

ORIGINAL ARTICLE

AWARENESS ON HEALTH AND SAFETY AMONG MUNICIPAL WORKERS ON SOLID WASTE COLLECTIONS: A CASE STUDY IN MALAYSIA

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ABSTRACT

Solid waste collection has been a major challenge for local council Municipal workers in urban areas where the population is growing rapidly and the need for local councils to ensure they provide service to clear solid waste in a timely manner without disrupting the existing system. This case study is a review of awareness of health and safety among municipal workers on solid waste collection. The study is an examination of such awareness in Malaysia which involves the Petaling Jaya City Council in the state of Selangor. We review the operating system of the Petaling Jaya City Council and the risks which are being exposed to the municipal workers in their daily operations. Health and Safety of municipal workers in the areas of public health, safety, and industrial hygiene has been a concern for a long time. In most cases the majority of municipal workers exposed are from the contractual aspect of outsourced labour. It is important to understand how large the area of a solid waste is and to identify, evaluate, and eliminate or control risks and hazards across the operation zone of the municipal workers which involves environmental and occupational demands. The data we find provides the latest perspectives on topics of widespread concern such contractors management, ergonomic safety, confined space, motor vehicle safety, machinery safety, fall hazard safety, electrical safety and emergency response. Management of legal requirements is also discovered to be important to ensure any organization conducting business is not in violation of any law, and if there is a change of process how is this being addressed. Finally, we look at the control measures needed to support a operation on a large scale where it will not endanger the health and safety of municipal workers when they are involved in solid waste management. The recommendation we have based on the review are to ensure there is a holistic approach and systems in place to address all the concerns that will be faced by the local municipal council in their daily operations and responsibilities at every level of the organization. Conclusion: Research material and data related to this area is limited and we hope future holistic research can be conducted to future enhance the study of health and safety effecting the municipal workers. Health and Safety management system and procedures are the key elements in ensuring a successful organization.

Key words: Awareness, safety and health, solid waste, municipal workers, collection, Petaling Jaya

INTRODUCTION

Health and Safety is a topic widely discussed in the 21st century and the awareness has been still growing. The implementation of Environmental Health and Safety applies to all the industry in Malaysia based on the Occupational Safety and Health Act 1994 (1). The Department of Occupational Safety and Health Malaysia (DOSH) has taken the lead in ensuring the roadmap of Health and Safety in Malaysia (2). The basic concept from this establishment is to ensure self-regulation in the implementation of OSHA 1994(1).

Malaysia, one of the South East Asian country, which is still developing, hence, the need of Local Councils are important and the standard of Municipal Solid Waste(MSW) management need to be improved. It comprises thirteen states and three federal territories, with a total surface area of 329,700 km. The capital city of Malaysia is Kuala Lumpur, with Putrajaya the seat of the federal government. Known as one of the rapidly developing economies in Asia, MSW generation is projected

to increase from 292 kg/capita in 2000 to 511 kg/capita in 2025 (3).The number correlates that the generating of MSW is expected to increase by 75.0% for the span of 25 years.

The quantity of MSW generated, the density and the proportion of streams vary widely between regions. For example, the average rate of urban waste generation amongst the high income countries such as Denmark, Japan, Korea and United Kingdom was 2.13 kg/capita/day. In the upper middle income countries such as Malaysia, Myanmar and Mexico, the rate was slightly lower than the high income countries (1.16 kg/cap/day).This was influenced by many factors, such as level of economic development, urbanization level, lifestyle, cultural norms, geographical location, energy sources and weather conditions (4-6).

Global issues on health and safety among MSW workers

Due to rapid growth of recycling industry, news on injuries and fatal accident has been on the rise.

The early studies on occupational accident were reported from Denmark. The incidence of occupational accidents during 1989 to 1992 was 95 per 1000 employees per year among workers in the waste collection industry, and 17 per 1000 employees per year in the total work force (7). The most common accidents were fractures, sprains, wound and soft tissue accidents. It was also reported that exposures in recycling industry could lead to different kinds of health effects (8). For example, diesel exposure could lead to eye irritation, asthma, decreased lung function, upper respiratory tract irritation, lung cancer; exposure to micro-organisms cause Organic Dust Toxic Syndrome (ODTS) and flu symptoms. In addition, heavy lifting in workers' duties was found to have related health effect like disorders of the neck, shoulder and back, tendon diseases, extremes, etc.(9).

