

# NATIONAL OCCUPATIONAL STANDARD FOR LABORATORY TECHNOLOGIST



**NOS.LT.01  
FIRST EDITION**

## APPROVING AUTHORITY

This National Occupational Standard (NOS) has been prepared and published under the authority of the Zambia Qualifications Authority Board on 16<sup>th</sup> May, 2024.

## ZAMBIA QUALIFICATIONS AUTHORITY

The Zambia Qualifications Authority (ZAQA) Act No. 13 of 2011 was enacted by the Government of the Republic of Zambia to ***“provide for the development and implementation of a national qualifications framework; establish the Zambia Qualifications Authority; provide for the registration and accreditation of qualifications; provide measures to ensure that standards and registered qualifications are internationally comparable; and provide for matters connected with, or incidental to the foregoing”***. Among other functions, ZAQA is responsible for ***determining national standards for any occupation***, through the various sector specific National Occupational Standards Development Teams (NOSDTs).

## REVISION OF NATIONAL OCCUPATIONAL STANDARDS

National Occupational Standards (NOS) shall be revised every 5 years, or whenever it is deemed necessary, by the issuance of either amendments or revised editions. It is important that users of the NOS ascertain that they are in possession of the latest amendments or editions.

## NOS DEVELOPMENT TEAM RESPONSIBLE

This National Occupational Standard was prepared by the Water NOSDT, upon which the following organisations were represented:

1. Technical Education Vocational and Entrepreneurship Training Authority (TEVETA) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) Thrive Project
2. Habitat for Humanity Zambia (HHZ)
3. Living Water International (LWI)
4. Ministry of Water Development and Sanitation (MWDS)
5. National Water Supply and Sanitation Council (NWASCO) / Lusaka Water Security Initiative (LuWSI)
6. Natural Resources Development College (NRDC)
7. The Copperbelt University (CBU)
8. The University of Zambia (UNZA)
9. Water Resources Management Authority (WARMA)
10. WaterAid Zambia (WAZ)
11. Zambia Environmental Management Agency (ZEMA)

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## FOREWORD

The Zambia Qualifications Authority (ZAQA) is a statutory body under the Ministry of Education established by ZAQA Act No. 13 of 2011 to ***“provide for the development and implementation of a national qualifications framework; provide measures to ensure that standards and registered qualifications are internationally comparable; and provide for matters connected with, or incidental to the foregoing”***.

Among other functions, ZAQA is responsible for ***“determining national standards for any occupation”***, through the various sector specific National Occupational Standards Development Teams (NOSDTs) with experts composed of representation from the appropriate authorities, government departments, consumer associations, regulators, industry, academia, and non-governmental organisations, etc.

This National Occupational Standard (NOS) has been developed by the Water National Occupational Standards Development Team in accordance with the laid down procedures and guidelines of ZAQA. All users should ensure that they have the latest edition of this publication as the NOS are revised from time to time.

This NOS shall be used by, among others, industry, employers, quality assurance bodies, awarding and professional bodies, and education and training institutions, as a benchmark to identify training needs, develop job profiles/descriptions, develop curricula, and learning programmes in various sectors where the occupation exists. In the Water sector, demonstration of competence against this NOS may be required in order to run a business or practice a craft or profession.

## JUSTIFICATION

Laboratory Technologist is one of the critical trades in the water sector that ensures drinking water provided to communities is clean and safe for human consumption. He/she also ensures that any effluent discharged into the natural environment meets standards to prevent pollution of water resources. A Laboratory Technologist is responsible for carrying out laboratory and field operations using correct procedures and adhering to health and safety guidelines, and ensures all necessary pieces of equipment and materials are readily available and match the desired standards.

This NOS highlights the core knowledge, skills, competences, and personal attributes that Laboratory Technologists must possess to be successful in their jobs.

## **ACRONYMS AND ABBREVIATIONS**

CS	Core Skills
K	Knowledge and Understanding
LT	Laboratory Technologist
NOS	National Occupational Standard
NOSDT	National Occupational Standards Development Team
OK	Organisational Knowledge
OSHE	Occupational Safety, Health and Environment
PC	Performance Criteria
PS	Professional Skills
RPL	Recognition of Prior Learning
SOP	Standard Operating Procedure
TK	Technical Knowledge
ZAQA	Zambia Qualifications Authority
ZQF	Zambia Qualifications Framework

## GLOSSARY OF TERMS

For the purposes of this NOS, the following terms and definitions shall apply:

**Core Skills/Generic Skills:** are a group of skills that are key to learning and working in today's world. These skills are typically needed in any work environment. In the context of the NOS, these include communication related skills that are applicable to most job roles.

**Disability:** is the physical or mental impairment that substantially limits one or more major life activities.

**Function:** is an activity necessary for achieving the key purpose of the sector, occupation or area of work, which can be carried out by a person or a group of persons. Functions are identified through functional analysis and form the basis of the NOS.

**Job Title:** defines a unique set of functions that together form a unique employment opportunity in an organisation.

**Knowledge and Understanding:** are statements, which together specify the technical, generic, professional, and organisational specific knowledge that an individual needs in order to perform to the required standard.

**National Occupational Standards (NOS):** are statements of the standards of performance individuals must achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding. They are precise descriptions of what an individual is expected to be able to do in his/her work role.

