

Undergraduate Diploma in Occupational Health and Safety Intake September 2025-March 2026

Assessment Task: One written assignment based on chosen questions	
Module: <i>Managing Chemical Biological and Psychological Risks</i>	Tuition Centre: 21 Academy Licence Number: 2018-017
Level: MQF Level 5	Student Name:
Date:	ID Number:
Assignment Deadline: 29 October 2026	
<p>Task</p> <p>This assignment aims to assess your understanding of Managing Chemical Biological and Psychological Risks and your ability to apply effective risk control measures. Through the questions provided, you will analyse common Managing Chemical Biological and Psychological Risks and demonstrate your knowledge of health and safety regulations.</p> <p><i>You should plan to spend approximately 30 hours researching the assignment question, preparing for, and writing the assignment for assessment. The nominal word count for the assignment is 2,400 words.</i></p> <p><i>Please ensure that you refer to 21 Academy's Assignment Guidelines for comprehensive information regarding the submission of your assignment. Additionally, the assignment submission form must be included with your completed work, clearly indicating which question you have chosen to answer by ticking the box next to the question number.</i></p>	
<p>Answer 1 (one) question from the following:</p> <div style="margin-left: 20px;"> ☐ Question 1 </div> <p>Scenario: Flash Agri-Foods & Bio-Rendering Facility</p> <p>Aegis Agri-Foods operates an industrial poultry processing and animal rendering plant operating 24/7 with 60 full-time operators. The site handles large volumes of organic tissue, animal slurry, and concentrated industrial sanitation chemicals. The facility maintains no centralized chemical inventory, and Safety Data Sheets (SDSs) are kept in a binder inside an off-site administrative office.</p> <ul style="list-style-type: none"> • Zone 1: Evisceration & High-Pressure Washdown Unit <p>25 operators perform manual evisceration and clean-down of automated slaughter lines. Cleaning crews utilize high-pressure water lances (150 bar) to blast carcass residue and intestinal waste off stainless-steel conveyor systems. This generates dense, persistent liquid mists and bio-aerosols that fill the unventilated, humid hall. Workers wear simple cotton overalls and standard household latex gloves; no respiratory protection equipment (RPE) or splash-proof face shields are issued.</p> <p>Recently, a sanitation worker sustained a direct high-pressure spray of poultry fecal slurry across their unshielded face and eyes. The worker rinsed their eyes briefly at a staff sink, did not complete an incident log, and returned to work. Within 3 days, the worker was hospitalized with severe acute <i>Campylobacter</i> enteritis and keratoconjunctivitis. Separately, two long-term evisceration operators were diagnosed with chronic <i>Chlamydia psittaci</i> (Psittacosis) infections over the past 18 months. The facility lacks biohazard warning signage, biological spill response kits, or any employee health surveillance or immunization programs.</p> <ul style="list-style-type: none"> • Zone 2: Automated Clean-In-Place (CIP) & Sanitation Bay 	

10 technicians oversee chemical sanitization using concentrated Peracetic Acid (PAA) and Sodium Hypochlorite (bleach) formulations. To clear persistent organic buildup in holding tanks, technicians routinely manual-mix bulk drums of PAA and Sodium Hypochlorite—a practice that releases copious amounts of toxic chlorine gas (Cl_2) and acetic acid vapors into the enclosed bay. The local exhaust ventilation (LEV) canopy hood mounted above the mixing area was installed 11 years ago, has never been certified, and operates with severely clogged ductwork. Technicians wear thin disposable vinyl gloves during chemical pouring.

Technicians frequently report severe ocular stinging, dry coughing, and episodic chest tightness that worsen during mid-week shifts but fully resolve over multi-day leave. Handlers report skin redness, blistering, and chemical burns where gloves regularly swell, tear, and degrade upon chemical contact. Following worker grievances, management positioned a single static gas monitor high on a ceiling truss 18 meters away from the mixing bay, adjacent to an open roof louvre. Because the monitor registered zero readings, management rejected all worker health complaints as unfounded.

Tasks & Evaluation

- **Task 1: Biological Risk Profiling & Exposure Mechanics (Zone 1)**

Critically evaluate the bio-aerosol generation mechanics and exposure pathways within the Zone 1 evisceration hall. Classify the biological agents identified (*Campylobacter jejuni*, *Chlamydia psittaci*) into Risk Groups 1–4, justifying your classifications based on pathogenicity, routes of transmission, and medical countermeasures. Analyse the systemic organizational factors that caused the critical splash incident to go unreported. **(30%)**

- **Task 2: Toxicological & Technical Critique of Zone 2**

Provide a comprehensive technical critique of Zone 2, analysing the toxicological mechanisms driving the operators' respiratory and dermatological symptoms resulting from chemical mixing. Evaluate the chemical degradation mechanisms of the provided PPE and identify the scientific and methodological flaws in management's air-monitoring strategy and LEV maintenance program.

(30%)

- **Task 3: Safety Management Overhaul & Action Plan**

Formulate a comprehensive action plan to rectify safety management failures across both operational zones. Detail how you will apply the Hierarchy of Controls, utilize SDS Sections 4 (First Aid), 6 (Accidental Release), and 8 (Exposure Controls/Personal Protection) to construct safe operating procedures, and establish a mandatory health surveillance and vaccination framework.

