

Occupational Health and Safety Manual

for Fecal Sludge Emptying, Transportation and Disposal Services



Disclaimer

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1. Background

According to International Labor Organization (ILO), Occupational Health and Safety (OHS) is defined as the means to prevent work-related injuries and disease to protect and promote the health of workers which will ultimately improve the working conditions and environment. Around the world, more than 2 million people die every year due to unsafe working environment, work-related diseases and injuries. These incidences are even more prevalent in low middle countries. Consequently, work-related health problems result in an economic loss of 4 to 6% of GDP for most countries (World Health Organization, WHO).

WHO research also shows that in many countries more than half of the workers are employed in the informal sector. Due to lack of regulatory enforcement of occupational health and safety standards, these informal workers are deprived of social and health care protection. Likewise, about 70% of workers do not have any kind of insurance to compensate them in case of any occupational diseases and injuries.

In many of the low middle country, sanitation workers provide the crucial public service by keeping themselves in occupational and environmental health hazard, injury and sometimes to death. Among them, Fecal Sludge (FS) service providers fall into one of the most vulnerable categories as they directly deal with fecal matter which contains infectious organisms- pathogenic bacteria, eggs of parasites, worms etc. Despite high vulnerability, occupational, health and safety of fecal sludge service providers are not catering properly due to a lack of enabling environment for policy and guideline enforcement at the implementation level.

ILO established OHS in 1919 AD, however, it's still new in Nepal. Even though Constitution of Nepal 2074 BS and Labor Act 2048 BS (1992 AD) are the apex legal documents to address health and safety provisions for any employees, these documents do not go into further details about the provisions specifically for the sanitation workers.

Furthermore, the Government of Nepal endorsed Institutional and Regulatory Framework for Fecal Sludge Management in Urban Areas of Nepal in 2017 AD. The possible stakeholders who are more likely to be involved in the FSM service chain are described in this regulatory framework along with their respective roles and responsibilities. Few organizations have developed OHS guidelines for sanitation workers but none of these guidelines have been adopted as the national OHS guideline for sanitation workers.

1.1 Situation of Occupational Health and Safety of FS Service Providers in Nepal

In Nepal, sanitation workers are one of the major frontline workers in cities or communities with the responsibility to maintain cleanliness and hygiene. Amongst them, fecal sludge desludgers and transporters need to directly deal with fecal matter posing them to many health and safety risks at different stages of Fecal Sludge Management (FSM) chain. Despite health risks, the majority of FS desludgers in Nepal do not adopt health and safety protection measures at work.

Furthermore, it is entrenched as a caste-based occupation in Nepal from ancient time. Gradually, it got outmoded due to stigmatization as “work of untouchable people”. Slowly migrant workers, homeless, and other people replaced them. Most of the time, these workers are located haphazardly and without any sense of social belonging. Even as citizens, they are suffering social discrimination, insecurity, and a lack of rights. Primarily, these groups do not have matriculation, so they are devoid of all government facilities. Additionally, they themselves are not aware of their rights. They have accepted discrimination and stigmatization as part of their faith, pushing themselves towards vulnerability and perilous life choices day by day.

Furthermore, Nepal government has endorsed FSM Institutional and Regulatory Framework for Fecal Sludge Management in Urban Areas of Nepal in Year 2017. This regulatory framework mainly describes the roles and responsibilities of FSM throughout its service chain. Few organizations have initiated to develop OHS guidelines for sanitation workers, but they are yet to trickle down at implementation level. Despite limited efforts made by the government and some other organizations, OHS policy, guidelines, and procedures specifically for FS service providers are the urgent need to ensure their health, safety, and dignity.

1.2 Provision of Policy and Legal Framework to Address OHS in Nepal

Appropriate legislation, policies, and legal framework are the key factors for successful implementation of occupational health and safety, and a safe working environment for the sanitation workers. The Constitution of Nepal 2017 guarantees the right to live with safety, healthy, and dignity for labor without any discrimination. Aligning with the core values of the Constitution of Nepal, some legislative and legal frameworks have been formulated specifically to ensure the occupational health and safety of workers. A summary of policy and legal frameworks in Nepal and the major areas covered by them to address OHS are listed below:

Table 1: Policy and Legal Framework to Address OHS in Nepal

Policy and Legal Framework	Major Areas Covered on OHS
<p>Labor Act (2048 BS) (1992 AD)</p>	<p>Formulated for industrial workers where at least 10 or more people work. The major provisions in the Act are:</p> <ul style="list-style-type: none"> • Fixed working hours, provision of leave, and holiday. • Provision of safe working conditions, including health and safety. • Fixation of minimum wages, payment for overtime working hours, and provision of bonuses. • Arrangement of sanitation and cleanliness of the working area, provision of drinking water, waste disposal, proper ventilation, and lighting. • Protection from dust and fumes, provision of medical examinations, and preventive measures for accidents.
<p>Three-year Interim plan (2064- 2067 BS)</p>	<p>The interim plan addresses OHS for industrial workers as:</p> <ul style="list-style-type: none"> • Allocated budget for OHS projects, including capacity building and training for officials. • OHS awareness program for industrial workers. • Education program on occupation. • Program for strengthening the monitoring system of OHS.
<p>Three-year plan Approach paper (2010-2013 AD)</p>	<p>The plan’s approach was set to create:</p> <ul style="list-style-type: none"> • Healthy and safe working environment. • Develop cordial labor relations, including a labor inspection system. • Demonstrate model labor offices throughout the country.

General
Federation of
Nepal Trade
Union

Established in 1989 to advocate for the rights of laborers.

Most industries are affiliated with this trade union. The trade union mainly promotes the following rights for the industrial workers:

- Trade union rights and gender equality.
- Training, capacity building, and campaigning.
- Work facilities, incentives, insurance, etc.
- Conduct a study to find the gaps and challenge of workers faced at their workplace.

Labor Act
(2074 BS)

Labor Act 2074 (Chapter 12) includes the provision of OHS focusing on industrial and enterprise labor.

- The employer shall formulate and implement policies on health and safety.
- The employer shall provide safety and health insurance for labor.
- Provision of training and orientation for labor health, safety, and health standards for enterprises.
- Special provision relating to the treatment of occupation disease.

Likewise, the Labor Act (Chapter 13) has provisions related to industries or services of a special nature, such as tea estate labor, construction labors, transport labor, and domestic labor.

Institutional
and Regulatory
Framework for
FSM in Urban
Areas of Nepal
(2017 AD)

This regulatory framework is the first dedicated document for FSM. This regulatory framework sets the objective for providing guidance for effective planning, implementation, and monitoring of FSM services including the following provisions:

- Provision of a public health and environment division to oversee the FSM service.
- Local bodies (*Palikas*) have the responsibility to prepare standards and guidelines for safe collection of FS and licensing for transportation vehicles.
- Appropriate health and safety training for fecal sludge emptying and transportation.

“Leaving No One Behind” is the core value of the Sustainable Development Goals, and to ensure this value, it is very essential to guarantee the protection of labor rights, and provide safe and secure working environments to the who deliver those essential services.

2. Objective

2.1 Objective of OHS

The main objectives of the occupational health and safety are as follows:

- To develop and promote a healthy and safe workplace and environment.
- To protect and promote health and safety by preventing and controlling occupational diseases, accidents, and any hazardous conditions.
- To maintain and promote workers health and their working capacity.
- To promote and develop organizational level management systems through policy and a participatory approach to improve occupational health and safety.