**National Occupational Standards (NOS) Code:** is a unique reference code that identifies a NOS.

**National Occupational Standards Development Team (NOSDT):** means an established group of national stakeholders/experts responsible for the development of National Occupational Standards within a specific economic sector or occupation.

**Occupation:** is a set of job roles, which perform similar/related set of functions in an industry.

**Organisational Context:** includes the way the organisation is structured and how it operates, including the extent of operative knowledge that managers have in their relevant areas of responsibility.

**Performance Criteria:** are statements that together specify the standard of performance required when carrying out a task.

**Scope:** is the set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on the quality of performance required.

**Sector:** is a conglomeration of different business operations having similar businesses and interests. It may also be defined as a distinct subset of the economy, whose components share similar characteristics and interests.

**Sub Sector:** is derived from a further breakdown based on the characteristics and interests of its components.

**Technical Knowledge:** is the specific knowledge needed to accomplish specific designated responsibilities.

**Unit Title:** gives a clear overall statement about what the incumbent should be able to do.

**Elements:** set out competences the incumbent should possess to carry out the day-to-day activities.



## 1. OVERVIEW

This is an introductory section providing a brief summary and specific information or commentary about the content of the NOS and the targeted sector and occupation to help the user judge whether it is relevant to them.

<b>NOS Code</b>	<b>NOS.LT.01</b>
<b>Occupation</b>	Laboratory Technology
<b>Job Title</b>	Laboratory Technologist
<b>Job Description</b>	A Laboratory Technologist collects and analyses water and wastewater samples to check for treatment efficiency, as well as compliance with applicable drinking water quality, wastewater quality, and environmental standards. He/she works within the field and laboratory setting—cleaning, maintaining, and packaging of apparatus, reagents and cleaning materials, general management of the laboratory, records inventory, preparation and submission of water and wastewater laboratory technical reports, and following procedures with respect to laboratory and field analytical work, while adhering to health and biosafety guidelines.
<b>Job Purpose</b>	A Laboratory Technologist is responsible for sampling, testing, and reporting on water and wastewater monitoring, maintenance, and operating the laboratory. He/she is also responsible for quality-checking/calibration of the equipment to ensure they all work as they should, and ensuring compliance to international and local standards and methods.
<b>ZQF Level</b>	6
<b>Sector</b>	Water
<b>Sub sectors</b>	Water and Sanitation, and Water Resources Management and Development.
<b>Other Economic Sector(s) in which the Occupation is Practiced</b>	Agriculture, Forestry, Environment, Fisheries & Livestock, Commerce, Tourism, Mining, Construction, etc.
<b>Other Similar Jobs that can be Performed in the Occupation</b>	Medical Laboratory Technology, Soil and Land, Veterinary, Food and Drugs, Mining Laboratories.
<b>Minimum Educational Job Entry Qualification(s)</b>	Diploma (level) in Science Laboratory Technology
<b>Practicing License Requirements (if any)</b>	Membership with relevant professional body (e.g. Engineering Institution of Zambia)
<b>Training/RPL (Suggested)</b>	<ol style="list-style-type: none"> <li>1. First Aid.</li> <li>2. ICTs.</li> <li>3. Knowledge of applicable drinking water quality, wastewater quality, and environmental standards.</li> </ol>

<b>Minimum Job Entry Age</b>	20 years
<b>Prior Experience (Recommended)</b>	1 year experience or internship
<b>Performance Criteria</b>	As described in the Units under Section 4

## **2. SCOPE**

This NOS specifies the fundamental knowledge and understanding, skills and competences, and personal attributes that Laboratory Technologists must possess to be successful in their jobs.

## **3. PERSONAL ATTRIBUTES (VALUES, ETHICS AND ATTITUDES)**

This job requires ability to: Plan, organise, and prioritise work; have good analytical skills; work in a team; have physique to sustain strenuous conditions; have high technological exposure to handle various equipment, tools, and materials; have sensitivity towards safety for self, others, and the work environment whilst working at the site; be well versed with tasks, functions, standards, specifications, codes of practice, and safety norms applicable to laboratories; be honest, sober, professional, accountable, collaborative, and results oriented, etc.

## **4. UNITS AND ELEMENTS**

This National Occupational Standard is divided into 5 Units representing the tasks that a jobholder should undertake in his/her day-to-day work. Each unit is further broken down into elements depicting the number of activities to be carried out for the successful execution of a particular task.

**UNIT 1** [This Unit covers the skills and knowledge required by a Laboratory Technologist in laboratory and field operations using a range of equipment and methods required for analysis of water and wastewater].

