高雄醫學大學實驗(習)場所危害鑑別風險評估執行計畫
Kaohsiung Medical University
Laboratory Hazard Identification and Risk Assessment Plan

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1、 法源依據

Article 1 Legal Basis

(1) 職業安全衛生法施行細則第三十一條。

1. Article 31 of the Enforcement Rules of the Occupational Safety and Health Act.

(2) 本校職業安全衛生管理計畫第一項。

2. Article 1 of the KMU Occupational Safety and Health Management Plan.

2、 目的

Article 2 Purpose

為有效達成實驗(習)場所安全衛生管理，將對於各項作業程序可能造成傷害或事故者，進行危害鑑別、風險評估及控制措施等程序，進而將風險控制在可忍受的程度之下，特制定高雄醫學大學實驗(習)場所危害鑑別風險評估執行計畫(以下簡稱本計畫)。

Kaohsiung Medical University (KMU) formulates the KMU Laboratory Hazard Identification and Risk Assessment Plan ("this Plan") to effectively achieve safety and health management in laboratories, to identify hazards, assess risks, and implement control measures for any work procedures that may cause harm or accidents, and hence to control risks to an acceptable level.

3、 範圍

Article 3 Scope

本校實驗室、試驗室、實習工場、試驗工場及其他職業安全衛生法適用範圍均適用之。

This Plan applies to all KMU laboratories, testing labs, training workshops, experimental workshops, and other areas to which the Occupational Safety and Health Act is applicable.

4、 定義

Article 4 Definitions

(1) 危害：潛在造成任何形式傷害的來源或情況，這些傷害包括人員受傷或疾病、財產的損失、工作環境的損壞，或是前述項目的同時發生。

1. Hazard: A source or situation that may potentially cause any form of harm, including personal injury or disease, property damage, damage to the work environment, or a combination of the aforementioned items.

(2) 危害鑑別：確認危害之存在，並定義其特性之過程。

2. Hazard identification: The process of confirming the existence of a hazard and defining its characteristics.

(3) 風險：係一個特定危害事件發生之可能性及後果的組合，可能性即指特定危害事件發

生的機率，而後果則代表其影響的嚴重性。

3. Risk: The combination of the likelihood of occurrence and consequences of a specific hazardous event. Likelihood refers to the probability of the occurrence of the hazardous event, while consequences mean the severity of its impact.

(4) 風險評估：估計風險的規模與決定風險是否為可忍受的整個過程。

4. Risk assessment: The entire process of estimating the risk magnitude and determining whether the risk is acceptable.

5、 權責

Article 5 Authority and Responsibilities

(1) 各單位風險評估人員：負責執行單位內各項作業之危害鑑別及風險評估。

1. Risk assessor of each unit: Responsible for carrying out hazard identification and risk assessment for various operations within the unit.

(2) 實驗場所負責人及共用人：

2. Laboratory directors and co-users:

負責執行安全衛生危害鑑別及風險評估作業。

Responsible for carrying out safety and health hazard identification and risk assessment.

(3) 單位主管：

3. Heads of units:

含院長、校級研究中心主管、系主任或院級研究中心主管等對實驗場所負責人負有監督責任之單位主管。

Include the President, directors of the university-level research centers, department chairs, or directors of college-level research centers, and the heads of units who are charged with the duty of supervising the laboratory directors.

(4) 職業安全管理人員（以下簡稱職安人員）：

4. Occupational safety management officer (“the OS Officer”):

1. 訂定本校實驗(習)場所危害鑑別風險評估執行計畫。

(1) Formulate the KMU Laboratory Hazard Identification and Risk Assessment Plan.

2. 對各單位所屬實驗場所之危害因素，提出建議及改善措施。

(2) Propose recommendations and improvement measures for the hazards of the laboratories under each unit.

(5) 環境保護暨職業安全衛生室(以下簡稱環安室)主管：

5. Director of the Office of Environmental Protection, Occupational Safety and Health (EHS):

督導危害鑑別及風險評估作業之執行與審查。

Supervise the implementation and review of hazard identification and risk assessment.

6、 內容

Article 6 Content

(1) 實施風險管理時機：

1. Time for the implementation of risk management:

1. 定期評估：由環安室啟動，每丨年重新評估一次。

(1) Regular assessment: To be initiated by the EHS, and re-assessed once in a year.

2. 不定期評估：

(2) Irregular assessment:

(1) 當實驗導入新設備、新實驗程序、使用新化學品或變更作業程序時。

i. When new equipment, experimental procedures, chemicals are introduced or used, or operational procedures are changed.

(2) 當有重大事故發生、安全衛生政策有重大修訂。

ii. When a major accident occurs or there are significant amendments to the safety and health policy.

(2) 危害鑑別、風險評估及控制措施程序（如圖一）：

2. Procedures for hazard identification, risk assessment, and control measures (see Figure 1):

1. 給予各單位風險評估人員必要的教育訓練，提升其安全衛生知識及評估技能。

(1) Provide necessary education and training to the risk assessors of each unit to enhance their safety and health knowledge and assessment skills.

2. 依作業之步驟、流程或階段逐步辨識出所有可能的潛在危害及後果。

(2) Identify all possible and potential hazards and consequences step by step according to the procedures, processes, or stages of operation.

3. 評估時不僅考量正常運作之評估，應適時考量在異常或意外事故發生時可能產生之風險。

(3) When performing assessment, take into consideration not just the normal operation, but also the potential risks that may arise in case of abnormal operation or accident.