The recorded data from United States Bureau of Labor Statistics, in 2008, showed that the fatal work injury rate (per 100,000 full-time equivalent workers) of refuse and recyclable material collectors was 35.5, which was the 6th highest fatal work injury rate, and was very high when compared to the all worker fatal injury rate of 3.7. As the Malaysian recycling industry is developing extensively, the workers in this industry in Malaysia would have similar problems as those found in other countries. Thus, the objectives of this study were to understand the situations and possible causes of the workers' safety and health problems in the local recycling industry, to identify and evaluate the safety and health problems of the workers in the industry, to propose possible solutions for the identified problems, and to provide indications of further possible work.

Risk involving municipal workers in Malaysia

Municipal workers are subject to health risk and even serious injury since their work involves cleaning rubbish, debris, hazardous materials and health risk. Municipal workers, while clearing debris on the road have high risk of being hit by a moving vehicle. There is also high risk of being hit by debris while clearing construction materials or tree branches. In most cases when it involves hazardous materials, municipal workers are not informed of the risk. In this context, the person disposing the hazardous material may have no knowledge of the right way of disposal and packaging that required by law in the process, which leaves the municipal workers exposed to the risk. Health risk associated with the exposure of daily job can cause skin and blood infection if the workers are directly exposed to open wound.

The other common issues respiratory tract infection caused from fumes and inhalation. Higher risk of HIV, hepatitis B or C, etc due to needle prick or

working in an unhygienic environment. A report from the National Institute for Occupational Safety and Health (NIOSH) (10) shows that between 1980 and 1992, 450 sanitation workers aged 16 or older died in incidents involving refuse collection.

Ergonomic issues related to repetitive work in this industry is an important subject which requires more research to address the risk. The ergonomic analysis shall include:

- Identification of task including task name, description of the job task, location and tools/equipment utilized in the task.
- Technical evaluation of risk factors and identification of root cause.
- Discussion with workers on all shifts performing the job to determine worker anthropometry variation, existence of symptoms, and potential corrective actions.
- Consideration of extended work shifts and alternate work weeks.

Machine/Equipment Safeguarding for fixed powered machines and equipment, and power transmission devices and equipment related to heavy machinery used by council workers. The issue related to machinery equipment apply both to point of operation safeguarding of machines, and to any other danger point where an employee may come into contact with the moving parts of the machine, or material handling equipment. Injuries from the unexpected release or transmission of machine equipment / process energy during work, where workers are exposed to hazardous energy sources from machines, equipment or processes. It is important to identify the processes for assessing, safeguarding, training and maintaining. This requirement addresses to the Factory and Machinery Act 1967, FMA (Fencing of Machinery and Safety) Regulation 1970 and OSHA 1994(1).

Besides that there are risk of workers working on or near exposed energized electrical conductors or circuit components operating at between 50 and 600 volts. This will pose a risk of workers being electrocuted and in worst case scenario cause death. Fall hazards at the workplace cause while performing work at height using fixed, portable and rolling ladders. The exposed floor and also wall openings which may pose dangers by standing at floor edges and roof. In most cases council workers make use of platforms, aerial lifts and scaffoldings. Confined space entry where council workers are subject to enter pits, tanks, boilers, trenches, machine interiors or any other location that is not properly identified and tagged as "Confined Space" occupational injury/illness while entering, exiting, and working in confined spaces pose serious injury to workers, who are not trained or unable to identify the risk related to the "Confine Space" risk.

Motor Vehicle operation is widely used in the council daily work to clear debris and move

equipment's to and from the staging area to the disposal area. Fatigue due to long hours of work and traffic congestion and distance of travel may add to the risk of road traffic accident. In most cases workers use their two wheelers from work area to job site due to restricted number of council transport. In most cases employees using two wheelers are exposed to road traffic accident and the risk of being knocked down by bigger vehicle. Weather also plays an important role and during rainy days the risk is much higher due to blind spot and other road users who are unable to see the two wheelers.

Due to weather pattern changes that are occurring now a days we are seeing more pressure being put on the local council to address the emergency response related to flash flood, falling trees, traffic congestion due to road works and rush hours traffic management. This is a trend which is testing the limits of the local council to be prepared to face any incident beyond their scope in urban areas.