<b>Unit No.</b>	<b>01</b>
<b>Unit Title</b>	<b>Laboratory and Field Operations</b>
<b>Description</b>	This Unit describes the skills and knowledge required by a Laboratory Technologist to operate in the laboratory and field.
<b>Scope</b>	This Unit covers the following: <ul style="list-style-type: none"> <li>• Raw, treated water and wastewater quality monitoring.</li> </ul>
<b>Performance Criteria (PC) with respect to the Scope</b>	
<b>Element</b>	<b>Performance Criteria (PC)</b>
<b>Raw, Treated Water and Wastewater Quality Monitoring</b>	To be competent, the individual must be able to: <p>PC1. Undertake sampling (collection, handling, and transportation) of raw and treated water/wastewater.</p> <p>PC2. Undertake laboratory and field tests.</p> <p>PC3. Prepare samples for testing.</p> <p>PC4. Prepare sampling and analytical plans and reports.</p> <p>PC5. Maintain laboratory protocols and records.</p>
<b>Knowledge and Understanding (K)</b>	
<b>A. Organisational Context (knowledge of the company/ organisation and its processes)</b>	The individual on the job must demonstrate knowledge and understanding of: <p>OK1. Organisation standards, process standards, and procedures.</p> <p>OK2. Standard operating procedures.</p> <p>OK3. Organisation policies, regulations, and guidelines.</p> <p>OK4. International agreements and protocols Government is party to.</p> <p>OK5. Organisation strategy (vision and mission).</p>
<b>B. Technical Knowledge</b>	The individual on the job must demonstrate knowledge and understanding of: <p>TK1. ISO 17025 (testing and calibration labs).</p> <p>TK2. ZS:190:2010 Drinking Water Quality Standards.</p> <p>TK3. WHO Drinking Water Quality Guidelines.</p> <p>TK4. Sampling techniques and ethics.</p> <p>TK5. Laboratory analytical procedures and processes.</p> <p>TK6. Categories of tests (physical, chemical, and biological) for water and wastewater quality.</p> <p>TK7. Laboratory reporting procedures and processes.</p> <p>TK8. Software packages for analysis and generation of reports (Excel, Statistical packages, Microsoft Project, PowerPoint, Word, Access, GIS, Remote sensing).</p>
<b>C. Regulatory Context (knowledge of rules and regulations)</b>	The individual on the job must demonstrate knowledge and understanding of: <p>RK1. Laws and regulations related to environment, water, forests, climate change, public health, occupational health, and biosafety.</p>

	<p>RK2. ISO 17025 (testing and calibration labs).          RK3. ZS:190:2010 Drinking Water Quality Standards.          RK4. WHO Drinking Water Quality Guidelines.</p>
<b>Skills (S)</b>	
<b>A. Core Skills/ Generic Skills</b>	<b>Writing Skills</b>
	<p>The individual on the job must be able to:</p> <p>CS1. Write in English (at least working level), and be able to, or have the means to, give simple instructions in the local language used at the site.          CS2. Prepare and provide clear and simple instructions, details, and sketches to co-workers.</p>
	<b>Reading Skills</b>
	<p>The individual on the job must be able to:</p> <p>CS3. Read English and be able to, or have the means to, give simple instructions in the local language used at the site.          CS4. Read and interpret sketches, instructions provided for the required work.          CS5. Read and interpret various safety and general signage, safety rules and tags, etc., provided at the workplace, including directions for exit routes during emergencies.</p>
	<b>Oral Communication (Listening and Speaking skills)</b>
	<p>The individual on the job must be able to:</p> <p>CS6. Speak in English (at least working level), and be able to, or have the means to, give simple instructions in the local language used at the site.          CS7. Listen attentively and interpret communication/ instructions from the supervisor and other co-workers.          CS8. Convey information clearly and concisely to co-workers</p>
<b>B. Professional Skills</b>	<b>Decision-Making</b>
	<p>The individual on the job must be able to:</p> <p>PS1. Determine and report to the superior whether the working space is safe for operating.          PS2. Follow the organisation rule-based decision-making processes.          PS3. Make decisions in emergency situations in the absence of the supervisor.</p>
	<b>Plan and Organise</b>
	<p>The individual on the job should be able to:</p> <p>PS4. Plan work and organise required resources in coordination with team members and superiors.          PS5. Prepare and contribute to annual work plans and budgets.          PS6. Prepare sampling and analytical plans.</p>

	<b>Customer Centricity</b>
	The individual on the job should be able to: PS7. Manage relationships with customers with intent to satisfying their requirements.
	<b>Problem Solving</b>
	The individual on the job should be able to: PS8. Identify and resolve any conflicts within the team. PS9. Know the procedures for handling disciplinary matters and grievances. PS10. Investigate, document, and engage relevant authorities to resolve customer grievances. PS11. Identify problems and find solutions. PS12. Use modern problem-solving techniques.
	<b>Analytical Thinking</b>
	The individual on the job should be able to: PS13. Analyse the information received from officers and subordinates. PS14. Analyse and convey to the supervisor technical reports. PS15. Use data and information for decision-making and evidence-based reporting. PS16. Use software packages for data analysis.
	<b>Critical Thinking</b>
The individual on the job should be able to: PS17. Identify and deal with or report violation of any safety norms which may lead to accidents. PS18. Ask relevant questions for better understanding. PS19. Devise innovative solutions.	

**UNIT 2** [This Unit covers the skills and knowledge required by a Laboratory Technologist in laboratory and field tools and equipment required to perform analysis for water and wastewater]

<b>Unit No.</b>	<b>02</b>
<b>Unit Title</b>	<b>Laboratory and Field Tools</b>
<b>Description</b>	This Unit describes the skills and knowledge required by a Laboratory Technologist to operate and manage laboratory and field tools and equipment.
<b>Scope</b>	This Unit covers the following: <ul style="list-style-type: none"> <li>Operate and manage laboratory and field tools and equipment for water and wastewater quality monitoring.</li> </ul>
<b>Performance Criteria (PC) with respect to the Scope</b>	
<b>Element</b>	<b>Performance Criteria (PC)</b>
<b>Operate and Manage Laboratory and Field Tools and Equipment for Water and Wastewater Quality Monitoring</b>	To be competent, the individual must be able to: <p>PC1. Select appropriate sampling tools (collection, handling and transportation) of raw and treated water and wastewater.</p> <p>PC2. Identify appropriate tools and equipment for laboratory and field tests.</p> <p>PC3. Set up and operate standard laboratory and field tools and equipment.</p> <p>PC4. Clean the laboratory tools and equipment.</p> <p>PC5. Maintain a record of the inventory of reagents and advise on re-order levels.</p> <p>PC6. Recommend for tools, equipment, and apparatus requirements.</p> <p>PC7. Maintain laboratory protocols and records.</p>
<b>Knowledge and Understanding (K)</b>	
<b>A. Organisational Context (knowledge of the company/ organisation and its processes)</b>	The individual on the job must demonstrate knowledge and understanding of: <p>OK1. Standard operating procedures.</p> <p>OK2. Organisation policies, regulations, and guidelines.</p> <p>OK3. International agreements and protocols Government is party to.</p> <p>OK4. Organisation strategy (vision and mission).</p>
<b>B. Technical Knowledge</b>	The individual on the job must demonstrate knowledge and understanding of: <p>TK1. WHO Drinking Water Quality Guidelines.</p> <p>TK2. Firefighting (different fires and quenching methods).</p> <p>TK3. First Aid.</p> <p>TK4. Cleaning methods for surfaces and different spillages.</p> <p>TK5. Sampling techniques and ethics.</p> <p>TK6. Laboratory analytical procedures and processes.</p> <p>TK7. Categories of tests (physical, chemical, and biological) for water and wastewater quality.</p> <p>TK8. Operating laboratory equipment and instruments.</p> <p>TK9. Calibration of tools and equipment.</p>

	<p>TK10. Laboratory reporting procedures and processes.</p> <p>TK11. Preventive and remedial actions to be taken in case of exposure to toxic materials.</p> <p>TK12. Trade effluent standards.</p>
<b>C. Regulatory Context (knowledge of rules and regulations)</b>	<p>The individual on the job must demonstrate knowledge and understanding of:</p> <p>RK1. Laws and regulations related to environment, water, forests, climate change, public health, occupational health, and biosafety.</p> <p>RK2. ISO 17025 (testing and calibration labs).</p> <p>RK3. ZS:190:2010 Drinking Water Quality Standards.</p> <p>RK4. WHO Drinking Water Quality Guidelines.</p>
<b>Skills (S)</b>	
<b>A. Core Skills/ Generic Skills</b>	<b>Writing Skills</b>
	<p>The individual on the job must be able to:</p> <p>CS1. Write in English (at least working level), and be able to, or have the means to, give simple instructions in the local language used at the site.</p> <p>CS2. Prepare and provide clear and simple instructions, details, and sketches to co-workers.</p>
	<b>Reading Skills</b>
	<p>The individual on the job must be able to:</p> <p>CS3. Read English and be able to, or have the means to, give simple instructions in the local language used at the site.</p> <p>CS4. Read and interpret sketches, instructions provided for the required work.</p> <p>CS5. Read and interpret various safety and general signage, safety rules and tags, etc., provided at the workplace, including directions for exit routes during emergencies.</p>
<b>B. Professional Skills</b>	<b>Oral Communication (Listening and Speaking skills)</b>
	<p>The individual on the job must be able to:</p> <p>CS6. Speak in English (at least working level), and be able to, or have the means to, give simple instructions in the local language used at the site.</p> <p>CS7. Listen attentively and interpret communication/ instructions from the supervisor and other co-workers.</p> <p>CS8. Convey information clearly and concisely to co-workers</p>
	<b>Decision-Making</b>
	<p>The individual on the job must be able to:</p> <p>PS1. Determine and report to the superior whether the working space is safe for operating.</p> <p>PS2. Follow the organisation rule-based decision-making processes.</p> <p>PS3. Make decisions in emergency situations in the absence of the supervisor.</p>



	<b>Plan and Organise</b>
	The individual on the job should be able to:  PS4. Plan work and organise required resources in coordination with team members and superiors. PS5. Prepare and contribute to annual work plans and budgets. PS6. Prepare sampling and analytical plans.
	<b>Customer Centricity</b>
	The individual on the job should be able to:  PS7. Manage relationships with customers with intent to satisfying their requirements.
	<b>Problem Solving</b>
	The individual on the job should be able to:  PS8. Identify and resolve any conflicts within the team. PS9. Know the procedures for handling disciplinary matters and grievances. PS10. Investigate, document, and engage relevant authorities to resolve customer grievances. PS11. Identify problems and find solutions. PS12. Use modern problem-solving techniques.
	<b>Analytical Thinking</b>
	The individual on the job should be able to:  PS13. Analyse the information received from officers and subordinates. PS14. Analyse and convey to the supervisor technical reports. PS15. Use data and information for decision-making and evidence-based reporting.
<b>Critical Thinking</b>	
The individual on the job should be able to:  PS16. Identify and deal with or report violation of any safety norms which may lead to accidents. PS17. Ask relevant questions for better understanding. PS18. Devise innovative solutions.	