4. 確認各作業的相關條件(如作業週期、作業環境、使用或可能接觸的機械、設備、工具、能源及化學物質等及作業資格等)，辨識出各項作業可能發生的危害類型，並描述發生危害的因素及導致後果的情境。

(4) Confirm the relevant conditions for each operation (such as operational cycle, work environment, and the machinery, equipment, tools, energy sources, chemicals that are used or may be contacted, as well as qualifications required for the operation), identify the types of hazards that may occur in each operation, and describe the factors leading to hazards and the consequent scenarios that could be resulted.

5. 確認現有的防護措施（可降低危害之發生可能性及後果嚴重度），如：工程控制、管理控制及個人防護具。

(5) Confirm the existing protective measures (that can reduce the likelihood of hazards and severity of consequences), such as engineering controls, administrative controls, and personal protective equipment.

6. 確認每項作業對於人員傷害、不健康之潛在危害，然後以主觀的方式評估每項危害發生的可能性(考慮現有防護措施防護下及人為疏失運作的情況下)及發生後的嚴重性(不考慮現行防護措施運作的情況下)，並依危害鑑別與風險評估填表說明表說明(附表

一)，填寫危害鑑別與風險評估表，(下稱風險評估表，如附表二)。

(6) Identify the potential hazards of each operation associated with personal injuries and health issues, and then subjectively assess the likelihood of each hazard occurring (under the existing protective measures and in situations of human negligence) and the severity of the consequences if it occurs (without taking into consideration the existing protective measures). Complete the Hazard Identification and Risk Assessment Form ("the Risk Assessment Form", Appendix 2) in accordance with the descriptions in the Instructions on Completion of the Hazard Identification and Risk Assessment Form (Appendix 1).

7. 評估各項危害辨識後，依據後果發生之可能性與嚴重度組合，評估風險等級。

(7) After identifying each hazard, assess the risk level based on the combination of the likelihood and severity of the consequences.

8. 依據風險等級來決定控制措施，對於不可接受風險項目應依據下列優先順序，採取有效降低風險之控制措施，降低風險：

(8) Determine the control measures according to the risk levels. For items with unacceptable risk levels, control measures that can effectively reduce the risk shall be adopted according to the following priority to lower the risk:

(1) 消除：應先考量消除危害或風險之潛在根源，如使用無毒性化學。

i. Elimination: Consider eliminating the potential source of hazard or risk first, e.g., using non-toxic chemicals.

(2) 取代：若無法消除，須試圖以取代方式降低風險，如使用低危害物質等。

ii. Replacement: If elimination is not possible, try to reduce the risk by means of replacement, e.g., using low-hazard substances.

(3) 工程控制：以工程控制方式降低危害事件發生可能性或減輕後果嚴重度。如警報裝置、通風設備加強吸排氣之風量等。

iii. Engineering controls: Reduce the likelihood of hazardous events or alleviate the severity of consequences through engineering controls, e.g., alarm systems, enhanced ventilation to increase airflow.

(4) 管理控制：以管理控制方式降低危害事件發生可能性或減輕後果嚴重度。如自動檢查、教育訓練、標準作業程序及緊急應變計畫等。

iv. Administrative controls: Reduce the likelihood of hazardous events or alleviate the severity of consequences through administrative controls, e.g., autonomous inspections, training and education, standard operating procedures, and emergency response plans.

(5) 個人防護具：最後才考量使用個人防護具來降低危害發生時對人員所造成的衝擊。如耳塞、口罩等。

v. Personal protective equipment: Consider using personal protective equipment as the last resort to reduce the impacts caused by hazards, e.g., ear muffs, facial mask, etc.

9. 確定控制措施後，應再次評估控制後之殘餘風險。

(9) Having confirmed the control measures, re-assess the residual risk after implementing the

controls.

(3) 紀錄審核與保存

3. Review and preservation of records

1. 風險評估表由單位主管審核後送交環安室彙整、存檔。

(1) The Risk Assessment Form shall be reviewed by the head of unit, and then forwarded to the EHS for compilation and filing.

2. 風險評估表至少須保存三年。

(2) The Risk Assessment Form shall be kept for a minimum of 3 years.

(4) 風險等級判定

4. Determination of risk levels

風險等級（採取控制措施後風險等級之最大值，即為「實驗室危險等級」） Risk Levels (The maximum risk level after implementing the control measures is the "Laboratory Hazard Level".)	**風險控制規劃 Risk Control Plans**	**備註 Remark**
5－重大風險 Significant risk	須立即採取風險降低設施，在風險降低前不應開始或繼續作業。 Immediate risk reduction measures shall be taken; operations shall not start or continue until the risk is reduced.	不可接受風險，對於重大及高度風險者，須發展降低風險之控制設施，將其風險降至中度以下。 Unacceptable risk - for significant and high risks, control measures shall be developed to lower the risk to a moderate level or below.
4－高度風險 High risk	須在一定期限內採取風險控制設施，在風險降低前不可開始作業，可能需要相當多的資源以降低風險，若現行作業具高度風險，須儘速進行風險降低設施。 Risk control measures shall be implemented within a specified timeframe. Operations shall not start until the risk is reduced. Considerable resources may be needed to lower the risk. If the current operations have a high level of risk, risk reduction measures shall be implemented as quickly as possible.	
3－中度風險 Moderate risk	須致力於風險的降低，例如： －基於成本或財務等考量，宜逐步採取風險降低設施、以逐步降低中度風險之比例。 －對於嚴重度為重大或非常重大之中度風險，宜進一步評估發生的可能性，作為改善控制的基礎。	

