Step 10

Prepare the fleets

Scheduled desludging operation depends mainly on the desludging fleets. Not only on the vehicles, but also on the crews and operational procedures. Fleet performance determines the level of public satisfaction with scheduled desludging. The appearance and cleanliness of the desludging vehicles will affect the public image on the scheduled desludging. The latest tracking technology needs to be used to monitor the vehicles.

10.1 NO MORE HANDCART

Given the high frequency of desludging and the distance that must be travelled, scheduled desludging operation needs to use a motorized vehicle equipped with sludge tank and vacuum pump. No handcart and no manual pumping should be used in a scheduled desludging operation (Figure 10.1).

Several factors must be considered when we choose desludging unit, the factors include (1) width of the road to be passed, (2) travel distance, (3) traffic conditions, (4) required volume of sludge tank, (5) maximum gross weight limits of the truck, (6) comfortability and safety, (7) price, (8) ease of maintenance and (9) availability of spare parts. The implications of desludging vehicle cost on the financial performance of the scheduled desludging scheme need to be carefully assessed. Most of the scheduled desludging operation cost are for operation and maintenance of the desludging vehicle.

The choices of motorized vehicles that are worth considering for desludging operations are (1) three-wheeled motorized carts, (2) pick-up cars and (3) trucks. It is good if the scheduled desludging operation is equipped with all types of vehicles, given the diversity of road widths and traffic conditions as well as volume of septic tanks. For buildings in areas with narrow access roads, desludging operations inevitably need to use motorized carts or pick-up cars (Figure 10.2).

Sludge tanks can be manufactured for different volumes. From 0.6 m^3 for motorized carts to 12.0 m^3 for large trucks. Consider the desludging and transportation mode before we determine the tank size, especially if the scheduled desludging operation will apply a fixed volume desludging mode (see **Step 6: Design**

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Figure 10.1 A fleet of scheduled desludging consists of three components, namely (1) desludging units, (2) crew members, and (3) operating procedures. Collective compatibility of the three components will make scheduled desludging operations run efficiently, effectively, quickly, cleanly, and safely. The good appearance of these three components will increase public trust toward scheduled desludging service in the city.

Figure 10.2 The most important parts of a desludging unit are (1) sludge tank, (2) vacuum pump, and (3) desludging hose. Each unit must also carry safety equipment and first-aid kit box.

operations). If we apply a fixed volume desludging of 1.5 m^3, a 3-m^3 tank desludging truck will be able to serve two households before leaving for the septage treatment plant. With a 4.5-m^3 tank, a desludging truck will be able to serve three households before leaving for the septage treatment plant. In addition, consider also the road width and weight limits before we determine the size of the tank. The bigger the sludge tank, the

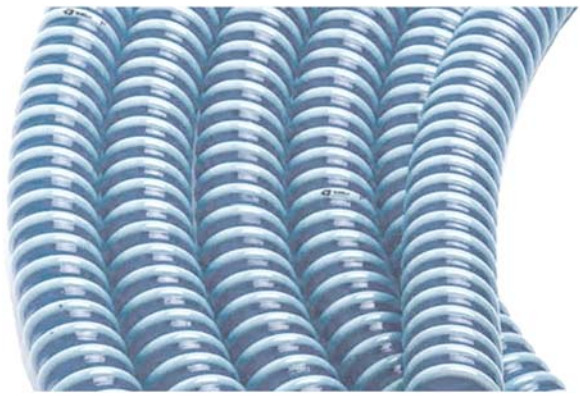

Figure 10.3 Sludge hose is generally made of flexible PVC material with a size of 3 inches or 4 inches. Most trucks carry 30-m hoses except for special orders for homes that are far from the highway.

heavier the burden of the road posed by the desludging unit. In full condition, a desludging truck with a 3 m^3 tank volume will weigh around 5 tons (Figure 10.3).

