Emptying and De-sludging Practices

An Occupational Safety Needs Assessment Study

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Context

Rationale and Objectives

- In-depth analysis of current de-sludging practices (including measures for occupational safety) to understand resultant safety and health hazards for desludging workers

- Understand the underlying reasons (knowledge, behavior etc.) for occupational practices and existence of hazards

- Understand the relevance and sufficiency of legally-mandated Personal Protective Equipment (PPE) and understand challenges for usage

- Develop a set of preliminary set of recommendation for improvement of Occupational Safety Standards (OSS)

Approach and Methodology

Systems Thinking approach: holistic, multiple methods and iterative

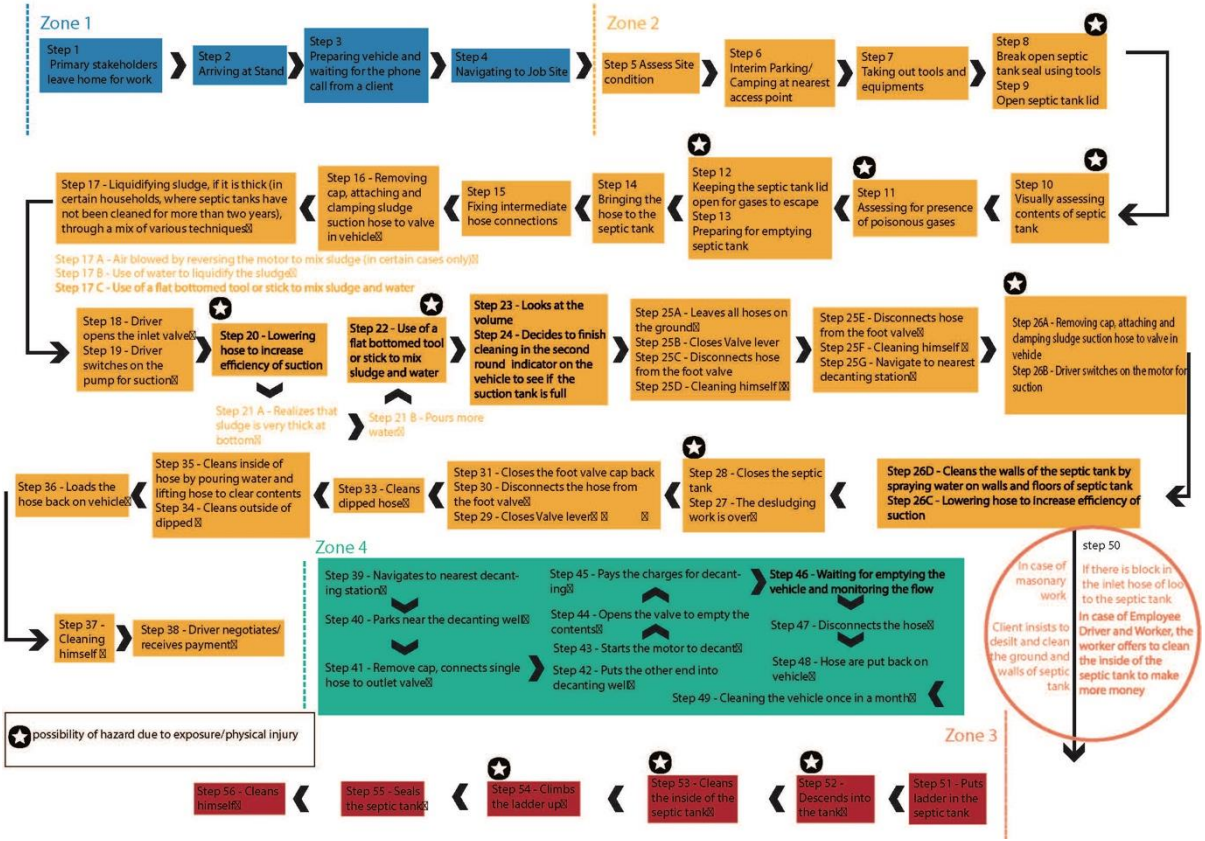
Methods

- Literature review
- Process documentation of de-sludging
- Qualitative interviews
- Learning safety practices from parallel industries
- Mock Testing of PPE sample kit

De-sludging Process

Process broken into 56 detailed steps (including time taken, equipment used, interactions etc.)