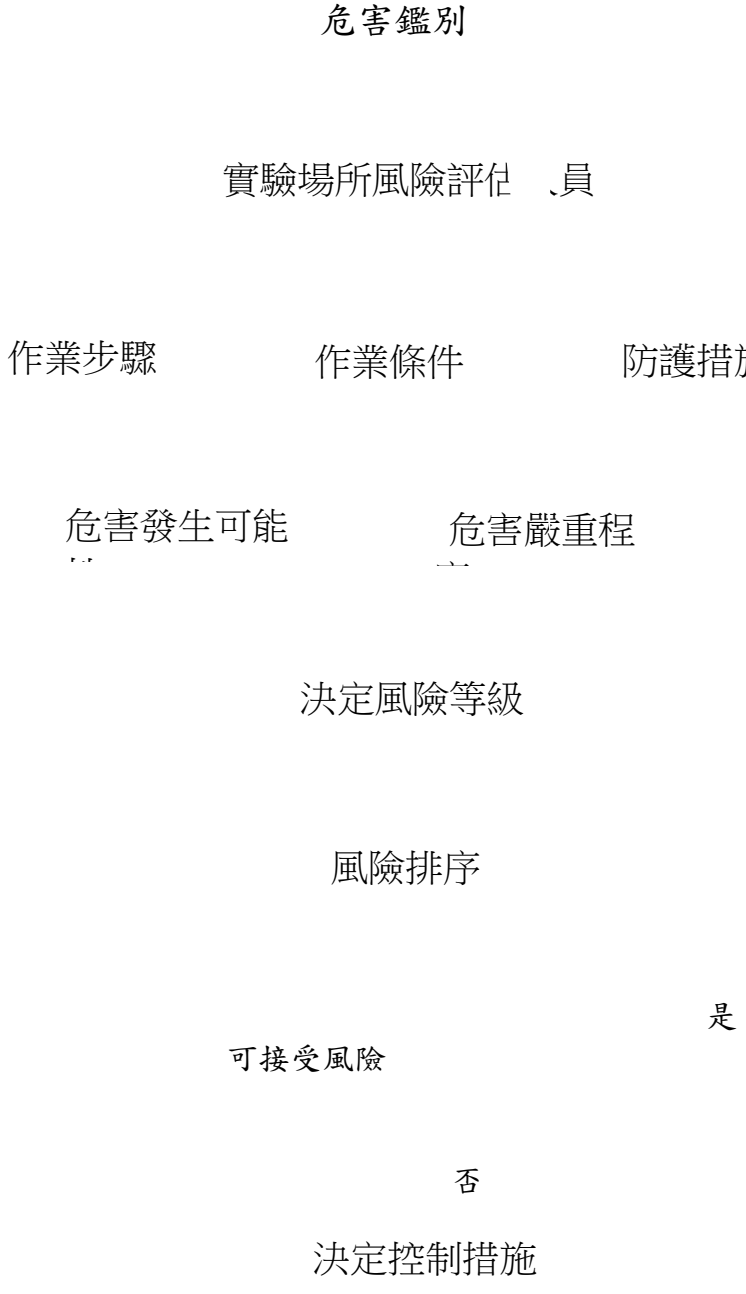
	Efforts shall be made to reduce the risk, such as: - Based on cost or financial consideration, gradual steps should be taken to implement risk reduction measures to progressively lower the proportion of moderate risks. - For moderate risks with significant or very significant severity, further assessment of the likelihood of occurrence is recommended to serve as a basis for improving control measures.	
2－低度風險 Low risk	暫時無須採取風險降低設施，但須確保現有防護設施之有效性。 Risk reduction measures are not required at the moment, but effectiveness of the existing protective measures shall be ensured.	
1－輕度風險 Mild risk	不須採取風險降低設施，但須確保現有防護設施之有效性。 No risk reduction measures are needed, but effectiveness of the existing protective measures shall be ensured.	

7、 本計畫經環境保護暨職業安全衛生委員會審議通過後，自公布日起實施，修正時亦同。

Article 7　The Regulations shall be passed by the Environmental Protection, Occupational Safety and Health Committee, and then implemented on the date of promulgation and shall apply to subsequent amendments.

圖一 危害鑑別及風險評估程序

Figure 1 Hazard Identification and Risk Assessment Procedures



危害鑑別
Hazard identification
實驗場所風險評估人員
Laboratory risk assessor
作業步驟
Operating procedures
作業條件