2.2 Objective of OHS Manual

The overall objective of the OHS manual is to provide instructions on occupational health and safety measures for fecal sludge emptying transportation and disposal service providers. The specific objectives are:

- To help identify the potential occupational health and safety risks at different stages of FS desludging, transportation, and disposal services.
- To provide information on stepwise risk mitigation procedures for FS desludging, transportation, and disposal services.
- To support FS desludging and transportation service providers in achieving a healthy and safe workplace and environment.
- To maintain and promote workers' health and enhance their working capacity,
- To support the service providers in strengthening their organizational occupational and safety management systems and,
- To serve as a guiding document for any organization, company, or individual who works in the related field.

2.3 Targeted Users of OHS Manual

The targeted users of the OHS manual are FSM stakeholders who are involved and responsible for managing FS in a safe manner, such as FSM service providers, local bodies, development sectors, sanitation workers, etc.

3. About FSM Service Chain

The sanitation service chain is a loop that is required to achieve safely managed sanitation. In the onsite sanitation system, the FSM service chain ensures safely managed sanitation to protect human and environmental health from the exposure of fecal matter. The FSM service chain involves five vital components, as listed below:

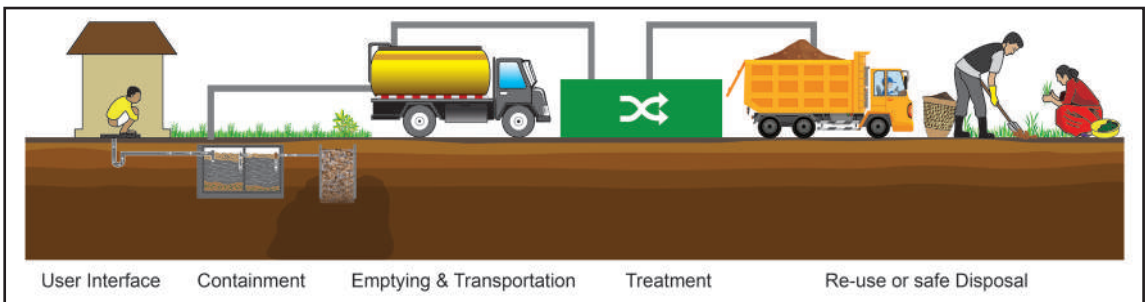


Figure 1 : Sanitation value chain

A. User Interface

The user interface is the technology with which the user comes into contact. In the context of FSM, the user interface is a type of toilet, such as a squatting or pedestal pan and/or urinal by which the user accesses the sanitation system. The user interface is the first component of FSM.

Objective: To provide safe access to discharge human waste and ensure the human waste (feces and urine) is hygienically separated from human contact to prevent exposure to fecal contamination.

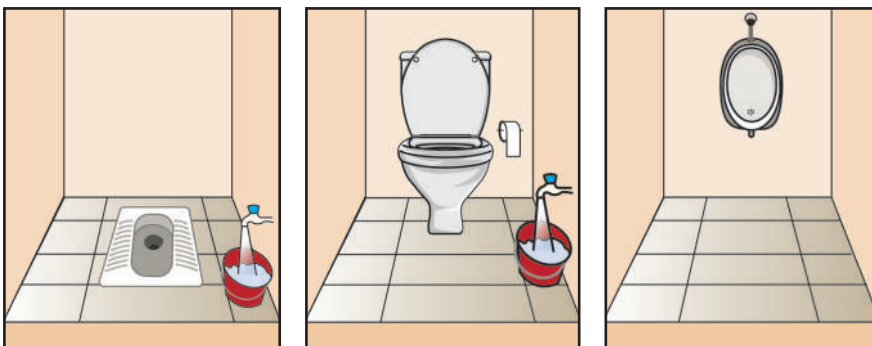


Figure 2: Various types of user interface

B. Storage/ Containment

Storage/containment describes collecting and storing the waste produced from the user interface, and the various containment technologies that are used to store waste to safeguard the environment. Properly designed containments (such as a Septic Tank, Biogas Digester, Dry Ecosan, etc.) partially treat the waste products. Waste produced from storage or containment often requires proper treatment before use and after the disposal of end products.

Objective: To safely contain the waste product generated from user interfaces for a certain period, treat partially, and safeguard against environmental pollution.

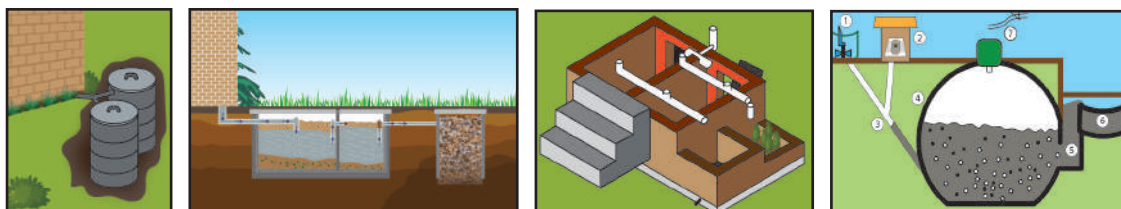


Figure 3: Containment types in practice

C. Desludging/Emptying

Desludging is the process by which fecal sludge contained inside the storage or containment is emptied for disposal or treatment. Timely and regular desludging of containment is a crucial activity in the FSM service chain. Besides, special precautions and measures are essential to be followed during the desludging process as there are high chances of direct exposure to fecal matter. Both manual and mechanical desludging are common in developing countries, even though manual desludging is illegal and often prohibited.

Objective: To prevent containment from FS overflowing and clogging, and, hence, to protect containment from its failure and increase its lifespan.



Figure 4: Various types of desludging methods

D. Transportation

Transportation is the means of conveyance of fecal sludge from containment/storage to a safe disposal or treatment plant. Transportation via vehicle is the common practice, however manual and semi-mechanized modes of transportation are also in practice depending on the geographical condition and availability of transportation means.

Objective: To ensure the safe and economical conveyance of fecal sludge.



Figure 5: Various means of FS transportation

E. Treatment

Technologies are used to treat wastewater and residues to reduce the pollution load by means of physico-chemical and/or biological processes. Treatment is a process to ensure the reduction of FS pollution loads to a standardized quality for safe disposal or use. Various types of treatment processes such as mechanical, natural and hybrid systems are used depending on end use, pollution strength, land availability, and resource availability.

Objective: To protect environment and public health by reducing the pollution load of FS to a standardized quality before safe disposal or reuse.