Department of Occupational Safety and Health Statistics 2013

Based on the statistics by the Department of Occupational Safety and Health Malaysia in 2013 (Table 1), we are able to see that the number of cases recorded for death for all industry in Malaysia is 649 and the public services and Statuary Bodies has recorded 67 death, 0 for non-permanent disability and 0 for permanent disability. Manufacturing sector contributes the highest cases on occupational accidents, followed by agriculture, forestry, logging and forestry. Highest death in occupational accidents occurs in construction industry.

It further relates in Figure 1, the 15 states in Malaysia, on cases involving the occupational accidents. It is unfortunate that we are unable to fur-

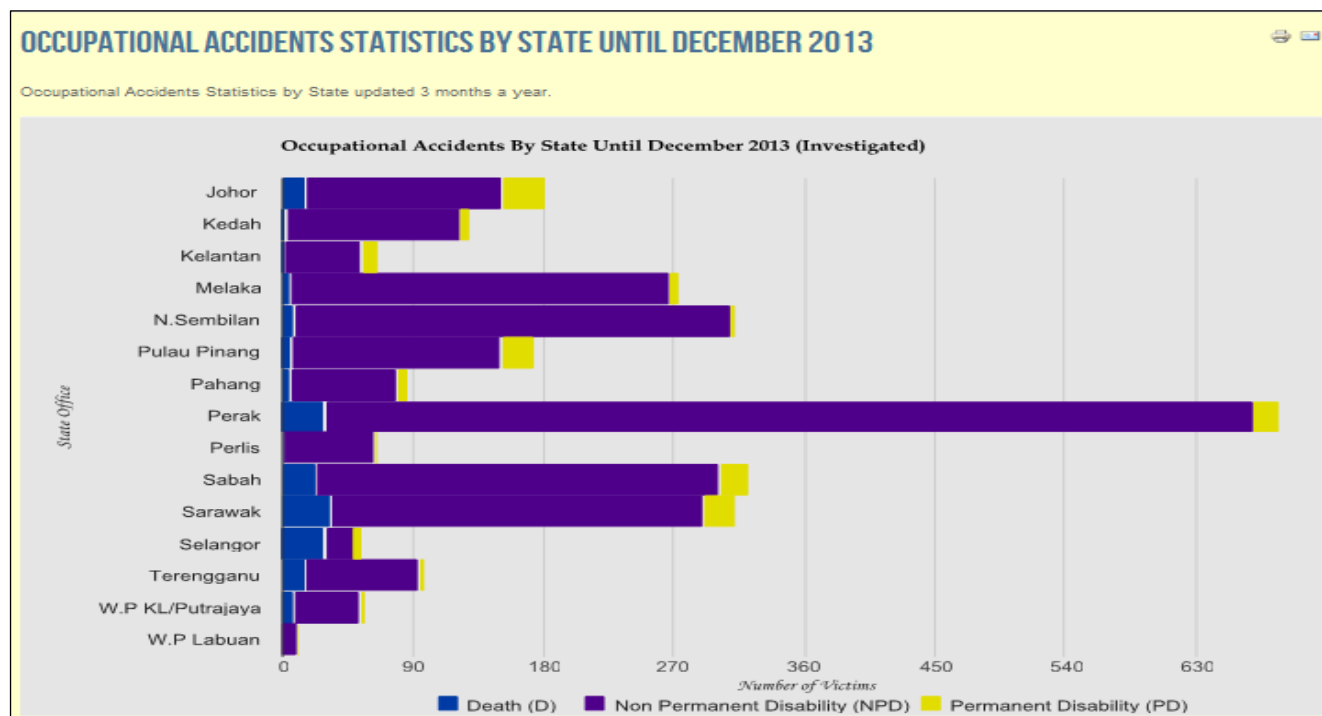
ther analyze the data to see if this area covers local council statistics. This will be a good area to conduct further research to see what the impacts are.

Challenges and future of municipal workers in Malaysia: Case study

On the local waste recovery process flow, there are different characters playing different roles, which include waste generators, scavengers, recyclable material collectors and recyclable material exporters. Industry value is estimated at RM476mil in 2005 and more than RM600mil in 2011. Around 25,000 tones generated per day in Peninsular Malaysia (2012 projections). High amount of food waste generated from municipal solid waste. Mechanism of separation at source between recyclables and non-recyclables on voluntary basis with the collection mechanism started in Sept 2012 (12). In this context, we will review the current health and safety risk involving the municipal council workers in the state of Selangor. Selangor has a total area of 8,104 km with 5.4 million inhabitants in 2010. This is approximately 20% of Malaysia's total population (13). It is a state with a diversified economy including agriculture, industry, commerce and tourism (14, 15). The state has recorded the highest GDP per capita in recent years (RM 27.6 million in 2009) and make the highest contribution to the national GDP (22.1% in 2010) (13). Selangor (including Federal Territory of Putrajaya) and Federal Territory of Kuala Lumpur are the major waste producers, responsible for one third of the total waste of the country (16). The Selangor state has developed tremendously to fulfill the vision 2020, which requires the state to be fully developed by 2020.