10.2 TWO ARE ENOUGH

Two crew members are needed for every desludging unit. Collectively, these two individuals will carry out duties to:

(1) Determine the route; in order to obtain the most efficient travel plans according to the desludging work order.
(2) Ensure the desludging unit readiness; especially regarding truck engine, sludge tank, vacuum pump, sludge hose, safety equipment, first aid kit, GPS monitoring equipment and work forms.
(3) Drive the desludging unit; from the pool, the house or building where septic tank is used to the septage treatment plant and back to the pool or move for the next cycle of operation.
(4) Communicate with customers; starting from confirming customer address and willingness to accept the service, explaining customer's rights and obligations as well as work procedures to be performed.
(5) Check septic tank readiness and condition; including making sure septic tank lid is open, measure the depth of settled sludge, record conditions and take photos of septic tank.
(6) Install sludge hose; to connect the septic tank with the truck's sludge tank.
(7) Control vacuum pump operation; ensuring it will work according to the needs and conditions.
(8) Monitor volume of the contents of sludge tank; in order to maintain the accuracy of the amount of septage that has been pumped out.
(9) Record desludging operation; either in writing or digital recording including identification and address of customers, duration of desludging and septage volume.
(10) Monitor septage disposal; to ensure that all septage is disposed in the septage treatment plant according to the standard operating procedures (SOPs) and recorded by the plant operator.
(11) Ensure safety; make sure that safety procedures are applied and safety gears are used.
(12) Check documentation and prepare daily report.

One crew needs to have the skills and proper license to drive a desludging unit. The other crew member should have skills in assessing and emptying septic tanks. Other tasks can be divided between the two crew members. Tasks performed in and around the desludging unit should be given to the driver. For example, the task of controlling pump operation, keeping record of desludging operation and ensuring compliance with work safety requirements.

10.3 WORK BY PROCEDURES

The SOP must be adhered to by all scheduled desludging crew members to maintain quality of service, safety of crew members and homeowners, work efficiency, good documentation, administrative order and to prevent environmental impacts. An SOP must clearly outline the work steps that must be carried out by all desludging crew members to meet operating objectives and performance indicators. The contents of SOP must describe the purpose of the assignment, the scope and responsibilities, definitions and references, work flowcharts, estimated duration and documentation.

A scheduled desludging operation should follow a set of standard procedures which at least includes procedures for (a) pre-departure check, (b) septic tank emptying operation and (c)

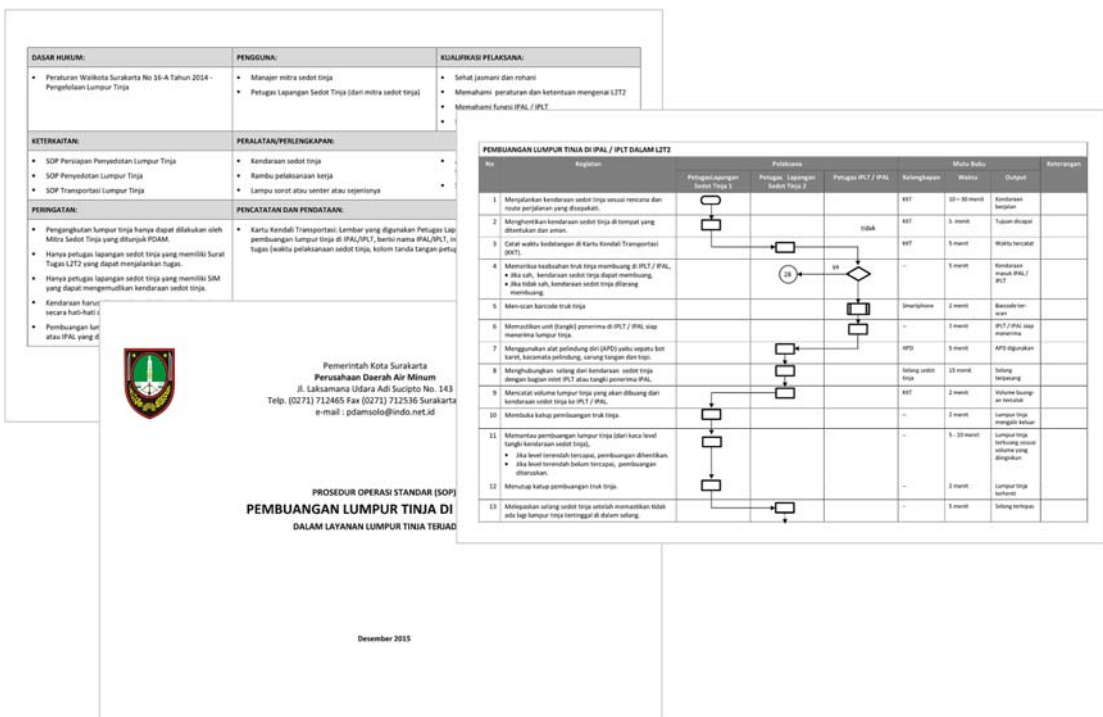

Figure 10.4 There are many formats of SOPs and each country has its own standard format. However, each SOP format should be able to describe all required work steps sequentially. Performance indicator of each step must be stated along with the individual responsible for the step.

septage disposal operation. The details of each SOP may differ from one service provider to another but in general the contents will consist of the same set of generic activities (see the following tables) (Figure 10.4).

Generic steps of SOPs for pre-departure check.

Steps	Description
1. Daily briefing	The crew members discuss and determine (a) buildings to serve, (b) vehicles to use and (c) septage treatment plant to go.
2. Customer confirmation	The crew member contacts the building owners to confirm (a) the address and route to the building, (b) there will be a person who would accompany the fleet and (c) the septic tank lid is open or will be open.
3. Customer septage treatment plant	The crew member contacts septage treatment plant operator to ensure that the plant was willing and ready to accept the septage that will be brought by the desludging truck.
4. Decide route	The crew member decides the most efficient and fastest route to reach the building.
5. Inspect desludging unit	The crew member ensures the vehicle and pump are functioning properly, the fuel is available, sludge tank is not full, and the sludge hose is set.
6. Check forms and equipment	The crew member checks the availability and functioning of communication equipment, safety gears, assignment sheets and forms, crew identification card.

Generic steps of SOPs for septic tank emptying.

Steps	Description
1. Travel to building	The driver takes the desludging unit to the targeted building or house according to the specified time and route.
2. Vehicle stop	The driver stops the desludging unit in a safe place (on a hard and level surface) which will not interfere with the traffic.
3. Introduction	The crew member shows his/her identity card and explains the purpose of the visit, the rights and obligations of the building owner, procedures to be taken and expected cooperation from building owner.
4. Use protective equipment	The crew member uses personal protective equipment (PPE) which consists of work clothes, rubber gloves, hats, protective glasses, rubber boots and mask.
5. Observe the septic tank	The crew member checks whether the lid of septic tank is open and takes record of its condition, in particular regarding the depth of settled sludge and its hardness.
6. Install hose	The crew member places the sludge hose in safe place between the desludging unit with the septic tank. If needed, the crew member should move and park the desludging unit in a closer spot.

(*Continued*)

Generic steps of SOPs for septic tank emptying (*Continued*).

Steps	Description
7. Pump out septage	The crew member operates the pump and opens the tank valve so that the septage flows into the sludge tank until it reaches the desired tank height.
8. Cleaning	The crew member cleans the area and ensures that all desludging activities do not leave any drops of dirty water and impurities in the property that may create odors.
9. Tidying	The crew member cleans the hose and puts it back to its place in the desludging unit.
10. Settlement	The crew member asks the building owner to sign the desludging duty sheet and give one copy to the building owner.

Generic steps of SOPs for septage disposal.

Steps	Description
1. Trip to the treatment plant	The driver takes the desludging unit to septage treatment plant according to the specified time and predetermined route.
2. Examination of sludge tank	The septage treatment plant operator checks the validity and eligibility of the desludging unit to dispose septage in the plant.
3. Desludging vehicle stop	The crew member stops the desludging unit at the designated spot at the septage treatment plant area.
4. Use protective equipment	The crew member uses PPE which consists of work uniform, rubber gloves, hat or helmet, protective glasses, safety shoes and mask.
5. Install hose	The crew member connects the hose from desludging unit to designated receiving unit in the treatment plant.
6. Drain septage	The driver opens the drain valve so that the septage can freely flow out to the receiving unit until the sludge tank is empty.
7. Cleaning	The crew member cleans the area and ensures that their activities do not leave any drops of dirty water and impurities.
8. Tidying	The crew member cleans the hose and puts it back to its place in the desludging unit.
9. Settlement	The crew member asked the septage treatment plant operator to sign the septage disposal task sheet.

10.4 KNOWING THE RISKS

Septic tanks are dangerous because they accumulate a variety of toxic gases. Methane can be very toxic in high concentrations while it is explosive in a concentration commonly found in septic tanks. Other gases are hydrogen sulfide, ammonia, nitrogen dioxide, sulfur dioxide, and carbon dioxide. Hydrogen sulfide in small

Figure 10.5 Collaboration between the desludging fleet crew members is needed so that all tasks can be performed properly. Most importantly, the crew members must have good attitude and skills to communicate with customers.

concentrations may cause eye irritation, shortness of breath and unrelenting cough. Exposure to higher concentrations can be fatal quickly. Other potential hazards are suffocation, collapse of septic tanks and health risks from bacterial or viral infections. Deaths that involve falling into or accidentally entering a septic tank occur throughout the world. Septic tank explosions also occur frequently, especially as a result of careless work in desludging operations.

Crew members must be assured that their desludging work carries a high risk to health and safety. They also need to be aware that they or their co-workers can experience accidents or health problems due to their careless work. They must also be aware that residents of the house can become victims of their mistakes in work. It is strongly recommended to remind the health and safety risks for all crew members during the daily briefing.

The use of personal protective equipment (PPE) by desludging crew is a must. Each person working nearby the septic tank must use rubber gloves, protective glasses, safety shoes and masks (see Figure 10.5). Another prevention is to ensure that the crew will follow the SOP when opening the septic tank lid, checking septage depth, checking septic tank chamber, mixing septic tank content, pumping septage out, and closing the lid. Anybody should never be allowed to work alone at a septic tank because falling into a septic tank or inhaling methane gas can be fatal. They can also fall into the septic tank when they examine its interior. **Annex F** provides more information on the safety issues of scheduled desludging operation (Figure 10.6).

10.5 MONITOR THE OPERATION

Every action of the fleet needs to be monitored. It starts when the desludging unit leaves the garage, goes to the building, empties the septic tank, disposes septage at the treatment plant until it returns to the garage. The monitoring encourages fleet crews to work according to standard procedures and daily operational