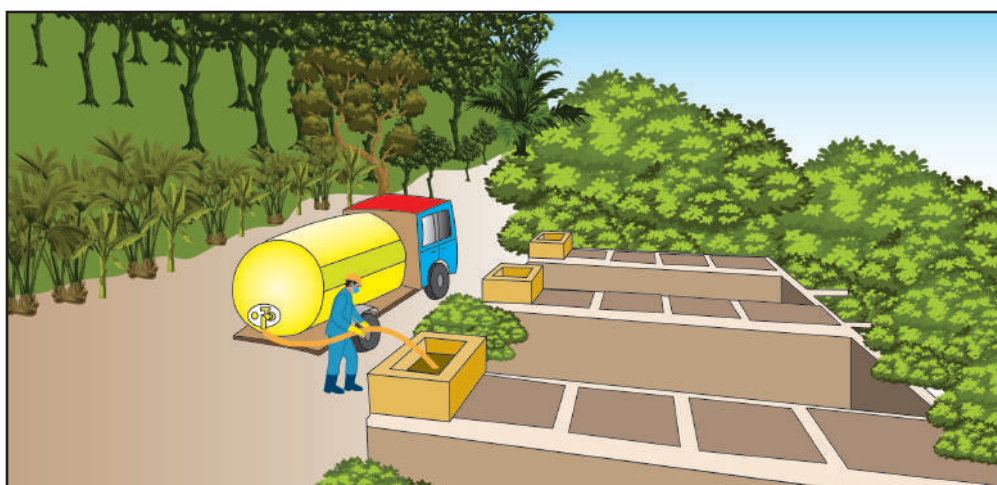


Figure 6 : Fecal sludge treatment plant

F. Safe Disposal/Reuse

Safe disposal means the process by which the end products of FSTP are disposed safely in the environment or reused ensuring quality standards.

Objective: To protect the environment from FS pollution and contamination.



Figure 7: Reuse of FSTP end product in agriculture

3.1 Potential Occupational Hazard and Health Risk at Different Stages of FSM

During the FS service process, there are three major concerns: exposure to harmful gases, direct contact with fecal sludge, and physical injuries. This section will describe different types of occupational hazards, and diseases that may occur during FS desludging, transportation, and disposal.

3.1.1 Occupational Hazards

An occupational hazard is a condition that may jeopardize human health or action that leads to injuries or illness which is related to a particular occupation. The hazard could pose both long- and short-term risks to human health. Short-term hazards may include physical injuries and other health effects like allergies, coughing, choking, etc. whereas long-term hazards may lead to chronic diseases. During FS desludging, transportation, and disposal, the workers have a high risk of the following hazards:

Physical Hazard

Generally, physical hazards occur because of excessive heat and cold, disturbing noise, vibration, and improper light in the working space, improper functioning, injuries, falls, etc. Specifically, during the FS emptying to disposal process, weak structure of the containment, slips and accidental falls inside the containment, exposure to sharp objects, lifting heavy manholes, and sometimes being careless to close the manhole lid after completion of the work are the main reasons for physical injuries and accidents.

Biological Hazard

A biological hazard, or biohazard, is a biological substance that poses a threat to the health of living organisms, primarily humans. It is more prevalent during the FS emptying, transportation, and disposal processes as workers have a high chance of being exposed to pathogens. Another common risk is getting exposed to harmful gases generated from containment through the oral, nasal, and dermal mediums. This hazard is more susceptible to manual scavengers if they do not use adequate safety measures. Biological hazards may lead to many types of occupational diseases and sometimes cause public health issues if they are not addressed properly.

Chemical Hazard

Generally, chemical hazards occur during the emptying of containment when a person is exposed to harmful gases and inhales them through oral, nasal, or dermal routes. During the desludging process in confined containments (especially during manual emptying), there might be the minimum level of oxygen, which may cause a shortage in breathing. Also, a septic tank or pit generates toxic gases such as Methane, Ammonia, and Sulphur dioxide, which lead to skin and eye irritation, and breathing problems. Likewise, if hospitals and industries do not practice safe disposal mechanisms for chemical substances, there might be a high chance of chemical exposure during FS desludging. This chemical hazard may lead to physical and health hazards for the worker.

Mechanical hazard

Mechanical hazards are more prevalent in industries where workers are exposed to machinery parts. In the FSM process, this hazard is mainly caused by the failure in the mechanical parts of the desludging machine or transportation means. For example, if the pipe couplings between the truck and the receiving point are not correctly aligned, then FS flow will not be smooth through the pipe connection and cause spilling and leakage of

FS, which may lead to the accident as well as biological hazards. Similarly, if the FS is overloaded by the truck and other carriers, then it might cause an accident.

Ergonomic hazard

An ergonomic hazard is caused by any factor, tool, or environment at the workplace that leads to physical injuries or any other health issues for the workers. In FS desludging service, ergonomic hazards may be caused by repetition, awkward positions, work stress, improperly designed tools, equipment, working methods of desludging, direct exposure to vibration, and extreme temperatures. Such hazards can expose FS desludging workers to musculoskeletal disorders and physical injuries.

Psychological hazard

In Nepal, most FS desludging services are provided by the informal sector, and workers in this sector belong to a minority group; therefore, they are facing discrimination in their occupation, which leads to mental trauma. Lack of recognition, security, and working in a discomforting environment lead to frustration, tension, and poor human relations with the community. This psychological hazard may lead to both physical and mental health problems for the worker, such as depression, hypertension, heart disease, and sometimes chronic disease. Therefore, psychological hazards need to be considered as one of the prioritized components for sanitation workers.



Potential Occupational Hazard during FS Desludging, Transportation and Disposal



Pre-Desludging



During Desludging



After Desludging



Transportation


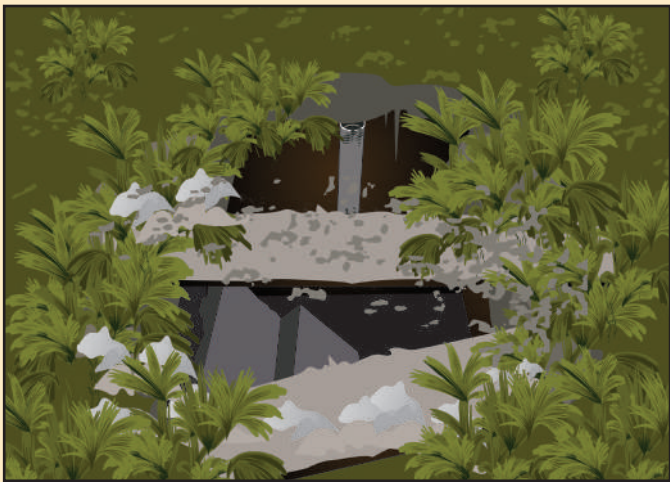


Disposal



PRE-DESLUDGING



Potential Occupational Hazard	Type of Hazard	Potential Risk
<p>Fault in the engine or any other parts of FS carrying vehicle</p>	<ul style="list-style-type: none"> • Physical • Mechanical 	<ul style="list-style-type: none"> • Road accident leading to physical injuries of the workers. 
<p>Improper construction of containment (septic tank/pit)</p>	<ul style="list-style-type: none"> • Physical • Biological • Chemical 	<ul style="list-style-type: none"> • Collapsing of the containment structure during desludging. • Accident-causing physical injuries to the workers. • Direct contact with pathogenic and chemical contamination contained in FS may lead to occupational diseases.. 

Potential Occupational Hazard

Corroded lid/ improperly constructed manhole of the containment

Type of Hazard

- Physical
- Biological
- Chemical

Potential Risk

- Workers accidentally falling into the septic tank can cause physical injuries.
- Accidental falls may cause direct contact with pathogenic and chemical contamination contained in FS, which may lead to occupational diseases such as intestinal infection, and parasites resulting in diarrhea and stomach pain.
- During an accidental fall, a worker may face shortness of breath, which can be life-threatening.



Narrow access and obstacles (thorns and bushes) around containment

- Physical

- Risk of bruises, wounds, and injuries and if left unattended, they can become infected, leading to other health problems such as infection in other body parts.



Potential Occupational Hazard

Type of Hazard

Potential Risk

Unknown access point of the containment

- Physical

- Containment structure may be damaged to find out the access point.



