope of Application

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

5.3. Responsibility

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

5.4. Equipment and Supplies

- Standardized Incinerator⁷
- Sharp pit
- Placenta pit
- Materials for encapsulation and inertization
- Sanitary Land Fill

5.5. Method

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

6. Issuance

	Name	Title	Signature	Date
Prepared by				
Checked by				
Approved by				

⁷ Most of the station hospital does not have incinerator.

8.3 SOPs of Health Care Waste Management for Urban Health Centers

(Logo) Urban Health Center Address	Standard Operating Procedures	Document No.	
	Health Care Waste Management	Date issued	
		Date reviewed	

1. Standard Operating Procedure of Waste Segregation

1.1. Purpose

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

1.2. Scope of Application

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

1.3. Responsibility

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

1.4. Equipment and Supplies

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

1.5. Method

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

2. Standard Operating Procedure of Waste Storage

2.1. Purpose

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

2.2. Scope of Application

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

2.3. Responsibility

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

2.4. Equipment and Supplies

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

2.5. Method

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

3. Standard Operating Procedure of Waste Transportation

3.1. Purpose

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

3.2. Scope of Application

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

3.3. Responsibility

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

3.4. Equipment and Supplies

- Basket
- Trolley
- Cart

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

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

3.5. Method

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

4. Standard Operating Procedure of Treatment of Waste

4.1. Purpose

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

4.2. Scope of Application

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

4.3. Responsibility

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

4.4. Equipment and Supplies

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

4.5. Method

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

5. Standard Operating Procedure of Disposal of Waste

5.1. Purpose

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

5.2. Scope of Application

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

5.3. Responsibility

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

5.4. Equipment and Supplies

- Sharp pit⁸
- Placenta pit⁹
- Sanitary Land Fill

5.5. Method

- Dispose placenta and small to placenta pit.
- Dispose general waste, sharp waste and treated waste to municipal waste collecting system.
- Dispose general waste and treated waste to sanitary land filling where there is no municipal waste collecting system.
- Dispose sharp waste to sharp pit where there is no municipal waste collecting system.
- Transport pharmaceutical waste to Township Hospital or Station Hospitals in order to be encapsulated and inertized.

6. Issuance

	Name	Title	Signature	Date
Prepared by				
Checked by				
Approved by				

8 Where there is enough space.

9 Where there is enough space.

8.4 SOPs of Health Care Waste Management for Rural Health Centers

(Logo) Rural Health Center Address	Standard Operating Procedures	Document No.	
	Health Care Waste Management	Date issued	
		Date reviewed	

1. Standard Operating Procedure of Waste Segregation

1.1. Purpose

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

1.2. Scope of Application

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

1.3. Responsibility

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

1.4. Equipment and Supplies

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

1.5. Method

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

2. Standard Operating Procedure of Waste Storage

2.1. Purpose

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

2.2. Scope of Application

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

2.3. Responsibility

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

2.4. Equipment and Supplies

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

2.5. Method

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

3. Standard Operating Procedure of Waste Transportation

3.1. Purpose

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

3.2. Scope of Application

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

3.3. Responsibility

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

3.4. Equipment and Supplies

- Basket
- Trolley
- Cart

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

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

3.5. Method

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

4. Standard Operating Procedure of Treatment of Waste

4.1. Purpose

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

4.2. Scope of Application

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

4.3. Responsibility

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

4.4. Equipment and Supplies

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

4.5. Method

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

5. Standard Operating Procedure of Disposal of Waste

5.1. Purpose

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

5.2. Scope of Application

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

5.3. Responsibility

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

5.4. Equipment and Supplies

- Sharp pit
- Placenta pit
- Sanitary land fill

5.5. Method

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

6. Issuance

	Name	Title	Signature	Date
Prepared by				
Checked by				
Approved by				

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

(Logo) Rural Health Sub-center Address	Standard Operating Procedures	Document No.	
	Health Care Waste Management	Date issued	
		Date reviewed	

