



Faculty of Science
DEPARTMENT OF BIOLOGICAL SCIENCES

Department Safety & Health Management System

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(Name/Signature)	(Designation)	(Date)
Reviewed By		
J. Sivaraman	Professor/ Safety Chair	30 Sep 2016
(Name/ Signature)	(Designation)	(Date)
Approved By		
Paul Matsudaira	Professor/HoD	14 Oct 2016
(Name/Signature)	(Designation)	(Date)

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Rev. No	Description of Change	Date of Approval	Remarks
2	Review all elements in SHMS	14 Oct 2016	
3	Remove S14 building and update ERP	28 Oct 2016	

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Introduction

Profile of Biological Sciences
Organization of the laboratories in DBS

Department Profile

Senior Management	
Head of Department	Prof Paul Matsudaira
Deputy Heads	A/P Mok Yu-Keung, Mok; Prof Winkler, Christoph; Loh Chiang Shiong
Assistant Deputy Heads	Darren Yeo Chong Jinn
Profile of department full-time staff (excluding part time & visiting staff)	
Number of Faculty Members (i.e. Professor, Associate Professor, Assistant Professor, Lecturer etc.)	87
Number of Research Staff (i.e. Postdoctoral Fellow, Research Fellow, Research Scientist, Professional Officer, Research Assistant, Research Associate, Research Engineer etc.)	154
Number of Executive & Professional Staff (i.e. Associate Directors, Managers, Executives etc.)	10
Number of General Staff (i.e. MAOs, Lab Techs, SPAs, OAs)	40
Principal Investigators with lab	
Total no. of Principal Investigators (PIs) in the department.	43
Total no. of PIs certified to the NUS Laboratory	43

S & H Certification Scheme	
Profile of department full time students	
Number of Undergraduate	3000
Number of Postgraduate	230
Research Focus	
Major Research Focus	Biophysical Sciences
	Cell, Molecular and Developmental Biology
	Ecology , Biodiversity and Environmental Biology
Teaching Labs	
LS Lab 1 – LS Lab 7	
Serviced Core Facility	
Confocal Lab	
Cryo Lab	
DNA Sequencing	
Plant Holding	
Protein and Proteomics Centre (PPC)	
S1A_ Level 4 Shared Teaching Lab	
Dark Room	
Location of Building	
S1	
S1A	
S2	
S3	

Academic Staff and Laboratories in DBS.

S/N	Group	Academic Staff	Laboratory	Location	Certified to Lab Certification Scheme?
1.	Biophysical Sciences	RM Kini	Protein chemistry, design and engineering	S2-L2	Yes
2.		Paul Matsudaira	Multi-scale dynamics in biology	S1A-L2	Yes
3.		Greg Tucker-kellogg	System Biology	S2-L5	Yes
4.		Yang Daiwen	Protein NMR and folding	S3-L3	Yes
5.		J Sivaraman	Macromolecular structure & function	S3-L3	Yes
6.		K Swaminathan	X-ray crystallography	S3-L3	Yes
7.		Ganesh Anand	Protein- protein interactions	S2-L2	Yes
8.		Henry Mok	Protein NMR and folding	S3-L3	Yes
9.		Song Jianxing	Protein folding, NMR and Genomics	S2-L5	Yes
10.		Adam Yuan	RNA Biology	S2-L5	Yes
11.		Lin Qingsong	Proteomics	S2-L2	Yes
12.		Lu Gan	Mitosis	S1A-L6	Yes

S/N	Group	Academic Staff	Laboratory	Location	Certified to Lab Certification Scheme ?
1.	Cell, molecular and developmental Biology	Dink Jeak Ling	Host-pathogen interaction and innate immunity	S1A-L5	yes
2.		Gong Zhiyuan	Molecular development biology	S3-L6	yes
3.		Prakash Kumar	Plant morphogenesis	S1A-L7	yes
4.		Wang Shu	Biotechnology	S3-L6	yes
5.		Wong Sek Man	Molecular virology	S1A-L6	yes
6.		Yu Hao	Plant functional genomics	S1A-L7	yes
7.		Chan Woon Khiong	Fish genomics	S1A-L5	yes
8.		Chew Fook Tim	Allergy, Immunology and Genetics	S2-L5	yes
9.		Christoph Winkler	Developmental Biology	S1A-L5	yes
10.		Ge Ruowen	Angiogenesis and Cancer Biology	S3-L6	yes
11.		Cynthia He	Cell biology	S1A-L6	yes
12.		Lim Tit Meng	Developmental biology	S1A-L5	yes
13.		Liou Yih Cherng	Post-translational modification and function	S3-L6	yes
14.		Pan Shen Quan	Bacterial genetics & biotechnology	S1A-L6	yes
15.		Sanjay Swarup	Metabolites Biology	S1A-L6	yes
16.		Wu Min	Cell biology	S1A-L6	yes
17.		Xu Jian	Molecular cell biology	S1A-L6	yes
18.		Lau On Sun	Plant developmental biology	S1A-L7	6 Oct

S/N	Group	Academic Staff	Laboratory	Location	Certified to Lab Certification Scheme?
1.	Ecology, Environmental Biology and Biodiversity	Alex Ip	Molecular & Environmental Physiology	S1A-L5	yes
2.		Rudolf Meier	Biodiversity	S1A-L5	yes
3.		Peter Ng	Crustacean taxonomy	S3-L2	yes
4.		Li Daiqin	Entomology	S3-L2	yes
5.		Hugh Tan	Biodiversity	S3-L2	yes
6.		A/P Webb, Edward Layman	Biodiversity	S3-L4	yes
7.		Frank Rheindt	Avian Evolution Laboratory	S3-L4	yes
8.		Antonia Monteiro	Evolutionary Developmental Biology	S3-L2	yes
9.		Darren Yeo	Freshwater Biology	S3-L2	yes
10.		John Ascher	Biodiversity	S3-L4	yes
11.		Danwei Huang	Marine Biology	S3-L4	yes

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Section 1

General Requirement
Contacts of Safety & Health Committee Members
Annex 1- Current Organization Structure

General Requirements

The Head of Department, Prof Paul Matsudaira, has established and implemented a departmental Safety and Health Management System (DSHMS) in accordance with the requirements of the standards set by OSHE.

There are a total of 43 research laboratories under three major groups: Biophysical Sciences, Cell, Molecular and Developmental Biology, Ecology, Biodiversity and Environmental Biology.

There are a total of seven teaching labs and seven service core facilities managed by the department that are under the scope of this S&H management system.

The Head of Department has formed the Departmental Safety & Health Committee (DSHC) and he has appointed committee members to champion safety and health issues in the department. The committee consist of Departmental Safety & Health Committee Chair (academic staff); departmental Safety & Health Coordinator (being a member of the committee); and committee members representatives from different teaching groups located in different buildings and functions in the department.

The Head of Department set departmental safety and health management as one of his KPIs and hold regular forum in the departmental executive management meeting and staff meeting.

DSHC run safety and health programmes in the department, including the sharing of best practices within the department. The DSHC explores opportunities to encourage staff and students to participate in University, faculty or department S&H events.

DSHC Chair has established, implemented and maintained; the departmental S&H management system. He updates the performance of S&H management system to the HoD on a regular basis. Few improvements to existing procedures resulted from the performance review of the S&H management system.

Department Safety & Health Coordinator has provided continually guidance, advice and technical assistance to the Head of Department and DSHC chair on all S&H matters. Department Safety & Health Coordinator is the key liaison person with OSHE and Faculty on all safety and health matters pertaining to the department.

DSHC members are nominated by the Head of Department and assigned with specific tasks and responsibilities in the DSHMS. The members and their specific duties are made known to staff and students by staff meeting and student orientation session.

A Safety Lead is nominated and assigned to each of research labs by the Head of Department. The Safety Lead assists the academic supervisors on establishing, implementing and maintaining the lab's S&H management system.

This diagram in Annex 1 shows a current organizational structure of the departmental safety & health management.

The scope of the DSHMS covers the overall operation and activities of the department under teaching, service facilities; teaching module field trip and office that can impact on the safety and health of staff and students and other interested parties.