Unknown access point of the containment /Lifting of heavy Lids (manhole covers) with bare hands

- Physical
- Biological

- Injury to the worker's extremities.
- If the worker does not maintain personal hygiene, it may lead to intestinal infection caused by parasites, resulting in diarrhea and stomach pain.



Potential Occupational Hazard

While lowering the hose or mixing the sludge by using tools, workers bend down from their waist to get close to the tank

Type of Hazard

- Physical
- Biological
- Chemical

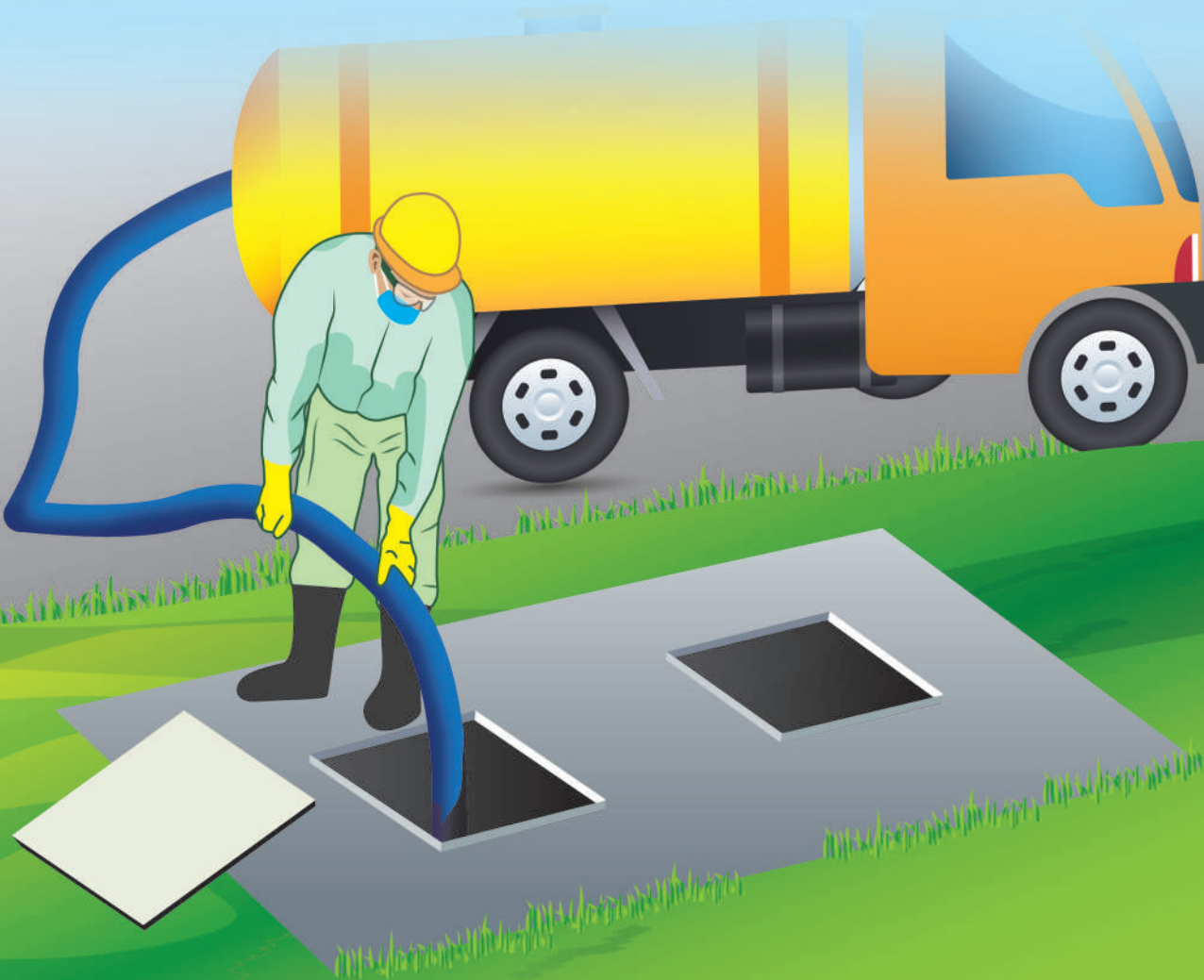
Potential Risk

- Accidental fall inside the containment and causes physical injuries.
- Accidental falls may cause direct contact with pathogenic and chemical contamination contained in FS, which may lead to occupational diseases such as intestinal infection, and parasites resulting in diarrhea and stomach pain.
- Direct chemical exposure may lead to shortness of breath, respiration problem, and allergic reactions in body parts.





DURING-DESLUDGING



Potential Occupational Hazard

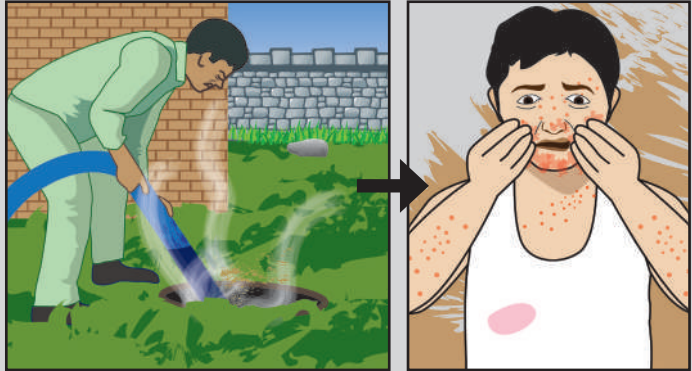
Desludgers may inhale toxic gases through oral, nasal, or skin route

Type of Hazard

- Biological
- Chemical

Potential Risk

- Skin, eye irritation, allergy, and problems in respiration.
- Intestinal infection may occur due to biological exposure.



Entering inside septic tanks and manual desludging

- Physical
- Biological
- Chemical

- Depletion of oxygen results in shortness of breath, which may be life-threatening.
- High chances of inhaling fecal matters if worker does not use safety measures, which can cause bacterial and viral infections, that may lead to intestinal diseases such as diarrhea, hepatitis, etc.
- Exposure to chemical matters contained in FS can cause problems with respiration, allergies, asthma, etc.



Potential Occupational Hazard

Absence of vent pipe in a septic tank or vent pipe is not correctly installed

Type of Hazard

- Physical
- Biological
- Chemical

Potential Risk

- Accumulation of harmful gas inside the containment
- Loss of consciousness or, in some instances, death.

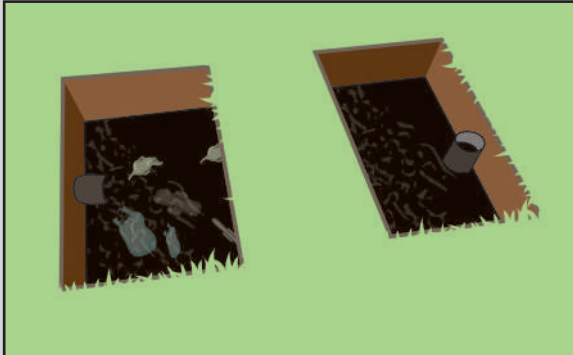



Breakage in the suction pipe, body of tank, improper pipe connection at inlet and outlet of the tank

- Physical
- Biological

- Risk of contact with fecal matter.
- Physical injuries during handling of broken pipe.