1. Standard Operating Procedure of Waste Segregation

1.1. Purpose

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

1.2. Scope of Application

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

1.3. Responsibility

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

1.4. Equipment and Supplies

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

1.5. Method

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

2. Standard Operating Procedure of Waste Storage

2.1. Purpose

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

2.2. Scope of Application

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

2.3. Responsibility

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

2.4. Equipment and Supplies

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

2.5. Method

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

3. Standard Operating Procedure of Waste Transportation

3.1. Purpose

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

3.2. Scope of Application

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

3.3. Responsibility

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

3.4. Equipment and Supplies

- Basket
- Trolley
- Cart

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

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

3.5. Method

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

4. Standard Operating Procedure of Treatment of Waste

4.1. Purpose

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

4.2. Scope of Application

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

4.3. Responsibility

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

4.4. Equipment and Supplies

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

4.5. Method

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

5. Standard Operating Procedure of Disposal of Waste

5.1. Purpose

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

5.2. Scope of Application

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

5.3. Responsibility

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

5.4. Equipment and Supplies

- Sharp pit
- Placenta pit
- Sanitary land fill

5.5. Method

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

6. Issuance

	Name	Title	Signature	Date
Prepared by				
Checked by				
Approved by				

8.6 SOPs for Needle-Syringe Management at PHC Immunization Posts

(Logo) Sub RHC address	Standard Operating Procedure for Needle and Syringe waste Management	Document No.	
		Date issued	
		Date reviewed	

1. Standard Operating Procedure of Waste Segregation

1.1. Purpose

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

1.2. Scope of Application

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

1.3. Responsibility

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

1.4. Equipment and Supplies

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

1.5. Method

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

2. Standard Operating Procedure of Waste Storage

2.1. Purpose

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

2.2. Scope of Application

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

2.3. Responsibility

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

2.4. Equipment and Supplies

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

2.5. Method

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

3. Standard Operating Procedure of Waste Transportation

3.1. Purpose

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

3.2. Scope of Application

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

3.3. Responsibility

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

3.4. Equipment and Supplies

- Bags
- Basket
- Back packs

3.5. Method

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

4. Standard Operating Procedure of Treatment of Waste

4.1. Purpose

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

4.2. Scope of Application

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

4.3. Responsibility

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

4.4. Equipment and Supplies

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

4.5. Method

Syringes

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

Vaccine vials

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

5. Standard Operating Procedure of Disposal of Waste

5.1. Purpose

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

5.2. Scope of Application

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

5.3. Responsibility

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

5.4. Equipment and Supplies

- Sharp pit
- Standardized Incinerator
- Autoclave
- Secured burial pit
- Sanitary land fill

5.5. Method

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

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

Name of the Health Facility:

Address:

Name of the Head of Health Facility:

Name and Designation of Waste Management In-charge:

Date of Inspection:

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

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

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

Total Score: () out of 7.

Other Finding(s)

Is there a public participation on waste management?

Is there any experience of inspection on application of SOPs?

Impressing

Is overall compliance of waste management satisfactory?

Instruction / Recommendation:

	Name	Designation	Signature	Date
Checked by				
Countersigned by				
Approved by				

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

SUMMARY

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

Practices regarding asbestos that are normally considered acceptable by the World Bank Group (WBG) in projects supported through its lending or other instruments are addressed in the WBG's General Environmental, Health and Safety (EHS) Guidelines.¹⁰ This Good Practice Note provides background and context for the guidance in the WBG EHS Guidelines.

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

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

ASBESTOS AND HEALTH RISKS

What is Asbestos, and Why are We Concerned with its Use?

Asbestos is a group of naturally occurring fibrous silicate minerals. It was once used widely in the production of many industrial and household products because of its useful properties, including fire retardation, electrical and thermal insulation, chemical and thermal stability, and high tensile strength. Today, however, asbestos is recognized as a cause of various diseases and cancers and is considered a health hazard if inhaled.¹¹ The ILO estimates that over the last several decades 100,000 deaths globally have been due to asbestos exposure,¹² and the WHO states that 90,000 people die a year globally because of occupational asbestos exposure.¹³

¹⁰ [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).

¹¹ 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).

¹² http://www.ilo.org/wow/Articles/lang--en/WCMS_081341

¹³ http://www.who.int/occupational_health/publications/asbestosrelateddiseases.pdf

Over 90% of asbestos¹⁴ fiber produced today is chrysotile, which is used in asbestos-cement (A-C) construction materials: A-C flat and corrugated sheet, A-C pipe, and A-C water storage tanks. Other products still being manufactured with asbestos content include vehicle brake and clutch pads, roofing, and gaskets. Though today asbestos is hardly used in construction materials other than asbestos-cement products, it is still found in older buildings in the form of friable surfacing materials, thermal system insulation, non-friable flooring materials, and other applications. The maintenance and removal of these materials warrant special attention.