Objective

Department established this DSHMS with the overall aim to support and promote a safe and healthy workplace as well as to meet regulatory requirements that are consistent with the NUS Safety and Health Policy.

Contacts of DSHC

No	Name	Role	Emails	Office tel.
1	Professor Paul Matsudaira	HOD	dbshhead@nus.edu.sg	65162692
2	Prof J Sivaraman	DSHC Chair / EXCO member	dbsjayar@nus.edu.sg	65161163
3	Mr Yan Tie	DSHC Coordinator	dbsyant@nus.edu.sg	65165200
4	Ms Liew Chye Fong	Member	dbslcf@nus.edu.sg	65162850
5	Ms Kho Say Tin	Member	dbskhost@nus.edu.sg	65162850
6	Ms Ang Swee Eng	Member	dbslimse@nus.edu.sg	65164757
7	Ms Tay Bee Ling	Member	dbstbl@nus.edu.sg	65164757
8	Mr Allan Tan	Member	dbstanjh@nus.edu.sg	65165200
9	Ms Chua Ling Lih	Member	dbscll@nus.edu.sg	65162854
10	Ms Goh Poh Moi	Member	dbsgohpm@nus.edu.sg	65162705
11	Ms Mok Lim Sum, Michelle	Member	dbsmlls@nus.edu.sg	65164594

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Section 2

Safety & Health Policy
Annex 2 – Safety & Health Policy

Safety & Health Policy

Purpose and scope

The purpose of the departmental Safety & Health Policy is to state its commitment to ensure a high standard of safety and health management in the department. The policy is applicable to all staff, students and visitors in the department. In addition, The S &H policy provides the framework for goal setting and department programs development.

Roles and responsibilities

The departmental S&H policy are authorized by Head of Department and DSHC Chair.

DSHC is responsible for drafting the Policy, reviewing the policy once in every two years and ensuring that the Policy is well communicated among all staff, students and visitors.

Principal Investigators are responsible for communicating the Policy with staff and students under their charge.

All staff, students and visitors should be aware of the Policy.

Procedures

- a. A departmental Safety & Health policy should be made being aligned to the University S&H Policy, Directives and Regulations.
 - b. The policy should be reviewed and revised periodically, or any changes of department's top management, or every two years to ensure that it remains relevant and appropriate to the departmental operation, risks and University's requirement.
 - c. The Policy and its review and revision should be communicated with and made readily available to all staff and students and visitors via the departmental communication platforms, such as safety orientation sessions, staff meetings, emails and departmental intranet (safety shared folder; \\dbssafety).
- A latest Departmental Safety & Health Policy is shown in Annex 2.

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Section 3

Hazard Identification and Risk Assessment (HIRA)
Risk Assessment Team and Register
Annex 3 – Risk Assessment Register and RAs (common activity/ facility/vendor)

Hazard Identification and Risk Assessment (HIRA)

Purpose and scope

The purpose of this section is to provide a framework for all staff and students in identifying hazards, conducting risk assessment and establishing controls for all activities in teaching labs and serviced core facilities and those activities organized by the department outside departmental premises.

This section is applicable to all staff, students and visitors working in the department.

Roles and responsibilities

Head of Department is responsible for ensuring the risk management of potential hazards is identified by DSHC, and providing the availability of resources to establish, to implement and communicate the risk assessments in the department.

DSHC is responsible for reviewing the hazards and risk management in the department; and reviewing and establishing risk control when in the event of an incident/accident or when there is any modification in the departmental safety and health management, or when there are any temporary changes that impact the departmental operations and activities. Safety Chair and/or Safety coordinator are the approval authority for the common activities. DSHC is also responsible for establishing, implementing and reviewing safety SOPs for common activities in the department to reduce and to control risk as specified in the risk assessments.

Activities that are used by 50 % or more of the laboratories in the department are referred to common activity. Liquid nitrogen handling and chemical waste disposal are a few examples of common RA.

Principle investigators are to ensure the hazards to be properly identified and risk assessment to be conducted and implemented in his/her laboratory for lab activities, processes and equipment. Visitors and contractors engaged by PIs' research lab are responsible for conducting a risk assessment relevant to their activities in a lab and submitting to the lab PI or safety lead for documentation. Moreover PIs' should identify and ensure the required SOPs and RAs are in place for the after office hour activities in their lab.

Teaching labs/Service facilities managers are responsible for identifying hazards and conducting and implementing risk assessment for class experiments, activities and equipment both in teaching labs and serviced core facilities and in field work. The departmental supporting staff is also responsible for communicating the risk assessments to students and facilities users; and reviewing the risk assessments in a timely manner (incident, changes or in 3 years). The departmental supporting staff should equip themselves with a proper training in risk management.

Contractors engaged by the department are responsible for conducting a risk assessment relevant to their activities in the department and submitting to DSHC for documentation.

Procedures

- ✚ A 3x3 risk matrix method should be used for hazard identification and risk assessment (template for risk assessment, Annex 3);
- ✚ all sources of hazards arising from departmental activities, such as teaching classes in a laboratory and in field work, experiment and services in core facilities, use of chemicals and biological materials and equipment handling and maintenance; and other non-routine activities such as emergency situations and temporary process changes et al.
- ✚ Risk level should be evaluated and assessed;
- ✚ Risk control should be implemented. DSHC determine whether existing controls are effective or need improvement, of if additional controls are required if the risk level is above 3.
- ✚ Risk assessments are reviewed periodically for any changes of an activity that can impact its hazards and risk, such as personnel, management structure, process, usage of materials; and for introduction of new equipment and for any incident on the work activities.

All risk assessments are implemented and documented in respective laboratories and core facilities, and the documented files are kept in the departmental safety shared folder by DSHC for sharing purposes.

DBS Risk Assessment Teams

Research Activities			
Scope	Conducted by	Review and Approve By	Storage Location
Research Labs	Researchers and PGs	PIs	PI's SMS Folder \\dbssafety> LabSMS

Teaching Modules			
Scope	Conducted by	Review and Approve By	Storage Location
Teaching Labs (Lab 1- Lab 7)	Lab Technologist /Lab Managers and/or TA	Module /Teaching coordinator and /Or Chair of DSHC	\\dbssafety> Reference >Teaching Core

Core/Service Facility			
Scope	Conducted by	Review and Approve By	Storage Location
<ul style="list-style-type: none"> • Cryo EM • Confocal Lab • DNA Sequencing Lab • Protein & Proteomics Centre • Plant Holding Facilities • Dark Room • SIA Level 4 Teaching Lab 	Facility Managers & Lab Technologists	Facility Supervisors and/or Directors and / Or Safety Chair and/or Safety coordinator	\\dbssafety> Reference >Teaching Core

Non Routine Activities

Scope	Conducted by	Review and Approve By	Storage Location
Service and Maintenance (Contract and ad-hoc) Egs are Centrifuge maintenance ; BSC maintenance	Respective Supplier	Respective Supplier	\\dbssafety> Reference RA > RA of maintenance vendor
Maintenance fluorescence tube	Chong Ping Lee	Wong Sek Mun	\\dbssafety> Reference RA > RA of common activity

Common Activities

Scope	Conducted by	Review and Approve By	Storage Location
1) Instrument Operation: Egs: autoclaves/ heat block etc) 2)Processes : Eg : Chemical Waste disposal ; 3) Handling of Liquid Nitrogen	Researchers and/or PGs Lab and /or Technologists and /or Safety committee members	PIs and/or DHSC chair	\\dbssafety> Reference RA > RA of common activity

Research Personal Working After office hours

Scope	Conducted by	Review and Approve By	Storage Location
Research labs	Researchers and PGs	PIs	PI's SMS Folder \\dbssafety> LabSMS

Activities outside NUS premises

Scope	Conducted by	Review and Approve By	Storage Location
Field Trip	Research personnel and /or Lab Technologist	Principal Investigator	PI's SMS Folder \\dbssafety> LabSMS