Potential Occupational Hazard	Type of Hazard	Potential Risk
<p>Presence of blocking objects inside containment</p>	<ul style="list-style-type: none"> • Physical • Biological • Chemical 	<ul style="list-style-type: none"> • Increment in duration of exposure time with fecal matter. • Desludgers may need to enter inside the tank to remove blockages. 
<p>Presence of sharp object inside the containment</p>	<ul style="list-style-type: none"> • Physical 	<ul style="list-style-type: none"> • Physical injuries cause wound, scratches, etc.
<p>Smoking, chewing, and eating during desludging</p>	<ul style="list-style-type: none"> • Physical • Biological • Chemical 	<ul style="list-style-type: none"> • Direct exposure to the fecal matter through the mouth and nose. 



AFTER DESLUDGING



Potential Occupational Hazard

If the lid of manhole is remained open after desludging

Type of Hazard

- Physical
- Biological
- Chemical

Potential Risk

- Accidental falls inside the containment can cause physical injuries, wounds, scratches, etc.
- Accidental falls may cause direct contact with pathogenic and chemical contamination contained in FS, which may lead to occupational diseases such as intestinal infection, and parasites resulting in diarrhea, stomach pain, and allergies in different body parts.



If the spillage is not managed properly

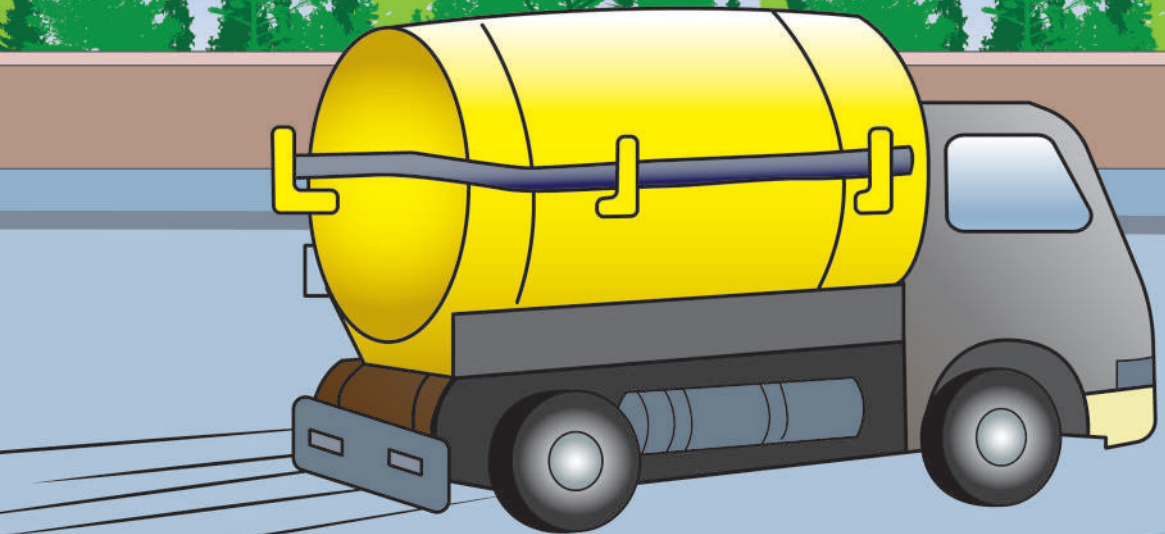
- Physical
- Biological

- Pathogenic contamination to the worker, surrounding community, and environment.
- Slippery ground may lead to accidents.
- Bad smells.





TRANSPORTATION



Potential Occupational Hazard

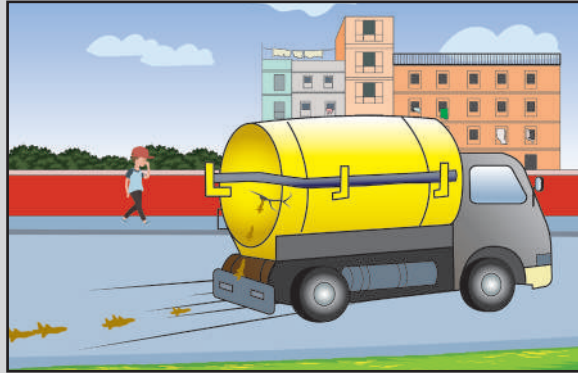
Cracks on the body of the vehicle or the inlet point of the vehicle is not closed properly

Type of Hazard

- Biological

Potential Risk

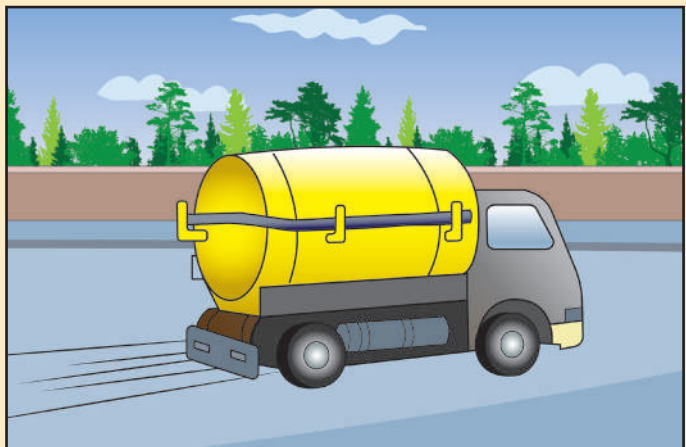
- Leakage of FS during transportation.
- Pathogen contamination.
- Slippery road causes road accidents and physical injuries to the public.