Conditions of operation

防護措施

Protective measures

危害發生可能性

Likelihood of hazards

危害嚴重程度

Severity of hazards

決定風險等級

Determine the risk level

風險排序

Risk prioritization

是

Yes

可接受風險

Acceptable risk

否

No

決定控制措施

Determine control measures

附表一
Appendix 1

高雄醫學大學實驗(習)場所風險評估填表說明

Kaohsiung Medical University

Instructions on Completion of the Laboratory Risk Assessment Form

欄位名稱 Fields		填表說明 Instructions on completion
1.作業名稱 1. Name of operation		實驗(習)場所之實驗操作或活動之相關作業。 Operation relating to the experimental practice or activity in the laboratory.
2.危害辨識及後果 Hazard identification and consequences	作業週期 Operational cycle	係指該作業之執行頻率或週期，例如連續式作業、每日一次、每週一次、每月五次、一年一次等。 Refers to the implementation frequency or cycle of the operation, e.g., continuous operation, daily, weekly, 5 times in a month, annually, etc.
	作業環境 Work environment	係指執行該作業之場所及其環境狀況，如辦公室、潔淨室、實驗室、實習工廠、噪音、粉塵、高/低溫。 Refers to the places for implementation of the operation and the environmental condition, e.g., office, clean room, laboratory, training workshop, noise, dust, high/low temperature.
	機械/設備/工具 Machinery/ equipment/ tools	如電動手工具、堆高機、衝床、剪床、化學設備、高壓設備/容器、鍋爐、氣體鋼瓶、游離輻射設備等。 E.g., power tools, forklifts, punching machines, shearing machines, chemical equipment, high-pressure equipment/containers, boilers, gas cylinders, ionizing radiation equipment, etc.
	能源/化學物質 Energy/ chemical substances	執行該作業時，所需使用或可能接觸到之化學品，列出運作量最大之化學品名（如：乙醚、乙醇、丙酮、甲苯、三氯甲烷等）。若所使用之化學物質種類甚多，可依其危害特性予以分類，例如參考安全資料表 SDS。 Chemicals that are used or may come into contact when performing the operation, specifying the chemical with the highest operational quantity (e.g., ether, ethanol, acetone, toluene, chloroform, etc.). If a large variety of chemicals are used, they can be categorized according to their hazard characteristics, by referring to the Safety Data Sheet (SDS).
	作業資格 Work qualifications	校內外環安衛教育訓練、校外主管機關證照等。可填校內教育訓練證書代碼 S(實驗室安全衛生教育訓練)、B(生物安全教育訓練)、R(輻射安全教育訓練)。

欄位名稱 Fields		填表說明 Instructions on completion
		On-campus and off-campus environmental protection, safety and health education and training, as well as certification from external competent agencies. KMU's internal education and training certificate codes can be used: S (Laboratory Safety and Health Education and Training), B (Biosafety Education and Training), and R (Radiation Safety Education and Training).
	危害類型： Hazard types:	依作業步驟、流程或階段逐步辨識出潛在之危害及其類型。 Identify the potential hazards and their types step by step according to the procedures, processes, or stages of operation. 針對每一項作業必須要考量各作業階段（例如正常操作、緊急開/停機、正常開/停機、緊急操作等）可能產生之危害。**危害類型之分類如下：** For each operation, the potential hazards that may arise during each stage of operation shall be considered (e.g., normal operation, emergency start/stop, normal start/stop, emergency operation, etc.). **Hazard types are classified as follows:** 1.**墜落/滾落：**指人體從建築物、施工架、機械、設備、梯子、斜面等處墜落而言。**Falling/Tumbling:** Refers to a person falling from buildings, scaffolding, machinery, equipment, ladders, slopes, etc. 2.**跌倒：**指人體在近於同一平面上跌倒而言，即因絆跤或滑溜而跌倒之情況。**Tripping:** Refers to a person falling on nearly the same surface, i.e., being tripped due to stumbling or slipping. 3.**衝撞：**指除墜落、滾落、跌倒之外，以人體為主碰撞靜止物或動態物而言。**Collision:** Refers to incidents where a person as an active body collides with stationary or moving objects, except falling, tumbling, or tripping. 4.**物體飛落：**指以飛來物、落下物等主體碰撞人體之情況。**Falling objects:** Refer to situations where flying or falling objects as active bodies collide with a person. 5.**物體倒塌/崩塌：**指堆積物（包含積垛）、施工架、建築物等塌崩、倒塌而碰撞人體之情況。**Collapse of objects:** Refers to situations where piled materials (including stacked items), scaffolding, buildings, etc., collapse and collide with a person. 6.**被撞：**指飛來、落下、崩塌、倒塌外，以物體為主碰撞人體之情況。**Being struck:** Refers to situations where objects as active bodies collide with a person, except in case of flying, falling, collapse, or toppling of objects. 7.**被夾、被捲：**指被物體夾入或捲入而被擠壓、撚挫之情況。**Being trapped or entangled:** Refers to situations where a person is trapped or caught by objects, leading to compression or spraining.

欄位名稱 Fields		填表說明 Instructions on completion
		8.**被刺、割、擦傷：**指被擦傷之情況，及以被擦的狀況而被刺、割等之情況。**Being punctured, cut, or abraded:** Refers to situations involving abrasion, and punctures or cuts caused by abrasion. 9.**踩踏/踏穿：**指踏穿鐵釘、金屬片之情況而言，包含踏穿地板、石棉瓦等情況。**Trampling/Stepping through:** Refers to situations where a person steps on nails or metal pieces, including cases of stepping through floors or asbestos tiles. 10.**溺斃：**包含墜落水中而溺斃之情況。**Drowning:** Includes falling into water and being drowned to death. 11.**與高低溫接觸：**高溫係指與火焰、電弧、熔融狀態之金屬、開水、水蒸汽等接觸之情況，包含高溫輻射熱等導致中暑之情況；低溫包含暴露於冷凍庫內等低溫環境之情況。**Contact with high or low temperatures:** High temperature refers to situations involving contact with flames, electric arcs, molten metals, boiling water, steam, etc., including heat stroke caused by thermal radiation. Low temperature includes exposure to cold conditions, for example, inside a freezer. 12.**與有害物等之接觸：**包含起因於暴露於輻射線、有害光線之障害、一氧化碳中毒、缺氧症及暴露於高壓、低壓、皮膚接觸(臉、眼、手、腳)等有害環境下之情況 **Contact with harmful substances:** Includes conditions caused by exposure to radiation, harmful light-related disorders, carbon monoxide poisoning, oxygen deficiency, and exposure to harmful environments such as high pressure, low pressure, or direct contact with the skin (face, eyes, hands, feet), etc. 13.**感電：**指接觸帶電體或因通電而人體受衝擊之情況。**Electric shock:** Refers to situations where a person is being impacted due to contact with electrified objects or due to electric shock. 14.**火災：**指火燒 原料或物質快速的氧化而發出熱與光。**Fire:** Refers to emission of heat and light caused by the rapid oxidation of materials or substances by fire. 15.**爆炸：**指壓力之急激發生或開放之結果，帶有爆音而引起膨脹之情況。**Explosion:** Refers to the result of a sudden onset or release of pressure, causing an expansion with a booming sound. 16.**物體破裂：**指容器、裝置因物理的壓力而破裂之情況，包含壓壞在內。**Object fracture:** Refers to breakage of containers or devices due to physical pressure, including crushing. 17.**不當動作：**指起因於身體動作不自然姿勢或動作反彈等，引起扭筋、扭腰、樝挫及形成類似狀態，如不當

