

# Office of Safety, Health & Environment

# NUS Safety & Health (S&H) Management System Standard for Departments – Part B: Guidance Notes

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# Introduction

This NUS Safety & Health (S&H) Management System Standard for Departments – Part B: Guidance Notes provides explanatory notes and examples to assist Head of Departments in developing and implementing the S & H Management System at the departmental level. The explanatory notes provide supplementary information for the various elements in the *NUS Safety & Health (S&H) Management System Standard for Departments - Part A: Requirements,* and describes the typical requirements for the elements of the S&H Management System.

# a) Objective

The aim of this Guidance Note is to support NUS departments with the implementation of S&H management system for managing safety and health risks arising from activities and workplaces managed by department and to improve its S&H performance.

# b) Scope

This guidance note provides generic advice on the application of NUS Safety & Health (S&H) Management System Standard for Departments - Part A: Requirements. It explains the underlying intent of the S&H management system elements at the departmental level to address the risks faced by the department.

This guideline does not create additional requirements to those specified in NUS Safety & Health (S&H) Management System Standard for Departments - Part A nor does it prescribe mandatory approaches to the implementation of the standard.

# c) Terms and definitions

# 3.1. Academic Supervisor

Refers to academic staff who are appointed as principal investigator, laboratory supervisor, programme leader, etc. who have been (1) awarded research grant, (2) university appointed agents/representatives for research (including research-related activities supporting academic modules), or other sponsored project; (3) managing departmental level facilities such as research and/or core/shared facilities

# 3.2. Department

Any academic department, research centre/institute, administrative department, hall of residence or residential college.

# 3.3. External parties

Persons who are not staff or students of the department. Examples of external parties are collaborators, contractors and visitors.

# 3.4. Hazard

Source, situation, or act with a potential for harm in terms of human injury or ill health, or a combination of these.

# 3.5. Hazard identification

Process of recognizing that a hazard (3.4) exists and defining its characteristics. When conducting hazard identification, personnel health factors shall be considered.

### **3.6.** Head of Department (HOD)

A person appointed by the senior management of the University to assume overall management responsibility of a Department (3.2).

# 3.7. Incident

An event(s) in which an injury or ill health (regardless of severity) or fatality occurred, or could have occurred.

Note 1: An accident is an incident which has given rise to injury, ill health or fatality

Note 2: An incident where no injury, ill health, or fatality occurs may be referred to as a

"near-miss", "near-hit" or "close call".

Note 3: A dangerous occurrence is an incident which is specified in the First Schedule of the Workplace Safety and Health Act. This is a dangerous occurrence which needs to be reported to the Ministry of Manpower.

#### 3.8. Interested party

A person or group of persons who are concerned with or affected by the S&H performance of a department (e.g. OSHE, regulators, contractors, visitors, collaborators, tenants, staff and students).

# 3.9. Laboratory

Refers to any room where there is the use of chemicals, biological agents, radiation producing materials/equipment, heavy machinery or high voltage equipment, etc.

#### 3.10. Management of Change

Any change that can affect or impacts the department S&H hazards and risk. This includes changes to the department's organisational structure, personnel, management system, processes, activities, use of materials, etc.

#### 3.11. Non-compliance

Failure to comply, as with a law, regulation or requirement that is applicable to the department's operations and risks.

#### 3.12. Non-conformance

Failure to comply with a requirement, standard, or procedure

### 3.13. Non-routine activities

Activities conducted only periodically or on an ad-hoc basis

### 3.14. NUS S&H policies

Governing statements which provide direction related to S&H performance and are defined at the University, faculties, research institutes and/or departmental levels

# 3.15. Risk

A combination of the likelihood of an occurrence of a hazardous event or exposure(s) and the severity of injury or ill health that may be caused by the event or exposure.

### 3.16. Risk Assessment

A process of evaluating the risk(s) (3.15), taking into account the adequacy of any existing controls, and deciding whether or not the risk(s) is acceptable.

# 3.17. Safety and Health (S&H)

Conditions and factors that affect, or could affect the S&H of staff, students, laboratory officers, contractor personnel, visitors and any other person in the workspace

### 3.18. Safety & Health Management System

A management system is a set of interrelated elements used to monitor and improve all aspect of safety & health in an organization.

# 3.19. Safety & Health Objective

Safety & Health goals in terms of performance that a Department (3.2) sets out to achieve.

# 3.20. Safety & Health Performance

Measureable results of management of S&H risks.

# 4.1 General Requirements

#### a) NUS DSHMS requirements

- The Head of Department shall establish and implement a S&H Management system in accordance with the requirements set out in DSHMS standard.
- The department shall define and document the activities and premises managed by the department that are under the scope of this S&H management system.
- Head of Department shall form a Departmental Safety & Health Committee (DSHC) and appoint committee members to champion safety and health issues in the department. The committee shall consist of:
  - Departmental Safety & Health Committee Chair (DSHC Chair);
  - Departmental Safety & Health Coordinator (being a member of DSHC); and
  - Representatives from different organizational levels and functions in the department.
- DSHC shall drive safety programmes in the department, including the sharing of best practices within the department. The committee shall encourage staff and students to participate in University, faculty or department S&H events.
- DSHC Chair has the responsibility and authority for:
  - ensuring that the S&H management system is established, implemented and maintained in accordance with this standard; and
  - ensuring that reports on the performance of S&H management system are presented to Head of Department for review and used as a basis for improvement of the S&H management system.
- Department Safety & Health Coordinator shall provide guidance, advice and technical assistance to Head of Department and DSHC on all S&H matters. Department Safety & Health Coordinator shall be the key liaison person with OSHE on all safety and health matters pertaining to the department.
- The identity of the DSHC members shall be made known to staff and students of the Department

#### b) Purpose

The department should establish and maintain a safety & health management system that conforms to all the requirements of the Standard. This should also assist the department in meeting applicable legal and NUS safety & health requirements.

The safety & health management system should not be considered as "established" until all the system elements are demonstrably implemented.

Once established, the system should continue to function and this requires active efforts on the part of the department. Many systems start out well but deteriorate due to the lack of maintenance.

The DSHMS adopts the Plan-Do-Check-Act cycle of management which is designed to ensure active maintenance of the system.

#### c) Scope of DSHMS

The level of detail and complexity of the safety & health management system, the extent of documentation and the resources required are dependent on the nature (size, structure, complexity) of the department and its activities.

The scope of the DSHMS should cover the overall operation of the department under teaching, research and service clusters. Examples:

- Research labs
- Teaching labs
- Core / shared facilities
- Offices
- Field activities

Department should not attempt to limit the scope of the DSHMS so as to exclude from assessment, an operation or activity, that can impact on the safety & health of the staff, students and other interested parties.



3 main functions in University

#### d) Departmental Safety & Health Committee (DHSC)

The aim of safety & health committee is to help promote co-operation between management and staff in achieving and maintaining a safe and healthy working condition in the department. Head of Department shall form and appoint suitable committee members to champion safety & health programs in the department. The committee shall consist of:

- Departmental Safety & Health Committee Chair (DSHC Chair) Head of Department or management representative (MR). MR should be given the authority to make decision on behalf of HoD.
- Departmental Safety & Health Coordinator Provide guidance, advice and technical assistance to Head of Department and DSHC on all S&H matters.
- Representatives from different levels and functions in the department Members should represent every units in the department. The number of staff's representatives should not be less than management staff.

This diagram shows the organizational structure of S & H Committee:



#### e) Initial Review

Department establishing DSHMS should determine its current management of S&H against the standard by means of initial review. The objective is to determine the extent to which the requirements of the standard are being met.

The outcome of the initial review will provide information which the department can use to formulate plans for implementing and prioritizing improvements to the S & H management system.

Department should consider, but not limit itself to, the following items when conducting its initial review:

- legal and other requirements
- hazard identification and evaluation of risks faced by the department
- evaluation of existing S & H systems, practices, processes and procedures
- evaluation of outcomes from the previous audits, inspections and incident & accident investigations findings

Where existing processes already exist (e.g. hazard identification and risk assessment etc.), they should be reviewed for adequacy against the requirements of the standard.

# 4.2 Safety & Health Policy

#### a) NUS DSHMS requirements

The Head of Department shall define and authorise the department S&H policy.

The Head of Department shall ensure that within the defined scope of its S&H management system (4.1), it:

- a) is aligned with the University's S&H Policies;
- b) includes a commitment to prevention of injury and ill health and continual improvement in S&H management and S&H performance;
- c) includes a commitment to comply with applicable safety and health legislation, guidelines and standards that the Department subscribes to which are related to its S&H hazards.
- d) provides the framework for setting and reviewing S&H objectives;
- e) is documented, implemented and maintained;
- f) is communicated to all persons working under the control of the department with the intent that they are made aware of their individual S&H obligations;
- g) is available to interested parties; and
- h) is reviewed periodically to ensure that it remains relevant and appropriate to the department's operations and S&H risks.

# b) Purpose

To establish a written safety & health policy which represents the Head of Department's commitment and approach in providing and maintaining a safe and healthy environment.

The aim of S & H policy are to:

- Establish an overall sense of direction and sets the principles of action for the department
- Enable stakeholders to understand the overall commitment of the department and how this can affect their individual responsibilities
- Demonstrate the formal commitment of the department, in particular the Head of Department, towards implementing and improving an effective safety and health management system.

The responsibility for producing and authorizing the S & H policy must rest with the Head of Department.

#### c) Factors for Consideration

In developing the S & H policy, the Head of Department should consider the following factors:

- alignment with the University's S & H policies
- S & H hazards of the department
- legal and other S & H requirements
- previous and current department's S & H performance

- needs of people under the control of the department and other interested parties
- opportunities and needs for continual improvement
- resources needed

#### d) Content

The S & H policy is, as a minimum, required to include statements about the commitment of the department to the:

- **prevention of injury and ill-health** Department has the legal and moral obligations to prevent and reduce the risk of accident, incident and illness as low as reasonably practicable
- continual improvement in S & H management and performance Department should aim to improve its S & H management and performance, effectively and efficiently, to meet the changing business and regulatory needs.

The S & H policy statement may include a broad areas for action but the planned performance improvement program should be explicit in the S &H Objectives and Programme (see 4.3.3) and monitored in the Performance Measurement (see 4.5.1).

• **compliance to legal and other requirements** – This S & H policy statement is a formal acknowledgement by the department that it has a duty to comply, if not exceed, the requirement of the regulations or other requirements by the University.



3 basic principles in Safety & Health Policy

An effective S & H policy should also:

#### • be documented, implemented and maintained;

Planning and preparation are keys to successful implementation of S & H policy. Some policy statements can be unrealistic because resources are not adequate to deliver the programs.

Department should ensure that the necessary resources (e.g. finances, manpower, competency etc.) are available and that all S & H objectives are achievable within this framework.

S & H policy must be documented and periodically reviewed.

#### be communicated to all persons working under the control of the department;

In communicating the S & H policy,

- consideration should be given to how to create and maintain awareness in both new and existing persons in the department.
- should take into account issues such as diversity in the department, literacy levels, language skills, etc.

#### be available to interested parties;

Any individual or group (internal or external) concerned with or affected by the S & H performance of the department would be particularly interested in the S & H policy statement.

A process should exist to communicate the S & H policy to these interested parties. It is for the department to determine how it wishes to make the S & H policy available to its interested parties e.g. through publication on a web site, or by providing printed copies on request.

#### • be reviewed periodically

Change is inevitable, as regulations and risks at workplace evolve. Consequently, the S & H policy should be amended and revised, in particular after the conduct of Management Review (see 4.6) to ensure continuing suitability and effectiveness.

If changes are made to the S & H policy, the revised policy should be communicated to all persons under the oversight of the department.

A sample of S & H policy can be found in <u>Annex A.</u>

# 4.3 Planning

# 4.3.1 Hazard Identification, risk assessment and risk control

### a) NUS DSHMS requirements

The department shall ensure risk assessments are conducted for all its activities in accordance with legal requirements and University requirements.

Risk assessments shall take into consideration:

- a. Non-routine activities in the workplace (such as maintenance of equipment etc.);
- b. Activities / experiments conducted after office hours;
- c. Activities organised by the department outside the departmental premises (e.g. field work);
- d. Activities in the department's core/common facilities and teaching laboratories;
- e. Activities of all persons involved in the department's operations including external parties,
- f. Infrastructure, equipment and materials at the workplace, whether provided by the department or others;
- g. Renovation, installations, commissioning/decommissioning of equipment & workplaces, that comes under the control of the department; and
- h. Any applicable legal obligations relating to the S&H risk and implementation of necessary risk controls
- i. Human factors and capabilities and
- j. Possible emergency situations

All risk assessments shall be documented and kept up-to-date through periodical review as required by regulation or University standard. When selecting risk controls, the principle of hierarchy of controls shall be used.

Department would need to reassess risks and review established risk controls whenever there is

- a. An incident/accident that occurs in the department;
- b. Changes or proposed changes in the department, its activities or materials; or
- c. Modifications to the S&H management system, including temporary changes, and their impacts on operations, processes and activities, prior to the implementation of the change(s).

For lab-based departments, the department shall ensure that Academic Supervisors and lab supervisors have established their laboratory SHMS to manage risks in their laboratories, workshops or respective areas of control.

The Head of Department shall ensure that workplaces in the department with high hazards and risks are considered when establishing, implementing and maintaining its S&H management system.

DSHC shall advise the Head of Department on high risks areas or activities. For laboratory based departments, the DSHC can review the Academic Supervisors Laboratory SMS when determining high risk areas or activities. Head of Department shall ensure that these high hazards and risks are considered when establishing, implementing and maintaining its S&H management system.

#### b) Purpose

The overall purpose of the risk assessment process is to recognize and understand the hazards that might arise in the course of the department's activities and ensure that the risks to people (including staff, students, visitors & contractors) arising from these hazards are evaluated and controlled to a level that is acceptable.

#### c) General

The department should have a comprehensive appreciation of all S & H risks in its domain, as stipulated in sub clauses 4.3.1 (a) to (j), after undertaking the process of hazard identification, risk evaluation and implementing risk controls.

This is achieved by:

- 1. Developing a methodology for hazard identification and risk assessment.
- 2. Identifying hazards,
- 3. Estimating the associated risks, taking into account the adequacy of any existing controls
- 4. Determining whether these risks are acceptable, and
- 5. Determining whether the appropriate risk controls comply with applicable regulations, codes of practice, NUS requirements and standards

The results of risk assessments enable the department to assess the risk reduction options and prioritize resources for effective risk management.

The outputs from the hazard identification, risk assessment and determining control processes should also be used to establish linkages with the other elements of the SHMS. For example:

- S & H legal and other requirements (see 4.3.2)
- Competency & training requirements (see 4.4.2)
- Communication to relevant stakeholders (see 4.4.3)
- Control measures as part of Ops Control element (see 4.4.6)
- Incident & accident records (see 4.5.2)
- Internal audit results (see 4.5.2)

The following figure provides an overview of the overall risk assessment process.



#### d) Methodology for risk assessment

Hazard identification and risk assessment methodologies vary greatly across industries, ranging from simple assessments to complex quantitative analyses with extensive documentation. NUS adopts a 3 x 3 risk matrix (see <u>Annex B</u> for risk assessment template). Information on methodology for conducting risk assessment can be found in the <u>OSHE Training Portal</u>.

It is for department to plan and implement appropriate hazard identification and risk assessment processes that are suitable to manage the risks exist in the department and also to ensure compliance to any S & H legislative requirements.

To ensure consistency of application within the department, it is recommended that the risk assessment procedure(s) be documented.

#### e) Hazard identification

The aim of hazard identification is to identify proactively all sources of hazards arising from the department's activities, with the potential to cause harm in terms of injury & ill-health.

Examples for Sources of Hazard:

- Activity (e.g. working at height)
- Equipment (e.g. moving machinery, ionizing/non-ionising apparatus)
- Substance (e.g. working with hazardous materials)

Hazard identification should consider the different types of hazards, associated with activities (e.g. research, teaching & service) under the control of the department, including physical, chemical, biological and radiation

Hazard identification processes should be applied to both routine and to non-routine activities. Examples of non-routine activities are:

- facilities or equipment cleaning
- temporary process change
- non-scheduled maintenance
- utility disruptions
- emergency situations

#### f) Evaluation of risk

As the 3 x 3 risk assessment method uses descriptive categories for assessing severity or likelihood of harm, clear definitions of terms such as "low", "medium" & "high" are given below to ensure that different individuals interpret the terms consistently.

#### Severity

1	Low	No injury, injury or ill-health requiring first aid treatment only
2	Medium	Injury requiring medical treatment or ill-health leading to temporary disability
3	High	Fatality, multiple cases of hospitalization, permanent disability, chronic (irreversible) illness

#### Likelihood

1	Unlikely	Not likely to occur under normal circumstances
2	Possible	Possible or known to occur
3	Very Likely	Common or repeating occurrence

Risk is the combination of the likelihood of an occurrence of a hazardous event or exposure(s) and the severity of injury or ill health that can be caused by the event or exposure(s).

The matrix recommended by this guideline is as follows:

Likelihood Severity	Likely	Possibly	Unlikely
Low	3	2	1
Med	6	4	2
High	9	6	3

An acceptable risk is a risk that has been reduced to a level that the department is willing to assume with respect to its legal obligation, its S&H policy and objectives.

Risk = Likelihood x Severity	
RISK	DECISION PROCESS
< 3	Acceptable risk
3, 4	Consider additional risk control
> 4	Additional risk control required

#### g) Implementing risk controls

Having completed a risk evaluation and having taken account of existing controls, department should be able to determine whether existing controls are effective or need improvement, or if additional controls are required.

If additional controls are required, their selection should be determined by the principle of the hierarchy of controls. For example:



Department must take into consideration the legal requirements, standards and codes of practice which can specify appropriate controls for specific hazards. Department should also ensure that controls are capable of attaining "as low as reasonably practicable" (ALARP) levels of risk.

An action is considered to be practicable when it is capable of being done. To determine whether the control is reasonable, it should takes into account:

- Severity of injury/ ill-health
- Degree of likelihood
- Knowledge of hazard and the ways of eliminating, reducing or controlling it
- Availability, suitability and cost of safeguards

#### h) Management of Change

Department should manage and control any changes that can affect or impact its S & H hazards and risks. This includes changes to the department's structure, personnel, S & H management system, processes, activities, use of materials, etc. Such changes should be evaluated through hazard identification and risk assessment prior to their introduction.

The management of change process should include consideration of the following questions to ensure that any new or changed risks are acceptable:

- have new hazards been created?
- what are the risks associated with the new hazards?
- have the risks from other hazards changed?
- could the changes adversely affect existing risk controls?

#### i) Record and documentation

Department should document and keep the results of risk assessment. The following types of information should be recorded:

- identification of hazards,
- determination of the risks associated with the identified hazards,
- indication of the levels of the risks related to the hazards,
- description of the measures to be taken to control the risks (see 4.4.5)
- determination of the competency requirements for implementing the controls (see 4.4.2).

#### j) Periodic review

The hazard identification, risk assessment and risk control process shall undergo periodic review at predetermined time set out in the WSH (Risk Management) Regulation or at a time pre-determined by the management in the department, whichever is earlier.

This period can also vary depending on the changes within the department to review the validity of the risk assessment. Such changes can include:

- Changes to methods of working & processes
- Introduction of new equipment & machinery
- Effect of accident / incident on the work activities

# 4.3.2 Legal & other requirements

#### a) NUS DSHMS requirements

DSHC shall identify legal and University/Faculty requirements and other S&H requirements that are applicable to its operations. DSHC shall take into account applicable legal requirements as well as NUS S&H policies, and other University/Faculty requirements when establishing its S&H management system.

DSHC shall keep a register of regulations applicable to its operations and S&H risks. DSHC shall keep this information up-to-date and communicate applicable updates to relevant persons in the department (e.g. staff, students, collaborators, and contractors) and other relevant interested parties.

#### b) Purpose

The department needs to be aware of and understand how its activities are, or will be, affected by the applicable legal and other requirements and to communicate this information to the relevant personnel.

The requirement of this system element is intended to promote commitment, awareness and understanding of the legal responsibilities arising from the activities and workplaces under the control of the department. There is no requirement to maintain a library of legal documents that are rarely referenced or used. It is sufficient that the department be able to access the information when required.

#### c) General

The department should demonstrate its commitment to comply with applicable legal and other S&H requirements in its S&H policy that relates to its S&H hazards (see 4.3.1).

These legal requirements can take many forms, such as:

- legislation, including statutes, regulations
- codes of practice
- orders issued by regulators
- permits, licences or other forms of authorization,

Examples of "other requirements" can include:

- agreements with regulators
- non-regulatory guidelines
- best practices (eg codes, industry guidelines)
- University's policies, directives & manuals

### d) Process

Department should establish a procedure to identify relevant legislation and other requirements. Department can explore the most appropriate channels for accessing the information on the requirements. For examples:

- Singapore Statutes Online (<u>http://statutes.agc.gov.sg</u>)
- Register of S&H Legislation applicable to NUS (<u>https://inetapps.nus.edu.sg/osh/portal/legalreq.html</u>)
- NUS Online Regulated Materials Identifier an online portal to help identify regulated chemicals (<u>https://wws.nus.edu.sg/rci/default.aspx</u>)

The department should then evaluate & identify which legal and other requirements (this can take the form of a register – see <u>Annex C</u> for sample of legal register) are applicable to:

- its activities
- its products, processes, facilities, equipment, materials, personnel,
- its location

The department's procedure should ensure that it can determine any changes that affect the applicability of legal and other requirements relevant to its S&H hazards. The procedure needs also to identify who should receive information on legal and other requirements, and ensure that relevant information is communicated to them (see 4.4.3).

The following figure provides a summary of the process.



# 4.3.3 Objectives and programmes

#### a) NUS DSHMS requirements

The department shall establish, implement and maintain documented S&H objectives and the Head of Department shall endorse these objectives. The S&H objectives shall be aligned to the University / Faculty-level S&H objectives where applicable.

The objectives shall be measurable, where practicable, and consistent with the department's S&H policy.

The department shall establish, implement and maintain a programme (s) for achieving its objectives. Programme(s) shall include:

- designation of responsibility and authority for achieving objectives
- the means and time frame by which the objectives are to be achieved

The programme(s) shall be reviewed at regular and planned intervals, and adjusted as necessary, to ensure that the objectives are achieved.

#### b) Purpose

Department to ensure that measurable safety & health objectives are established to fulfil the commitments established in its S&H policy, which includes prevention of injury and ill health.

#### c) Setting objectives

The process of setting and reviewing objectives, and implementing programmes to achieve them, provides a mechanism for the department to continually improve its S&H management system and performance.

When setting S&H objectives the department should take into account the following factors:

- legal and other requirements (see 4.3.2).
- department's S&H risks (see 4.3.1)
- financial, operational and business requirements
- views of staff, students and interested parties (see 4.4.3)
- analysis of performance against previously established S&H objectives
- past records of S&H non-conformances, accidents & incidents
- results of management review (see 4.6)

Department should set objectives that are specific, measurable, achievable, relevant, and timely (known as SMART objective) to help department to monitor the progress and achieve them more readily.

It is recommended that the department records the background and reasons for setting the objectives, in order to facilitate their future review. Examples of types of S & H objectives can include:

- reduction of risk level (e.g. reduce exposures to hazardous substances)
- introduction of controls or eliminate hazards (e.g. for noise reduction in a workshop)
- elimination or reduction in frequency of particular accident / incident (e.g. to reduce slip & fall incidents by 20%)
- objectives to increase S & H competence & awareness
- increase staff & students satisfaction in relation to S & H (e.g. for a reduction of workplace stress)

When establishing S&H objectives, feedback from those people most likely to be affected by the S & H objectives should be gathered, as this can assist in ensuring that the objectives are reasonable and readily accepted.

S & H objectives may be broken down into separate tasks, depending on the size of the department, complexity of the objective and time-scale. There should be clear links between the various levels of tasks and the S & H objectives.

S & H objectives applicable to the department as a whole, can be established by top management or Department Safety & Health Committee. Other S & H objectives can be established by, or for, relevant individual units or functions within the department. However, not all units and functions in the departments are required to have specific S & H objectives.

#### d) Programme(s)

In order to achieve the S & H objectives, a programme(s) should be established. A programme is an action plan for achieving all the S & H objectives. For complex issues, a project plans may be needed to administer the programme(s).

In considering the means necessary to establish the programme(s) department should examine the resources required (financial, people, infrastructure) and the tasks to be performed. (see <u>Annex D</u> for Sample of Objective & Program)

To achieve a particular objective, department should assign responsibility, authority, and completion dates for individual tasks to ensure that the S & H objective can be accomplished within the overall timeframe.

The S & H objectives should be communicated (see 4.4.2) to relevant personnel and implemented through the various S & H programs in the department.

Reviews of programme(s) need to be conducted regularly, and the programme(s) adjusted or modified where necessary. This can be included during the periodic S & H committee meeting or part of management review (see 4.6).

# 4.4 Implementation and operation

# 4.4.1 Resources, roles, responsibilities, accountability and authority

#### a) NUS DSHMS requirements

Head of Department shall take the ultimate responsibility for S&H and the S&H management system in the Department.

Head of Department shall demonstrate commitment by:

- a) ensuring the availability of resources essential to establish, implement, maintain and improve the S&H management system; and
- b) defining roles, allocating responsibilities and accountabilities, and delegating authorities, to facilitate effective S&H management. Roles, responsibilities, accountabilities, and authorities shall be documented and communicated.

Supervisors shall implement and maintain the S&H management system of the department.

#### b) Purpose

An effective S & H management system would require the roles, responsibilities and authorities of all persons in the department to be clearly defined, documented and communicated. Adequate resources are required to enable S & H tasks to be performed.

#### c) Documentation of roles & responsibilities

The standard requires that the responsibilities and authority of all persons who perform duties that are part of the S & H management system to be documented. Department is free to choose the format(s) that best suits its needs which can be described and included in:

- S & H management system documents
- Work procedures & task descriptions
- Job description
- Induction training package

Such documentation can be required for the following people:

- Head of department
- Management representative for S & H
- S & H Committee Members
- those responsible for S & H training,
- those responsible for equipment that is critical for S & H,
- those responsible for managing facilities
- those managing the S & H of contractors,
- S & H Officer
- Staff & students

#### d) General responsibilities

#### i. <u>Head of Department</u>

Demonstration of commitment to S & H should begin at the highest levels of management. Head of Department should:

- determine and make available, in a timely and efficient manner, all the resources needed to prevent injuries and ill health in the workplace,
- identify & delegate S & H responsibilities and ensure accountability
- empower those personnel with S & H responsibilities with the necessary authority to fulfil their roles
- appoint one of its members as the person responsible for the S & H management system and reporting on its performance. (also known as "Management Representative")

#### ii. Management Representative (MR) - S & H Committee Chair

MR should be a member of top management. MR may be supported by other personnel who have delegated responsibilities to help establish and maintain S & H management system at the departmental level. The MR should be regularly informed of the performance of the system and should be actively involved in the setting and periodic review of the S & H objectives (see 4.3.3).

#### iii. Line Management - Manager / Supervisor / Principal Investigator

Line management responsibility should include ensuring that S & H management system is implemented, managed and maintained within their area of operations. This also include arrangement to resolve any conflict between S & H and operational issues by escalation to higher management if required.

Where principal responsibility for S & H matters rests with line management, the roles and responsibilities of any person with specialized S & H function (e.g. S & H Officer) should be defined to avoid any ambiguity.

(see Annex E for sample of S & H roles & responsibilities)

#### c) <u>Communication</u>

The department should communicate and promote that S & H is the responsibility of everyone in the department, not just the responsibility of those with defined S & H management system responsibilities. Department should ensure that every persons understand the scope and interfaces between the various S & H functions.

#### d) <u>Resources</u>

Department should review periodically the resources and their allocation, via management review, to ensure they are sufficient to:

- maintain a safe and healthy workplace including equipment, manpower, expertise and training
- carry out S & H programmes and activities, including performance measurement and monitoring

#### e) <u>Management commitment</u>

Top and line management should provide visible demonstration of their commitment to S & H. This can include participating in site inspection, accident investigation, attendance at S & H committee meeting and acknowledging good S & H performance.

# 4.4 Implementation and operation

# 4.4.2 Training, awareness and compliance

#### a) NUS DSHMS requirements

The department shall ensure that staff, students and any person(s) working under its control, is (are) competent on the basis of appropriate education, training or experience, and associated records are retained.

DSHC shall identify training needs associated with its S&H risk. When defining the training needs of person(s), consideration should be made to the following:

- a) Mandatory training courses under the applicable legal legislations and the NUS Structured Safety Training System (SSTS);
- b) Induction training courses organized at the departments (including University, Faculty, RIRC and Department level);
- c) Training courses to address specific department needs (including laboratory-specific needs or activity-specific needs).

DSHC shall ensure that a system of monitoring the training status of these person(s) is established.

DSHC shall establish, develop and maintain the safety & health trainings that are conducted at the departmental level.

# b) Purpose

To enable that all staff, students and visitors under the control of the department to carry out their work tasks safely, the department should ensure that they:

- are aware of their work's S &H risks,
- are aware of their roles and responsibilities,
- have the necessary competence and/or awareness to perform tasks that can impact on S &H,

The department should require that contractors, which they engaged, are able to demonstrate that their staff have the competence to perform their work safely.

Note: The difference between competence and awareness is:

- a) Awareness is to be conscious of something, e.g. S & H hazards and risks.
- **b)** Competence is the demonstrated ability to apply knowledge and skills consistently to attain desired outcomes

#### c) S & H competence

Department Safety & Health Committee (DHSC) should put in place an effective procedures to identify the minimum competence requirements for the different group of people under the control of the department such as

- Department Safety & Health Committee members
- Laboratory personnel e.g. Academic Supervisors, research staff, laboratory technologists, students etc.
- Non-laboratory personnel e.g. administrative staff
- Visitors

The responsibility for determining the specific training for individual tasks / persons should be delegated to the line management. When determining the competence required for a task, the following factors should be considered:

- results of hazard identification, risk assessment and risk control
- roles and responsibilities in the workplace (including the nature of the tasks to be performed, and their associated S & H risks),
- job descriptions (including any hazardous tasks to be performed)
- requirements of operating procedures and instructions,
- results from incident investigations,
- legal and other requirements,
- individual capability (e.g. literacy, language skills, etc.).

DHSC should also give specific consideration to the competency of those person(s) who will be:

- the top management representative
- performing risk assessments (4.3.1),
- performing tasks identified by risk assessment that can introduce hazards.
- performing tasks associated with S & H programme
  - o exposure assessments (4.5.1) e.g. industrial hygiene monitoring,
  - performing incident investigations (4.5.3),
  - performing audits (4.5.5),

The department should ensure that all personnel are competent prior to permitting them to perform tasks that can impact on S & H.

S & H competence requirements should be considered prior to recruiting new personnel, and/or the reassignment of those already working under the purview of the department.

Records used by the department for ensuring that personnel are competent should be maintained and up-to-date. (4.5.4).

#### d) Safety awareness

To ensure staff, students, visitors and contractors work or act safely, the department should ensure persons working under its purview are aware of:

- emergency procedures,
- specific S & H risks in the workplace
- the need to conform to university & department's policies and procedures,
- accident reporting procedures
- the benefits of improved S & H performance,
- the potential consequences of departing from procedures e.g. accidents & disciplinary actions
- any other aspects that might impact on S & H

Safety orientation programme should also be provided for contractors, short-term staff/student and visitors, etc., according to the S & H risks to which they are exposed.

#### e) S & H training programme

The training programme should focus on both competency requirements and the need to enhance awareness of all persons under purview of the department. The programmes shall take into consideration the training needs of person(s) and consideration should be made to the following:

- a) Mandatory training courses under the applicable legal legislations and the NUS Structured Safety Training System (SSTS). More information on NUS SSTS can be found at this <u>link</u>.
- b) Induction training courses organized at the departments (including University, Faculty, RIRC and Department level);
- c) Training courses to address specific department needs (including laboratory- specific needs or activity-specific needs).

#### f) Monitoring of training programme

The effectiveness of training and the resulting level of competence / awareness should be evaluated. This can be achieved through:

- written / oral assessment
- practical demonstration
- other means that demonstrate competency and awareness.

Training records should be maintained and kept up-to-date (4.5.4).

# 4.4 Implementation and operation

# 4.4.3 Consultation and communication

#### a) NUS DSHMS requirements

	nunication of S&H information, including hazards and risks and
a) internal comr components o • functi • effect	of the S&H Management system, among the various levels and ions of the department, including addressing communication needed to rively manage the S&H concerns in core and common facilities and areas;
b) communicatio collaborators	on with stakeholder and persons working under its control (e.g. contractors, , and visitors);
c) receiving, doo interested pa coordinated t	cumenting and responding to relevant communications from external rties and regulators. (Communications with regulators shall be hrough OSHE.)
d) updating facu specific S&H r	Ilty safety committee, faculty safety officer and OSHE on departmental matters.
Where relevant, staff, students and other stakeholders e.g. contractors shall be consulted and invited to participate in	
a) the developm objectives,	ent and review of department's safety and health policies and
b) incident inves	tigation,
c) risk assessme	nt, and
d) changes to re	levant S&H management system elements that affect their S&H.

#### b) Purpose

The department should promote participation through adoption of best S & H practices in support to its S & H policy & objectives from all those affected by its operation. This can be achieved through a process of consultation and communication with the various stakeholders.

#### c) General

The department's communication processes should provide for the flow of information bottom-up, topdowns and across the department. It should provide for both the gathering and the dissemination of information and should ensure that S & H information is provided, received and understood by all relevant persons in the department. Consultation is the process by which management and staff representatives, jointly consider and discuss S & H issues of mutual concern. It involves seeking acceptable solutions to problems through the general exchange of views and information. One of the ways to discuss departmental-level S & H issues is through Department S & H Committee. This should include arrangement to involve relevant staff in the following consultation:

- the development & review of S & H policies, objectives and programmes
- selection of appropriate measures to control specific hazards or preventing unsafe behavior
- recommending improvement to S & H performance
- changes that affect S & H, particularly before the introduction of new or unfamiliar hazards, e.g.:
  - o the introduction of new or modified equipment,
  - $\circ$   $\;$  the construction, modification or change of use of buildings and facilities,
  - the use of new chemicals or materials,
  - o new processes or procedures

#### d) Internal and external communication

The department should develop procedures for internal communication among various functions and levels of the department and for external communication with interested parties e.g. visitors & contractors.

The department should effectively communicate information concerning its S & H hazards and management system to those involved in or affected in order for them to actively participate in, or support, the prevention of injury and ill health, as applicable.

When developing procedures for communication, department should consider the following:

- the target audience and their information needs,
- appropriate methods and channel of communication,
- department's complexity, structure and size,
- barriers to effective communication in the workplace such as language,
- legal and other requirements,
- evaluation of the effectiveness of the communication.

Mode of communications where S & H issues can be communicated to staff, students, visitors and contractors can include:

- briefings and meetings, induction/orientation talks, etc.,
- newsletters, posters, emails, suggestion boxes/schemes, websites and notice boards containing information on S & H issues.

#### e) Communication on DSHMS

It is important to effectively communicate information about DHSMS at various levels and between various functions of the department. This should include:

- management's commitment in S & H (e.g. resources committed to improve S & H performance)
- importance of identification of hazards and risks controls
- S & H objectives and other continual improvement activities
- incident investigation (e.g. accident/incident statistics, factors that can contribute to the occurrence of incidents, results of incident investigations)
- any changes that can impact on the S & H management system

#### f) Communication with contractors

It is important to develop and maintain procedures for communicating with contractors and other visitors to the department. The extent of this communication should be related to the S & H risks faced by the visitors & contractors.

The procedure(s) should be appropriate to the S & H hazards and risks associated with the work to be performed. In addition to communicating performance requirements, the department should communicate the consequences associated with non-conformity with its S & H requirements.

Contracts are often used to communicate S & H performance requirements. There can be a need to supplement contracts with other on-site arrangements (e.g. pre-project S & H planning meetings) to ensure that appropriate controls are implemented to protect individuals at the workplace.

The communication should include information about risk assessment any operational controls (see 4.4.6) related to the specific tasks to be performed or the area where the work is to be done. This information should be communicated before the contractor comes on-site and a site recce should be performed, as appropriate, before the work starts.

In addition to the specific S & H requirements for activities carried out on-site, the following could also be relevant to the department when communicating with contractors:

- information about contractor's S & H management systems
- legal and other requirements that impact on the contractor's work
- previous S &H experience and performance record
- staffing for accomplishing S & H activities (e.g. Registered Safety Officer / Coordinator etc.)
- emergency response procedure
- the need for additional consultation and/or contractual provisions for high-hazard activities
- requirements for the assessment of conformance with agreed S & H performance criteria
- processes for reporting of accident/incident, nonconformities, and incident investigation and corrective/preventive actions.
- arrangements for day-to-day communications.

#### g) Communication with visitors

For visitors (including delivery people, customers, members of the public, service providers, etc.), communication can include warning signs and security barriers, as well as verbal or written communication. Information that should be communicated includes:

- S & H requirements relevant to their visit,
- evacuation procedures and responses to alarms,
- access controls requirements,
- any personal protective equipment (PPE) that needs to be worn (e.g. safety glasses, lab coats).

# 4.4 Implementation and operation

# 4.4.4 Documentation and document controls

### a) NUS DSHMS requirements

The S&H management system documentation shall include documents, including records, determined by the department to be necessary to ensure the effective planning, operation and control of processes that relate to the management of its S&H risks.

Documents (including records) required by the S&H management system and by this standard shall be controlled.

The following should be considered in developing the document management system:

- a) documents are approved for adequacy prior to issue;
- b) documents are reviewed and updated to keep them relevant
- c) current revision status of documents are identified;
- d) relevant versions of applicable documents are available at points of use;
- e) documents remain legible, accessible and readily identifiable;
- f) documents of external origin determined by the department to be necessary for planning and operation of the S&H management system are identified and distributed to relevant person(s), their distribution controlled; and
- g) unintended use of obsolete documents are prevented and suitable identification are applied to them if these documents are retained for any purpose.
- h) records are legible, identifiable and traceable.

#### b) Purpose

The department should document and maintain up-to-date documentation and information system to ensure that its S&H management system can be understood and operated effectively and efficiently.

#### c) General

The department should review its documentation and information needs for the S & H management system, before developing the documentation necessary to support its S & H processes.

In deciding what documentation is required the department should determine where there is any risk that a task, through lack of written procedures or instructions, will not be performed in the required manner.

There is no requirement to develop documentation in a particular format in order to conform to the Standard nor is it necessary to replace existing documentation such as manuals, procedures, or work instructions if these documents have adequately describe the required arrangements.

If the department already has an established, documented S & H management system which is proven to be more convenient and effective, it can continue to adopt its existing practice and still meeting the requirement of the Standard.

#### d) Typical Documentations

The department should give consideration to document and data systems that support its S & H management system and activities, and which enable it to fulfil the requirements of the Standard such as:

- i. S & H policy statement
- ii. List of S&H objectives and implementation schedule
- iii. Roles and responsibilities delegation
- iv. Legal register of relevant legislations
- v. Licenses from authorities
- vi. Facility layout
- vii. Risk assessments
- viii. Safe Work Procedures (SWPs)
- ix. Training needs analysis matrix and records
- x. Safety data sheets of hazardous materials
- xi. Chemical and biological agents inventory list
- xii. Equipment maintenance schedule and records
- xiii. Equipment (e.g. fume hood and BSC) test and certification reports
- xiv. Swipe / wipe test results from radioactive materials
- xv. Waste disposal records
- xvi. Medical surveillance report
- xvii. Internal audit reports
- xviii. Inspection reports
- xix. Incident / accident reports
- xx. Communications with authorities, OSHE and faculty / department safety officer
- xxi. S & H committee minutes of meeting
- xxii. Records of management reviews

#### e) Control of documents

All documents and data containing information required for the operation of the S&H management system and the performance of the department's S&H activities should be identified and controlled.

Department should put in place procedures to define the controls for the identification, approval, issue and removal of S&H documentation & data.

Documents and data should be legible, available and accessible when required, under routine and nonroutine conditions, including emergencies. This could include ensuring that up-to-date as-built drawing, hazardous material safety data sheets, procedures and instructions, etc., are available to those persons who require them during an emergency.

The development of a department's document control process will typically result in items such as the following:

- a document control procedure, including assigned responsibilities and authorities,
- document registers
- a list of controlled documentation and its location,
- archive records (some of which should be held in accordance with legal or other time requirements)

Documents should be reviewed from time to time to ensure that they are still valid and accurate. This can be performed as a dedicated exercise, and could also be mandatory in accordance with legal requirements e.g.

- review of risk assessment every 3 years or any management of change or occurrence of incident, whichever is earlier
- following changes in legal and NUS requirements, processes, installation, workplace layout, etc.

Obsolete documents retained for reference can present a particular concern, and great care should be taken to ensure that they do not return back into circulation. However, it is sometimes necessary to retain obsolete documents as part of the records relating to the development or performance of the S&H management system which is typically 3 years unless stated otherwise.

# 4.4 Implementation and operation

# 4.4.5 Operational controls

#### a) NUS DSHMS requirements

The department shall determine those operations and activities that are associated with the identified risks where the implementation of controls is necessary to manage the S&H risks. This shall include risks arising out of management of change.

The department shall implement and maintain:

- a) operational controls as required by University policies, directives and manuals; the department shall integrate these operational controls into its overall S&H Management system;
- b) controls related to purchased goods, equipment and services;
- c) controls related to transport, import, transfer, handling, storage and/or disposal of materials (including hazardous materials), equipment and services;
- d) controls related to core, shared, common areas or activities;
- e) controls related to contractors, collaborators and other visitors to the workplace;
- f) documented procedures, to cover situations where their absence could lead to nonconformance to the S&H policy, objectives, regulations and standards; and
- g) stipulated operating criteria and conditions to ensure conformance to the S&H policy, objectives, regulations and standards.

All control measures should be communicated to all persons in the department, including staff, students, suppliers, collaborators, contractors and visitors as required.

# b) Purpose

The department should establish and maintain arrangements to ensure the effective application of control and mitigation measures, whichever these are required to manage the operational risks and fulfils the S&H policy & objectives and ensure conformance to legal and other requirements.

# c) General

The department should establish procedures to control its identified risks (including those that could be introduced by contractors or visitors), documenting these in instances where failure to do so could result in incidents & accidents or deviation from S&H standard practices or requirements.
Some examples of areas in which S&H risks can typically arise and suggested control measures are given below:

### 1) Purchase or transfer of goods & services and use of external resources

- Approval to purchase or transfer hazardous materials
- Availability of documentation for safe handling of equipment, machinery or hazardous materials
- Evaluation of the S&H competency of contractors
- Approval of S&H design for new facility or equipment

## 2) Hazardous tasks

- Identification of hazardous tasks
- Approval of working method
- Pre-qualification of personnel for hazardous work
- Permit-to-work system and access control procedures
- Lock-out and tag-out procedures

#### 3) Hazardous materials

- Identification of inventories and storage locations
- Safe storage location and access control
- Provision and access to safety data sheet and other relevant S&H information

#### 4) Maintenance of facility and equipment

- Provision, control and maintenance of department's facilities and equipment
- Provision, control and maintenance of PPE
- Segregation and control of access
- Inspection and testing of S&H related equipment such as
  - $\circ$  Guarding and physical protection
    - Emergency shutdown
    - $\circ$  Fire detection and suppression system
    - o Lifting equipment
    - Radiological materials and safeguards
    - Essential monitoring devices
    - $\circ$  Ventilation system
  - $\circ$  Medical facilities & provision
  - Emergency shower & eyewash

# d) Maintaining the adequacy of operation controls

Operational controls should be reviewed on a periodic basis to evaluate their ongoing suitability and effectiveness. Changes that are determined to be necessary should be implemented (see **4.3.1**).

In addition, procedures should be in place to determine circumstances where new controls and/or modifications of existing operational controls are needed. Proposed changes to existing operations should be evaluated for S & H hazards and risks before they are implemented. When there are changes to operational controls, the department should consider whether there are new or modified training needs (see **4.4.2**).

# 4.4 Implementation and operation

# 4.4.6 Emergency preparedness & response

# a) NUS DSHMS requirements

DSHC shall identify potential emergency situations and develop corresponding emergency response plans/procedures to respond to these emergency situations.

In planning its emergency response, DSHC shall take into account of the needs of relevant interested parties, e.g. emergency services and other occupiers in the same building, neighbours. The department shall ensure that its emergency procedures are aligned to the University's Crisis and Emergency Management (CEM) Manual

The department shall ensure equipment and facilities are adequate and available to respond to emergency situations in the workplace.

The department shall:

a) periodically test the procedure(s) to respond to emergency situations, where practicable, involving relevant interested parties as appropriate; and

b) periodically review, where necessary, revised its emergency preparedness and response procedure(s), in particular, after periodical testing and after the occurrence of emergency situations (4.5.2)

# b) Purpose

The department should assess the potential accident and emergency response needs, plan to mitigate the emergencies, develop procedures to response effectively, test its planned responses and continue to improve the effectiveness of the response.

#### c) Identification of potential emergency situations

Department should identify potential emergency situations that could impact on S & H should consider emergencies that can be associated with specific activities, equipment or workplaces.

Examples of possible emergencies, which vary in scale, can include:

- fires and explosions,
- release of hazardous materials/gases,
- loss of essential services (e.g. loss of electric power),
- pandemics/epidemics/outbreaks of communicable disease,
- failure of critical equipment,

• emergencies during field trip (e.g. drowning, animal attack)

When identifying potential emergency situations, consideration should be given to emergencies that can occur during both normal operations and abnormal conditions (e.g. operation start-up or shut-down, construction or demolition activities).

Emergency planning should also be reviewed as a part of the ongoing management of change. Changes in operations can introduce new potential emergencies or necessitate that changes be made to emergency response procedures. For example, changes in facility layout can impact emergency evacuation routes.

The department should determine and assess how emergency situations will impact all persons within and/or in the immediate vicinity of workplaces controlled by the department. Consideration should be given to those with special needs, e.g. people with limited mobility, vision and hearing. The department should also consider potential impacts on emergency responders operating at the workplace (e.g. fire-fighters).

# d) Establishing and implementing emergency response procedures

A procedure(s) for responding to emergency situations should be developed and should also take into account applicable legal and other requirements.

The emergency procedure(s) should be clear and concise to facilitate their use in emergency situations. They should also be readily available for use by emergency responders. Emergency procedure(s) that are stored on a computer or by other electronic means might not be readily available in the event of a power failure, so paper copies of emergencies procedure(s) ought to be maintained in readily accessible locations. e.g. Fire Warden Box

# e) Emergency response equipment

The department should determine and review its emergency response equipment and material needs. Emergency response equipment and materials can be needed to perform a variety of functions during an emergency, such as:

- evacuation
- leak detection
- fire suppression
- chemical/biological/radiological monitoring
- communication
- isolation, containment, shelter
- personal protection
- decontamination, and
- medical evaluation and treatment.

Emergency response equipment should be available in sufficient quantity and stored in locations where it is readily accessible; it should be stored securely and be protected from being damaged. This equipment should be inspected and/or tested at regular intervals to ensure that it will be operational in an emergency situation.

Special attention should be paid to equipment and materials used to protect emergency response personnel. Individuals should be informed of the limitations of personal protective devices and must be trained in their proper use.

The type, quantity and storage location(s) for emergency equipment and supplies should be evaluated as a part of the review and testing of emergency procedures.

## f) Emergency response training

Staff & students should be trained in how to initiate the emergency response and evacuation procedures (see **4.4.2**).

The department should determine the training needed for personnel who are assigned emergency response duties and ensure that this training is received. Emergency response personnel should remain competent and capable to carry out their assigned activities.

## g) Periodic testing of emergency procedures

Emergency drills can be used to evaluate the department's emergency procedures, equipment and training, as well as increase overall awareness of emergency response protocols.

The department should maintain records of emergency drills. The type of information that should be recorded includes:

- description of the emergency situation
- scope of the drill
- a timeline of events
- actions and observations of any significant achievements or problems.

This information should be reviewed with the participants to share feedback and recommendations for improvement.

When changes are made in emergency response procedure(s), these changes should be communicated to the personnel and functions that are impacted by the change; their associated training needs should also be evaluated.

# 4.5 Checking

# 4.5.1 Performance measurement and monitoring, Evaluation of compliance

## a) NUS DSHMS requirements

#### A. Performance measurement and monitoring

DSHC shall establish, implement and maintain a procedure(s) to monitor and measure its S&H performance(s) on a regular basis.

Where applicable, this procedure(s) shall provide for:

- a) both qualitative and quantitative measures, appropriate to the needs of the department
- b) monitor the extent to which the department's S&H objectives are met;
- c) monitor the effectiveness of controls (for health and safety), such as through DSHC inspection of the workplaces;
- d) proactive measures of performance that monitor conformance with the S&H programme, controls and operational criteria established by department;
- e) reactive measures of performance that monitor ill-health, incidents (including accident, nearmisses, etc.) and other historical evidence of deficient S&H performance; and
- f) recording of data and results of monitoring and measurement sufficient to facilitate corrective and preventive actions analysis.

DSHC shall review the performance monitoring and measurement results related to the departmental S&H performance.

If equipment are required to monitor or measure performance, the department shall ensure that these equipment are calibrated and maintained. Records of calibration and maintenance activities and results shall be retained.

#### B. Evaluation of compliance

Consistent with its commitment to compliance, DSHC shall establish, implement and maintain a procedure(s) for periodically evaluating compliance with legal and University requirements and other requirements that are applicable to their operations and risk (4.3.2).

DSHC shall keep records of the results of the periodic evaluations.

# b) Purpose

The department should identify key performance parameters for its S&H performance across the department. These should include, but not limited to, parameters that determine whether:

- tracking progress on meeting S&H policy commitments, achieving objectives and targets, and continual improvement,
- determine whether applicable legal and other requirements to which the department subscribes have been met,
- providing data for the evaluation of competence of staff & students
- monitoring incidents, injuries and ill health,
- providing data to proactively and reactively measure the department's S&H performance,

To achieve these purposes, department should plan what will be measured, where and when it should be measured, what measurement methods should be used. The results of measurement and monitoring should be analysed and used to identify both strength and areas requiring correction or improvement.

#### c) Type of indicators

The department's measuring and monitoring should use both reactive and proactive measures of performance, but should primarily focus on proactive measures in order to drive performance improvement and injury reduction.

- a) Examples of proactive measures include:
  - assessments of compliance with legal and other requirements,
  - the effective use of the results of S&H inspection and audit
  - evaluation of the effectiveness of S&H training,
  - use of perception surveys to evaluate S&H climate
  - completion of statutory inspections
  - the extent to which S&H programme(s) (see **4.3.3**) have been implemented
  - the use of health screening,
  - industrial health monitoring,
  - benchmarking against best S&H practices,
- b) Examples of reactive measures include:
  - monitoring of ill health,
  - occurrences and rates of incidents and ill health,
  - lost time incident rates, lost time ill health rates,

## d) Monitoring and measuring equipment

S&H monitoring and measurement equipment should be suitable, capable and relevant for the S&H performance characteristics to be measured.

To assure the validity of results, monitoring equipment used to measure OH&S conditions (e.g. sampling pumps, noise meters, toxic gas detection equipment, etc.) should be maintained in good working order and calibrated or verified, and adjusted if necessary.

The calibration status of measuring equipment should be clearly identified to the users. S&H measuring equipment whose calibration status is unknown, or which is known to be out of calibration, should not be used.

Additionally, it should be removed from use, and be clearly labelled, tagged, or otherwise marked, to prevent misuse. Calibration and maintenance should be performed by competent personnel (see **4.4.2**).

## e) Evaluation of compliance

A department should establish, implement and maintain a procedure for periodically evaluating its compliance with the legal or other requirements that are applicable to its S&H risks, as part of its commitment to compliance.

A variety of inputs can be used to assess compliance, including:

- audits,
- the results of regulatory inspections,
- analysis of legal and other requirements,
- reviews of documents and/or records of incidents and risk assessments,
- interviews,
- facility, equipment and area inspections,
- project or work reviews,

The results of the periodic evaluations of compliance with legal or other requirements need to be recorded.

# 4.5 Checking

# 4.5.2 Incident investigation, Non-compliance, Corrective action and Preventive action

## a) NUS DSHMS requirements

#### A. Incident Investigation

DSHC shall ensure that:

- a) staff and students are encouraged to report incidents arising out of departmental activities
- b) incidents are investigated in a timely manner and results are documented in accordance to University requirements;
- c) appropriate corrective and preventive measures are identified, effectively adopted and implemented in a timely manner;
- d) results or lessons learnt from incidents are communicated to relevant stakeholders; and
- e) all associated records (including results of incident investigation) are maintained.

#### DSHC shall

- a) After an occurrence of an accident or dangerous occurrence
  - i. To conduct an inspection of the workplace and
  - ii. Discuss observations and corrective/preventive actions; and
- b) For all incidents,
  - i. review the results of the incident investigation to identify and address any underlying S&H deficiencies at the department level; and
  - ii. review adequacy of department's response and mitigation of the incident.

#### B. Non-compliance, corrective action and preventive action

DSHC shall ensure that:

- a) Non-compliances are identified, investigated and results are documented;
- b) Appropriate actions are identified and adopted to mitigate the S&H consequences;
- c) The cause(s) is determined and actions are taken to avoid their recurrence
- d) Lessons learnt from the non-compliances are communicated to affected parties in the department; and
- e) All associated records are maintained.

Risk assessments shall be conducted prior to implementation of the corrective action and preventive action if these action(s) identifies:

- a) new or changed hazards; or
- b) the need for new or changed controls.

DSHC shall review the results of the investigation to identify and address any underlying safety & health deficiencies at the department level.

# b) Purpose

Department should have effective procedure for reporting and investigating incident, accidents and non-conformances. The key purpose of the procedure is to prevent recurrence of the situation by identifying and addressing the underlying (root) cause(s).

It can also be used for raising the overall S&H awareness in the department

## c) Procedures

The procedures should include the following considerations:

#### i. General

- Define the roles and responsibilities if the persons involved in the implementing, reporting, investigating, follow-up and monitoring of corrective & preventive actions
- Require that all incidents and accidents be reported
- Apply to all persons in the department including contractors & visitors
- Take into account property damage
- No blame policy as a result of reporting
- ii. Immediate action (taken upon occurrence of incident & accident)
  - Define process of notification
  - Align with emergency response plan
  - Define the scale of investigative efforts in relation to incident impact level

#### iii. Recording

- Recording the details of incident, accident
- Defining where the records are to be stored and responsibility for record control and storage
- iv. **Investigation** (define how the investigation process should be handled)
  - Type of events to be investigated
  - Purpose of investigation
  - Identify competent person for investigation
  - Identify root cause of non-conformance
  - Arrangement for witness interview
  - Equipment for investigation e.g cameras, PPEs.
- v. **Corrective actions** (to rectify non-conformances to prevent recurrence)
  - Identify & implement short and long term measures
  - Evaluate impact on hazard identification and risk assessment.
  - Record any required changes in procedures
  - Apply risk control using the principles of hierarchy of control (elimination, substitution, engineering control, administrative control & PPE) to ensure they are effective

- vi. **Preventive actions** (proactive measures to eliminate root causes)
  - Identify any S&H issues requiring preventive measures
  - Review of systemic gaps in the S&H management system

#### d) Follow-up

- Corrective and preventive actions should be taken as permanent measures
- Checks should be made on the effectiveness of the actions taken
- Outstanding actions should be reported to top management at the earliest time.

#### e) Incident analysis

Identified causes of accidents and incidents should be classified and analysed on a regular basis. Incident rate and severity ratings should be calculated for comparison purposes.

Classification and analysis should be performed for the following;

- Reportable incidents
- Location, injury type, activity involved, body part, time & day of incident (where appropriate)
- Type and amount of property damage
- Contributing and root cause(s)

Due attention should also be given to property damage. Records relating to repair of property could be an indicator of damage caused by unreported accident/incident

Accident and ill-health data / information are important as they can be a direct indicator of S&H performance.

For more information, refer to NUS Accident Incident Reporting & Investigation Standard

# 4.5 Checking

# 4.5.3 Internal Audit

## a) NUS DSHMS requirements

The department shall ensure that internal audits of the S&H management system and that of Academic Supervisors (for laboratory based departments) are conducted at planned intervals to

- a) determine whether the S&H management system:
  - 1) conforms to the requirements of this S&H standard; and
  - 2) has been properly implemented and maintained; and
  - 3) is effective in meeting the department's S&H policy and objectives;
- b) provide information on the results of internal audits to the Head of Department.

Audit procedure(s) shall be established, implemented and maintained by the DSHC and it shall address:

- a) the responsibilities, competencies, and requirements for planning and conducting audits, reporting results and retaining associated records; and
- b) the determination of audit criteria, scope, frequency and methods.

Selection of auditors and conduct of audits shall ensure objectivity and the impartiality of the audit process. Auditors shall be competent in conducting S&H audits.

# b) Purpose

S&H management system internal audit is a process whereby department can review and continuously evaluate the effectiveness of their S&H management system. In general, S&H management system audits need to consider S&H policy and procedures and the conditions and practices in the workplace

An internal audit program should be established to allow department to review its conformity of its S&H management system to the Standard. Planned internal audit should be carried out by personnel from within the department.

The personnel conducting the internal audit should be in a position to perform the duty impartially and objectively.

## c) Establishing an internal audit program

The implementation of an internal audit program should address the following:

- communication of the audit program to relevant parties,
- establishing and maintaining a process for the selection of auditors and audit teams,
- providing the resources necessary for the audit program
- planning, coordinating and scheduling audits,
- ensuring that audit procedures are established implemented and maintained,
- ensuring the control of records of audit activities,
- ensuring the reporting of audit results and audit follow-up.

The results of the risk assessments (see **4.3.1**) should guide the department in determining the frequency of audits of particular activities, areas or functions and what parts of the S & H management system should be given attention. At the minimum, internal audit of the department SHMS should conduct once every two years.

The internal audits should cover all areas and activities under the control of the department and assess conformity to the Standard.

#### d) Internal audit activities

Internal audits should be conducted according to the audit program. The department should also consider conducting additional audits:

- when indicated by the results of previous audits,
- depending on the type of incidents or increased frequency of incidents, or
- when circumstances indicate that they are necessary.

An internal audit typically consists of the following activities:

- initiating the audit,
- conducting document review and preparing for the audit,
- conducting the audit & interview
- preparing and communicating the audit report,
- completing the audit and conducting audit follow-up.

#### e) Initiating an audit

The following activities are typically done to initiate an audit:

- defining the audit objectives, scope and criteria for the audit,
- selection of appropriate auditors and audit team for the audit taking into account the need for objectivity and impartiality,
- confirming audit arrangements with the auditee and other individuals who will take part in the audit.

• Determination of any applicable workplace S & H rules is an important part of this process. In some cases, auditors could need additional training and/or be required to conform to additional requirements [e.g. the wearing of specialized personal protective equipment (PPE)].

# f) Selection of auditors

A minimum of two persons should undertake the internal audits. A team approach can widen involvement and improve cooperation. A team approach can also allow a wider range of specialist skills to be utilized and allow for individual auditors to have specific competencies.

The following are the basic guide for selection of auditors:

- In order to maintain objectivity and impartiality, auditors should not audit their own work.
- Auditors need to understand their task and be competent to carry it out.
- Auditors should be familiar with the S&H hazards and risks of the areas they are auditing and any applicable legal or other requirements.
- They need to have the experience and knowledge of the relevant audit criteria and activities they are auditing to enable them to evaluate performance and determine gaps.

## g) Conducting an audit

The following activities are typically part of the audit:

- communication during the audit,
- collecting and verifying information and evidences
- generating audit findings and conclusions.

The audit team should communicate to the auditee in a timely manner:

- the plans for the audit,
- any concerns raised during the audit, and
- the audit conclusions.

Communication of the plans for the audit can be achieved through the use of an opening meeting. Audit findings and conclusions should be reported during a closing meeting.

Evidence collected during the audit which suggests a risk that requires immediate action should be reported and addressed without delay.

The audit should ensure that a representative sample of the important activities is audited and that relevant personnel are interviewed. This can include interviews of personnel such as individual staff, students and management representatives.

Relevant documentation, records and results should be examined.

Audit evidence should be evaluated against the audit criteria of the Standard to generate the audit findings and conclusions. Audit evidence should be verifiable. Audit evidence should be recorded.

The results of the internal audits should be recorded and reported to Head of Department in a timely manner.

#### h) Conducting audit follow-up

A review of the results should be carried out and effective corrective action taken by DSHC

Follow-up monitoring of audit findings should be established to ensure that identified nonconformities are addressed.

Top management should consider internal audit findings and recommendations, and take appropriate action as necessary within an appropriate time.

See Annex F for Internal Audit Checklist

# 4.5 Checking

# 4.5.3 Management Review

## a) NUS DSHMS requirements

Head of Department and the DSHC shall review the department's S&H management system, at planned intervals, to ensure its continuing suitability, adequacy and effectiveness. Reviews shall include assessing opportunities for improvement and the need for changes to the S&H management system, including the S&H policy and S&H objectives. Records of the management reviews shall be retained.

Input to management review shall include:

- a) results of internal audits and evaluation of compliance with applicable legal and University requirements and with other requirements to that is applicable to the department's operations and risks;
- b) the results of participation and consultation (4.4.3), such as matter arising from the DSHC;
- c) relevant communication(s) from University's management, OSHE and other departments;
- d) Result of previous audits (including PI and DS&H SHMS certification audits conducted by OSHE)
- e) the S&H performance of the department (such as incident and accident statistics);
- f) the extent to which S&H objectives have been met;
- g) status of incident investigations, corrective actions and preventive actions;
- h) follow-up actions from previous management reviews;
- i) changing circumstances, including developments in legal and other requirements related to S&H; and
- j) recommendations for improvement.

The output from management reviews shall be consistent with the department's commitment to continual improvement and shall include any decisions and actions related to possible changes to:

- a) S&H performance;
- b) S&H policy and objectives;
- c) Resources; and
- d) Other elements of the S&H management system.

Relevant outputs from management review shall be made available for communications and consultations.

# b) Purpose

Head of Department and DSHC should review the operation of the S&H management system to assess whether it is effectively implemented and remain relevant for achieving the department's stated S&H policy and objectives.

Management reviews should focus on the overall performance of the S&H management system with regard to:

- suitability (is the system appropriate to the department; dependent on its size, the nature of its risks, etc.?),
- adequacy (is the system fully addressing the organization's S&H policy and objectives?), and
- effectiveness (is it accomplishing the desired results?).

## c) Conduct of management review

Management reviews should be carried out by HOD and DSHC on a regular basis (e.g. quarterly, semiannually, or annually) and can be carried out by meetings or other communication means.

Partial management reviews of the performance of the S&H management system can be held at more frequent intervals, if appropriate.

Different reviews can address different elements of the overall management review.

The DSHC has the responsibility for ensuring that reports on the overall performance of the department management system are presented to HOD, for review.

In planning for a management review, consideration should be given to the following:

- the topics to be addressed,
- who needs to participate to ensure the effectiveness of the review (top management, managers, Department S&H officer or other personnel),
- responsibilities of individual participants in respect of the review,
- information to be brought to the review
- how the review will be recorded.

In relation to the S&H performance of the department, and to show evidence of progress on the policy commitments to prevent injury and ill health, the following inputs should be considered:

- follow-up actions from previous management reviews;
- reports of emergencies (actual or exercises),
- staff / student safety climate survey
- incident statistics,
- results of inspections (internal & regulatory),
- results and/or recommendations from monitoring and measurement,

- S&H performance of contractors,
- information on changes in legal and other requirements
- reports from individual line management on the effectiveness of the system locally,
- progress in the achievement of S&H programs & training plans.
- adequacy of resources (financial, personnel, material),
- the state of preparedness for emergency,
- an assessment of the impact of foreseeable changes to legislation and other requirements

Depending on the decisions and actions agreed at a review, the nature and types of communication of the results of the review, and to whom they will be communicated, should also be considered and recorded.

# References

- 1. Occupational health and safety management systems Guidelines for the implementation of OHSAS 18001:2007
- 2. Occupational safety and health (OSH) management systems Part 2 : Guidelines for the implementation of SS 506

# Annex A - Sample of Safety & Health Policy

Consistent with Department of XXX mission to be the leading interdisciplinary research centre at NUS, we recognizes Department of XXX has a responsibility to provide and maintain a working environment that is safe and healthy. This responsibility extends to all staff, students, research partners, contractors and other visitors to Department of XXX.

Our Safety & Health policy statements are as follows:

1. XXX shall prevent and minimize the occurrence of injury and illness through proactive hazard identification and risk assessment, and implementation of risk control measures.

2. XXX shall take all reasonable efforts to comply with NUS Safety & Health Policies and applicable safety and health legislation, and international best practices.

3. XXX shall lead by example and demonstrate our commitment to S&H performance through dedication of resources for capacity and competency building, and effective communications.

4. XXX shall conduct regular reviews and obtain suggestions and feedback to continually improve S&H performance and management.

(Signature)

Director (XXX) DD/MM/YYYY

# Annex B - Activity-based risk assessment template

Name of Department:							Room Location:						
	Name of Super	visor:				Roor	m Name	:					
	Name of Activity	y:				Roor	m No.:						
No	Description/Details of Steps in Activity	Hazards	Possible Accident / III Health & Persons- at-Risk	Existing Risk Control (Mitigation)	Severity	Likelihood	Risk Level	Additional Risk Control	Severity	Likelihood	Residual Risk Level	Person Responsible	By (Date)
1							0				0		
2							0				0		
3							0				0		

Conducted by:

## Approved by:

Name:

Signature

Approval date:

Next revision date

# Annex C - Legal register applicable to Department

No	Legislations/ guidelines	Applicable to Department
1	Workplace Safety and Health Act	
2	Petroleum And Flammable Materials (PFM) Regulations	
3	Chemical Weapons Convention (NACWC)	
4	Poisons Act	
5	Environmental Protection & Management Act	
6	Environmental Public Health Act	
7	Sewerage and Drainage Act	
8	Misuse of Drug Act	
9	Arms and Explosives (Amendment) Act	
10	Radiation Protection Act	
11	Fire Safety Act	
12	Biological Agents and Toxin Act	
13	WHO guidelines for biosafety	
14	Singapore Biosafety Guidelines for Research on Genetically Modified Organisms (GMOs)	
15	Singapore Guidelines on the Release of Agriculture-Related Genetically Modified Organisms (GMOs)	
16	Any other Acts or Guidelines (if yes, please provide details)	

#### Regulatory body:

GMAC- Genetic Modification Advisory Committee (http://www.gmac.gov.sg/)

HSA - Health Sciences Authority ( http://www.hsa.gov.sg/ ), CDA - Centre for Drug Administration

MOH - Ministry of Health ( http://www.moh.gov.sg )

MOM - Ministry of Manpower ( http://www.mom.gov.sg )

NA(CWC) - National Authority-Chemical Weapons Convention (http://www.customs.gov.sg/nacwc/topNav/hom/)

NEA - National Environmental Agency ( http://www.nea.gov.sg )

NEA- RPNSD – Radiation Protection and Nuclear Science Department (http://app2.nea.gov.sg/anti-pollution-radiation-protection/radiation-protection/radiation-protection-services)

PUB - Public Utilities Board ( http://www.pub.gov.sg )

SCDF - Singapore Civil Defence Force ( http://www.scdf.gov.sg )

SPF- Singapore Police Force (http://www.spf.gov.sg/)

Annex D - Example of Objective & Programme

S/N	Description	Responsibility	Jar	<b>i-16</b>	Feb-09		Mar-09		Ap	r-16	Ma	y <b>-1</b> 6	Jun	-16
		Phase 1 -	- Planı	ning										
1	Overview & planning - Implementation Schedule													
2	Setting WSHMS implementing team & responsibility, etc													
3	Setting S&H Policy													
4	Establish management system manual													
5	Establish risk assessment procedure													
6	Conduct risk assessment and results to be reviewed by Management Representative													
7	Establish procedure on Legal And Other Requirements and legal register													
8	Setting S&H Objectives & Management Programme													
	Pha	se 2 – Documentat	ion an	d Impl	ementa	ation								
9	Establish the other management system procedures													
10	Establish and review relevant S&H operational control procedures													
11	System and operational control procedures walk- thru and deployment													
12	Application of licences and permits													
13	Internal and external communication													
		Phase 3 -	- Chec	king										
13	Internal self-check													
14	Internal audit													
		Phase 4	- Rev	iew										
15	Management Review													

# Objective 2016: To establish a Departmental Safety and Health Management System (DSHMS) by Jun 2016

# Annex E - Roles & Responsibilities Register

Management in RIRC/Department	Stakeholder	SHMS Element	Description of Duties (Examples)	Creating a positive safety culture in the RIRC/Department/Faculty (Examples)									
Senior Management	Director/HOD	OH&S Policy	Endorse and approve RIRC/ Department S&H policy										
	Deputy Director		Ensure SHMS establised for RIRC/Department										
		Risk Assessments	Ensure RIRC/Department risk management framework has been established	Participate in RIRC/Department risk management process									
		Legal and Other Requirement	Ensure RIRC/Department's compliance with legislation	RIRC/Department facility and lab set up a system to ensure compliance with national legal requirement and NUS standard.									
		Objectives and Programmes	Support Safety KPI										
			Endorse and approve RIRC/Department objectives and programmes, including safety budget for safety programmes and events	Support and participate in Univeristy and Department's safety events/activities									
		Structure, Roles and Responsibilities	Form the RIRC/ Department Safety Committee, and appoint RIRC/ Department Safety Committee members, e.g. Chairman and coordinator	Participate in Safety Committee meetings									
							Takes the ultimate responsibility for S&H and S&H management system in the RIRC/Department						
				Ensure the availability of resources pertaining to safety & health management in the RIRC/Department									
			Define S&H roles and responsibilities at RIRC/Department level										
		Training	Support RIRC/Department training requirements defined by the Safety Committee										
			Ensure that a system is established to determine that all staff, students and any person(s) working in the RIRC/Deparment are competent and have received the appropriate training.										
		Communication and Consultation	Encourage a smooth communication channel within RIRC/Department on S&H matters	Communicate to RIRC/Department Safety Committee Chairman and Safety Officer on major S&H concerns									
		Documentation	Ensure document management system for RIRC/Department SHMS is in place										
											Operational Controls	Ensure that controls related to its scope, operations and activities are implemented and maintained within the RIRC/Department	Conduct walk-through of the labs and highlight unsafe practices to the PIs and researchers

		Ensure safety system is established for core or shared facility	
	Emergency Preparedness and	Ensure that DSHC identifies potential emergency	Provide feedback to DSHC and
	Response	situations and develop corresponding emergency	participate in development of
		response plans/procedures within the RIRC/Department	ER plans
		Participate in fire drills	
	Performance Measurement and	Ensure that DSHC establishes, implement and maintain	
	Monitoring	to minitor and measure its S&H performance within the RIRC/Department	
		Support necessary arrangments for industrial hygeine	Support budget for occupational
		monitoring and occupational health surveillance programmes	health surveillance programme
	Accidents/Incidents/Non-	Support and facilitate the investigation of any accident /	Support necessary budget
	Conformances;	incident in the RIRC/Department by DSHC, OSHE and	planning for the implementation
	Corrective	regulators.	of corrective and preventive
	and Preventative Action		measures
	Internal Audit	Suppport departmental audits	Participate in departmental
			audits
	Management Review	Review the RIRC/Department SHMS	Review audit reports, incident
			statistics, etc. and use it as a
			basis for continuous
			management system
Admin Director	Objectives and Programmes	Facilitate S&H objectives and programmes	Provide feedback and
	objectives and riogrammes	r domate our objectives and programmes	participate in S&H objectives
			and programmes
		Facilitate and administer a budget for safety	Review S&H budget and
		programmes/events and necessary occupational health	provide necessary support
		surveillance programmes	
	Communication and Consultation	Facilitate/Communicate to Directors/HoDs regarding	Discuss with Directors/ HOD
		any major S&H concerns	regarding any adhoc S&H
			ISSUES
	Management Review	Facilitate admin support for S&H-related work	
	OH&S Policy	Develop RIRC/Department S&H policy	

Management in RIRC/Department	Stakeholder	SHMS Element	Description of Duties (Examples)	Creating a positive safety culture in the RIRC/Department/Faculty (Examples)
Safety & Health Management	RIRC/Department Safety Committee	Risk Assessments	Oversight of RIRC/Department safety management system	
Personnel			Review RIRC/Department RAs	
			Monitor that risk assessments are conducted for all activities within the Institute/Department	
			Advice Director/HOD/Dean on S&H issues, especially high risk areas/ activities	
			Develop program to mitigate risks and hazards associated with all the activities, e.g. research work, contractor activities, etc.	Establish a system to control conducting Risk Assessment before activity
		Legal and Other Requirement	Identify legal and university requirements	
			Take applicable legal requirements into account when planning activities/projects	
			Update and maintain RIRC/Department register of regulations applicable to the RIRC/Department.	
		Objectives and Programmes	Develop RIRC/ Department safety objectives and programmes	
			Maintain documented RIRC/ Department safety objectives and programmes	
			Participate in RIRC/ Department safety programmes and events	
			Propose a budget for S&H events/activities to RIRC/Department senior management	
			Assist RIRC/ Department S&H programmes excecution	
			Review RIRC/ Department S&H objectives and programmes	
		Structure, Roles and Responsibilities	Conduct Safety Committee meetings regularly	
			Assist the Directors/HoDs to define roles & responsibilities, accountabalities and authorities in the RIRC/Department SHMS.	
		Training	Identify and define RIRC/ Department training needs	
			Monitor RIRC/ Department training status	
			Document RIRC/ Department training records	
		Communication and Consultation	Communicate applicable updates to relevant persons, Safety Committee members, Safety Leads, etc.	
			Advice good practices to individual research group	
			Promote safety and health in RIRC/Depratment	

			Provide internal safety issues communication channel	
			Highlight Safety Officer on safety issues and concerns	
		Documentation	Develop a document management system for the RIRC/Department	
			Generate, maintain and update RIRC/Department SHMS	
		Operational Controls	Highlight safety concerns regarding the implementation and maintainence of operation controls	
			Participate in lab inspection	
		Emergency Preparedness and	Develop RIRC/ Department ERP	
		Response	Participate in fire drills	
			Review RIRC/Department ERP	
		Performance Measurement and Monitoring	Establish, implement and maintain procedures for periodically evaluating compliance with legal and University requirements	
			Establish, implements, monitor and review RIRC/ Department industrial hygine and occupational health surveillance programmes (if applicable)	
		Accidents/Incidents/Non- Conformances; Corrective and Preventative Action	Investigate incidents reported via AIRS	
			Monitor appropriate corrective and preventive measures are identified, effectively adopted and implemented in a timely manner	Ensure appropriate corrective and preventive actions are effectively implemented and incidents are closed.
			Review the results of incident investigations	Ensure the root cause has been identified and gaps are closed
		Audit	Conduct internal audits	
		Management Review	Review PI lab SHMS	
			Review Departmental SHMS	
			Review internal audits and provide recommendations for further improvement	
	RIRC/Department Safety Chair	OH&S Policy	Drive RIRC/ Department's SHMS establishment, implementation and maintainence.	
		Risk Assessments	Review/Approve RIRC/Department risk assessment	
	Safety officer	Legal and Other Requirement	Identify and flag legal compliance requirements	
		Objectives and Programmes	Review RIRC/ Department S&H objectives and programmes	
			Drive safety programmes	
		Structure, Roles and Responsibilities	Manage and lead the RIRC/department safety committee	
			Endorse the agenda and minutes of RIRC/Department safety committee meeting	

	Training	Identify/review training needs for RIRC/Department level	
	Communication and Consultation	Flag Director/HOD the performance of Dept SHMS and any major S&H concerns and issues	
		Flag Safety Officer on safety issues and concerns	
	Documentation	Review safety-related reports	
	Operational Controls	Flag operational controls implementation to core facilities	
	Emergency Preparedness and	Review, endorse and approve RIRC/Department ERP	
	Response	Participate in fire drills	
	Accidents/Incidents/Non- Conformances; Corrective and Preventative Action	Monitor corrective and preventative action	
	Audit	Participate in RIRC/department audit	
	Management Review	Review RIRC/department audit report	
		Oversight of RIRC/department SHMS	
		Provide guidance, advice and technical assistance to RIRC/Department	
		Report to Director/HOD on major S&H concerns and issues	
		Facilitate the RIRC/Department's Safety Committee to identify legal and university requirements	
		Facilitate RIRC/Department legal complaince	
		Communicate relevant updates to RIRC/Department Safety Committee members	
		Communicate relevant updates to PIs	
		Monitor the implementation of RIRC/Department S&H objectives and programmes	
		Provide adequate training to staff and students in RIRC/Department	
		Review risk assessment for high risk activities	
		Conduct lab inspections	
		Investigate incidents reported via AIRS and ensure that investigation reports are submitted to AIRS administrator	
		Participate in internal audits	
RIRC/Department	Operational Controls	Implement operation control measures	
	Incident reporting	Update and report to Safety Officer on safety issues and concerns	
	Doc Control	Update, document and maintain RIRC/Department legal requirements register	

		Performance Monitoring	Inspect lab and rectify lab inspection findings	
		Tarisiss	Implement the corrective action and preventative action	
		i raining	Conduct relevant trainings	
		Objective & Programme	Provide relevant S&H training for undergraduates in RIRC/Department	
			Participate in all S&H programmes and event	
		Communication and Consultation	Assist Safety Officers in S&H management in RIRC/Department	
		Emergency Preparedness and	Liaise with OSHE on all S&H matters of the RIRC/department	
		Response	Participate in fire drills	
Supervisor	Principal Investigator	OH&S Policy	Ensure lab activities are aligned with RIRC/Department S&H policy	
		Risk Assessments	Review and approve lab's RAs and SOPs	
		Legal and Other Requirement	Ensure legal compliance for the group's activities	
		Objectives and Programmes	Review and approve lab S&H objectives and programmes	
		Structure, Roles and Responsibilities	Define S&H roles and responsibilities in the lab	
		Training	Define lab members' training needs	
			Ensure lab-specific training is conducted for newcomers	
		Communication and Consultation	Provide safety communication channel within the lab	
			Update Safety Officer on safety issues and concerns	
		Documentation	Ensure that a document management system is established	
		Operational Controls	Ensure that risk control measures for the lab activities are implemented	
			Ensure sufficient PPE are provided	
		Emergency Preparedness and Response	Participate in fire drills	
		Performance measurement and monitoring	Ensure necessary IH and occupational health surveillance programme is established in the lab (if required)	
		Accidents/Incidents/nonconformances; corrective and preventative action	Participate in AIRS incident investigations and ensure the implementation of preventitve and corrective actions	
		Audit	Conduct lab internal audits	
		Management Review	Review lab SHMS periodically	

Core Facility Manager	OH&S Policy	Ensure core facility activities are aligned with RIRC/Department S&H policy	
	Risk Assessments	Review and approve core facility's RAs and SOPs	
	Legal and other requirement	Identify legal and university requirement for core activities	
	Objectives and Programmes	Participate in S&H programmes and event	
	Structure, Roles and Responsibilities	Define S&H roles and responsibilities for facility staff	
	Training	Define training needs for core staff	
		Update and maintain core staff training document	
	Communication and Consultation	Provide a safety communication channel within the core facility	
		Communicate with visitors, contractors, and other relevant personnel on safety issues	
		Update Safety Officer on safety issues and concerns	
	Documentation	Ensure sufficient and effective PPE in core activities	
	Operational Controls	Implement risk control measures for core facility activities	
		Maintain engineering controls, e.g. BSC and fume hood	
		Facilitate issuing of safety budget	
		Participate in lab inspections	
	Emergency preparedness and	Inspect and maintain emergency equipment	
	response	Attend lecture-based and/or hands-on spills training	
		Participate in fire drills	
	Performance measurement and monitoring	Update and maintain core staff medical surveillance record	
	Accidents/Incidents/Inonconformance's; corrective and preventative action	Participate in AIRS incident investigations and follow up on corrective measures	
	Audit	Participate in internal audits	
	Management Review	Review core facility SHMS	
Building	Communication and Consultation	Managing interfaces across departments and RIRC	
(Management	Operational Controls	Managing the general safety issues in the building	
	Emergency preparedness and response	Ensure that an annual fire drill is conducted	

Management in RIRC/Department	tt in Stakeholder SHMS Element Description of Duties (Examples)			Creating a positive safety culture in the RIRC/Department/Faculty (Examples)
NUS Staff and	Safety Lead	OH&S Policy	Follow RIRC/Department S&H policy	
Students		Risk Assessments	Develop RAs and SOPs	
			Review RAs and SOPs when there are any changes in processes	
		Legal and other requirement	Identify legal and university requirements for group activities	
			Ensure SDS is accessible to all the lab members	
			Update regulated-chemical inventory list	
		Objectives and Programmes	Participate in S&H programmes and events	
		Structure, Roles and Responsibilities	Assist the PI to assign roles and responsbilities in the lab	
		Training	Monitor training and lab-specific training status of lab members	
			Document training and lab-specific training records	
		Communication and Consultation	Communicate applicable updates to repspective lab members	
			Liase with safety coordinator on all lab S&H matters	
			Provide a safety communication channel within the lab	
		Documentation	Update, document and maintain lab SHMS	
		Operational Controls	Manage regulated materials and ensure lab members comply with legal and University's requirements	
			Manage chemicals procurement	
			Implement risk control measures for the lab activities	
			Inform visitors/contractors of hazards on site and provide PPE	
		Emergency preparedness and response	Participate in fire drills	
		Performance measurement and monitoring	Conduct SQRA	
		monitoring	Update and maintain medical surveillance records for lab members	
		Accidents/Incidents/nonconformances;	Report incidents via AIRS	
		and preventative action	Participate in AIRS incident investigations	
		Audit	Conduct lab inspections	
		Management Review	Provide feedback to PI	
	Staff & Students	OH&S Policy	Comply RIRC/Department S&H policy	
		Risk Assessments	Conduct RAs and prepare SOPs prior to conducting experiments	

			Review RAs and SOPs when there are any changes in processes	
		Legal and other requirement	Review RAs and SOPs when there are any changes in terms of process	
			Ensure legal compliance for research activities	
		Objectives and Programmes	Participate in S&H programmes and events	
		Structure, Roles and Responsibilities	Perform S&H duties assigned	
		Training	Attend NUS, RIRC/Department and lab-specific training	
		Communication and Consultation	Update Safety Lead, Safety Coordinator and Safety Officer on safety issues and concerns	
		Documentation	Update and/or forward a copy of safety & health documents to Safety Lead, e.g. training records, vaccination dates, updated RAs and SOPs, etc.	
		Documentation	Read the relevant RAs and SOPs prior to start of research work	
		Operational Controls	Comply control measures outlined in safety manuals, RAs and SOPs	
			Take safety precautions when conducting experiments	
			Inform visitors/contractors of hazards on site and provide PPE	
		Emergency preparedness and response	Participate in lecture-based and/or hands-on spill management if required	
		Performance measurement and	Conduct SQRA	
		morinoring	Comply medical surveillance requirements	
		Accidents/Incidents/non- conformances; corrective	Follow up on incidents and accidents by reviewing RAs and implementation of control measures	
		and preventative action	Report incidents via AIRS	
		Audit	Rectify lab inspection findings	
		Management Review	Provide feedback to PI	
Visitors/Contractors	Visitors/Contractors	Legal and other requirement	Comply legal requirements	
			Comply University and RIRC/Department/Faculty safety management requirement	
		Risk Assessments	Submit RAs for any activities conducted in RIRC/Department/Faculty (if required)	
			Submit all relevant documents for review and record	
		Training	Be aware of RIRC/Department/Faculty-related hazards on site	
		Operational Controls	Adhere to safe work procedures in the RIRC/Department/Faculty and lab	

# Annex F - Internal Audit Checklist

Inte	ernal Audit Report					
Name of Department		Name of Auditors				
Location			Name of Observers			
Dat	e of Internal Audit		_			
No	SHMS Element	Key Audit Points	Compliance/ Observations	Corrective Action	Person Responsible	Timeline
1	Safety & Health Policy	Is there departmental level S & H policy in place?				
		Is the policy endorsed by HoD?				
		How are policies communicated to department personnel?				
		Is policy reviewed regularly? If yes, how long?				
2	Risk Assessments	Are Risk assessments conducted for all routine/non-routine activities?				
		Is R.A conducted for activities of all persons involved in their operations, which include personnel within the department as well as external people such as visitors, contractors and collaborators?				

Are the risk assessments kept up-to-date and		
adequately endorsed?		
Is the hierarchy of controls approach		
is the meral chy of controls approach		
considered when determining the type of risk		
controls needed?		
Is RA conducted for activities outside the		
department (premises)?		
Is BA conducted for core, common and shared		
facilities and workplaces?		
racinties and workplaces:		
Is RA conducted for changes or proposed		
changes at the PI-level, its activities,		
equipment, personnel or materials?		
How are the results of the RA communicated to		
the relevant personnel?		
Do you review risk assessments when there is		
change in process. Show proof		
change in process. Show proof.		
Are control measures identified and		
implemented?		
Are these measures in some wated into the COD.		
Are these measures incorporated into the SOPS		
(in any)?		

3	Legal and other requirements	What legislations and other requirements are applicable to the department?		
		How are these requirements accessed?		
		How are they communicated to the department users?		
		What type of licence (s) are maintained by department / PI?		
4	Objectives and Programmes	What are your S&H objectives? Any documentation?		
		Are the objectives in line with the policies?		
		Is there a S&H programme? Eg. S&H workplan, timeline for objective targets, actions to be done relating to S&H.		
5	Structure, Roles and Responsibilities	Are roles and responsibilities of department personnel in the department established? Documentation?		
		How are these communicated to everyone?		
6	Training	How does the PI ensure that any person(s) under its control performing tasks that can impact on its safety and health are competent		
		Are all training records documented?		
		Is training needs analysis is performed?		
		Who is monitoring the training status?		
		How is safety induction trainings are conducted for all staff, students including visitors and contractors?		
		Is appropriate person(s) trained effectively for emergency and crisis situations?		

7	Communication and	How is safety information disseminated to staff
	Consultation	and students?
		How are feedback/concerns from your staff and students addressed? Show proof.
		How do you communicate safety concerns to contractors and visitors?
8	Documentation	Is there licences/permits required under legislations applicable to your department? Show proof.
		Are the documents:       i. approved for adequacy prior to issue?         ii. reviewed and updated to keep them relevant?
		Are the records legible, identifiable and traceable?
9	Operational Controls	Any SOPs in place?
		Any equipment maintenance records? Frequency?

		<ul> <li>Are controls necessary to manage the Safety and Health risk implemented?</li> <li>Has the Dept/PI implement and maintain: <ul> <li>a. Controls related to transport, import, transfer, handling, storage and/or disposal of materials (including hazardous materials), equipment and services?</li> <li>b. Control related to with collaborators,</li> </ul> </li> </ul>		
10	Emergency preparedness and response	Is there an emergency response plan in place? Have you participated in any drills?		
		Are you aware of the emergency procedures? (escape route, assembly area, emergency contact		
11	Performance measurement and monitoring	How often do you carry out department level inspections and industrial hygiene monitoring? Show evidence		
		How do you ensure that follow up actions are carried out?		
		Are there equipment requiring calibration? Show evidence		
12	Accidents/Incidents/non- conformances; corrective and preventative action	Are there incidents/ accidents?		
		Is there procedure for accident/incident reporting / investigation?		
		Who is responsible for reporting?		
		Who carries out investigation, corrective and preventative actions?		
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13	Audit	Is internal audit conducted?		
		Are the previous audit findings for AFIs being addressed?		
		Is the result of the audit forwarded to HOD?		
14	Management review	Is management review conducted?		
		When is it conducted?		
		Who conduct the review?		
		What is the outcome of the review?		
		How are the findings communicated to relevant personnel?		
		Who carries out investigation, corrective and preventative actions?		