High speed and careless driving

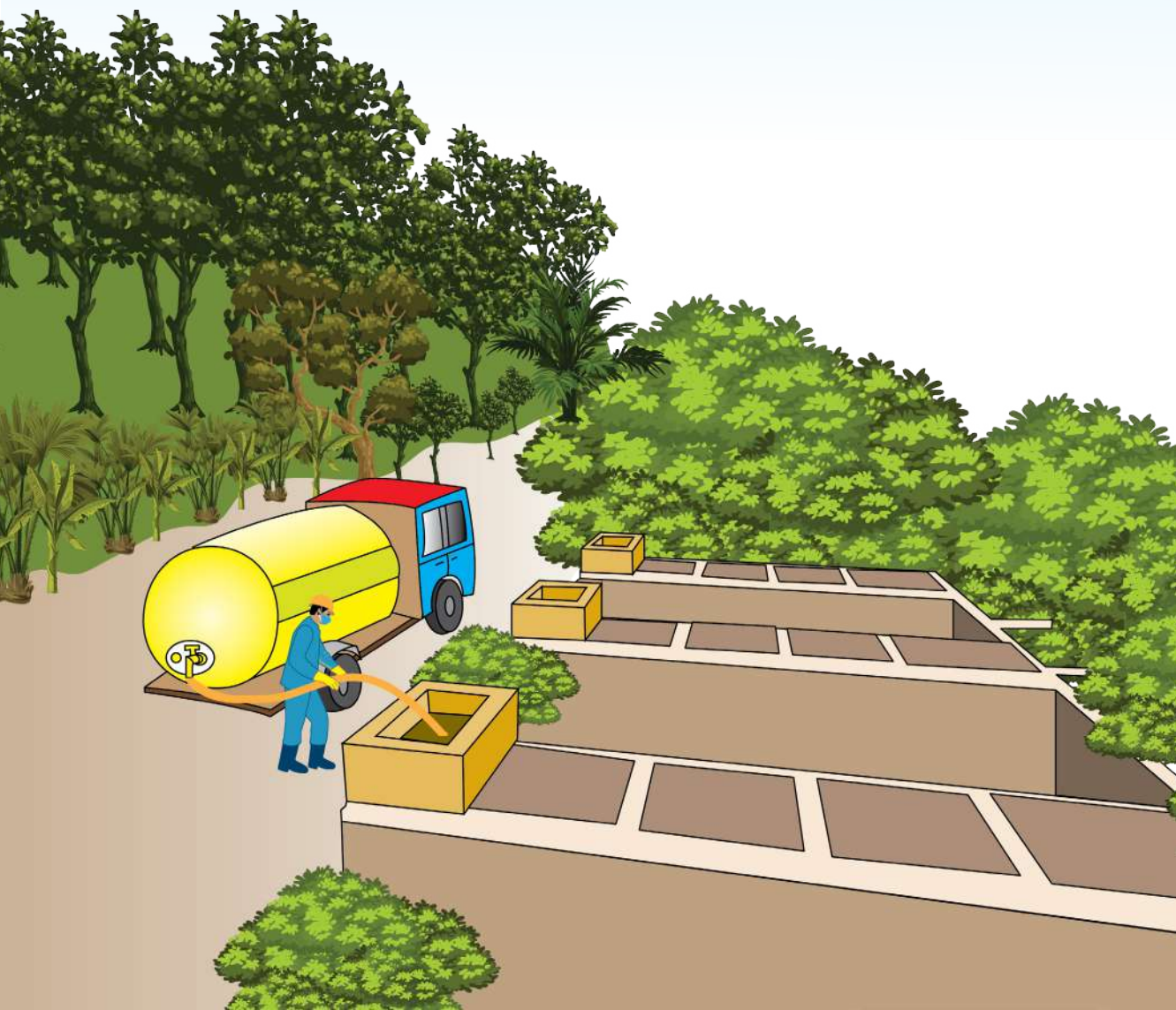
- Physical
- Biological

- Road accidents and physical injuries.
- Sometimes, road accidents involving vehicles can cause large amounts of sludge to spill over the road. This may result in direct exposure of FS to the public, which may create pathogenic contamination for human health as well as the surrounding environment.





DISPOSAL



Potential Occupational Hazard

If traffic control is not done properly at the busy FSTP site for disposal

Type of Hazard

- Physical

Potential Risk

Chances of accidents and may cause physical injuries.



If the pipe couplings between the truck and the FS receiving is not correctly aligned

- Biological

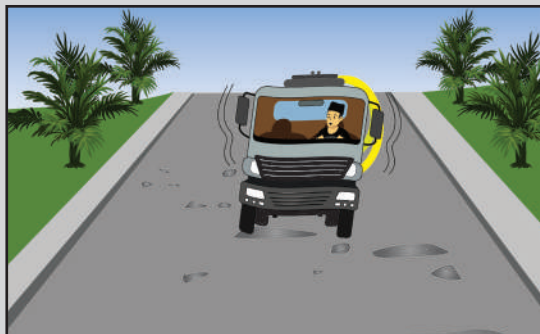
- Uneven discharge of FS resulting in spillage of FS at the disposal area, which may further result into exposure to pathogenic contamination for the workers.





Improper design and construction of FS disposal point and platform

- Physical
- Biological

- Slip of the truck.
- Accidental falls of operators can cause physical injuries and direct exposure to FS.



Potential Occupational Hazard	Type of Hazard	Potential Risk
If desludgers and vehicle operators do not wear PPE	<ul style="list-style-type: none"> • Biological 	<ul style="list-style-type: none"> • Directly exposed to pathogen contamination 

Lack of regular cleaning of vehicle after disposal	<ul style="list-style-type: none"> • Biological • Physical 	<ul style="list-style-type: none"> • Pathogenic contamination. • Leakage and breakage in the body parts of the vehicle may lead to accidents. 
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Note: Psychological hazards may exist throughout the process of FSM service because they are not only associated with individual actions and associated hazards.

<ul style="list-style-type: none"> • Occupational discrimination, • Misbehavior and discrimination during the job from society and clients • Lack of recognition and dignity • Social, financial, and health insecurity 	<ul style="list-style-type: none"> • Depression • Hypertension, • Heart disease • Chronical disease • Poor mental health condition
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3.1.2 Occupational Diseases

According to the ILO, occupational disease means any disease contracted because of exposure to risk factors arising from work activity. Occupational disease occurs due to exposure to a pathogenic environment by using unsafe equipment or materials or working in a harmful environment.

In the FS desludging occupation, workers directly deal with a highly concentrated pathogenic matter, which leads to a high health risk. Furthermore, sealed containment contains harmful gases, and inhalation of these gases causes various allergy and respiratory problems and sometimes leads to death. Some major diseases that are prone to the person who deals with fecal matter are listed below:

Gastrointestinal Condition

A gastrointestinal condition is any kind of disease that occurs within the gastrointestinal tract, i.e., from the mouth to the anus. Gastrointestinal conditions are more common among sanitation workers. Many studies have reported that workers who deal with wastewater, sewage, and fecal matters are found to have intestinal infections with parasites resulting in diarrhea and stomach pain. Likewise, this kind of occupation is also found to have increased risk of various types of hepatitis virus infection.

Respiratory Condition

Respiratory diseases also have a high prevalence among sanitation workers, including both acute and chronic symptoms of respiratory diseases. Nose irritation, cough, headache, chronic bronchitis, pulmonary tuberculosis, asthma, and congestive heart failure risks were found in sewage workers. FS desludgers and operators may have a high risk of smell and taste dysfunction if they are directly exposed to fecal matter for a long time.

Musculoskeletal Disorder

This disorder is any kind of injury or disorder that may occur due to the working environment and working posture of the sanitation worker. Back, neck, elbow, and shoulder pain are found more commonly in sanitation workers. Lifting heavy equipment and working in the same posture for a long period of time are the main reasons for this disorder.

Mental and Social Health Condition

In the context of Nepal, many sanitation workers are found to be illiterate; they belong to a minority group by caste and are found to have mental and social health conditions as this occupation is considered inferior work. FS desludging services are provided by the informal sector where they have very little recognition from society and health perspectives. Therefore, workers are found to have mental health problems, depression, and occupational stress, which result in addiction to alcohol and smoking.

Others

Skin infections have been caused by direct and prolonged contact with fecal sludge and due to the chemicals used in toilet/bathroom cleaning products.

Occupational Health and Safety Measures during FS Desludging, Transportation, and Disposal



3.2 Occupational Health and Safety Measures during FS Desludging, Transportation, and Disposal

Occupational health and safety measures are required to be considered from the design stage of technologies. The safe design of vehicles, roads, and disposal points is the most important control measure, as it provides the highest degree of protection and extends to those who are not involved in the occupation. Unlike PPE, the efficacy of safe design is not affected by the behavior of the person involved in the occupation and is hence more reliable.

Thus, occupational health safety is ensured by the proper or safe design of various components of fecal sludge emptying, transportation, and disposal under the sanitation service chain.

FS Service Point

Safety Measures

A. Pre-Desludging

Pre-desludging incorporates the process to be conducted from taking the desludging vehicle out of the garage for service.