Table 1: Occupational Accidents Statistics by Sector till December 2013 (DOSH Malaysia) (11).

Industry	Death	Non-Permanent Disability	Disability	Permanent Disability
Manufacturing	58	1469		28
Mining and Quarrying	83	0		0
Construction	69	83		2
Agriculture, Forestry, logging and fishery	33	488		4
Utility	100	0		0
Transport, Storage and Communications	84	0		0
Whole Sale and Retail Trade	66	2		0
Hotel and Restaurant	19	0		0
Financial, Insurance, Real Estate and Retail Services	70	0		0
Public Services and Statuary Bodies	67	0		0
Total	649	2042		34

Figure 1: Occupational Accidents Statistics By States in Malaysia Until December 2013 (DOSH Malaysia) (2)

Selangor state municipal council is divided into 12 municipal councils and out of the 12 municipal councils, two councils has been elevated to city status. This two are Shah Alam City Council and Petaling Jaya City Council. In order to ensure the review is effective, we have chosen the Petaling Jaya City Council called as Majlis Bandaraya Petaling Jaya or Petaling Jaya City Council (MBPJ). The total area of MBPJ is 484.32Km² with a population

of 1,782,375 (based on 2010 census, shown in Figure 2) (17). It is a local authority which administers Petaling Jaya City and adjoining areas. This agency is under the Selangor State government and they are responsible for public health and sanitation, waste removal and management, town planning, environmental protection and building control, social and economic development and general maintenance functions of urban infrastructure.

Figure 2: Demographic Data of Petaling Jaya, Selangor (17).

The focus in this review is to observe on the issue of waste removal and management, which is further divided into 28 Zones and each zone, is allocated individual supervisors to monitor the per-

formance of outsourced contractors for garbage collection, general area cleaning and drainage cleaning. The Table 2 as below shows the breakdown of both scenarios.

Table 2: Cleaning and Rubbish Collection and Drainage Cleaning in MBPJ (18, 19)

Cleaning and Rubbish Collection			
Supervisors	Zone	Cleaning Contractors	Collection contractors
29	28	78	37
Drainage Cleaning			
Supervisors	Zone	Cleaning Contractors	
8	14	20	

MBPJ Contractor Management

As we look at the details of the contractor it provides us an idea of how big is the area of MBPJ coverage is and the need to provide a sustainable service for a population of 1.7 million populations with a further breakdown of the zone. It is always a challenge for the local council to manage the health and safety issues concerning daily operations starting from the council level, council operations team, contractors, and subcontractors and finally the workers involved directly in the day to day operations. Based on the research from the MBPJ web site, tenders and jobs are advertised at their web site. The important purpose of the Contractor Health and Safety Program is to minimize risks associated with the activities of contractors who perform work for the council. Procedures are important process for the categorization, qualification, selection, and evaluation of contractors based upon their safety and environmental performance in accordance with health and safety Program and complies with OSHA 1994 (1).

Legal and Regulatory Compliance Management.

A consistent approach to the health and safety legal and Regulatory Compliance Management is important to ensure all the above risk identified are captured and reviewed. The most important element ensure that the local council are in compliance with all applicable legal Environmental Health and Safety (EH&S) requirements that are required by law, statute, ordinance, regulation, permit, order, directive, or equivalent, in compliance with the Malaysian regulations. In most cases, we find that legal requirements are neglected reason being the organization did not take the regulation to be serious or there is no competent person to advise the organization on the risk of neglecting the legal requirements which is applicable to the organization. Only when this is addressed the organization will be able to operate more efficiently to address the risk which may impact the organization and drive a culture where employees and contractors are comfortable to work because the organization is accountable to any health and safety issues that may impact the organization and ensur-

ing all the employees and contractors are able to work in an organization that cares about health and safety of each employees and contractors (20).

Change of Process Management

In most local council there are many departments working in the areas of operation including the office, field work, repair and maintenance, product development, engineering, store and warehouse. The purpose of this procedure is to describe the method by which local council carry out management of changes to its operations Process, Equipment's, Services, Store, Warehouse, field work and contractor management. This procedure outlines overall company initiatives and recommended assignment of responsibilities to council management team, Operator, Supervisor, Field operations and contractors in relation to EH&S to ensure any changes that is made is taken in consultation with all the relevant stake holders to ensure a smooth operations and communications (21).

Health and Safety Management Proposal Administrative Control Measure-

A management-directed work practice or policy that, when followed, eliminates the risk of non-compliance.

Competent Auditor

An EH&S professional who has adequate knowledge and experience to be able to identify compliance issues.

EH&S Compliance Issue

Case of potential or actual non-compliance with a legal EH&S requirement including those identified via:

- 1) complaints/concerns/self-inspections,
- 2) audit findings,
- 3) reporting to a government EH&S agency by a local council operation, or
- 4) Notification to a local council operation by a government EH&S agency.

Engineering Control Measure

Engineered machinery or equipment that eliminates the risk of non-compliance.

Enforcement Action

Written notice from a Government EH&S Agency alleging that an operation has not complied with a Legal EH&S Requirement, or requiring correction of alleged non-compliance. This includes notice of violation, notice to comply, administrative order, consent order, improvement notice, prohibition notice or equivalent.

Government EH&S Agency

A government body that is assigned to create, administer or enforce legal EH&S requirements.

Independent, Comprehensive EH&S Compliance Audit

A full audit of legal EH&S required from an operation that is conducted by impartial auditors who do not work directly for a local organization being audited. Auditors may work either for third party firms or for a Local Council company and may be in the chain-of-command of the organization being audited.

Legal EH&S Requirements

EH&S obligations are required by law, statute, ordinance, regulation, permit, order, directive, or equivalent (such as a controlling government regulatory guidance document).

Level 1 Mistake-Proofing

A control measure that prevents an error from occurring at the source.

Management Committee

A committee established by each operation whose purpose is to direct and coordinate the overall EH&S Master Service Agreement (MSA)

A contract with a supplier that contains terms and conditions negotiated by Local Council. Typical terms and conditions in EH&S service supplier MSAs include the supplier's hourly rates and liability insurance coverage. A Local Council operation may simply issue a purchase order for a specific task to the supplier and reference the MSA in order to receive the negotiated terms and conditions.

Operation

An administrative entity that has responsibility for providing service, construction, warehousing or distribution of products and services within the corporation.

Procedure

A specification of a series of actions, acts or operations which have to be executed in the same manner in order to always obtain the same result in the same circumstances (for example, emergency procedures).

Process

A series of actions, changes, or functions bringing about a result.

Representative Sample

A small group which reflects the characteristics of the total population.

Periodic EH&S Assessments

The EH&S council or the EH&S Department shall establish a program to continuously identify and assess applicability of current (including newly enacted), proposed and emerging legal EH&S requirements that apply to it.

Local Council will document applicable legal EH&S requirements to a level of detail that ensures they are understood and that effective control measures are implemented. Documentation shall be kept current and shall include permit requirements (constituent limits, requirements for recordkeeping, reporting, training, inspections, maintenance, procedures/plans, etc.). The business planning process will include an assessment of legal EH&S requirements and resources needed to maintain compliance. Legal EH&S requirements may become applicable if business conditions change, such as the need for a permit are to be considered.

Process for Permits

Prior to submitting a permit application, modification or renewal, EH&S department shall validate that anticipated legal EH&S requirements of the permit can be met, such as the ability to comply with permit limits and deadlines. Legal counsel, the office of EH&S Department and an executive from the operation shall review major site-specific permit applications and major permit renewal applications prior to submission to a government EH&S agency. The review shall include an assessment of whether permit limits and conditions can accommodate current and long-term future business needs. The EH&S Department is responsible for documenting permits, including type of permit, effective date, expiration date and renewal application due date in the EH&S Reporting System (22).

Control Measures

The EH&S Department, Field Operations Department and Human Resource Department shall define compliance control measures for each legal EH&S requirement identified per section above. Control measures shall be sufficiently standardized such that they will continue to function when personnel changes occur. Compliance control measures shall be integrated with existing business processes wherever possible.

Government EH&S Agency Communication

Routine written communication with government EH&S agencies, such as regulatory reports that do

not involve compliance issues must be reviewed. In cases where a legal EH&S requirement specifies who may sign a document, legal counsel shall perform a review to verify that the proposed signatory is legally authorized to sign the document. Examples: permit applications and compliance certifications. A document that has been reviewed by legal counsel and outlines who may sign a particular document meets this signatory review requirement (23).

Assessment of Compliance

The EH&S Department is responsible to manage the following aspects of government EH&S agency inspections:

- a) Notifying site management that inspection is taking place by e-mail, telephone and notice to who involved.
- b) understanding purpose and scope of inspection (e.g. opening meeting)

Internal EH&S Inspections

Applicable legal EH&S requirements in checklists are used for routine, periodic workplace inspections. Inspection checklists shall define situations where a discovered compliance issue shall be reported to the local EH&S organization for further evaluation. The EH&S Committee and EH&S Department shall determine which compliance issues identified during self-inspections shall be elevated for further review.

Complaints and Concerns

EH&S Department and EH&S Committee shall assess compliance aspects of employees' and other stakeholders' complaints and concerns. (Examples: EH&S complaints and concerns submitted verbally from an employee or neighboring property owner, through a bargaining-unit EH&S complaint process, through an operation's Dialog program, etc). Response to complaints and concerns shall be documented and address validated compliance issues.

Independent, Comprehensive EH&S Compliance Audit

Local Council shall plan and conduct an independent, comprehensive EH&S compliance audit every 3 years. Audits shall be conducted by competent auditors using checklists or audit protocols. Audit documentation shall include:

- a) a summary of who performed the audit and the auditors' qualifications
- b) a summary of the scope of the audit indicating major EH&S programs audited
- c) a completed audit protocol or checklist
- d) audit findings that reference specific legal EH&S requirements, findings of non-compliance and the risk rank of each finding

- c) workplace tour - tour routes, splitting samples, duplicating photographs
- d) records review - records reviewed and/or removed from the site
- e) government EH&S agency comments/closing conference - issues identified during the inspection
- f) post-inspection activities - actions taken, correspondence with the government EH&S agency, communication of results and lessons learned to appropriate stakeholders

The EH&S Department is responsible for coordination of correcting compliance issues identified during inspections as soon as possible. If it is required or desirable to notify the government EH&S agency that conducted the inspection of post-inspection actions taken, that notification shall conform to the requirements of below.

The EH&S Department is responsible for documenting government EH&S agency inspections in the EH&S Reporting System.

- e) audits of compliance with ISO14001, OHSAS 18001 or similar EH&S management systems (20,21).

Managing compliance issues to closure EH&S Department is responsible for the process or procedure to ensure compliance. The process or procedure includes a review and validation of compliance issues by an independent EH&S professional. The independent EH&S professional shall be someone from an organization that has oversight for the operation that has the compliance issues, provided independence can be maintained. The operation shall involve legal counsel in review of compliance issues where disclosure to a government EH&S agency may be required or beneficial (i.e., to consider the benefit of potentially reduced penalties for self-disclosure).

Reporting Requirements

The EH&S Department shall report the results of independent, comprehensive EH&S compliance audits and track corrective actions to closure via the EH&S Reporting System. The Local Council Director is responsible for certifying that corrective actions for all independent, comprehensive EH&S compliance audit findings have been implemented per the Local Council EH&S Corporate Compliance Reporting Requirements.

Records

Retention of EH&S assessments and action plans should be maintained in accordance with the documents and records retention schedule (Anne Picot) (24).

CONCLUSION

The aspect of health and safety within the local council is a challenge and the management of health and safety is not an easy task. It requires a

team work and a culture where everyone is well aware of their roles and responsibilities to ensure safe operations. The above review gives us a perspective of just a small part of the local council operations. In order to ensure a successful and sustainable health and safety organization the management of every level is important. This can be achieved by first reviewing the legal aspect of the operations. The ever changing EHS law means, it is important to ensure all future risk is mitigated to prevent any unwanted incident. By doing this, the organization will be able to identify all risks and work towards a solution to ensure these risks are mitigated and addressed in a timely manner. The contractor management structure provided above will give us an idea on how we would be able to address all the challenges and the direction it should take.

ABBREVIATIONS

MSW-Municipal Solid Waste, ODTS-Organic Dust Toxic Syndrome, DOSH- Department of Occupational Safety and Health Malaysia, EH&S- Environmental Health and Safety, MSA- Master Service Agreement

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COMPETING INTERESTS

There is no conflict of interest

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