欄位名稱 Fields		填表說明 Instructions on completion
		抬舉導致肌肉骨骼傷害，或工作台/椅高度不適導致肌肉疲勞等。**Improper actions:** Refers to twisting of tendons, twisting of the waist, spraining, and similar conditions arising from body movements, unnatural postures or actions, e.g., muscle and skeletal injuries caused by improper lifting or muscle fatigue resulting from unsuitable workbench/chair heights. 18.**化學品洩漏：**指容器或設備之危害性物質外洩，但未造成人員傷害之事件。**Chemical leakage:** Refers to the release of hazardous substances from containers or equipment, without causing personal injury. 19.**針刺感染：**化學或生物實驗操作針頭等。**Needlestick infection:** Needlestick operations and the like in chemical or biological experiments. 20.其他，請說明。Other; please specify.
	危害可能造成後果之情境描述 Description of the possible consequences of the hazards	詳述各種危害可能發生的原因及災害的情境。 Give details of the possible causes and disaster scenarios of various hazards.
3.現有防護設施 3. Existing protective measures		現有防護設施係指目前為預防或降低危害發生之可能性，或減輕其後果嚴重度所設置或採取的相關設備及措施，包含工程控制、管理控制及個人防護具等： Existing protective measures refer to the equipment and measures currently in place or adopted to prevent or reduce the likelihood of hazards occurring or to alleviate the severity of their consequences. This includes engineering controls, administrative controls, and personal protective equipment (PPE): 1.**工程控制：**係指可避免或降低危害發生可能性或後果嚴重度之裝置或設備，例如： **Engineering controls:** Refer to devices or equipment that can prevent or reduce the likelihood of hazards occurring or the severity of consequences, for example:

欄位名稱 Fields	填表說明 Instructions on completion
	(1) **墜落/滾落：**護欄/護圍、安全網、安全母索、安全上下設備、高空作業 車、移動式施工架等。**Falling/Tumbling:** Guardrails/barriers, safety nets, safety harnesses, safe ascending/descending equipment, aerial work platforms, mobile scaffolding, etc. (2) **衝撞：**護欄/護圍、接觸預防裝置（包含警報、接觸停止裝置）等。 **Collision:** Guardrails/barriers, touch prevention devices (including alarms and contact shutoff devices), etc. (3) **物體飛落：**護欄/護圍/護網、防滑舌片、過捲揚預防裝置等。 **Falling objects:** Guardrails/barriers/safety nets, anti-slip hook latches, overwind prevention devices, etc. (4) **被夾、被捲：**護欄/護圍、制動裝置、雙手操作式安全裝置、光感式安全 裝置、動力遮斷裝置、接觸預防裝置等。 **Being trapped or entangled:** Guardrails/barriers, braking devices, two-hand operation safety devices, photoelectric safety devices, power shutoff devices, touch prevention devices, etc. (5) **與有害物等之接觸：**雙套管、洩漏偵測器、防液堤、承液盤、沖淋設施、 通風排氣裝置等。 **Contact with harmful substances:** Double pipes, leak detectors, liquid containment dikes, drip trays, shower facilities, ventilation and exhaust systems, etc. (6) **感電：**防止電擊裝置、漏電斷路器、接地設施等。 **Electric shock:** Electric shock prevention devices, leakage circuit breakers, grounding facilities, etc. (7) **火災：**防爆電氣設備、火災偵測器、消防設施、高溫自動灑水系統、靜 電消除設備（如靜電夾、靜電刷、靜電銅絲、靜電布、增加作業環境濕 度等）、冷凍/冷藏儲存、防火毯、滅火毯、滅火器等。 **Fire:** Explosion-proof electrical apparatus, fire detectors, firefighting facilities, high-temperature auto sprinkler systems, ionization equipment (e.g., electrostatic clamps, anti-static brushes, anti-static tinsel, anti-static fabric, increasing workplace humidity, etc.), refrigerating/freezing storage, fire blankets, fire extinguishers, etc. (8) **爆炸：**防爆電氣設備、火災偵測器、消防設施、高溫自動灑水系統、防 爆牆、靜電消除設備（如靜電夾、靜電刷、靜電銅絲、靜電布、增加作 業環境濕度等）、冷凍/冷藏儲存等。 **Explosion:** Explosion-proof electrical apparatus, fire detectors, firefighting facilities, high-temperature auto sprinkler systems, blast wall, ionization equipment (e.g.,