**UNIT 3** [This Unit covers the skills and knowledge required by a Laboratory Technologist in sample collection and handling for water and wastewater]

<b>Unit No.</b>	<b>03</b>
<b>Unit Title</b>	<b>Sample Collection and Handling</b>
<b>Description</b>	This Unit describes the skills and knowledge required by a Laboratory Technologist to collect and handle water and wastewater samples.
<b>Scope</b>	This Unit covers the following: <ul style="list-style-type: none"> <li>• Collection of Water and Wastewater samples.</li> <li>• Handling of Water and Wastewater samples.</li> </ul>
<b>Performance Criteria (PC) with respect to the Scope</b>	
<b>Element</b>	<b>Performance Criteria (PC)</b>
<b>Collection of Water and Wastewater Samples</b>	To be competent, the individual must be able to: <p>PC1. Prepare sampling plans.  PC2. Undertake sampling of water and wastewater.  PC3. Prepare samples for testing.  PC4. Conduct field tests.  PC5. Prepare sampling reports.  PC6. Maintain sampling protocols and records.</p>
<b>Handling of Water and Wastewater Samples</b>	To be competent, the individual must be able to: <p>PC7. Undertake sample handling (transportation and storage) of water and wastewater.  PC8. Preserve samples.  PC9. Label samples.  PC10. Store samples.  PC11. Maintain protocols for sample transportation and storage.</p>
<b>Knowledge and Understanding (K)</b>	
<b>A. Organisational Context (knowledge of the company/ organisation and its processes)</b>	The individual on the job must demonstrate knowledge and understanding of: <p>OK1. Organisation standards, process standards, and procedures  OK2. Standard operating procedures.  OK3. Organisation policies, regulations, and guidelines.  OK4. International agreements and protocols Government is party to.  OK5. Organisation strategy (vision and mission).</p>
<b>B. Technical Knowledge</b>	The individual on the job must demonstrate knowledge and understanding of: <p>TK1. First Aid.  TK2. Sampling site selection.  TK3. Sampling frequency.  TK4. Sampling equipment.  TK5. Sample containers.  TK6. Sampling safety precautions.  TK7. Sample labelling and description.</p>

	<p>TK8. Sample treatment and preservation. TK9. Sample storage. TK10. Composite sample preparation. TK11. Sample filtration. TK12. Analytical techniques. TK13. Analytical methods. TK14. Analytical instruments. TK15. Analytical procedures. TK16. Scheme (order) of analysis. TK17. Evaluation of the accuracy of analytical results.</p>
<p><b>C. Regulatory Context (knowledge of rules and regulations)</b></p>	<p>The individual on the job must demonstrate knowledge and understanding of:</p> <p>RK1. Laws and regulations related to environment, water, forests, climate change, public health, occupational health, and biosafety. RK2. ISO 17025 (testing and calibration labs). RK3. ZS:190:2010 Drinking Water Quality Standards. RK4. WHO Drinking Water Quality Guidelines.</p>
<p><b>Skills (S)</b></p>	
<p><b>A. Core Skills/ Generic Skills</b></p>	<p><b>Writing Skills</b></p> <p>The individual on the job must be able to:</p> <p>CS1. Write in English (at least working level), and be able to, or have the means to, give simple instructions in the local language used at the site. CS2. Prepare and provide clear and simple instructions, details, and sketches to co-workers.</p> <p><b>Reading Skills</b></p> <p>The individual on the job must be able to:</p> <p>CS3. Read English and be able to, or have the means to, give simple instructions in the local language used at the site. CS4. Read and interpret sketches, instructions provided for the required work. CS5. Read and interpret various safety and general signage, safety rules and tags, etc., provided at the workplace, including directions for exit routes during emergencies.</p> <p><b>Oral Communication (Listening and Speaking skills)</b></p> <p>The individual on the job must be able to:</p> <p>CS6. Speak in English (at least working level), and be able to, or have the means to, give simple instructions in the local language used at the site. CS7. Listen attentively and interpret communication/ instructions from the supervisor and other co-workers. CS8. Convey information clearly and concisely to co-workers.</p>

<b>B. Professional Skills</b>	<b>Decision-Making</b>
	The individual on the job must be able to:
	PS1. Determine and report to the superior whether the working space is safe for operating.
	PS2. Follow the organisation rule-based decision-making processes.
	PS3. Make decisions in emergency situations in the absence of the supervisor.
	<b>Plan and Organise</b>
	The individual on the job should be able to:
	PS4. Plan work and organise required resources in coordination with team members and superiors.
	PS5. Prepare and contribute to annual work plans and budgets.
PS6. Prepare sampling and analytical plans.	
<b>Customer Centricity</b>	
The individual on the job should be able to:	
PS7. Manage relationships with customers with intent to satisfying their requirements.	
<b>Problem Solving</b>	
The individual on the job should be able to:	
PS8. Identify and resolve any conflicts within the team.	
PS9. Know the procedures for handling disciplinary matters and grievances.	
PS10. Investigate, document, and engage relevant authorities to resolve customers grievances.	
PS11. Identify problems and find solutions.	
PS12. Use modern problem-solving techniques.	
<b>Analytical Thinking</b>	
The individual on the job should be able to:	
PS13. Analyse the information received from officers and subordinates.	
PS14. Analyse and convey to the supervisor technical reports.	
PS15. Use data and information for decision-making and evidence-based reporting.	
PS16. Use software packages for data analysis.	
<b>Critical Thinking</b>	
The individual on the job should be able to:	
PS17. Identify and deal with or report violation of any safety norms which may lead to accidents.	
PS18. Ask relevant questions for better understanding.	
PS19. Devise innovative solutions.	

**UNIT 4** [This Unit covers the skills and knowledge required by a Laboratory Technologist in maintaining documents and records required for laboratory use]

<b>Unit No.</b>	<b>04</b>
<b>Unit Title</b>	<b>Maintenance of Documents and Records</b>
<b>Description</b>	This Unit describes the skills and knowledge required by a Laboratory Technologist in maintenance of documents and records for laboratory use.
<b>Scope</b>	This Unit covers the following: <ul style="list-style-type: none"> <li>• Maintenance of documents and records for laboratory use.</li> </ul>
<b>Performance Criteria (PC) with respect to the Scope</b>	
<b>Element</b>	<b>Performance Criteria (PC)</b>
<b>Maintenance of Documents and Records</b>	To be competent, the individual must be able to: <ul style="list-style-type: none"> <li>PC1. Catalogue documents and records.</li> <li>PC2. Ensure all quality manuals are readily available for reference.</li> <li>PC3. Ensure Standard Operating Procedures for specific experiments are available.</li> <li>PC4. Maintain test specific reports.</li> <li>PC5. Maintain logbooks/registers for samples and quality control data.</li> <li>PC6. Label samples and reagents as per SOPs.</li> <li>PC7. Maintain master laboratory log and constantly update.</li> <li>PC8. Ensure proper and effective archiving practices.</li> <li>PC9. Maintain inventory of reagents and consumables.</li> <li>PC10. Maintain laboratory equipment and instrument maintenance records.</li> <li>PC11. Maintain records of internal and external laboratory audits.</li> <li>PC12. Maintain records of incident reports.</li> </ul>
<b>Knowledge and Understanding (K)</b>	
<b>A. Organisational Context (knowledge of the company/ organisation and its processes)</b>	The individual on the job must demonstrate knowledge and understanding of: <ul style="list-style-type: none"> <li>OK1. Standard operating procedures.</li> <li>OK2. Organisation policies, regulations, and guidelines.</li> <li>OK3. International agreements and protocols Government is party to.</li> <li>OK4. Organisation strategy (vision and mission).</li> </ul>
<b>B. Technical Knowledge</b>	The individual on the job must demonstrate knowledge and understanding of: <ul style="list-style-type: none"> <li>TK1. Cataloguing procedures.</li> <li>TK2. Document control procedures.</li> <li>TK3. Document archiving practices.</li> <li>TK4. Document and records disposal procedures.</li> <li>TK5. Documentation system followed by the organisation.</li> </ul>

<b>C. Regulatory Context (knowledge of rules and regulations)</b>	<p>The individual on the job must demonstrate knowledge and understanding of:</p> <p>RK1. Laws and regulations related to environment, water, forests, climate change, public health, occupational health, and biosafety.</p>
<b>Skills (S)</b>	
<b>A. Core Skills/ Generic Skills</b>	<b>Writing Skills</b>
	<p>The individual on the job must be able to:</p> <p>CS1. Write in English (at least working level), and be able to, or have the means to, give simple instructions in the local language used at the site.</p> <p>CS2. Prepare and provide clear and simple instructions, details, and sketches to co-workers.</p>
	<b>Reading Skills</b>
	<p>The individual on the job must be able to:</p> <p>CS3. Read English and be able to, or have the means to, give simple instructions in the local language used at the site.</p> <p>CS4. Read and interpret sketches, instructions provided for the required work</p> <p>CS5. Read and interpret various safety and general signage, safety rules and tags, etc., provided at the workplace, including directions for exit routes during emergencies.</p>
	<b>Oral Communication (Listening and Speaking skills)</b>
<p>The individual on the job must be able to:</p> <p>CS6. Speak in English (at least working level), and be able to, or have the means to, give simple instructions in the local language used at the site.</p> <p>CS7. Listen attentively and interpret communication/ instructions from the supervisor and other co-workers.</p> <p>CS8. Convey information clearly and concisely to co-workers.</p>	
<b>B. Professional Skills</b>	<b>Decision-Making</b>
	<p>The individual on the job must be able to:</p> <p>PS1. Determine and report to the supervisor whether the working space is safe for operating.</p> <p>PS2. Follow the organisation rule-based decision-making processes.</p> <p>PS3. Make decisions in emergency situations in the absence of the supervisor.</p>
	<b>Plan and Organise</b>
<p>The individual on the job should be able to:</p> <p>PS4. Plan work and organise required documents in coordination with team members and superiors.</p> <p>PS5. Prepare and contribute to annual work plans and budgets.</p>	

	<b>Customer Centricity</b>
	The individual on the job should be able to:  PS6. Manage relationships with customers with intent to satisfying their requirements.
	<b>Problem Solving</b>
	The individual on the job should be able to:  PS7. Identify and resolve any conflicts within the team. PS8. Know the procedures for handling disciplinary matters and grievances. PS9. Investigate, document, and engage relevant authorities to resolve customer grievances. PS10. Identify problems and find solutions. PS11. Use modern problem-solving techniques.
	<b>Analytical Thinking</b>
The individual on the job should be able to:  PS12. Analyse the information received from officers and subordinates. PS13. Analyse and convey to the supervisor technical reports. PS14. Use data and information for decision making and evidence-based reporting.	
<b>Critical Thinking</b>	
The individual on the job should be able to:  PS15. Identify and deal with or report violation of any safety norms which may lead to accidents. PS16. Ask relevant questions for better understanding. PS17. Devise innovative solutions.	



**UNIT 5** [This Unit covers the skills and knowledge required by a Laboratory Technologist on health, safety, and environment in the laboratory and for field operations that need to be followed to maintain a healthy, safe, and secure work environment when dealing with water and wastewater]

<b>Unit No.</b>	<b>05</b>
<b>Unit Title</b>	<b>Maintenance of Health, Safety, and Environment</b>
<b>Description</b>	This Unit describes the skills and knowledge required by a Laboratory Technologist in maintenance of health, safety, and environmental protection for individuals and the environment in the laboratory and during field operations related to water and wastewater.
<b>Scope</b>	This Unit covers the following: <ul style="list-style-type: none"> <li>• Work safety in the field, and water and wastewater laboratory.</li> <li>• Appropriate emergency procedures.</li> </ul>
<b>Performance Criteria (PC) with respect to the Scope</b>	
<b>Element</b>	<b>Performance Criteria (PC)</b>
<b>Work Safety in the Field, and the Water and Wastewater Laboratory</b>	To be competent, the individual must be able to: <p>PC1. Follow safety checks when sampling (collection, handling, and transportation) of raw and treated water and wastewater.</p> <p>PC2. Use appropriate protective clothing or equipment when performing laboratory and field tests.</p> <p>PC3. Recognise risks to bystanders and take action to reduce risk associated with jobs in the workplace.</p> <p>PC4. Complete all health, safety, and security activities, like safety drills, and prepare records legibly and accurately.</p> <p>PC5. Identify and recommend opportunities for improving health and safety in the workplace.</p>
<b>Appropriate Emergency Procedures</b>	To be competent, the individual must be able to: <p>PC6. Report all accidents, incidents or problems without delay to appropriate personnel, and take necessary remedial action to reduce further danger.</p>
<b>Knowledge and Understanding (K)</b>	
<b>A. Organisational Context (knowledge of the company/ organisation and its processes)</b>	The individual on the job must demonstrate knowledge and understanding of: <p>OK1. Standard operating procedures.</p> <p>OK2. Organisation policies, regulations, and guidelines.</p> <p>OK3. International agreements and protocols Government is party to.</p> <p>OK4. Organisation strategy (vision and mission).</p>
<b>B. Technical Knowledge</b>	The individual on the job must demonstrate knowledge and understanding of: <p>TK1. Risks to health and safety and the measures to be taken to control such risks in the workplace.</p> <p>TK2. Basic emergency First Aid procedures.</p>



	<p>TK3. Firefighting (different fires and quenching methods).</p> <p>TK4. Cleaning methods for surfaces and different spillages.</p> <p>TK5. Preventive and remedial actions to be taken in case of exposure to toxic materials.</p> <p>TK6. Reporting accidents, incidents, and problems, and the appropriate action to be taken.</p> <p>TK7. Laboratory safety manual.</p>
<b>C. Regulatory Context (knowledge of rules and regulations)</b>	<p>The individual on the job must demonstrate knowledge and understanding of:</p> <p>RK1. Laws and regulations related to environment, water, forests, climate change, public health, occupational health, and biosafety.</p>
<b>Skills (S)</b>	
<b>A. Core Skills/ Generic Skills</b>	<b>Writing Skills</b>
	<p>The individual on the job must be able to:</p> <p>CS1. Write in English (at least working level), and be able to, or have the means to, give simple instructions in the local language used at the site.</p> <p>CS2. Prepare and provide clear and simple instructions, details, and sketches to co-workers.</p>
	<b>Reading Skills</b>
	<p>The individual on the job must be able to:</p> <p>CS3. Read English and be able to, or have the means to, give simple instructions in the local language used at the site.</p> <p>CS4. Read and interpret sketches, instructions provided for the required work</p> <p>CS5. Read and interpret various safety and general signage, safety rules and tags, etc., provided at the workplace, including directions for exit routes during emergencies.</p>
	<b>Oral Communication (Listening and Speaking skills)</b>
	<p>The individual on the job must be able to:</p> <p>CS6. Speak in English (at least working level), and be able to, or have the means to, give simple instructions in the local language used at the site.</p> <p>CS7. Listen attentively and interpret communication/ instructions from the supervisor and other co-workers.</p> <p>CS8. Convey information clearly and concisely to co-workers.</p>
<b>B. Professional Skills</b>	<b>Decision-Making</b>
	<p>The individual on the job must be able to:</p> <p>PS1. Determine and report to the supervisor whether the working space is safe for operating.</p> <p>PS2. Follow the organisation rule-based decision-making processes.</p> <p>PS3. Make decisions in emergency situations in the absence of the supervisor.</p>

	<b>Plan and Organise</b>
	The individual on the job should be able to: PS4. Plan work and organise required resources in coordination with team members and superiors.
	<b>Customer Centricity</b>
	The individual on the job should be able to: PS5. Manage relationships with customers with intent to satisfying their requirements.
	<b>Problem Solving</b>
	The individual on the job should be able to: PS6. Identify and resolve any conflicts within the team. PS7. Know the procedures for handling disciplinary matters and grievances. PS8. Investigate, document, and engage relevant authorities to resolve customers grievances. PS9. Identify problems and find solutions PS10. Use modern problem-solving techniques.
	<b>Analytical Thinking</b>
	The individual on the job should be able to: PS11. Analyse the information received from officers and subordinates. PS12. Analyse and convey to the supervisor technical reports. PS13. Use data and information for decision-making and evidence-based reporting.
<b>Critical Thinking</b>	
The individual on the job should be able to: PS14. Identify and deal with or report violation of any safety norms which may lead to accidents. PS15. Ask relevant questions for better understanding. PS16. Devise innovative solutions.	

## 5. EQUIPMENT, TOOLS AND CONSUMABLE MATERIALS

Equipment, tools, and consumable materials used by the jobholder include, but are not limited to:

**Hand Tools:** Hammer, sampling bottles, fire lighter, rope, portable lab, cooler box, GPS, camera, calculator, etc.

**Measuring Instruments:** Titration apparatus, try scale, spirit level, measuring tape, etc.

**Power Tools:** Blending machine, heaters, incubators, water distiller, etc.

**Consumables and General Requirements:** Cotton wool, mutton cloth, methylated spirit, ethanol, reagents, stationery, cleaning detergents, distilled water, First Aid kit, fire extinguishers, etc.

**Personal Protective Equipment:** Safety goggles, safety shoes, PVC gloves, dust and gas mask, apron or dust coat, etc.

## 6. DILEMMAS/CHALLENGES AND COMPLEXITIES FOR A JOBHOLDER

Dilemmas associated with the job of Laboratory Technologist include: exposure to fumes and toxic gases; working around environments that could be toxic and slippery; working in dangerous areas with likelihood of flammable materials; working in confined spaces with likelihood of suffocation; working in wet and dusty environments and for long working hours; pressure from supervisors and colleagues; pressure from government regulators, etc.

### 6.1 Alternative Choices (Solutions) to Dilemmas and Complexities

Solutions to dilemmas include: wearing protective clothing, and ensuring their availability and use by other employees; exercising regularly to maintain physical fitness; exercising proper work ergonomics; participating in workplace safety sensitisation and awareness meetings/training sessions; adhering to company safety and standard operating procedures at all times; consulting extensively within and outside one's department / team on environment; water and wastewater safety issues; planning and prioritising work, etc.; provision of milk for those working in dusty and fume producing environments; providing routine medical checkups.

## 7. WORKING CONDITIONS/ENVIRONMENT

Working conditions include: indoor and outdoor involving field work; community engagements and office work. This may include working in conditions that may be dusty, slippery, with fumes and flammable materials, exposure to seasonal heat and cold, or adverse weather conditions; emergency call-outs; standing for

long hours, and lifting relatively heavy objects. In most cases, the job involves working normal hours, but in some instances, shift work and regular overtime may be required. The job also requires wearing suitable protective clothing such as works suits, safety visors or goggles, gloves, and safety harnesses etc.

## **8. PARTIES INVOLVED/INTERACTING WITH THE JOB HOLDER OR TRAINEE**

### **8.1 Internal – Within the Organisation**

Parties involved/interacting with the jobholder who are internal to the organisation include: supervisors/superiors, trainers, occupational health and safety teams, other colleagues, etc.

### **8.2 External – Outside the Organisation**

Parties involved/interacting with the jobholder who are external to the organisation include: government regulators, trainers, professional bodies, clients, suppliers of equipment/tools/consumables, fellow Environment and Water Quality Officers from other companies, labour unions, occupational health and safety associations, communities, etc.

## **9. PHYSICAL DEMANDS ON THE BODY**

- Ability to sustain strenuous conditions such as climbing heights.
- Walking and standing for long periods of time.
- Bending, stretching, twisting or reaching out.
- Lifting, carrying, pushing, and pulling heavy objects.
- Using fingers, hands, and feet with ease to complete the assigned task (dexterity).
- Etc.

## **ANNEX A**

### **Criteria for Assessments based on this NOS**

#### **A.1 Guidelines for Assessment**

**A.1.1** Criteria for assessment for curricula and learning programmes based on this NOS will be created by curricula and programme developers, and each Performance Criteria (PC) will be assigned marks proportional to its importance in the NOS. Curricula and programme developers will also lay down proportion of marks for theory and practical skills for each performance criteria, giving more weight to practical skills.

There shall be allocated 'Total Marks', which will be the sum of all marks in each Unit, distributed across the number of PCs in that particular Unit. The 'Out of mark will be the mark allocated to each PC, which will be shared between theory and skills practical assessments.

**A.1.2** Individual awarding/assessment bodies, or institutions and other users of the NOS, will create unique question papers for the theory part and evaluations for the skill practical part for their respective candidates.

## ANNEX B NOS Version Control

This Annex gives details necessary for the tracking of the NOS versions based on the number of revisions.

<b>NOS Code</b>	<b>NOS.LT.01</b>		
<b>ZQF Level</b>	5	<b>Version Number</b>	01
<b>Sector</b>	Water	<b>Date of Approval</b>	May 2024
<b>Sub Sector</b>	Water Supply and Sanitation, Water Resources Management and Development	<b>Date of Last Review</b>	N/A
<b>Occupation</b>	Laboratory Technology	<b>Date of Next Review</b>	May 2029

*“You learn,  
We Standardise”*

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