(40%)



Question 2:

Scenario2 : Averno Environmental Services & Bio-Waste Processing Plant

Averno Environmental Services operates a regional bio-waste recycling and industrial chemical recovery facility operating 24/7 with 40 technicians split across two main operational sectors. The facility lacks a centralized chemical inventory, and Safety Data Sheets (SDSs) are locked in a read-only terminal inside a restricted manager's office.

- **Zone 1: Anaerobic Digestion & Bio-Solids Dewatering Unit**

22 utility technicians service, flush, and clear blockages within high-pressure sewage sludge lines, digestate pumps, and industrial centrifuge dewatering units. Technicians frequently clear line blockages using high-pressure air-flushing lances and manual hose agitation. This process generates thick, persistent liquid mists and bio-aerosols in an enclosed, high-humidity processing hall with no mechanical extraction ventilation. Technicians are provided with standard cotton coveralls and thin household rubber gloves; no eye protection or respiratory protective equipment (RPE) is supplied.

Recently, a technician suffered a high-pressure coupling failure, resulting in raw digestate and sewage slurry blasting directly into their eyes, nostrils, and face. The worker washed their face with tap water at an eyewash basin, omitted a formal incident log entry, and completed their shift. Within 48 hours, the worker was hospitalized with acute *Leptospirosis* (Weil's disease) and severe gastroenteritis. Separately, a senior technician was clinically diagnosed with chronic

Hepatitis B infection last year. The unit has no biohazard warning signage, biological spill response protocols, or employee immunization and health surveillance programs.

- Zone 2: Industrial Solvent Recovery & Drum Washing Bay

10 technicians recover spent industrial solvents (primarily Dichloromethane/Methylene Chloride and Toluene) and perform manual solvent wiping of distillation vessel interiors. Technicians spray solvent mixtures and wipe down vessel walls inside a semi-enclosed washing booth. The booth's local exhaust ventilation (LEV) system was installed 10 years ago and has never undergone statutory thorough examination, testing (TET), or airflow certification. Technicians utilize general-purpose thin disposable nitrile gloves for manual solvent-wiping tasks.

The vessel cleaners report recurring central nervous system symptoms, including severe afternoon dizziness, mental confusion, lightheadedness, and peripheral tingling in their fingers and toes. The spray operators report severe upper respiratory tract irritation, persistent dry coughing, and toxic skin burns where the nitrile gloves routinely swell, soften, and dissolve within minutes of solvent contact. Following worker grievances regarding intense chemical vapors, management placed a single static air-monitoring sampler on a structural column 18 meters away from the booth, adjacent to an open roller-shutter door that draws in outdoor air. The monitoring report indicated

airborne chemical concentrations were well below statutory Workplace Exposure Limits (WELs); consequently, management dismissed all worker health complaints as unfounded.

Tasks & Evaluation

- Task 1: Biological Risk Profiling & Transmission Mechanics (Zone 1)

Critically evaluate the bio-aerosol generation mechanics and exposure pathways within the Zone 1 bio-solids processing hall. Classify the biological agents likely present (*Leptospira interrogans*, *Hepatitis B virus*, enteric pathogens) using Risk Groups 1–4, justifying your classification based on pathogenicity, routes of entry, and available medical interventions. Evaluate the systemic organizational failures and safety culture flaws that led to the acute splash incident remaining unreported. (25%)

- Task 2: Technical & Toxicological Critique (Zone 2)

Provide a detailed technical critique of Zone 2, analyzing the physiological and toxicological mechanisms driving the technicians' neurological, respiratory, and dermal pathologies (focusing on Dichloromethane metabolism to Carbon Monoxide and Toluene neurotoxicity). Analyze the chemical permeation kinetics causing degradation of the provided PPE, and expose the technical and scientific flaws in management's LEV maintenance program and localized air-sampling methodology (contrasting static ambient sampling with personal breathing zone monitoring). (35%)

- Task 3: Safety Management Overhaul & Action Plan

Develop a comprehensive action plan to rectify the safety management failures across both operational zones. Detail how you will apply the Hierarchy of Controls, operationalize SDS Sections 4 (First Aid), 6 (Accidental Release Measures), and 8 (Exposure Controls/Personal Protection) into standard operating procedures, and design a legally defensible health surveillance and employee immunization strategy. (40%)



Question 3:

Psychosocial risks such as excessive workload, poor communication, bullying, lack of support, job insecurity and poor work-life balance can negatively affect both employees and organisations.

a) Explain how an organisation can identify and assess psychosocial risks in the workplace. Your answer should consider the main psychosocial hazards, relevant theories or models, and appropriate methods of risk assessment.

b) Using practical workplace examples, explain and evaluate the measures an organisation can implement to control psychosocial risks and improve employee wellbeing. Your answer should

consider organisational controls, management and employee involvement, support measures, and how the effectiveness of these measures can be monitored.

Pass Mark of total weighted score, 50%

Assignment weighted score 100%

By submitting I confirm that this assessment is my own work

Mark:

Signature: <main assessor>

Date

Signature: <quality assurance>