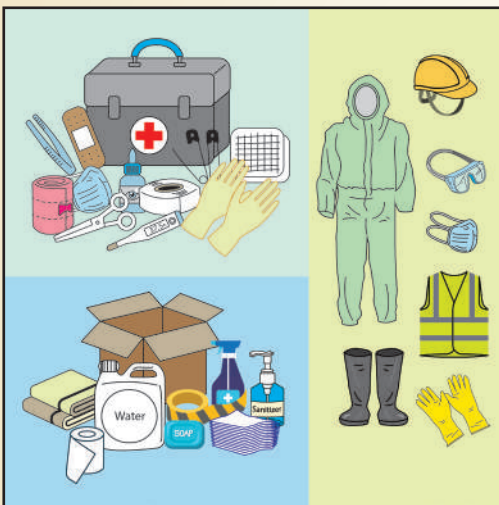


- **Approaching the desludging site:**
 - Confirm the order and location,
 - Collect information regarding road accessibility, vehicle parking area during emptying, type of containment, and the volume of a containment,
 - Examine and ensure four protective gears and safety devices before leaving for service,
 - a) First Aid and Sanitary box,
 - b) PPE, c) Tools/Equipment and
 - d) Vehicle Condition
 - Ensure necessary items are available in First Aid Box, Sanitary Box, and PPE set

First Aid Box – adhesive dressing strips (medicated tape), waterproof bandage, various sized cotton bandage, cotton, scissors, tweezers, safety pins, clinical thermometer, eye/ear drops, medical mask, instruction booklet, disposal gloves, triangular bandage, wound cleaning wipes, etc.

Sanitary Box – clean water (20 ltrs), soap, disinfectant, sanitizer, security tape, toilet paper role, napkin, and towel

PPE – gum boot, glove, apron, safety glasses or goggles, helmet, and mask



- Drive carefully and safely, particularly during rainy and nighttime, on heavy traffic roads, and gravel/earthen roads,
- Keep the vehicle's speed under control,
- Don't drive when drunk,
- Don't talk on your mobile while driving, and
- Stop the vehicle at the side in case of an urgent mobile call.

• ***Investigating the Site:***

- Ensure that you are at the right customer or site,
- Request customer for arrangement of water,
- Inform the customer about the entire emptying procedures,
- Protect the emptying site by caution/safety tape,
- Locate the containment and its manholes, and
- Identify and fix the location to place the equipment.

B. During Desludging



- Wear Personal Protective Equipment (PPE),
- Handle the desludging equipment and tools with care so that they will not injure people or damage property,
- The desludgers must not lean over or crouch down at the tank opening during this operation,
- Do not open the manhole with bare hands, use tools to open the manhole.
- Let the gas out of the tank and keep it open for at least 15 minutes,
- Do not smoke, chew during desludging, and
- Verify that the tank is properly vented.

How to ensure the containment is vented properly?



- The existence of cockroaches indicates the presence of oxygen inside the containment,
- Do not use any form of flame or fire to check the gases inside the containment because it causes fire as the methane gas inside the containment is highly inflammable, and exposes workers to the risk of skin burns, and may cause other physical damages, and
- If harmful gases are detected, wait for them to escape before commencing operations.

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- Fix the desludging pipe properly/firmly to ensure there will be no leakage,
- Do not stand above the containment slab /manhole cover, or be careful with its strength as possible,
- Do not enter the containment to clean up the remaining sludge, which is not sucked by the pump,
- Do not enter the containment to remove the blockage during desludging. Use the pump to pull it out,
- Ensure that desludging is properly done by confirming customer satisfaction, and
- Dislocate the desludging equipment carefully.

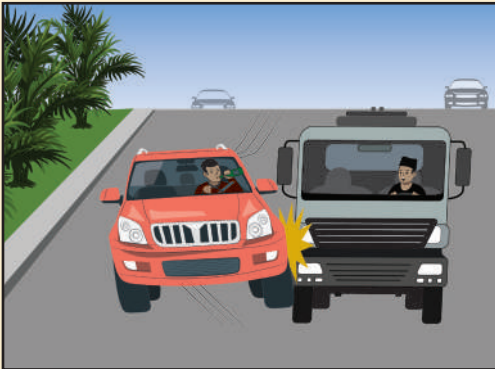
C. After Desludging



• *Evaluating the Site:*

- Close the manhole cover properly,
 - Check for spillage, if any, and clean it using water and proper absorbent materials,
 - Add disinfectants, such as hydrated lime, to the affected areas, and
 - Perform the final inspection and report to the customers after the service is completed.
- ### • *Maintain Personal Hygiene:*
- Wash hands and feet with soap and water,
 - Clean the desludging equipment properly with detergent and water,
 - Disinfect PPE with ethanol or sanitizer, and
 - Put the equipment and PPE back in place.

D. Transportation



- Examine and ensure all the desludging equipment is replaced.
- Drive carefully and safely, particularly during rainy and nighttime, on heavy traffic roads, and gravel/earthen roads,
- Keep the vehicle's speed under control,
- Do not drive when drunk,
- Do not talk on a mobile while driving. Stop the vehicle at the side in case of an urgent mobile call, and
- The spill management equipment to be used; includes shovels, disinfectants, sorbents, and collection bags.

E. Disposal



- ***Positioning the Vehicle***
 - Provide a well-designed facility for vehicle access and a landing platform for disposal to avoid accidents,
 - Provide a layout of treatment to provide clear instructions for the vehicle operator,
 - Drive with additional care inside the treatment plant,
 - Stop the truck by properly applying parking brake at the designated location (landing platform) to dispose fecal sludge, and
 - Register the trip.

FS Service Point



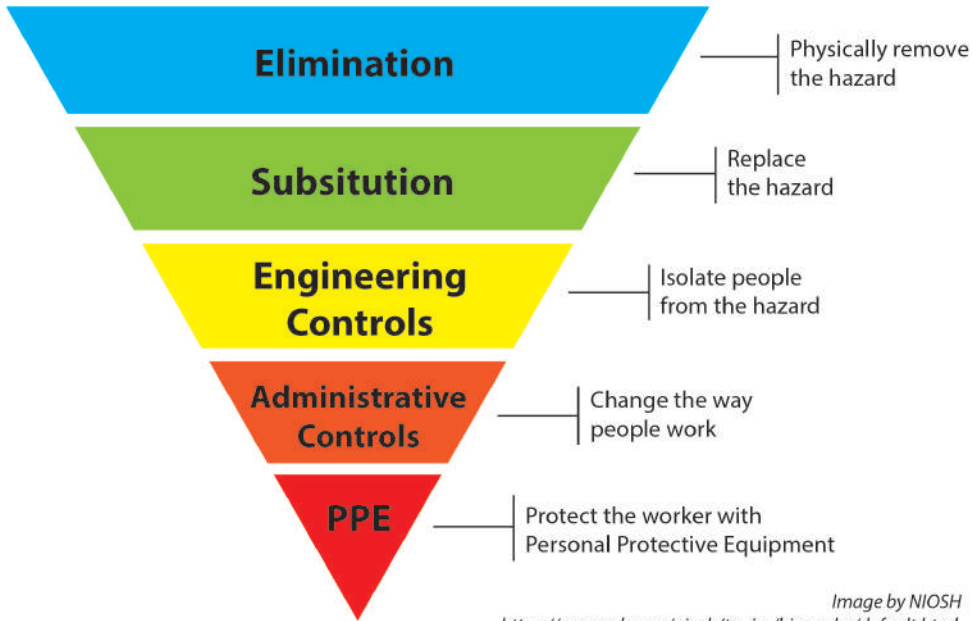
Safety Measures

- ***Discharging Fecal Sludge***
 - Wear PPE,
 - Connect the hose pipe of the truck to the receiving point correctly so that it facilitates the smooth flow of sludge through the connection,
 - Wash the tank of a truck to remove the remaining sludge,
 - Disconnect the truck carefully and allow it to leave the platform,
 - Every day, wash the landing platform at the end of the day and disinfect it,
 - Wash the truck, particularly the wheels, at vehicle cleaning platform at the treatment plant site.



3.3 Framework to Control Safety Issue in FSM Service

The hierarchy of control is the widely accepted 5 level action pyramids, which is defined by the Center for Disease Control and Prevention. This framework describes the process of providing a safe working environment for the workers, and it is very relatable to the FSM occupation.



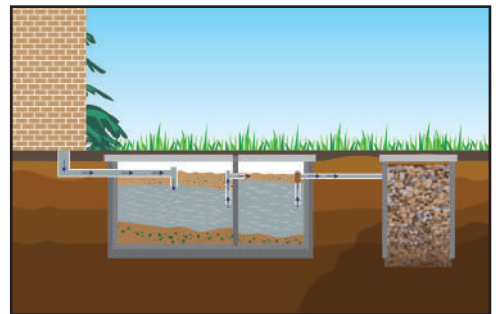
I. Elimination- It suggests removing the hazard physically or eliminating work that has a high potential to create hazard. In FSM service, prohibition or discouragement of manual scavenging can be practiced through enforcement of rules and regulation, and by conducting awareness programs for service providers, clients, and workers.



II. Substitution – Replacing materials, tools, and technology to minimize hazards. Replacing the manual FS desludging method with mechanical, semi-mechanical or other improved options of desludging.



III. Engineering Control – Use of engineering tools and technologies that isolate workers from direct exposure to fecal matter and protect their health and safety. For example, by constructing well designed septic tanks to ensure the safety of the construction, use of blockage removal tools instead of entering inside the septic tank, providing adequate sanitation facilities at FSTP to maintain worker hygiene, etc.



IV. Administrative Control – FS desludging is a special task that requires special attention to ensure the health, safety, and dignity of the workers. In this regard, this type of occupation requires separate guidelines, SoPs, policies, and etc. Action for policy and law enforcement is another crucial part that can be achieved through periodic monitoring of FSM service, awareness raising program is required to be implemented at the field level.



Policy and legislative reformation are required:

- To recognize FS service providers,
- To develop mechanisms to formalize FSM business,
- To develop mechanisms to ensure workers’ regular health check-ups, health and accident insurance, and capacity building activities.

- V. **PPE-** PPE is a line of defense to protect workers from hazards. The main objective of using PPE is the personal protection of the worker and to minimize risks; therefore, PPE does not eliminate hazards. Inappropriately designed and improperly used PPE may cause other risks during work. Therefore, before using PPE, the worker must be aware of its importance and the proper techniques to use it.



In addition to PPE, the compulsion to provide full coverage of medical and accidental insurance to the workers will motivate them to contribute and continue in this business.

**FOR PROPER
USE
OF PPE**

Right Selection

Depending on the nature of the hazard for the particular occupation, PPE must be selected accordingly.

Proper Fitting

Comfort and correct fitting of PPE are very important to get a high degree of protection.

Proper Maintenance and Storage

Regular cleaning and maintenance will keep PPE in hygienically good condition and provide better protection to workers.

Capacity Building and Awareness

Education, awareness, and hands-on training for the correct methods of use and handling of PPE are very important.

4. OHS Responsibilities

Occupational health and safety cannot be achieved with the effort of a single actor. There are many actors with specific roles and responsibilities to ensure health and safety in the FSM service chain, from FS emptying, transportation, to disposal. The major stakeholders and their responsibilities are described below:

4.1 Government's Responsibility

- Create an enabling environment for FSM by formulating and enforcing policies, acts, and regulations,
- Develop and enforce OHS guidelines and standard operating procedures to safeguard the workers' health and safety,
- Set up institutional mechanisms to regulate the FSM through registration, licensing mechanisms, etc. and define the roles and responsibilities of stakeholders in the FSM,
- Conduct surveillance on FSM regularly and effectively,
- Develop an insurance mechanism for occupational diseases, injuries, and accidents, and,
- Develop an incentive mechanism or recognition for FSM workers.

4.2 Service Provider's Responsibility

- Train and capacitate the workers on safe desludging and discharging processes,
- Capacitate on occupational health and safety procedures,
- Provide full coverage of medical and accidental insurance for the workers,
- Provide sufficient safety gear and equipment - Sanitary Box, First Aid Box, and PPE,
- Regular monitoring to ensure the health and safety practices of the workers during their service,
- Provide an enabling environment for the workers to get easy access to their manager or company owner regarding their issues in the profession,

- Ensure a satisfactory salary scale so that they can work with full dedication and satisfaction,
- Provision of regular health checkups for workers,
- Facilitate holidays and weekends, and
- Provide incentives and recognition.

4.3 Client's Responsibility:

- Consider FS's desludging service as a normal service,
- Treat the occupation and workers with respect,
- Provide water for cleaning the surface and hand washing,
- Ensure and provide easy access to the containment, and
- Do not force a worker to enter the containment for manual scavenging.

4.4 Worker's Responsibility

- Understand the service and equipment properly,
- Receive appropriate hands-on training on desludging, transportation and disposal service,
- Sincerely follow the instructions and procedures for desludging, transportation, and disposal services,
- Regular maintenance and ensuring vehicle and tools condition before leaving for work,
- Check and ensure the Sanitary Box, First-Aid box, and PPE are in place and in sufficient quantity,
- Inspect the emptying site carefully before proceeding with work,
- Do not encourage manual scavenging,
- Ensure safety first if it is an unavoidable situation to enter the containment,
- Drive vehicle carefully obeying traffic rules, and
- Sincerely follow the occupational health and safety guidelines and manual provided.

5. References

- DoLIDAR (2017)- Occupational Safety and Health Guidelines.
- GEFONT (2011)- Current Situation of OHS in Nepal- A Study Report.
- Hemali Harish Oza, Madison Gabriella Lee, Sophie Boisson, Frank Pega, Kate Medlicott, Thomas Clasen (2021)-Occupational Health Outcomes Among Sanitation Workers- A Systematic Review and Meta-Analysis.
- IWA (2015) – Fecal Sludge Management- System Approach for Implementation and Operations.
- Marahatta SB, Katuwal D, Adhikari S, Rijal K (2017), Knowledge on Occupational Health Hazard and Safety Practices among the Municipal Solid Waste Handler.
- Ministry of Water Supply and Sanitation, Nepal (2017)-Institutional Regulatory Framework for Fecal Sludge Management in Urban Areas of Nepal.
- SNV Netherlands (2015)-Participation- Oriented Safety Training for The Fecal Sludge Emptier- Action Manual on Occupation Safety and Health.
- SNV Netherlands (2015) -Occupational Health and Safety Guideline for Fecal Sludge Management.
- WHO (2013)- Training Manual on Occupational Safety and Health.
- World Bank (2019)- Health, Safety, and Dignity of Sanitation Workers- An Initial Assessment.

For Further Information:



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