Department-Level Risk Assessment Register

Equipment

No	Name of Activity	Conducted by	Date	Approval Date	Next Revision Date	Remarks
DBSRA_001	Operation of Autoclave	Chong PL	16 Sep 2016	8 Nov 2016		
DBSRA_002	Use of Centrifuge	CPL/LCF	30 Sep 2016	8 Nov 2016		
DBSRA_003	Handling Oven	CPL/LCF	30 Sep 2016	8 Nov 2016		
DBSRA_004	Handling of hotplate-stirrer	CPL/LCF	30 Sep 2016	8 Nov 2016		
DBSRA_005	Handling of Water bath	CPL/LCF	30 Sep 2016	8 Nov 2016		
DBSRA_006	Handling of Digital Dry Bath and Heat Block	CPL/LCF	30 Sep 2016	8 Nov 2016		
DBSRA_007	Handling of Microwave oven	CPL/LCF	30 Sep 2016	8 Nov 2016		

Processes

DBSRA_008	Chemical Storage and handling	LCF/CLL	26 Jan 2016	8 Nov 2016		
DBSRA_009	Storage and Transportation of Waste Chemical	CPL/LCF	25 Sep 2016	8 Nov 2016		
DBSRA_010	Handling Biowaste Disposal	Chua Ling Lih	30 Sep 2016	8 Nov 2016		
DBSRA_011	Handling Cytotoxic Waste Disposal	Chua Ling Lih	30 Sep 2016	8 Nov 2016		
DBSRA_012	Working with Liquid Nitrogen	Chong Ping Lee	01 - Aug-16	8 Nov 2016		
DBSRA_013	Working with fluorescent tube (n	Chong Ping Lee	14 - Jan-15		13 Jan 2018	

Teaching Labs and Core/Service Facility					
1.	Teaching Labs (Lab 1- Lab 7	Lab Technologist /Lab Managers and/or TA	Feb- May 2016	1 Sep 2016	Every Semester
2.	Core/Service Facility	Lab Technologists and/or Facility Managers	Feb- Aug 2016	1 Sep 2016	

The mechanism of HIRA implementation

The Department Biological Sciences is organized into laboratories (teaching / research) and common / core facilities.

All activities in DBS adhere to procedure(s) for ongoing hazards identification, risk assessment and determination of necessary control measures.

For grants based projects, PIs have to apply for Project Risk Assessment (PRA) and they are certified under Lab Certification Scheme

All results of the hazard identification, risk assessments and determined controls are documented and kept up-to-date of each research activity in each PIs SMS.

The full RAs (Research labs/teaching labs/Service labs) can be found deposited in DBS Shareholder.

When an activity is being used by 50% or more of the laboratories in the department, we consider that activity as common, e.g. operating autoclave, Liquid nitrogen handling; etc.

Details of the common RAs are reflected in the RA Register. These common RAs serve as the guide to all laboratories in the department. The laboratories in the department may adopt it for the same activity or they may implement their own depending on their research needs

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Section 4

Legal and Other Requirements
Legal Register _ Legislations applicable to DBS
Annex 4: Legislation Register for research laboratories and, teaching labs and departmental facilities in detail_2016

Legal and Regulatory Requirement

Purpose and Scope

The purpose of this section is to provide a framework in identifying the legal and University requirements; regulations and directives. This is applicable to all staff and students, and visitors in the departmental premises.

Roles and responsibilities

Head of Department is responsible for ensuring all information pertaining to any legal and regulatory requirements is listed in the departmental S&H Management System; and providing the resources for implementation and dissemination for these requirements.

OSHE and faculty safety officer are responsible to informing and updating the departmental DSHC of any legal and regulatory requirements and university directives.

DSHC is responsible to disseminate and update of any legal and regulatory requirements/directives from OSHE /Faculty Safety Unit to the staff and students.

Principle investigators, teaching lab and core facility managers are responsible for ensuring legal compliance of his/her laboratory activities and operation with respective applicable legal requirements, university regulations and directives for his/her laboratory.

A legal register is established to reflect departmental activities and operations are legal compliance with respective legislations and regulations/directives

Procedures

DSHC access established shared portal_dbs safety for information on relevant legislation and other legal and regulatory requirements possibly applicable to the departmental research labs, teaching labs and core facilities.

Principle investigators, lab and core facility managers identify relevant legislation and other legal and regulatory requirements, which are applicable to activities, process, equipment, personnel and infrastructure in respective labs, communicate with his/her team members. The changes and the review are updated and documented in respective SMS folder.

DSHC is committed to monitor legal updates and regulatory requirements; and communicate the changes with all relevant parties in the department in time through staff meeting and email

announcement. For an example, DSHC has been working closely with the regulated body on the pressure vessel testing and license renewal.

DSHC kept and documented a legislation register for all departmental laboratories and facilities. (Annex 4)

DSHC would help principle investigators, teaching lab managers, core facilities managers implement necessary controls to ensure compliance to the relevant legislations and regulations in their research labs, teaching labs and core facilities.

- ✚ Centralized registration/control in hazardous material procurement (Michelle Mok)
- ✚ Centralized safety equipment certification/licensing, such as fumehood annual certification, pressure vessel annual certification, Sonicator licensing; Statutory Medical Surveillance etc.

Legal Register

Legislations applicable to DBS (Labs and Common Facility)			
No	Legislations/ guidelines	Applicable to department	Regulatory Body
1	Workplace Safety and Health Act	Yes	MOM
2	Petroleum And Flammable Materials (PFM) Regulations	Yes	SCDF
3	Chemical Weapons Convention (NACWC)	Yes	NA(CWC)
4	Poisons Act	Yes	HSA-CDA
5	Environmental Protection & Management Act	Yes	NEA
6	Environmental Public Health Act	Yes	NEA
7	Sewerage and Drainage Act	Yes	PUB
8	Misuse of Drug Act	Yes	HSA-CNB
9	Arms and Explosives (Amendment) Act	Yes	SPF
10	Radiation Protection Act	Yes	NEA - CRPNS
11	Fire Safety Act	Yes	SCDF
12	Biological Agents and Toxin Act	Yes	MOH
13	WHO guidelines for biosafety	Yes	MOH
14	Singapore Biosafety Guidelines for Research on Genetically Modified Organisms (GMOs)	Yes	GMAC
15	Singapore Guidelines on the Release of Agriculture-Related Genetically Modified Organisms (GMOs)	Yes	GMAC
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>)

License Register – operation control

In DBS, these original licenses are kept in the respective laboratories



40 Scotts Road #13-00
Environment Building
Singapore 228231
Tel: 1800 2255 632
Fax: 6235 2811
Contact: nea.gov.sg/feedback
www.nea.gov.sg

LICENCE/CERTIFICATE ISSUED UNDER THE RADIATION PROTECTION ACT

LICENCE NO : N2/02335/0019

NATIONAL UNIVERSITY OF SINGAPORE
DEPARTMENT OF BIOLOGICAL SCIENCES
C/O DEAN'S OFFICE, FACULTY OF SCIENCE, BLK
S16 LEVEL 9
6 SCIENCE DRIVE 2
#09-S16
SINGAPORE 117546

ISSUE DATE : 23rd Mar 2016
START DATE : 1st Feb 2016
EXPIRY DATE : 31st Jan 2017

ATTN: MRS NORMISHA/ANG SENG TIO

AM KUMAR PRABHAKARAN

PURPOSE OF LICENCE : TO HAVE IN POSSESSION A
RADIATION IRRADIATING APPARATUS

LICENCE HOLDER : THE ABOVE ORGANIZATION

PARTICULARS OF IRRADIATING APPARATUS

TYPE	: ULTRASOUND
PURPOSE	: RESEARCH
MANUFACTURER	: SONICS & MATERIALS INC
MODEL NUMBER	: VCX 750
SERIAL NO	: 48161T
MAXIMUM ULTRASOUND POWER	: 750 W
STORED AT	: DEPT OF BIOLOGICAL SCIENCES BLK S2#02 RESEARCH LAB

LICENCE CONDITION(S)

- The licence shall be subject to suspension or cancellation at any time without compensation and without notice by the Director-General of Environmental Protection in the event of but not limited to the following events:
 - breach of any restrictions or conditions subject to which it was issued; or
 - contravention of any of the provisions of the Radiation Protection Act or the Regulations thereunder.