Because the health risks associated with exposure to asbestos are now widely recognized, global health and worker organizations, research institutes, and some governments have enacted bans on the commercial use of asbestos (see Box 1), and they urge the enforcement of national standards to protect the health of workers, their families, and communities exposed to asbestos through an International Convention.¹⁵

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.¹⁶ 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
- 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

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).¹⁷ 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

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

15 ILO Asbestos Convention No. 162, (see <http://www.ilo.org/ilolex> or http://www.itcilo.it/actrav/osh_es/m%F3dulos/legis/c162.htm)

16 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

17 http://www.euro.who.int/document/aicq/6_2_asbestos.pdf

and among neighbors of asbestos air pollution point sources.¹⁸ Some experimental animal studies show that high inhalation exposures to all forms of asbestos for only hours can cause cancer.¹⁹ 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.²⁰ 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,²¹ although pipe standards have been issued for asbestos-cement pipes conducting "aggressive" water.²²

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.²³ 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.²⁴

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 study²⁵ shows that a 59% increase in metric tons was consumed in 12 countries from 2000 to 2004.

18 "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.

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

20 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.

21 http://whqlibdoc.who.int/hq/2000/a68673_guidelines_3.pdf

22 http://whqlibdoc.who.int/hq/2000/a68673_tech_aspects_4.pdf

23 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. See also Oberta, AF "Case Study: An Asbestos Cement Plant in Israel -- Contamination, Clean-up and Dismantling." Hellenic Asbestos Conference, Athens, Greece, October 29 - 31, 2002. http://www.ibas.btinternet.co.uk/Frames/f_ika_hellen_asb_conf_rep.htm

24 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>

25 R. Virta, US Geological Survey, 2007.

INTERNATIONAL CONVENTION AND STANDARDS FOR WORKING WITH ASBESTOS

International Convention

The International Labor Organization (ILO) established an Asbestos Convention (C162) in 1986 to promote national laws and regulations for the “prevention and control of, and protection of workers against, health hazards due to occupational exposure to asbestos.”²⁶ 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;²⁷ 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.

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

²⁶ www.ilo.org/ilolex

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

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 HSG189/219²⁸).

- **Controlling exposure to airborne fibers.** Because asbestos fibers are primarily an inhalation hazard, the basic purpose of the regulations and standards is to control the concentration of asbestos fibers in the air inhaled by workers or others. Concentration limits have been set by regulations in numerous countries for workers whose duties involve contact with ACM; however, they do not purport to totally eliminate the risk of asbestos disease, but only to reduce it. Exposure limits for individuals other than workers, including occupants of buildings and facilities and the community, are lower than those for workers in deference to the very young and old as well as the physically compromised.
- **Measuring exposure to airborne fibers.** Compliance with exposure limits is demonstrated by air sampling in workers' breathing zone or in the space occupied by the affected individuals, with analysis of the sample by optical or electron microscopy, as explained in Appendix 3. Abatement protocols determine whether a building can be reoccupied after asbestos abatement.
- **Proper disposal.** Proper disposal of ACM is important not only to protect the community and environment but also to prevent scavenging and reuse of removed material. ACM should be transported in leak-tight containers to a secure landfill operated in a manner that precludes air and water contamination that could result from ruptured containers. Similar requirements apply to remediation of sites such as mines, mills, and factories where asbestos fiber was processed and products manufactured. (See EPA NESHAP regulations, Appendix 3.)
- **Transboundary movement of waste.** Waste asbestos (dust and fibers) is considered a hazardous waste under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. The Basel Convention imposes use of a prior informed consent procedure for movement of such wastes across international borders. Shipments made without consent are illegal. Parties have to ensure that hazardous waste is disposed of in an environmentally sound manner (ESM). Strong controls have to be applied from the moment of generation, to its storage, transport, treatment, reuse, recycling, recovery and final disposal.²⁹
- **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.³⁰ Thermal

28 See Appendix 3

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

30 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.

insulation containing asbestos and sprayed asbestos for insulation and acoustic damping were widely used through the 1970s and should be looked for in any project involving boilers and insulated pipes. Insulation dating from before 1980 should be presumed to contain asbestos unless analyzed and found not to. The microscopic methodology for analyzing bulk samples for the presence of asbestos is widely available in industrialized countries and is not expensive; it is less available in developing countries. In a developing country samples may have to be mailed out for testing; alternatively, training may be available for a laboratory in the country.

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

ALTERNATIVES TO ASBESTOS-CONTAINING MATERIALS

Growing Marketplace

Safer substitutes for asbestos products of all kinds are increasingly available (see Appendix 4). These include fiber-cement products using combinations of local vegetable fibers and synthetic fibers, as well as other products that serve the same purposes.³¹ The WHO is actively involved in evaluating alternatives.³²

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.

31 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>

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

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).³³ 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 Guidelines³⁴ specify that the use of ACM should be avoided in new buildings and construction or as a new material in remodeling or renovation activities. Existing facilities with ACM should develop an asbestos management plan that clearly identifies the locations where the ACM is present, its condition (e.g., whether it is in friable form or has the potential to release fibers), procedures for monitoring its condition, procedures to access the locations where ACM is present to avoid damage, and training of staff who can potentially come into contact with the material to avoid damage and prevent exposure. The plan should be made available to all persons involved in operations and maintenance activities. Repair or removal and disposal of existing ACM in buildings should be performed only by specially trained personnel³⁵ following host country requirements or, if the country does not have its own requirements, internationally recognized procedures.³⁶ 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.³⁷

33 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

34 [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)

35 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>)

36 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.

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

APPENDIX 2. WORLD BANK GROUP ASBESTOS REFERENCES

Policy guidance	References
<p>ACM should be avoided in new buildings or as new material in remodeling or renovation</p> <ul style="list-style-type: none"> Existing buildings: ACM Survey and management plan needed Disposal of ACM shall be carried out by specially trained individuals only following host country requirements, or in their absence, internationally recognized procedures 	<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"> 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. 	<ul style="list-style-type: none"> Ukraine -Equal Access to Quality Education (Project ID P077738) KH- Health Sector Support (Project ID: P070542) ID- Health Workforce and Services (Project. ID: P073772) Changchun, China -TBK Shili Auto Parts Co., (IFC, 2005)

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.

INTERNATIONAL STANDARDS
<p>WHO Policy and Guidelines (www.who.org)</p> <ul style="list-style-type: none"> <input type="checkbox"/> www.searo.who.int/LinkFiles/Publications_and_Documents_prevention_guidelines.pdf(p. 70) <input type="checkbox"/> www.searo.who.int/en/Section23/Section1108/Section1835/Section1864_8658.htm
<p>International Organization for Standardization (ISO) (www.iso.org)</p> <ul style="list-style-type: none"> <input type="checkbox"/> ISO 10312 (1995): Ambient air -- Determination of asbestos fibres -- Direct transfer transmission electron microscopy method. [Method similar to ASTM D6281] <input type="checkbox"/> ISO 13794 (1999): Ambient air – Determination of asbestos fibres – Indirect-transfer transmission electron microscopy method. <input type="checkbox"/> ISO/FDIS 16000-7: Indoor air – Part 7: Sampling strategy for determination of airborne asbestos fibre concentrations. <input type="checkbox"/> ISO 8672: Air quality -- Determination of the number concentration of airborne inorganic fibres by phase contrast optical microscopy -- Membrane filter method (1993) [Method similar to AIA RTM1]
<p>Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal</p> <ul style="list-style-type: none"> <input type="checkbox"/> Basel Convention Secretariat (www.basel.int)
<p>International Labour Organization (www.ilo.org)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Chemical Safety Card, ICSC 0014: www.ilo.org/public/english/protection/safework/cis/products/icsc/dtasht/_icsc00/icsc0014.htm
<p>European Union</p> <p>(europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=32003L0018&model=guichett)</p> <ul style="list-style-type: none"> <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 cm³ (8-hr TWA) measured by Phase Contrast Microscopy.

NATIONAL STANDARDS

ASTM International (www.astm.org)

- ASTM International (www.astm.org)
- Manual on Asbestos Control: Surveys, Removal and Management – Second Edition (March 2005). Author: Andrew F. Oberata, MPH, CIH. Discusses in detail how E2356, E2394 and E1368 are used to support an asbestos management program.
- E2356 Standard Practice for Comprehensive Building Asbestos Surveys. July, 2004. Covers baseline surveys for management of ACM and includes assessment protocols to make and prioritize removal vs. maintenance decisions. ASTM E2356 provides information for long-term management of ACM in a Baseline Survey and for preparation of the plans and specifications for a removal project. It contains detailed procedures and equipment (mostly ordinary hardware items) needed to take bulk samples of common types of suspect ACM. Once materials have been identified as asbestos-containing, an assessment is made as to which can be left in place. Quantitative assessment of the Current Condition and Potential for Disturbance of all friable and non-friable materials allows removal priorities to be tabulated and graphically displayed. Budgetary estimates for removal can be established on the basis of the quantitative assessments.
- 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)

- 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)

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). [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)**

- Occupational Safety and Health Guidelines for Asbestos (www.cdc.gov/niosh/pdfs/0041.pdf)
- Recommendations for Preventing Occupational Exposure (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)

- 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) / (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)

- 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)

- 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 - 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

Asbestos product	Substitute products
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;³⁸
 - 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.

³⁸ 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)

3. **Related to the contract clauses**³⁹

- 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

³⁹ 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.



The Republic of Union of Myanmar
Ministry of Health and Sports