- Mapping of hazards
- Identification of human body touch points
- Critical decision making points



Hazard Points in the Desludging Process

Steps	Hazard points
8- 9	Open the septic tank lid
10	Visually assessing contents of septic tank
11	Assessing for presence of gases
12	Keeping tank lid open for gases to escape
20	Lowering the hose to increase efficiency of suction
22	Use of a flat bottomed tool or stick to mix sludge and water
26A-B	Removing cap, attaching and damping sludge suction hose to valve in vehicle.

Example of Hazard Points

Step 8 - Break open septic tank seal using tools

- Physical injury while breaking open lid
- Collapse of lid and falling into septic tank

Step 11 - Assessing for presence of harmful gases

- Inhalation, skin burns

Step 20 - Lowering the hose

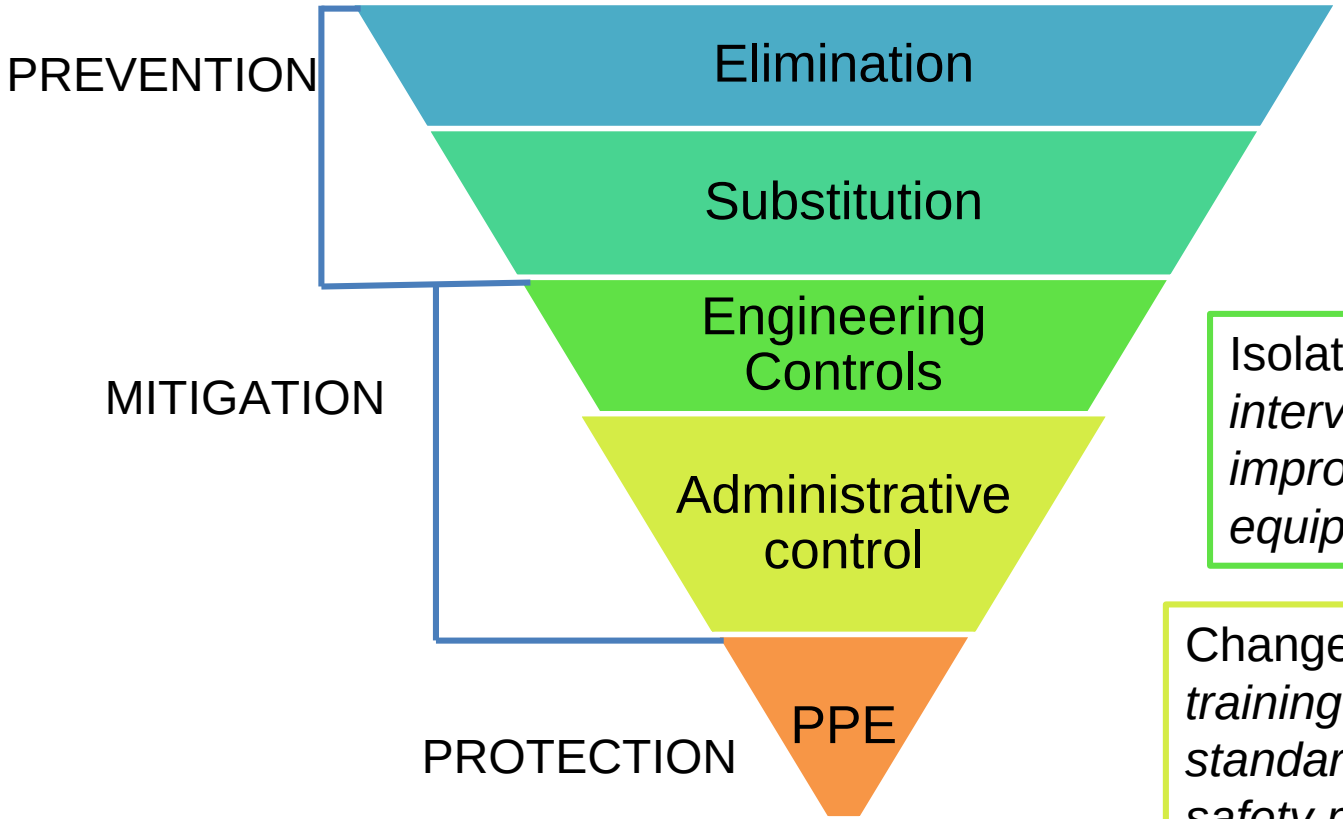
‘Why Analysis’ for Key Hazards Identified