欄位名稱 Fields	填表說明 Instructions on completion
	electrostatic clamps, anti-static brushes, anti-static tinsel, anti-static fabric, increasing workplace humidity, etc.), refrigerating/freezing storage, etc. (9) **物體破裂：**本安設計（設計壓力高於異常時之最高壓力）、溫度/壓力計、 高溫/高壓警報、高溫/高壓連鎖停機系統、釋壓裝置（含安全閥、破裂盤、壓力調節裝置等）、破真空裝置等。**Object fracture:** Intrinsic safety design (with designed pressure higher than the maximum pressure during abnormal condition), temperature/pressure gauges, high-temperature/high-pressure alarms, high-temperature/high-pressure interlock shutoff systems, pressure relief devices (including safety valves, rupture discs, pressure regulators, etc.), vacuum-breaking devices, etc. (10)**化學品洩漏：**吸液棉條、雙套管、洩漏偵測器、防液堤、承液盤、緊急遮斷閥、灑水系統、沖淋設施、通風排氣裝置等。**Chemical leakage:** Absorbent socks, double pipes, leak detectors, liquid containment dikes, drip trays, emergency shutoff valves, sprinkler systems, shower facilities, ventilation and exhaust systems, etc. 2.**管理控制：**係指可降低危害發生可能性或後果嚴重度之管理措施，例如：教育訓練、各類合格證、健康檢查、緊急應變計畫或程序、工作許可、上鎖/掛簽、各種標準作業程序（SOP）、日常巡檢、定期檢查、承攬管理、採購管理、變更管理、人員全程監視等。**Administrative controls:** Refer to management measures that can reduce the likelihood of hazards occurring or the severity of their consequences, e.g., education and training, various certifications, health examinations, emergency response plans or procedures, work permits, lockout/tagout, various standard operating procedures (SOPs), routine patrols, regular inspections, contractor management, procurement management, change management, and continuous personnel monitoring, etc. 3.**個人防護具：**係指可避免人員與危害源接觸，或減輕人員接觸後之後果嚴重度的個人用防護器具，例如：**Personal protective equipment:** Refers to PPE that can prevent personnel from contact with the hazard sources or reduce the severity of consequences after contact, e.g., (1)**呼吸方面：**如簡易型口罩、防塵口罩、濾毒罐呼吸防護具、濾毒罐輸氣管面罩、自給式空氣呼吸器（SCBA）等。**Respiratory protection:** Examples include simple masks, dust masks, gas filter respirators, gas filter air-supply masks, and self-contained breathing apparatus (SCBA), etc.

<table>
<tr><td>欄位名稱
Fields</td><td>填表說明
Instructions on completion</td></tr>
<tr><td></td><td>(2)防護衣：一般分為 A/B/C/D 級、實驗衣，依所需防護等級予以選用。Protective clothing: Generally categorized into Levels A/B/C/D, and laboratory coats, to be chosen according to the required level of protection.
(3)防護手套：防火手套、防凍手套、耐酸鹼手套、絕緣手套等。Protective gloves: Fire-resistant gloves, cold-resistant gloves, acid/alkali-resistant gloves, insulating gloves, etc.
(4)其他：安全面罩、安全眼鏡、護目鏡、安全鞋、安全帶、安全帽等。Other: Safety face shields, safety glasses, goggles, safety shoes, safety harnesses, safety helmets, etc.</td></tr>
<tr><td>4.評估風險
4. Risk assessment</td><td>風險為後果發生之可能性與嚴重度的組合：
Risk is the combination of the likelihood of occurrence and the severity of consequences:
1.可能性(P)之分級基準：Standards for the probability (P) levels:
判定在現有防護設施防護下，仍會發生該後果的可能性。
Determine the probability of the consequence occurring under the existing protective measures.
<table>
<tr><th colspan="2">等級
Levels</th><th>預期危害事件發生之可能性
Estimated probability of the occurrence of a hazardous event</th><th>防護設施之完整性及有效性
Integrity and effectiveness of protective measures</th></tr>
<tr><td>P4</td><td>極可能
Very likely</td><td>每年發生≧3 次；
Occurs ≧3 times per year.</td><td>未設置必要的防護設施，或所設置之防護設施並無法發揮其功能
Necessary protective measures are not in place, or the protective measures adopted are not functioning as intended.</td></tr>
<tr><td>P3</td><td>較有可能
Fairly likely</td><td>每年發生 1 至 2 次；
Occurs once or twice per year.</td><td>僅設置部分必要的防護設施，或對已設置之防護設施，未定期維護保養或監督查核</td></tr>
</table>
</td></tr>
</table>

欄位名稱 Fields	填表說明 Instructions on completion

			Only some necessary protective measures are in place, or the protective measures adopted are not regularly maintained, serviced, monitored, or inspected.
P2	有可能 Likely	每 1−10 年發生 1 次； Occurs once in every 1-10 years. 在製程、活動或服務之生命週期內可能會發生 1 次 May occur once in the processing cycle, activity cycle, or service life.	已設置必要的防護設施，且有定期維護保養或監督查核使其維持在可用狀態 Necessary protective measures are in place, and they are regularly maintained, serviced, monitored, or inspected to ensure they remain functional.
P1	不太可能 Not likely	約 10 年以上發生 1 次。 Occurs about once in more than 10 years.	除已設置必要的防護設施外，另增設其他防護設施，且有定期維護保養或監督查核，以維持其應有的功能 In addition to the necessary protective measures, additional protective measures are adopted, and they are regularly maintained, serviced, monitored, or inspected to ensure their proper functionality.

2.**嚴重度(S)之分級基準：Standards for the severity (S) levels:**

判定該後果嚴重度之等級。

Determine the level of severity of the consequence.