Working with non-ionising radiation irradiating apparatus/ lasers (Class 3b and 4)

No.	Name	Designation	Equip. Name /brand	Model	Serial No.	Power	Location	License No./ Exp. Date	
								N2	N3
###	Tong Yan	Scientific Officer							N3/02335/0003
									31-Dec-16
###	Zeiss LSM 510 Meta	confocal	Zeiss	LSM 510 Meta	2435000188	30mW (continuous)	S1A #03-07	N2/02335/0002	
									31-Aug-16
###	Zeiss 5 live	Confocal	Zeiss	LSM 5 Live	2402000113	100mW (continuous)	S1A #03-07	N2/02335/0004	
									31-Oct-16
###	Leica TCS SP5	confocal	Leica	TCS SP5X Two Photon	5100000957	Max 4W (pulsed)	S1A #01-09	N2/03378/0001	
									31-Oct-16
###	PE UV	Confocal	Perkin Elmer	Ultraview Vox Spinning disc	09UV029	50mW	S1A #03-07	N2/03378/0002	
									30-Sep-16

Sample taken from Confocal

Working with ionizing radiation irradiating apparatus									
No.	Name	Designation	Equip. Name /brand	Model	Serial No.	Location	License No./Exp. Date		
							L3	L5	R1
1	Shi Jian	Manager	FEI	Titan Krios	D3195	S2 Basement	L3/02944/0056	L5/02944/0057	
							31st Jan 2017	31st Jan 2017	
2	Tran Bich Ngoc	Research Fellow							R1/04270/0005
									30th Nov 2016
3	Cai Shujun	Post-grad	FEI	Titan Krios	D3195	S2 Basement			R1/02944/0061
Working with radioactive materials									
Name	Designation	Chemical/ Type (sealed or unsealed)	Radio-nuclide	Activity	Location	License No. /Exp. Date			
						L4	L6	R1	
Shi Jian	Manager	unsealed in the form of uranyl acetate			S2 Basement		L6/04270/0001		
							31st May 2018		
Tran Bich Ngoc	Research Fellow	unsealed in the form of uranyl acetate			S2 Basement			R1/04270/0005	
								30th Nov 2016	
Guerin Ep. Bonne, Isabelle Mij	Research Fellow	unsealed in the form of uranyl acetate			S2 Basement			R1/04270/0006	
								30th Nov 2016	

CWC Inventory List								
S/N	Schedule* (choose from list)	Chemical Name (choose from list)	CAS Number (Auto input if selected from list)	Quantity	Unit	Percentage Concentration (%)	Storage location	PI
1	3	TRIETHANOLAMINE	29310090	80	ml	98%	Cabinet storage under lock and key in S1A L7-02	Prof Prakash Kumar
2	3B	Triethanolamine	102-71-6	100	l	100%	S1A-05-22	Prof IP YK
3	3B	Triethanolamine	102-71-6	100	m	100	locked cabinet (S1A #07-01)	Yu Hao
4	3B	Triethanolamine	102-71-6	350	g		S1A#05-03	Prof. Ding Jeak Ling

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Section 5

Objectives and Programmes

Objective: To establish a departmental Safety Health Management Systems (DSHMS) by OCT 2016 with comprehensive implementation of the SHMS elements and target Cat E for all SHMS elements.

Annex 5 _Calendar of DBS Safety and Health Activities
2016

Objectives and Programmes

Purpose and Scope

This section aims to provide a framework in setting up annual S&H objectives and programmes in the department to ensure the S&H objectives are developed to fulfil the commitments established in the departmental S&H Policy.

Roles and Responsibilities

HoD is responsible for endorsing and authorizing the S&H objectives and programmes proposed by DSHC; and responsible for providing resource required in implementing and conducting S&H objectives and programmes;

DSHC is responsible for:






1. Proposing and conducting departmental S&H objectives and programmes in the department.
2. Monitoring and reviewing the implementation of the objectives and programmes;
3. Communicating the S&H objectives and programmes with all staff and students in the department.

PIs, teaching lab managers and core facility managers communicate the department S&H objectives and programmes with their students, staff and visitors.

Staff and students aware and participate actively the departmental S&H programmes.

Procedures

DSHC set up annual S&H objectives and programmes by taking into consideration of followings:

-  Legal and regulatory requirements
-  Departmental specific risks and special needs
-  Records of non-compliance and incidents
-  Results of management review
-  Performance of previous objectives and programmes

The endorsed annual S&H objectives and programmes is presented in department EXCO meeting, faculty meeting and staff meeting at the beginning of a year.

The annual S&H objectives and programmes is also deposited onto the departmental Safety Shared Folder for communication and sharing among all staff and students.

DSHC should monitor and review status and progress of implementation of the S&H objectives and programmes .

Policy	Target	Indicators
2) Identify, Assess and Control the OSH hazards associated with its activities to prevent injuries and ill-health to staff, students and visitors. This shall be achieved through the implementation of the laboratory and Department Safety and Health Management System (DSHMS)	KPI: Comprehensive implementation of the SHMS and achieve CAT Es in Department Safety and Health Management System audit and certification by OSHE	Participate in 2016/2017 NUS Safety and Health Awards with target to achieve good Commendation Award or higher
3)Build a positive safety and health culture and learning experience to all staff and students through the adoption of best practices and systems	Not more than 20 % of labs get grade B; Zero grade C and grade D	Inspection Result and Housekeeping grading

Objective:

To establish a departmental Safety Health Management Systems (DSHMS) by OCT 2016 with comprehensive implementation of the SHMS elements and target to achieve few CAT E on SHMS elements

Working Goals and activities in DBS Safety Management System, 2016			
S/N	Goals	Objectives (Activities/programmes)	Indicators/ Achievement
1	To put in place an effective Department Safety and Health Management System by reviewing and implementing all the elements using PDCA platform systematically	Review R & R of department Safety and Health Programmes during DHSC meeting _Jan 2016.	KPI: Comprehensive implementation of the SHMS and achieve CAT Es in Department Safety and Health Management System audit and certification by OSHE Participate in 2016/2017 NUS Safety and Health Awards with target to achieve good Commendation Award
		Review SMS in teaching and service core facilities	
		Prepare Pls' Lab certification audit by OSHE _Feb _Mar	
		Annual Chemical Inventory Update _May	
		Housekeeping and Inspection _June July	
		DBS DSHC carry out internal Inspection check - Sep	
		DBS fire Drill _ 4 Aug	
		Carry out Internal audit/review on department SMS from second week of Sep 2016	
2	To establish safety and health management	Conduct and implement risk assessments and develop safe work procedures	Review safety documents of teaching labs and service core facilities.

	system in teaching labs and service core facilities	Attend Training with reference to Minimum Dept Training Requirement	KPI :100 % SMS submission from teaching labs and service core facilities by end of Aug 2016
3	To equip staff & postgraduate research students with knowledge and confidence to conduct research safely.	Organized DBS /FOS Safety Orientation Training at the beginning of each semester Fos/Dept Safety Day	KPI - to ensure >90 % participation rate for new students and staff safety orientation training
		- Safety lead refresher training - Routine risk assessment training -Structured Safety training program	KPI : > 90 % attendance Monitoring Training Register or statistics
4	To implement routine operational control of centralized activities	100% Renewal of licenses and maintenance of Safety Equipment	KPI :Monitor validity of Licenses- Equipment Maintenance Register yearly First Aid Kit maintenance and Spill Kit maintenance half yearly.
		Disposal of Chemical waste within one month Sterilization and Disposal of Biohazardous Waste within 5 Days	KPI: Monthly Chemical Disposal Schedule KPI: No. of findings pertaining to accumulation of Biohazardous Waste Biological Indicator Testing for Autoclave monthly.
		Review efficiency of the operational control in departmental level quarterly during the committee meetings	KPI : FoS Housekeeping audit and Internal Inspection finding

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Section 6

Resources, Role and Responsibility
Annex 6 : role and responsibility of DSHC
Annex 7 : role and responsibility of safety lead

Resources, Roles & Responsibilities

Purpose and scope

This section defines scopes of resources, roles and responsibilities, accountability and authority which are required for an effective departmental S&H management system.

Roles and responsibilities

a) Head of Department

HoD takes the ultimate responsibility for S&H Management system in the department.

HoD reviews and directs the available resources (finance and manpower) to establish, maintain, implement and improve departmental S&H management system and programmes;

HoD identifies and nominates departmental S&H committee members and empowers DSHC members with authority to fulfil their roles and responsibilities in implementation of the departmental S&H management system on his behalf.

b) DSHC Chair and its members

DSHC Chair is nominated by HoD to present safety issues in the departmental top management team (EXCO). DSHC Chair is supported by DSHC members. He is responsible for establishing, implementing and maintaining S&H management system at the departmental level. DSHC chair is required to report safety related in the quarterly faculty meeting; monthly EXCO meeting. He is assisted by Departmental Safety Coordinator.

Departmental S&H Coordinator serves as the first point of contact for department's staff and students on all S&H matters; liaising with OSHE on all S&H matters pertaining to the department; and providing guidance, advice and technical assistance to HoD and DSHC on all S&H matters.

c) Principle Investigators and Teaching Lab/Service Core Facilities managers

A principle investigator is responsible for establishing, implementing and maintaining a S&H Management system in his/her research laboratories to ensure his/her laboratories to be certified by OSHE under its Certification Scheme for Academic Supervisors. A safety lead has been assigned by HoD to each of research laboratories. A safety lead is responsible in helping

his/her PI(s) in maintenance and implementation of the research lab S&H management system (Annex 7).

Teaching lab/service core facilities managers are responsible for establishing and implementing an S&H management system and they are incorporated into the departmental S&H Management system.

d) Staff, Students and visitors

Staff, students and visitors/contractors are responsible for being aware of legal requirements and safety rules and regulations, fulfilling essential safety training requirements, submitting risk assessment for the activities conducted in the department and being adhere to safe work procedures in the department.

Every DSHC member is assigned with specialized S&H functions and tasks together with a comprehensive of Role and Responsibility (Annex 6 and Annex 6 II).

Resources

DSHC reviews periodically the resources (budget, equipment, manpower, expertise and training) and their allocation through management review in a regular committee meeting, to ensure the resources are sufficient to maintain a safe and healthy workplace and to carry out efficient S&H programmes and activities in the department.

Expenditure/Duty Register

No	Equipment /instrument	\$ cost	In- Charge	Frequency
1.	Autoclave /pressure vessels recertification	\$5,142.42	Ang Swee Eng	Yearly
2.	Fume hood recertification	\$8,142.00	Allan Tan	Yearly
3.	Laminar Flow & BSC cabinets certification	\$3200.00	Allan Tan	Yearly
4.	Spill Kits	\$785.56	Tay Bee Ling	Half yearly
5.	First Aid kit Refill	\$93.73	Tay Bee Ling	Half yearly
6.	Waste disposal (Chemical/Biological)	\$81,731.70	Goh Poh Mui	Monthly
7.	Centrifuge maintenance	\$29,550.51	Subha N/ Floor manager	Yearly
8.	Sonicator license		Ang Swee Eng	Yearly
9.	Oxygen Sensor (maintenance and parts replacement)	\$46000	Allan /Ang Swee Eng/ Chong PL	Every 1.5 year
10.	R1 and R6 licence		Tay Bee Ling	Yearly
11.	N2 and N3 licence		Ang Swee Eng	Yearly
12.	Repair Autoclave		Floor Manager	As and when
13.	Dark Room _ X- Ray Developer	\$5200	CF Manager	Yearly

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Section 7

Competence, Training and Awareness
Annex 8- Dept Level Safety Training Matrix and Need in DBS (2016)
SMS Folders of Teaching Labs/ Core Facility SMS

Competence, Training and Awareness

Purpose and scope

This section aims to define a framework for department to ensure that all staff, students and visitors are given appropriate and sufficient safety training when they work in the departmental premises.

Roles and Responsibilities

HoD is responsible for providing appropriate resources (budget and manpower) for the S&H training requirements of all staff and students.

DSHC is responsible for:

1. Identifying and defining a minimum S&H training requirement for staff and students working in the departmental premises.
2. Providing an S&H Orientation Training in a departmental level for those new staff and new research students and academic visitors working in the departmental premises.
3. Monitoring and documentation of training status of departmental staff and students.

Principle Investigator is responsible for:

1. Identifying and defining S&H training needs of his/her laboratory members, and for providing a lab-specific lab training for any newcomers in his/her laboratory supporting.
2. Empowering Safety Leads in monitoring and documentation of S&H training status and lab-specific training status of all members in the lab that they are in.

Teaching lab/core facilities managers are responsible for:

1. Identifying, defining, monitoring and documentation of S&H training needs for teaching/service staff working in their lab/facilities.

Staff, students and visitors are responsible for attending S&H trainings defined by DSHC, their supervisors and/or teaching lab/core facilities managers.

Procedures

DSHC

DSHC identifies and defines Department _Level S&H Training Matrix and Training Needs of different groups of personnel in the department (Annex 8) according to the safety training guidelines from OSHE and FoS. (<https://inetapps.nus.edu.sg/osh/portal/training/ssts.html>)

DSHC takes into consideration of following factors for identification of specific S&H training needs of different groups of people,

- ✚ Hazard identification and risk assessment
- ✚ Roles and responsibilities
- ✚ Job specification
- ✚ Incident/accident investigation
- ✚ Legal/regulatory requirement

DSHC organizes and coordinates departmental Safety Orientation Training twice a year, each in beginning of the semester; and Faculty Safety Orientation Training three times a year, once in January and twice in August of the year, for all new staff, new research students and long-term visitors.

DSHC keeps a track record on departmental and faculty safety orientation trainings for new staff/research students/visitors.

Other mandatory S&H training is documented in respective labs, teaching labs and core facilities where staff/research students/visitors work.

DSHC, together with departmental top management, monitor periodically and review basic S&H training need for different groups of personnel in department.

PIs and teaching lab/core facilities managers

PIs identify and define S&H training needs for themselves, staff and students working under their supervision. Teaching lab managers and core facilities managers identify S&H training needs for themselves and staff who work in their labs and facilities.

In summary; they take into account of following factors while identifying S&H training needs for their staff and students,

- ✚ job specification, activities and risk assessment
- ✚ legal/regulatory requirement
- ✚ incident/accident investigation

They review S&H training needs periodically for their staff and students. Training *matrix, checklists and training records of deposited*

Research Labs: Folder of PI's SMS

Teaching Labs: Folder of Teaching Lab's SMS

Core/Service: Facility Folders of Core facilities ' SMS

Staff and students

Staff and students should attend NUS, FoS, Department and lab-specific safety training, document their training record in their respective lab or facilities.

DBS First Aiders Listing (2016)

S/No	Name	Extn	Certification No	License Validity
•	Kho Say Tin	62580	2-7-02039	19 May2016- 18 May 2018
•	Tong Yan	67202	2-7-02222	16 June 2016- 15 June 2018
•	Tay Bee Ling	64757	OFA19/14	3 Apr 2014 – 2 Apr 2017
•	Yang Qiaoyun	62706	OFAJul02/14	17 Jul 2014 – 17 Jul 2017
•	Tran Bich Ngoc	61882	OFA 00787	20 Aug 2014 – 20 Aug 2017
•	Ng Wen Qing	64255		Yet to be issued

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Section 8

Communication and Consultation
Annex 9: DBS Communication Channel and platforms

Communication and Consultation

Purpose and scope

It aims at promotion of communication, participation and consultation among the various stakeholders in the department to fulfill and achieve the departmental S&H policy and objectives. It is applicable to all staff, research students, and visitors working in the departmental premises.

Roles and responsibilities

HoD encourages a smooth communication channel within the department on S&H matters.

DSHC is responsible for communicating applicable updates on S&H matters from OSHE, FoS and any other top management down to relevant persons, PIs, staff and students and visitors.

DSHC provides internal S&H communication channels in the department and it also provides advice on good practices to individual research group and lab.

Overall, DSHC is responsible for promoting S&H awareness in the department.

A PI is responsible for providing a communication channel within the lab, directly or through his/her safety lead on S&H matters. A PI also provides DSHC with feedback on safety issues and concerns arising from his/her lab.

Similarly, teaching lab/core facilities managers are responsible for providing a communication channel within the lab/facilities, and communicating among his/her staff on S&H matters. Teaching lab/core facilities managers also should provide DSHC on safety issues and concerns arising from his/her lab/facilities.

Staff, research students and visitors should update their PIs/supervisors/safety lead or DSHC on safety issues and concerns.

Procedures

DSHC identifies various platforms in the department to communicate with staff, students and visitors on S&H matters and gather feedback on the implementation of existing or proposed measures.

The platforms for communication (Annex 9) include

- ✚ Departmental Safety Shared folder in a departmental server, \\dbssafety\ which covers all S&H related information and documents in the department; and departmental website.
 - S&H Management System Dossiors for all research labs
 - S&H Management System Dossiors for all teaching labs and Core Facilities
 - SOPs for common activities in the department
 - Risk assessment for common activities in the department
 - Department S&H Policy and latest departmental S&H working Objectives and Programmes
 - Maintenance/certification certificates for centrized safety equipment (BSC and fumehood)
 - Selected S&H guidelines from University an national regulators
 - Departmental safety orientation training materials
 - Departmental S&H Management System Handbook

- ✚ Regular staff meetings: monthly top management meeting (EXCO Meeting, DSHC Chair is appointed as a member of the EXCO), quarterly Faculty Meeting, Bi-annual Non-Academic Staff Meeting. S&H related issues and updates are one of the key agendas for all these meeting. Through the regular staff meeting, S&H related issues and updates could be distributed to the relevant stakeholders in the department

- ✚ Quarterly DSHC Meetings when S&H management review can be done

- ✚ Bi-yearly Safety Lead updates and feedback with FoS

- ✚ Email communication

- ✚ Research lab meetings

- ✚ DBS Safety Alert and announcement: S&H updates from OSHE and FoS pass down to all stakeholders in the department.

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Section 9

Documentation and Document Control
Annex 10 Document Control Register

Documentation and Document Control

Purpose and scope

The Department document and maintain up-to-date documentation and information on departmental-level S&H activities to ensure that the S&H Management System can be communicated and operated effectively and efficiently.

Roles and Responsibilities

HoD ensures a document management in departmental S&H management system in place.






DSHC is responsible in developing a document management system for the department, and generate, maintain and update the departmental S&H Management system. DSHC review all safety-related reports and documents periodically. DSHC members keep a good record and compile documents in the field they are in charge of. Document controller would oversee and compile the inputs from various members of DSHC.

PIs ensure that a document management system is established in their research lab; and review and update the system periodically or every three years, whichever is earlier.

Staff, students and visitors are responsible for understanding the relevant RAs and SOPs, and updating and forwarding their safety related records to their safety leads and PIs for documentation in their respective lab SMS dossier.

Procedures

DSHC identifies and assigns its committee members (Annex 10) for the following types of S&H documents and records

-  Departmental SOPs and RAs
-  DSHC meeting minutes
-  S&H training and safety education
-  Emergency responses (fire safety, spill and first aid)
-  Audit and inspection

- ✚ PFM inspection
- ✚ Fire Inspection and SCDF inspection
- ✚ Departmental SMS internal audit report
- ✚ Incident/accident report and investigation
- ✚ Regulated chemical procurement
- ✚ Chemical inventories
- ✚ Safety related equipment service and maintenance
- ✚ License and certificate of safety-related equipment
- ✚ Lab commissioning/decommissioning
- ✚ Waste management
- ✚ Medical surveillance/service
- ✚ Legislative matters

All documents should be maintained by respective personnel and overseen by document controller. Documents posted in the departmental Safety Shared folder would be updated accordingly. Any legislative matters and other safety issues with high urgency and importance would be updated at the Safety Shared folder promptly and all staff and students would be notified by various communication platforms.

DSHC reviews the documents periodically when there are any changes in the departmental SMS or every 2 years; whichever is earlier. This applies similarly to teaching and research labs.

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Section 10

Operation Control
Operation Control Registry

Operational Controls

Purpose and scope

The department has established and implemented operational controls for activities that have been identified to be of significant risk and fulfill the departmental S&H policy, objectives and conformance to legal and regulatory requirements. Where applicable, DBS adopts and integrates the university-level policies and directives into its overall S & H Management System.

Roles and Responsibilities

HoD is responsible for providing appropriate resources for implementation of necessary operation controls and measures in the department and to endorse that the controls related to its operation and activities are implemented and maintained in the department.

DSHC identify operation and routine activities that are associated with identified risks and to establish relevant safe practices of activities in a departmental level. DSHC also monitor and review implementation of operation controls in research labs, teaching labs and core facilities

All PIs has primary responsibility for the safety of users in the laboratories under his/her jurisdiction, this includes staff and students when they are working at other locations. They have ensured that risk controls are implemented for the activities in their research labs, and adequate operation control measures are provided in the lab.

Teaching lab and core facility Managers has primary responsibility to ensure that risk controls are implemented for the activities in their research labs, and adequate operation control measures are provided in the lab.

Staff, students and visitors have to comply to control measures outlined in the relevant RAs and SOPs, and adhere to safety work procedures in the labs and facilities.

Procedures

Based on risk assessments and legal/regulatory requirements of common activities in the department, DSHC identifies following at-risk areas that are required to implement operation controls in a department level. DBS reviews the suitability and effectiveness of the

implemented operation control periodically or when there are any changes in departmental SMS, incident/accident happen, or any update of legal requirements.

- ✚ Lab commissioning and decommissioning
- ✚ Chemical waste management disposal
- ✚ Regular maintenance and certification of safety equipment, such as fumehood, BSC, pressure vessels, sonicator, gas detector, laser equipment, chemical spill kit management, biological spill kit management, first aid box management
- ✚ Regulated chemical procurement, and chemical inventory management
- ✚ Control of radiation and laser users
- ✚ PPE management
- ✚ Quality control of certain processes, such as bioindicator testing for bio-waste sterilization
- ✚ Access control to laboratories and facilities

PIs and their safety leads identify special needs of operation controls based on risk assessment and legal/regulatory requirements of their lab-specific activities. The operation control requirements in a research lab should be reviewed periodically when there are any changes in lab SMS, incident/accident happen, or any update of legal requirements.

Teaching lab/core facilities managers identify special needs of operation controls based on risk assessment and legal/regulatory requirements of their lab-specific activities. The operation control requirements should be reviewed periodically when there are any changes in departmental SMS, incident/accident happen, or any update of legal requirements

Operation Control Register

Type	Statuary Requirement	Frequency	Person i/c	Remarks
Develop SOPs and RAs		Every 3 years or change of protocol or occurrence of incidence/accidence ; whichever is earlier	Respective teaching and CF labs managers/LT	
Coordinate DBS/ FoS safety Training and any other ad hoc safety training by FoS and DBS		Twice/yr	Yan Tie	
Monitor staff training by SAP -TEM		Once /yr	Lisa Lau	
Coordinate First Aid Box; Biological / Chemical Spill Kit Replenish	Mandatory	Twice a year	Tay Bee Ling	
Conduct Fire Drill and building safety inspection	Mandatory	Quarterly	Building coordinators and fire wardens	
Biosafety Cabinet Certification& Maintenance	Mandatory	Yearly	Allan Tan	
Coordinate Dept PI audit and re-certification		Once/year	Liew Chye Fong	
Coordinate Dept Internal Safety inspection		Twice /year	Liew Chye Fong	
Coordinate Fos Housekeeping Inspection	--	Yearly	Yan Tie	
Conduct departmental SMS Internal Audit	--	Once / 2 years	Kho Say Tin and Chua Ling Lih	

Conduct Incident / Accident Investigation	--	Upon occurrence (incidence/accidence)	PI /Safety Lead (research Lab). Teaching/Core Facility _ managers	Depends on the incidence level.
Coordinate Regulated Chemical Procurement		Upon receiving purchase requisition	Kho Say Tin/Michelle Mok	
Coordinate Fumehood Certification& Maintenance	Mandatory	Twice Yearly	Allan Tan	
Coordinate Autoclave Certification& Maintenance	Mandatory	Yearly	Ang Swee Eng	
Coordinate Oxygen Detection Sensor Maintenance		1.5 Year	Lab/Facility Manager	
Coordinate Radioactive Licence Renewal	Mandatory	Yearly	Tay Bee Ling	
Coordinate Laser and Sonicator Licence renewal	Mandatory	Yearly	Ang Swee Eng	
Waste Disposal Coordination	Mandatory	Monthly	Goh Poh Mui	
Coordinate Lab commissioning/decommissioning		As and when the need arise	Chua Ling Lih	
Medical surveillance/service		Upon receiving request	Yan Tie	
Legislative matters		whenever there is change of legal /regulation	Yan Tie	
Lab Clothes Washing	--	Monthly	Woo HC	

Department-level Standard Operating Procedure Register (1)

Equipment

No	Name of Procedure	Prepared Review by	Date	Approval /Review Date	Rev No	Remarks
DBS_SOP_001	Operation of Autoclave	Chong PL	16 Sep 2016	28 Sep 2016	002	
DBS_SOP_003	Operation of Centrifuge (High Speed/Ultra centrifuge)	Chong PL	12 Mar 2016	28 Sep 2016	003	
DBS_SOP_004	Usage of Heating Equipment (hotplates, heating block, oven etc)	Liew CF	23 Sep 2016	28 Sep 2016	002	
DBS_SOP_006	Operation of Biosafety Cabinet	Allan Tan	8 Apr 2008	30 Sep 2016	002	
DBS_SOP_015	Operation of Shaking Incubator	Tay BL	25 May 2016	30 Sep 2016	002	
DBS_SOP_020	Operation of Fumehood	Allan Tan	8 Apr 2008	30 Sep 2016	002	

Department-level Standard Operating Procedure Register (2)

Processes

No	Name of Procedure	Prepared/review by	Date	Approval /Review Date	Rev No	Remarks
DBS_SOP_002	Biological Waste Disposal in DBS	Yan Tie	4 April 2008	25 Sep 2016	003	
DBS_SOP_007	Emergency Response Plan	Allan Tan	4 April 2008	14 Oct 2016	003	
DBS_SOP_008	Dept Safety Inspection	Veronica Wong	8 April 2008	14 Oct 2016	003	
DBS_SOP_009	Chemical Procurement and Inventory Management	Chua Ling Lih/Kho ST	7 Apr 2008	30 Oct 2016	003	
DBS_SOP_010	First Aid Box	Tay BL/ Michelle	7 Apr 2008	30 Sep 2016	002	
DBS_SOP_011	Safe Handling of Liquid Nitrogen	Allan/Michelle Mok	7 Apr 2008	15 Sep 2016	002	
DBS_SOP_012	Chemical Waste Disposal in DBS	Goh Poh Moi	20 July 2016		001	
DBS_SOP_023	Use of Sterikon* Bioindicator	Ang Swee Eng /Yan Tie	1 Aug 2014		001	
DBS_SOP_024	Response to oxygen deficiency equipment in lab (O2 Detector)	Subha N/Allan /Yan Tie	1 Mar 2016		001	
DBS_SOP_025	Chemical Spill Response	Tay BL/ Michelle	12 May 2016	16 Sep 2016	001	
DBS_SOP_026	Biological Spill Response	Tay BL/ Michelle	12 May 2016	16 Sep 2016	001	

DBS_SOP_ 027	Handling of Gas Cylinder	Ang Swee Eng	20 Sep 2016		001	
DBS_SOP_ 028	Safe Practices & Management of Chemical Wastes	Chong Ping Lee	16 Sep 2016		001	
DBS_SOP_ 029	Contractor Management Cylinder	Kho Say Tin	5 Oct 2016		001	

**Department-level
Standard Operating Procedure Register (3)**

Teaching Labs and Core/Service Facility

1.	Teaching Labs (Lab 1- Lab 7	Lab Technologist /Lab Managers and/or TA	Feb- Sep 2016	Module /Teaching coordinator and /Or DSHC		
2.	Core/Service Facility (Lab 1- Lab 7	Lab Technologists and/or Facility Managers	Feb- Sep 2016	Facility Supervisors /Safety chair and /or safety coordinator		

Orientation Checklist for Contractors engaged by DBS

Name:		Vendor:	
Tel/email:		Manager of vendor:	
Address of vendor			
Contact person at DBS/email			
Description of activities at DBS			
Time/date of activities to be conducted at DBS			
Location of activities to be conducted at DBS			
Has vendor submit the necessary licence /permit			
Risk assessment to be conducted by vendor	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N.A.
Have DBS staff given the vendor any safety briefing before conducting activities	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N.A.

Template

Name & Signature: _____

Vendor: _____

DBS contact: _____

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Section 11

Emergency Preparedness and Response
DBSSOP_007

Emergency Preparedness and Response

Purpose and scope

The department assesses the potential accident and emergency response needs, plan to mitigate the emergencies, develop procedures to respond effectively, test its planned responses and continue to improve the effectiveness of the response. This is applicable to all staff, students and visitors.

Roles and Responsibilities

HoD should ensure that its DSHC identifies potential emergency situations and develops corresponding emergency response plan and procedures in the department. HoD should appoint a fire safety coordinator (a building coordinator) for all departmental premises, who liaise with OSHE, OED and DSHC in fire safety matters.






DSHC is responsible for identifying potential emergency situation for the department and developing a corresponding departmental Emergency Response Plan and procedures in the department. DSHC also should review the departmental Emergency Response Plan periodically. DSHC Chair should appoint one of DSHC members as a fire safety coordinator for the department, who is responsible for appointing fire wardens and first aiders for the department.

PIs should develop their Business Continuity Plan for their laboratory.

Staff, students and visitors should participate in emergency response drills organized by DSHC.

Procedures

DSHC identifies potential emergency situations that can be associated with specific activities, equipment and workplaces in a departmental level.

-  Fire
-  Chemical spill and biological spill
-  First aid
-  Failure of critical safety equipment
-  Operation shut-down

DSHC develops a department level Emergency Response Plan in line with the Faculty level Emergency Response Plan as a complement.

The Emergency Response Plan covers response procedures in events of a fire, chemical spill, biological spill, gas leak and other emergencies.

Every floor of the department buildings, where a few research labs share the space, should be equipped with a chemical spill kit, biological spill kit, first-aid box, gas detector, fire alarm system, fire extinguisher, and security CCTV.

DSHC provides chemical spill kits, biological spill kits and first-aid boxes for every floor of the buildings in department. To ensure adequacy and effectiveness of the emergency equipment, DSHC helps the floor managers replenish the spill kits and first-aid boxes biannually. The floor managers should engage a service on gas detector every 18 month, and security CCTV is maintained by Department General Office at a 24/7 frequency. Fire Alarm and fire extinguishers are maintained by NUS OFM.

DSHC shares the Emergency Response Plan with departmental staff, students and visitors through its communication platforms.

DSHC organizes a fire drill in a departmental level once a year and an observation report from the drill should be filed up as a document of management review, and submitted to OSHE and OFM for their information. Chemical spill drill should be conducted upon request.

The departmental Emergency Response Plan should be review periodically when there are any changes in departmental SMS or in three years. The revision in the departmental Emergency Response Plan should be communicated with all staff, students and visitors through the communication platforms.

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Section 12

Performance monitoring, Measurement and Evaluation

Performance Monitoring, Measurement and Evaluation

Purpose and scope

The Department has established and implemented a procedure to monitor and evaluate its S&H performance on a regular basis. DSHC shall identify key performance indicators for its S&H performance in the department; and review the performance monitoring and measurement related to the departmental S&H performance.

Roles and Responsibilities

HoD is responsible to ensure that DSHC establishes, implement and maintain a system to monitor and measure its S&H performance within the department; and to provide necessary resources and arrangement for activities of the S&H performance monitoring, measurement and evaluation.

DSHC should establish, implement and maintain procedures to periodically monitor, measure and review S&H performance; and to periodically evaluate compliance with legal and regulatory requirements in a departmental level.

PIs should establish, implement and maintain procedures to periodically monitor, measure and review S&H performance and legal compliance in their research lab.

Staff and students should identify their S&H performance parameters by conducting SQRA to ensure compliance with medical surveillance requirements.

Procedures

DSHC identifies S&H performance indicators, measures and compliance,

- ✚ Assessment of compliance with legal and regulatory requirements in a departmental level
 - legal requirement register in departmental level

- legal requirement register in research labs
- ✚ Review of S&H inspection and audit reports:
 - correction actions for Cat A and B findings
 - operational control implementation
- ✚ Training effectiveness:
 - minimal safety training requirement in a departmental level
 - identification of special training needs for different groups of people in the department
- ✚ Participation in safety promotion programmes
 - Participation rate of safety orientation
 - Participation rate of safety day functions
- ✚ Monitoring equipment maintained by the department
 - Gas detectors service scheme in 18 month frequency
 - Chemical/biological waste disposal scheme monthly
 - Biological indicator testing for pressure vessels monthly
 - Certification service for fumehood, BSC and pressure vessels yearly
- ✚ Participation in OH programmes
 - Request for OH programmes and service
- ✚ Incident/accident investigation and report
 - Incident/accident investigation report
 - Occurrence rate and analysis in a range of 4 years
 - Reportable case

Record and review should be documented by a DSHC member in-charge (Annex 6)

PIs should identify S&H performance indicators based on activities in their research labs; and document the report and review in their lab SMS folder.

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Section 13

Incident Investigation, Non Compliance ,Corrective and
Preventive Actions

Incident Investigation, Non Compliance, Corrective and Preventive Actions

Purpose and scope

This section aims to set up effective procedure for reporting and investigating incidents/accidents and non-conformances, to prevent recurrence of the situation by identifying and addressing the root causes. This is applicable to all staff, students and visitors in the department.

Roles and Responsibilities

HoD should support, by providing resources, the investigation of any incident/accident, and the implementation of corrective and preventive actions in the department.

Faculty Safety Officer is responsible for receiving incident/accident reporting via AIMS, defining incident level and scale of investigative efforts; conducting investigation of incident/accident reported and analysis of potential root causes.

DSHC is responsible for receiving incident/accident reporting from the faculty safety officer, coordinating the investigation with the subject and his/her supervisor, safety lead and other witnesses of the incident/accident. DSHC is responsible for following up and monitoring corrective and preventive actions from the analysis of root causes in a departmental level.

PIs are responsible for participating in incident/accident investigations and ensuring the implementation of corrective and preventive actions in their labs.

Staff, students and visitors are responsible for reporting incident/accident to their supervisors and lab managers (safety lead) and then online via AIRS; and following up on incident/accident by reviewing RAs and control measures in their workplace.

Procedures

Reporting

- Apply for immediate damage control (evacuation and first aid treatment etc) if necessary
- Reporting to PIs or lab/facilities manager immediately for all incident/accident and near misses.
- Reporting online via AIRS/AIMS https://inetapps.nus.edu.sg/osh/portal/eServices/ehs360_aims.html

Investigation

- DSHC receives the reporting from Faculty Safety Officer;
- Faculty Safety Officer defines incident/accident scale and level of investigation effort;
- An investigation team is formed, including Faculty Safety officer, DSHC coordinator, the incident/accident subject and his/her supervisor and safety lead, and other witnesses of the incident/accident.
- The investigation is conducted on the spot where the incident/accident happens
- Root causes and correspondent corrective and preventive actions should be proposed by the investigation team

Corrective and Preventive Actions

- Review system gap in lab's SMS and departmental SMS
- Review relevant RAs to identify short and long term measures
- A proactive measure to eliminate root causes
- Rectification of non-conformances to prevent recurrence of the incident/accident

Follow-up

- Corrective and preventive measures should be taken as a permanent measures
- Actual actions should be taken by either the research lab or the departmental level

- Outstanding actions should be reported to DSHC.
- DSHC should share the incident/accident with whole department through the communication platforms if necessary. For example DBS-safety alert will be sent to all students and staff.

Incident/accident analysis

- DSHC should classify and analyze all incident/accident cases on a regular basis based on incident/accident level, activities involved, location, injury type, property damage accordingly.
- DSHC should share the incident/accident analysis with staff and student through the departmental communication platforms.

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Section 14

Internal Audit
Annex 11 : Dept S &H Internal Audit Report

Internal Audit

Purpose and scope

The department should establish a process of internal audit to review and continuously evaluate the effectiveness of its S&H Management system. And the internal audit should be a part of the departmental S&H Management System.

Roles and Responsibilities

HoD should support the internal audit conducted by DSHC in the department.


DSHC should nominate internal auditors among its committee members, and all committee members should participate in the departmental internal audit.

DSHC internal auditors are responsible for internal audit on the departmental S&H management system based on the Internal Audit Checklist issued by OSHE objectively.

PIs are responsible for conducting an internal audit on their lab's S&H management system, with assistance from his/her safety leads.

Teaching lab/core facilities managers should participate in the internal audit on the departmental S&H management system.

Procedures

-  DSHC nominates at least two internal auditors from its committee members
- Nominated internal auditors should understand their task and be competent to conduct the internal audit; they have completed the internal auditor training conducted by OSHE.
- Nominated internal auditor should be familiar with the common S&H hazards and risks in the department and familiar with legal and regulatory requirement in the department.
- Nominated internal auditors should have the experience and knowledge of the relevant audit criteria and activities.

- ✚ The internal auditors initiate the internal audit process periodically or in a two-year frequency
 - Define the audit objectives and criteria (the Internal Audit Checklist issued by OSHE, Annex 11)
 - Call up and confirm the arrangement with the auditee and any other individuals (mainly other committee members)

- ✚ The internal auditors conduct the audit process
 - Document review
 - Audit and interview (via individual interview, email or committee meeting)
 - Summarize an audit report (the Internal Audit Checklist issued by OSHE)
 - Report the findings to DSHC and conduct audit follow-up if any

- ✚ The internal audit should cover all areas and activities under the control of the department and all elements of the departmental S&H Management system.

- ✚ PIs, together with their safety lead, conduct their lab-based SMS internal audit periodically or in three-year frequency.

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Section 15

Management Review

Management Review

Purpose and Scope

Department would review the operation and performance of the S&H management system to assess its suitability, adequacy and effectiveness. The management review would be conducted by the departmental top management and DSHC on a regular basis.

Roles and Responsibilities

HoD, through its top management team (EXCO), is responsible for review of the departmental S&H Management system.

HoD is responsible for nominating DSHC Chair as a member of its top management team (EXCO).

DSHC is responsible for

- i. review of the departmental S&H management system.
- ii. oversee and review of Pls' lab SMS.
- iii. putting up S&H issues to the departmental top management for review

Pls is responsible for review of their S&H management system in lab.

Teaching labs/core facilities managers are responsible for review of their S&H management in the lab and facilities.

Procedures

DSHC Chair, as a member of the EXCO, attends monthly EXCO meeting.

HoD and DSHC Chair conduct management review during each of the EXCO meetings. Different reviews should address different elements of the overall management review.

DSHC conducts management review after audit and inspection exercises, and present the audit and inspection reports to HoD for review, and DSHC should propose a follow –up actions in a departmental level. The review should be recorded in the meeting minutes.

DSHC conducts management review after analysis of incident/accident statistics, and proposes follow-up control measures in a departmental level, and then shares with staff and students through the departmental communication platforms.

DSHC oversees periodically the management reviews conducted by PIs for their research labs.

4 ANNEXURE

ANNEX 1: Current Departmental Safety & Health Organization Structure

ANNEX 2: Latest Departmental Safety and Health Policy

ANNEX 3: Risk Assessment Registry Folder

ANNEX 4: Legislation Register for research laboratories, teaching labs and departmental facilities

ANNEX 5: Working S&H Objectives and programmes, 2016

ANNEX 6: Roles and Responsibilities of DSHC Members

ANNEX 7: Roles and Responsibilities of a Safety Lead in a Research Laboratories

ANNEX 8: Department-level Training Matrix and Training Need (2016)

ANNEX 9: DBS Communication Channels and platforms

ANNEX 10: DBS S&H Document Controllers

ANNEX 11: Departmental S&H Management System Internal Audit Checklist