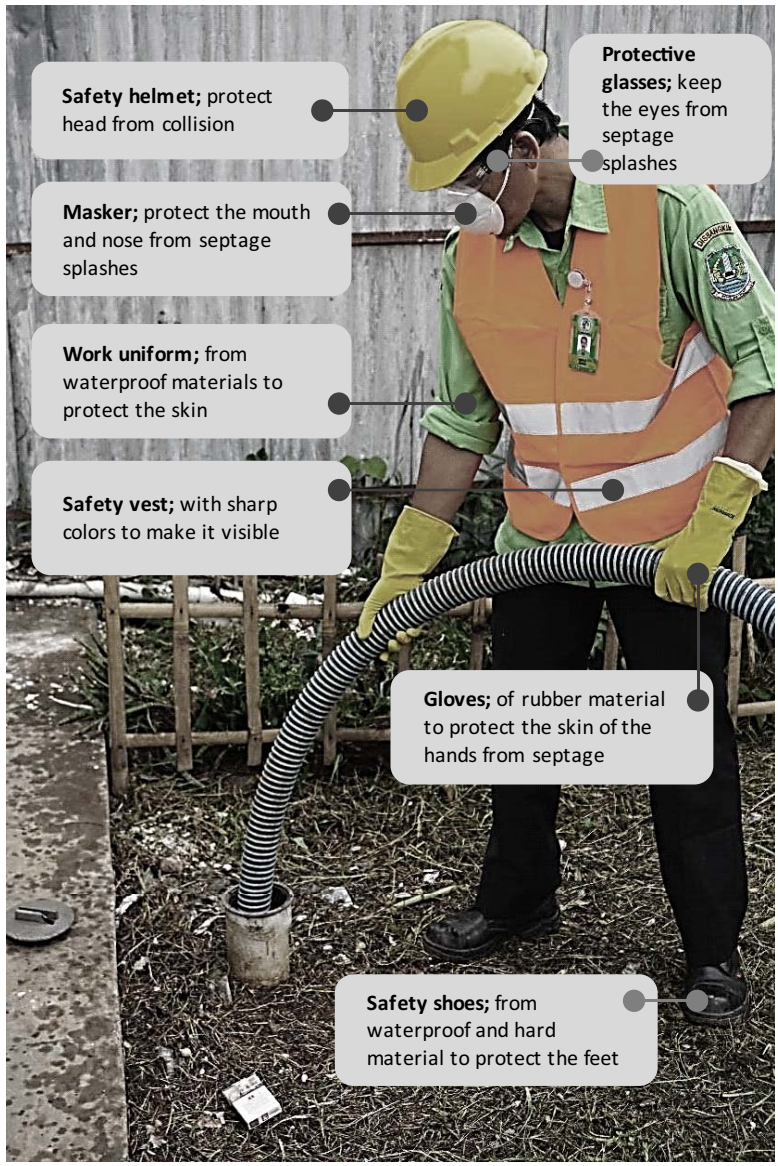

Figure 10.6 PPE that must be used by the crew of the desludging fleet, especially for those who are directly involved in septic tank emptying operation.

plans. The fleet will come to the building according to the schedule and dispose septage at the specified treatment plant.

Monitoring can be done manually, that is, by recording fleet activities at each stop, namely the garage, the building, the septage treatment plant and even the rest area. Information to be recorded includes (a) identification, name and address of the place, (b) time of arrival and departure, (c) activities carried

Figure 10.7 The use of digital GPS tracking systems allows the scheduled desludging operation to be monitored in real-time and continuously. Each building has a barcode to be scanned by a smartphone carried by a crew member. Internet connection allows the scan results to be sent to the data center. The crew no longer needs to carry a control card and ask for a signature from the building owner. This system has been developed by IUWASH for use in scheduled desludging scheme of Surakarta.

out at each stop. The crew write down the activity on the operation control card. Before leaving each stop, the crew must ensure that each operation control card is signed either by the garage officer, building owner or treatment plant operator. The operation control card is periodically handed over to the supervisor of scheduled desludging operation.

With current advances in information technology, monitoring of the fleet can also be done digitally (see photo below). The global positioning system (GPS) tracking system has been used in many transportation companies. The tracking system can continuously find the location of a vehicle and then display it on a digital map that can be seen in real time by the supervisor. It provides visibility into the whereabouts of the fleets which makes the monitoring much more effective. Some GPS tracking systems can even recommend the optimal route to crew members which will allow them to reach their destination faster. All tracking data will be stored in a central computer system so as to enable the evaluation of the performance of each desludging fleet, including the desludging frequency, number of trips and working time (Figure 10.7).

The monitoring records can also be used to verify the work progress of a desludging fleet. If the main service provider outsources the desludging work to an operating partner, the data from the monitoring should be used to verify the claim in the invoice. Payment can only be made if the record data show that they have desludged septic tank according to the schedule and disposed the septage at specified treatment plant.