等級 **Levels**	人員 **Personnel**	財務損失 **Financial loss**	適法性 **Legality**	對教學研究之影響 **Impact on teaching and research**

欄位名稱 Fields	填表說明 Instructions on completion

S4	重大 Significant	造成一人以上死亡、三人以上受傷、或是暴露於無法復原之職業病或致癌的環境中 Causing the death of a person or more, or the injury or exposure to an environment leading to irreversible occupational diseases or carcinogens of 3 persons or more.	100 萬以上 Over $1 million	違法且受罰 Illegal and punishable	停止相關活動數月以上 Suspension of the relevant activity for several months or longer
S3	高度 High	造成永久失能或可復原之職業病的災害 Accidents causing permanent disability or recoverable occupational diseases.	100 萬至 30 萬 $300,000 to $1 million	違法且需立即改善 Illegal and requires immediate improvement	停止相關活動數週 Suspension of the relevant activity for several weeks
S2	中度 Moderate	須外送就醫，且造成工時損失之災害 Accidents that require external medical care and result in loss of working hours.	30 萬至 2 萬 $20,000 to $300,000	限期改善 Requires improvement within specified time	停止相關活動數日 Suspension of the relevant activity for several days
S1	輕度 Mild	輕度傷害： 僅須急救處理，或外送就醫，但未造成工時損失之災害 Mild injury: Requires only first aid treatment or external medical care, but does not result in loss of working hours.	2 萬以下 Below $20,000	建議事項 Suggestions	停止相關活動數小時 Suspension of the relevant activity for several hours

3.**風險等級之分級基準：Standards for determining the risk levels:**

判定該風險之等級，例如後果之可能性為〝P2〞、嚴重度〝S2〞，其風險等級則為〝3〞。

欄位名稱 Fields	填表說明 Instructions on completion

Determine the risk level, for example, if the likelihood of the consequence is “P2” and the severity is “S2”, then the risk level would be “3”.

		可能性等級 Probability level			
		P4	P3	P2	P1
嚴重度等級 Severity level	S4	**5**	**4**	**4**	**3**
	S3	**4**	**4**	**3**	**3**
	S2	**4**	**3**	**3**	**2**
	S1	**3**	**3**	**2**	**1**

風險等級 Risk levels	**風險控制規劃 Risk control plans**	**備註 Remark**
5－重大風險 Significant risk	須立即採取風險降低設施，在風險降低前不應開始或繼續作業。 Immediate risk reduction measures shall be taken; operations shall not start or continue until the risk is reduced.	不可接受風險，對於重大及高度風險者須發展降低風險之控制設施，將其風險降至中度以下 Unacceptable risk - for
4－高度風險 High risk	須在一定期限內採取風險控制設施，在風險降低前不可開始作業，可能需要相當多的資源以降低風險，若現行作業具高度風險，須儘速進行風險降低設施。 Risk control measures shall be implemented within a specified timeframe. Operations shall not start until the risk is reduced. Considerable resources may be needed to lower the risk. If the current operations have a high level of risk, risk reduction measures shall be implemented as quickly as possible.	

<table>
<tr><th>欄位名稱
Fields</th><th>填表說明
Instructions on completion</th></tr>
<tr><td></td><td>
<table>
<tr><td>3－中度風險
Moderate risk</td><td>須致力於風險的降低，例如：
• 基於成本或財務等考量，宜逐步採取風險降低設施、以逐步降低中度風險之比例。
• 對於嚴重度為重大或非常重大之中度風險，宜進一步評估發生的可能性，作為改善控制設施的基礎。
Efforts shall be made to reduce the risk, such as:
• Based on cost or financial consideration, gradual steps should be taken to implement risk reduction measures to progressively lower the proportion of moderate risks.
• For moderate risks with significant or very significant severity, further assessment of the likelihood of occurrence is recommended to serve as a basis for improving control measures.</td><td>significant and high risks, control measures shall be developed to lower the risk to a moderate level or below.</td></tr>
<tr><td>2－低度風險
Low risk</td><td>暫時無須採取風險降低設施，但須確保現有防護設施之有效性。
Risk reduction measures are not required at the moment, but effectiveness of the existing protective measures shall be ensured.</td><td></td></tr>
<tr><td>1－輕度風險
Mild risk</td><td>不須採取風險降低設施，但須確保現有防護設施之有效性。
No risk reduction measures are needed, but effectiveness of the existing protective measures shall be ensured.</td><td></td></tr>
</table>
</td></tr>
<tr><td>5.降低風險所採取之控制措施
5. Control measures adopted to reduce the risk</td><td>1.依據風險評估結果，決定必須採取的風險降低設施：Determine the necessary risk reduction measures to be implemented based on the risk assessment results:
<table>
<tr><th>風險等級
Risk levels</th><th>控制措施
Control measures</th></tr>
<tr><td>5－重大風險
Significant risk</td><td>須立即採取風險降低設施，在風險降低前不應開始或繼續作業。
Immediate risk reduction measures shall be taken; operations shall not start or continue until the risk is reduced.</td></tr>
<tr><td>4－高度風險
High risk</td><td>須在一定期限內採取風險控制設施，在風險降低前不可開始作業，可能需要相當多的資源以降低風險，若現行作業具高度風險，須儘速進行風險降低設施。</td></tr>
</table>
</td></tr>
</table>

欄位名稱 Fields	填表說明 Instructions on completion
	Risk control measures shall be implemented within a specified timeframe. Operations shall not start until the risk is reduced. Considerable resources may be needed to lower the risk. If the current operations have a high level of risk, risk reduction measures shall be implemented as quickly as possible.
3－中度風險 Moderate risk	須致力於風險的降低，例如： －基於成本或財務等考量，宜逐步採取風險降低設施、以逐步降低中度風險之比例。 －對於嚴重度為重大或非常重大之中度風險，宜進一步評估發生的可能性，作為改善控制 設施的基礎。 Efforts shall be made to reduce the risk, such as: - Based on cost or financial consideration, gradual steps should be taken to implement risk reduction measures to progressively lower the proportion of moderate risks. - For moderate risks with significant or very significant severity, further assessment of the likelihood of occurrence is recommended to serve as a basis for improving control measures.
2－低度風險 Low risk	暫時無須採取風險降低設施，但須確保現有防護設施之有效性。 Risk reduction measures are not required at the moment, but effectiveness of the existing protective measures shall be ensured.
1－輕度風險 Mild risk	不須採取風險降低設施，但須確保現有防護設施之有效性。 No risk reduction measures are needed, but effectiveness of the existing protective measures shall be ensured.
	2.在決定控制設施時，須依下列順序考量風險降低設施：①消除→②取代→③工程控制→④管理控制→⑤個人防護具。When determining the control measures, the following risk reduction measures shall be considered in the specified order: (1) Elimination → (2) Replacement → (3) Engineering controls → (4) Administrative controls → (5) Personal protective equipment.