Hazard	Reason for hazard	Causes
Skin Diseases	Contact with sludge	i. Leakages from old pipes and valves ii. Absence of use of PPE as contact with sludge not seen as hazardous
Physical injury (cuts, falls)	Working with sharp objects, unsuitable work environments (thorns, bushes etc.)	i. Non –standard ‘septic tanks’, difficult to access locations ii. Usage of unsafe equipment iii. Absence of use of PPE
Inhalation of gases	Opening of septic tank lid (accumulation of harmful gases)	i. Improper construction of septic tanks with no ventilation/vent pipe to let out gases ii. Cleaning septic tank after long intervals iii. Chemicals/bleach in toilet cleaners, disinfectants flushed into septic tanks

‘Why Analysis’ for Key Hazards identified

Hazard	Reason for hazard	Causes
Skin burns	Conducting flame tests to test poisonous gases	i. Lack of alternative methods to test presence of harmful gases
Suffocation inside septic tank	Entry into septic tanks to clean blockages	i. Blockages due to flushing of non-biodegradable wastes such as cigarette butts, sanitary pads, condoms, plastics etc.

Hierarchy of Safety Controls



Physical Removal of Hazard

Replacing hazardous processes or materials *substituting manual work with machines*

Isolate the worker: *Design interventions and improvements in worker tools, equipment*

Change the way work is done: *training and licensing for standard operating procedure, safety manuals*

Source: CDC

Hierarchy of Safety Controls

Hierarchy	Indicative List of Actions
Elimination	Eliminating
Substitution	Substitute entering the tank by • Prevention of sludge to be solidified • Avoid blockages
Engineering Control	• Design of septic tank (slope, location of inlet pipe, standardisation of height, size, strength) • Equipment/tools for removing blockage and liquefying sludge • Design of decanting stations (e.g. slopes, bathroom facilities)
Administrative control	Standard Operating Procedures (air-blowing, for blockages) Training, Emergency Protocols
PPE	Provisioning and ensuring usage of PPE

Reasons for Non-usage of PPE

PPE	Specific reasons
Gloves	• Poor grip • Not useful for lifting heavy objects • Causes boils • Causes sweating • Hampers work speed
Boots	• Improper size hampers speed • Sludge entry into feet • Poor grip
Masks	• Prevents ventilation • Sweating • Disrupts communication

Cross – Cutting reasons
Not seen as value for money
Additional maintenance required
Bad quality products lead to repeated purchase
Lack of knowledge on where to purchase good quality PPE
Lack of awareness and training on PPE usage
Lack facilities for storage and maintenance
Bathing was considered sufficient

PPE Preferences

On basis of the ratings received, the PPE were ranked in the following orders of preference/priority :

1) Gloves
2) Respirator and breath mask
3) Gas monitor
4) Gumboots
5) Safety goggles
6) Helmet
7) Reflective jacket
8) Safety cone and tape

Desludging operators were unanimous in the need for **gloves** (to prevent contact with sludge) and **masks** (to prevent inhaling poisonous gases).

Key Requirements from PPE Field Testing

Respirator Mask

- Protects from poisonous gases/ dust
- Snug fit
- Allows for communication
- Prevents suffocation
- Water proof

Summary

1. Most OSS (protocols, PPE etc.) based on the assumptions that containment systems are designed and operated as per standard

2. OSS is a pyramid, PPE last line of defence, other factors could potentially be more important for safety

3. Interventions could range from BCC for households, better facilities (for washing and storage)

4. PPE: specific requirements, availability in the market, ensuring access