<table>
<tr><th>欄位名稱
Fields</th><th>填表說明
Instructions on completion</th></tr>
<tr><td>6.控制後預估風險
6. Estimated post-control risk</td><td>1.係預估實施降低風險之改善設施後的殘餘風險，可依各單位現況、成本或財務等考量降至可接受風險（建議降至 2－低度風險以下）。It is the estimated residual risk after implementing the risk reduction measures. Various units may consider their own current condition, the cost or financial status to reduce the risk to an acceptable level (recommended to reduce to “2 – low risk” or below).
2.採取控制措施後風險等級之最大值，即為「實驗室危險等級」。The maximum risk level after implementing the control measures is the “laboratory hazard level”.
<table>
<tr><th>風險等級
Risk levels
(採取控制措施後風險等級之最大值，即為「實驗室危險等級」)
(The maximum risk level after implementing the control measures is the “Laboratory Hazard Level”.)</th><th>風險控制規劃
Risk control plans</th><th>備註
Remark</th></tr>
<tr><td>5－重大風險
Significant risk</td><td>須立即採取風險降低設施，在風險降低前不應開始或繼續作業。
Immediate risk reduction measures shall be taken; operations shall not start or continue until the risk is reduced.</td><td rowspan="2">不可接受風險，對於重大及高度風險者須發展降低風險之控制設施，將其風險降至中度以下
Unacceptable risk - for significant and high risks, control measures shall be developed to lower the risk to a</td></tr>
<tr><td>4－高度風險 High risk</td><td>須在一定期限內採取風險控制設施，在風險降低前不可開始作業，可能需要相當多的資源以降低風險，若現行作業具高度風險，須儘速進行風險降低設施。
Risk control measures shall be implemented within a specified timeframe. Operations shall not start until the risk is reduced. Considerable resources may be needed to lower the risk. If the current operations have a high level of risk, risk reduction measures shall be implemented as quickly as possible.</td></tr>
</table>
</td></tr>
</table>

欄位名稱 Fields	填表說明 Instructions on completion			
	3–中度風險 Moderate risk	須致力於風險的降低，例如： –基於成本或財務等考量，宜逐步採取風險降低設施、以逐步降低中度風險之比例。 –對於嚴重度為重大或非常重大之中度風險，宜進一步評估發生的可能性，作為改善控制設施的基礎。 Efforts shall be made to reduce the risk, such as: - Based on cost or financial consideration, gradual steps should be taken to implement risk reduction measures to progressively lower the proportion of moderate risks. - For moderate risks with significant or very significant severity, further assessment of the likelihood of occurrence is recommended to serve as a basis for improving control measures.	moderate level or below.	
	2–低度風險 Low risk	暫時無須採取風險降低設施，但須確保現有防護設施之有效性。 Risk reduction measures are not required at the moment, but effectiveness of the existing protective measures shall be ensured.		
	1–輕度風險 Mild risk	不須採取風險降低設施，但須確保現有防護設施之有效性。 No risk reduction measures are needed, but effectiveness of the existing protective measures shall be ensured.		

附表二
Appendix 2

高雄醫學大學實驗(習)場所危害鑑別與風險評估表
Kaohsiung Medical University
Hazard Identification and Risk Assessment Form

單位 Unit	_____ 學院 College of _____ / Department (Center) of 系所(中心) / _____實驗室 _____ Laboratory	實驗室場所(房間)編號 Laboratory (Room) No.
實驗場所所在大樓 Building where the laboratory is located	□醫學研究大樓 Medical Research Building □綜合實驗大樓 Laboratory Complex Building □國際學術研究大樓 International Academic Research Building □生技教育館 Biotechnology Laboratory Building □第一教學大樓 First Teaching Building □第一、二棟紀念大樓 KMU First and Second Historic Buildings □濟世大樓 Chi-Shih Building □其他：Other:	
作業名稱 Name of operation		實驗室負責人 Laboratory director 評估人員簽章_____填表日期 Assessor's signature _____ Date:

1.作業步驟 1. Operational procedures	2.危害辨識及後果(危害可能造成後果之情境描述) 2. Hazard identification and consequences (Description of the possible consequences caused by the hazards)							3.現有防護設施 3. Existing protective measures	4.評估風險 4. Risk assessment			5.降低風險所採取之控制措施 5. Control measures implemented to reduce the risk	6.控制後預估風險 6. Estimated post-control risk		
	作業週期 Operational cycle	作業環境 Work environment	機器、設備 Machinery and equipment	能源/化學物質 Energy/Chemical substances	作業資格 Work qualifications	危害類型 Hazard types	可能危害情況概述 General description of possible hazards		可能性(P) Probability (P)	嚴重度(S) Severity (S)	風險等級 Risk level		可能性(P) Probability (P)	嚴重度(S) Severity (S)	風險等級 Risk level

*****欄位不足，請自行增列
* Please add extra rows if there is not enough space.

實驗場所負責人：
Laboratory Director:

單位主管：
(系主任或
院級研究中心主管)
Head of unit:
(Department Chair or Director of
College-level Research Center)

環安室職安人員：
EHS Occupational
Safety Officer: