**Introduction**

**Federal Democratic Republic of Ethiopia**

**Occupational Standard**

**Water Supply and sanitation Supervision**

**NTQF Level iV**

*Ministry of Education*

*february2017*

Ethiopia has embarked on a process of reforming its TVET-System. Within the policies and strategies of the Ethiopian Government, technology transformation – by using international standards and international best practices as the basis, and, adopting, adapting and verifying them in the Ethiopian context – is a pivotal element. TVET is given an important role with regard to technology transfer. The new paradigm in the outcome-based TVET system is the orientation at the current and anticipated future demand of the economy and the labor market.

The Ethiopia Occupational Standard (EOS) is the core element of the Ethiopian National TVET-Strategy and an important factor within the context of the National TVET-Qualification Framework (NTQF).They are national Ethiopian standards, which define the occupational requirements and expected outcome related to a specific occupation without taking TVET delivery into account.

This document details the mandatory format, sequencing, wording and layout for the Ethiopian Occupational Standard comprised of Units of Competence.

A Unit of Competence describes a distinct work activity. It is documented in a standard format that comprises:

* Occupational title, NTQF level
* Unit code
* Unit title
* Unit descriptor
* Elements and Performance criteria
* Variables and Range statement
* Evidence guide

Together all the parts of a Unit of Competence guide the assessor in determining whether the candidate is competent.

The ensuing sections of this EOS document comprise a description of the respective occupation with all the key components of a Unit of Competence:

* chart with an overview of all Units of Competence for the respective level including the Unit Codes and the Unit Titles
* contents of each Unit of Competence (competence standard)
* occupational map providing the technical and vocational education and training (TVET) providers with information and important requirements to consider when designing training programs for this standards, and for the individual, a career path

**UNIT OF COMPETENCE STANDARD CHART**

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| **Occupational Standard: Water Supply and sanitation Supervision Level IV** |
| **Occupational Code: EIS WSS** |
| ***NTQF Level IV***[EIS WSS4 01 0217](#EIS_WSO4_01) Investigate and plan the optimization of potable water distribution systems[EIS WSS4 03 0217](#EIS_WSO4_03) Supervise Concrete works[EIS WSS4 02 0217](#EIS_WSO4_02) Select treatment requirements for waterborne microorganisms |
| [EIS WSS4 06 0217](#EIS_WSO4_06) Undertake surveying of monitoring sites[EIS WSS4 05 0217](#EIS_WSO4_05) Develop an operation plan[EIS WSS4 04 0217](#EIS_WSO4_04) Perform advanced water quality testes  [EIS WSS4 08 0217](#EIS_WSO4_08) Prepare estimates, quotes and tenders[EIS WSS4 07 0217](#EIS_WSO4_07) Assess and optimize chemical dosing process [EIS WSS4 09 0217](#EIS_WSO4_09) Asses and optimize treatment process of sedimentation and Granular Media Filtration[EIS WSS4 10 0217](#EIS_WSO4_10) Assess and improve wastewater processes to control microbial impacts[EIS WSS4 12 0217](#EIS_WSO4_12) Test and Commission Water and Wastewater Collection and distribution Systems[EIS WSS4 11 0217](#EIS_WSO4_11) Coordinate implementation of customer service strategies[EIS WSS4 14 0217](#EIS_WSO4_13) Plan and Organize Work[EIS WSS4 13 0217](#EIS_WSS4_13) Facilitate the use of SCADA systems in a team or work area [EIS WSS4 15 0217](#EIS_WSO4_14) Migrate to New Technology[EIS WSS4 17 0217](#EIS_WSO4_16) Develop Individuals and Team[EIS WSS4 16 0217](#EIS_WSO4_15)  Establish quality standards[EIS WSS4 19 0217](#EIS_WSO4_18) Manage Micro, Small and Medium Enterprises (MSMEs)[EIS WSS4 18 0217](#EIS_WSO4_17) Utilize Specialized Communication Skills[EIS WSS4 20 0217](#EIS_WSO4_19) Apply Problem Solving Techniques and Tools |

**NTQF Level IV**

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| **Occupational Standard: Water Supply and Sanitation Operation Level IV** |
| **Unit Title**  | **Investigate and plan the optimization of potable water distribution systems** |
| **Unit Code** | **[EIS WSO4 01 0217](#EIS_WSO4_01_1116)** |
| **Unit Descriptor** | This unit of competency describes the outcomes required to coordinate, monitor and optimise system performance and maintenance planning in potable water distribution systems. |

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| **Elements** | **Performance Criteria** |
| 1 Evaluate potable water distribution system performance**.** | 1.1 Review existing distribution system performance data against relevant organizational and legislative requirements.1.2 Identify the impact of the distribution system on water quality. 1.3 Identify and coordinate any additional sampling and testing required for valid evaluation of current process performance. |
| 2 Investigate water distribution system issues**.** | 2.1 Review existing system fault reports and relevant water quality information.2.2 Identify and record links between operational problems and maintenance activities.2.3 Investigate the operational status of system components with reference to manufacturers' and suppliers' specifications.2.4 Carry out distribution system configuration investigations to identify potential deficiencies. |
| 3 Plan optimization of potable water distribution system**.** | 3.1 Identify potential hazards to the distribution system.3.2 Select appropriate preventive measures3.3 Develop and validate a system optimization plan. |

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| **Variable** | **Range** |
| Organisational or legislative requirements | * May include:
* federal, state and local environmental and water quality legislation and guidelines
* organizational policies
* standard operating procedures
* communication and reporting protocols
* quality assurance standards and processes
 |
| Distribution system | * May include:
* pipes
* hydrants
* valves(gate, float, check, foot .air release )
* backflow prevention devices
* reservoirs(service, collector, transfer ,elevated )
* chlorinators
* Boosters
* water points
 |
| Sampling | * May include:
* frequency of sampling
* bacteriological samples
* grab samples from:
	+ mains
	+ customer taps
	+ service reservoirs
	+ high-risk user facilities
	+ public fountains
 |
| Testing | * May include:
* microbiological testing
* levels of manganese and iron
* turbidity
* color
* taste and odor
* copper
* pH
* chlorine residuals
* hardness
* presence of disinfection by-products
 |
| Manufacturers' and suppliers specifications | * May include:
* valve installation and operation
* hydrant installation and operation
* pipe pressure specifications
* calibration and operation of inline equipment
 |
| Potential deficiencies | * May include:
* low pressure areas
* dead ends
* low flow areas
* backflow
* cross connections
* uncovered or unsecured service reservoirs
* leaks
* loss of disinfectant residual
 |
| Potential hazards | * May include:
* microbiological contamination of water
* chemical contamination
* waterborne disease outbreaks
* metal poisoning/corrosion
* pressure for firefighting appliances
* Household contamination
* Flooding
* Cross contamination
* Water fetching containers
 |
| Preventive measures | * May include:
* maintenance of disinfection residuals
* maintenance of adequate system pressure
* minimize hydraulic detention time
* flushing, scouring and swabbing
* awareness creation
* flood protection
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| **Evidence Guide** |
| Critical aspects of Competence | Assessment requires evidence that the candidate:* assessing distribution system performance and impacts on water quality
* investigating system faults and deficiencies and assessing the status of system components
* conducting hazard assessment and proposing prevention strategies
* producing and monitoring a potable water distribution system optimization plan
 |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:* Ethiopia Drinking Water Guidelines
* water quality parameters
* relevant legislation
* relevant enterprise policies
* range of appropriate measuring and testing procedures
* investigation procedures
* customer expectations and requirements
* operations and maintenance policies and procedures
* occupational health and safety and environmental legislation, Acts and procedures
* environmental management procedures
* control procedures for environmental risks and incidents
* system hydraulics
* incident management processes
* system layout
* system processes
* system operation
* water main isolation procedures
* sampling and testing procedures
* safety procedures
* lock out procedures for mechanical and electrical installations
* policies, standard operating procedures and legislation
* relevant utilities and service bodies
* communication systems
* risk management principles
* risk factors and potential hazards involved in water systems
* equipment operation, capacity and limitations of control systems
 |
| Underpinning Skills | Demonstrates skills to:* investigate and report on operational and control system problems
* coordinate sampling and testing
* performs various calculations to provide data for the analysis and development of options and solutions
* interpret plans, charts and instructions
* operate control and communication systems
* use safety and personal protective equipment
* communicate with colleagues, consultants and suppliers
* produce optimization reports
* interprets a range of complex and technical documents, including relevant:
* regulatory, legislative, licensing and organizational requirements
* industry codes and standards
* specifications
* organizational policies
* articulate complex ideas clearly
* analyze and evaluate reports and reference materials
* work collaboratively with relevant stakeholders
* analyses problems and recommend appropriate remedial solutions
* identify risks and hazards
* identify opportunities for improved distribution system management
* participate in the provision of appropriate information to inform workplace processes
* manage work priorities
 |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:* Interview / Written Test / Oral Questioning
* Observation / Demonstration
 |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level IV** |
| **Unit Title**  | **Select treatment requirements for waterborne** |
| **Unit Code** | **[EIS WSO4 02 0217](#EIS_WSO4_02_1116)**  |
| **Unit Descriptor** | This unit of competency describes the outcomes required to identify microorganisms and assess the appropriate potable water or water reuse treatment processes for inactivation or removal. |

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| **Elements** | **Performance Criteria** |
| 1Investigate waterborne microorganisms**.** | 1.1 Identify the samples of waterborne microorganisms found in water sources. 1.2 Identify the general characteristics of different types of microorganisms.1.3 Identify water quality or treatment problems caused by microorganisms. 1.4 Identify microorganisms causing problems specific to water treatment processes.1.5 Identify the characteristics of, and diseases caused by, pathogenic microorganisms. |
| 2Identify processes to remove microorganisms**.** | 2.1 Assess the effectiveness of a range of filtration processes for physically removing pathogenic microorganisms according to organizational and legislative requirements. 2.2 Assess the effectiveness of a range of ***disinfection processes*** for inactivating pathogenic microorganisms according to organizational and legislative requirements. 2.3 Identify and assess the implications of by-product formation resulting from disinfection processes.2.4 Assess the effectiveness of various ***pre- or post-treatment processes*** for removing microorganisms, or their metabolites, causing nuisance and toxicity problem. |
| 3Determine appropriate water treatment processes**.** | 3.1 Identify optimum treatment processes for the range of microorganisms found in water sources.3.2 Report on effective treatment processes and associated sampling and testing requirements required to maintain water quality. |

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| **Variable** | **Range** |
| Waterborne microorganisms | * May include:
* viruses
* bacteria
* protozoa
* algae
* cyanobacteria
* helminths
 |
| General characteristics  | * May include:
* evolutionary development
* source
* structure
* life cycle
* growth rates and requirements
 |
| Water quality or treatment problems | * May include:
* nuisance problems
* taste and odor
* filter clogging
* color
* corrosion
* toxicity problems
* pathogenic problems
 |
| Microorganisms causing problems | * May include:
* diatoms
* sulphur bacteria
* cyanobacteria including:
* Microcystis aeruginosa
* Anabaena circinalis
* Pathogenic microorganisms including:
* viruses:
* Enterovirus,
* Hepatitis A,
* Hepatitis E,
* Rotavirus
* bacteria:
* Campyllobacter
* Salmonella
* Escherichia coli
* protozoa species:
* Giardia
* Cryptosporidium
* Nagleria
* Helminths such as Ascaris lumbricoides
 |
| Characteristics of pathogenic microorganisms | * May include:
* pathogen city
* virulence
* resistance to disinfectants (Ct, log reduction)
* opportunistic infection capability
 |
| Diseases caused by pathogenic microorganisms | * May include:
* typhoid
* cholera
* ascariasis
* hepatitis
* giardiasis
* cryptosporidiosis
* gastroenteritis
* tuberculosis
 |
| Filtration processes | * May include:
* slow sand filter
* granular media filters
* membrane filters
 |
| Organisational and legislative requirements | * May include:
* federal, state and local environmental and water quality legislation and guidelines
* organizational policies
* standard operating procedures
* communication and reporting protocols
* quality assurance
 |
| Disinfection processes | * May include:
* chlorination
* chloramination
* UV
* chlorine dioxide
* ozone
 |
| Pre***-*** or post***-***treatment processes | * May include:
* micro-straining
* algicides
* activated carbon
* ozone-biologically activated carbon (BAC)
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| **Evidence Guide** |
| Critical aspects of Competence | Assessment requires evidence that the candidate:* identifying a range of waterborne microorganisms,
* analyzing their general characteristics and the types of problems caused
* identifying pathogenic microorganisms and the diseases caused
* assessing and selecting water or reuse treatment processes for physically removing or inactivating pathogenic microorganisms, including disinfection by-product issues
* assessing and selecting pre- or post-treatment processes for removing the causes of nuisance and toxicity problems
* preparing reports on the optimum treatment for a range of microorganisms including measures to ensure validity
 |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:* organizational and legislative requirements relevant to water quality and treatment
* types, lifecycle, characteristics of waterborne microorganisms
* nuisance problems caused by waterborne microorganisms
* toxicity and pathogenic problems caused by waterborne microorganisms
* relevant legislation, standards and workplace policies and procedures related directly to the control and treatment of waterborne microorganisms
* principles of water or reuse treatment processes
* concept
* log reduction
* properties and modes of action of disinfectants
 |
| Underpinning Skills | Demonstrates skills to:* interpret a range of complex and technical documents, including relevant:
* regulatory, legislative, licensing and organizational requirements
* codes and standards
* specifications
* organizational policies
* communicate effectively with a range of relevant parties using clear and direct communication to identify and confirm requirements
* articulate complex ideas clearly
* produce reports on treatment requirements for management
* analyze and evaluate reports and reference materials
* work collaboratively with relevant stakeholders
* analyze problems and apply appropriate remedial solutions
* perform various calculations to provide data for the analysis and development of options and solutions
* identify hazards and develop appropriate responses to control and mitigate risks in accordance with regulations and legislation
* identify opportunities for improved water management
* participate in the provision of appropriate information to inform workplace processes
* understand capabilities and limitations of plant, equipment and tools
* manage work priorities
* use information effectively to improve work performance
 |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:* Interview / Written Test / Oral Questioning
* Observation / Demonstration
 |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level IV** |
| **Unit Title**  | **Supervise concert work** |
| **Unit Code** | **[EIS WSO4 03 0217](#EIS_WSO4_03_1116)**  |
| **Unit Descriptor** | This unit covers supervising construction works using concrete. It requires candidates to be able to assess concrete materials in their raw and finished states, identify and evaluate the characteristics of different concrete types, identify defects and impurities in concrete and understand the effect of impurities in concrete. It is appropriate for supervisors of concrete constructions. |

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| **Elements** | **Performance Criteria** |
| 1.Monitor assessment of construction materials | 1.1. Plastic and hardened ***concrete properties*** are identified and recorded in accordance with ***relevant standards*** . 1.2. Types of cement are identified. 1.3. Sources of aggregate are identified and listed, and properties of each are identified. 1.4. Any impurities in raw materials are identified and documented in accordance with relevant standards and quality assurance standards. 1.5. ***Raw materials*** used to make concrete and concrete constructions are testedto ensure quality of finished product.  |
| 2.Supervise the handling and placement of concrete | 2.1. The effect of site access on the selection and distribution method of concrete is evaluated and documented. 2.2. Methods of distribution of concrete are listed and documented in accordance with legislative and organizational requirements. 2.3. Correct placement of level slabs, sloping slabs and vertical walls is ensured by monitoring field staff. 2.4. Reasons for, and effects of, compaction on plastic and hardened concrete are identified and listed. 2.5. Defects in concrete due to incorrect placement are identified and documented accordingly. 2.6. Finishing process and surface treatments to slab concrete are monitored and documented. 2.7. Accurate ***curing*** ***methods*** are observed and documented.  |
| 3**.** Identify faults in concrete and repair methods | 3.1. Repair methods for cracked concrete are established. 3.2. Causes of concrete faults are identified and documented accordingly. 3.3. Field staff members are instructed to repair identified faults in concrete.  |
| 4.Maintain accurate records | 4.1. Daily diary of work undertaken and observed is updated and maintained regularly in accordance with relevant standards and organizational requirements. 4.2. Directions given to ***relevant personnel*** are recorded accurately. 4.3. Changes or alterations to scheduled work activities are documented accurately and communicated to relevant personnel.  |

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| **Variable** | **Range** |
|  concrete properties  | * May include**:**
* admixtures, including air entraining agents, set controlling types and water reducing types
* testing of mix design, including selected applications using statistics, aggregate grading and first principles
* recognizing principles of reinforced concrete utilizing steel, wire and fibers.
 |
| Relevant standards  | * May include**:**
* industry standard specifications
* council standards
* relevant Ethiopia standards
* quality assurance standards.
 |
| Curing methods  | * May include**:**
* impermeable membrane curing
* continuously wetting concrete
* accelerated curing.
 |
| raw materials  | * May include**:**
* Texas ball mill test
* California bearing ratio test
* slump test
* destructive compression tests.
* Cubic test
 |
| Relevant personnel  | * May include**:**
* field staff or daily labor
* contractors
* management
* office or administration staff.
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| **Evidence Guide** |
| Critical aspects of Competence | Assessment requires evidence that the candidate:* observation of the learner performing a range of workplace tasks over sufficient time to demonstrate handling of a range of contingencies
* written and/or oral questioning to assess knowledge and understanding
* completion of workplace documentation
* third-party reports from experienced practitioners
* completion of self-paced learning materials including personal reflection and feedback from trainer, coach or supervisor.
 |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:* interpretation of reports, working drawings and specifications
* nature of materials and effect of performance
* relevant national, state or territory legislation and local government policies and procedures
* OHS requirements relevant to civil construction and operational works
* civil construction requirements
* methods of testing raw materials.
 |
| Underpinning Skills | Demonstrates skills to:* placing and handling concrete and cement
* construction
* supervisory and leadership skills
* communication
* literacy and numeracy skills
* time management
* priority management
* planning and organizing
* contingency management
* reading plans and calculating measurements
 |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:* Interview / Written Test / Oral Questioning
* Observation / Demonstration
 |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level IV** |
| **Unit Title**  | **Perform advanced water quality testes** |
| **Unit Code** | [EIS WSO4 04 0217](#EIS_WSO4_04_1116)  |
| **Unit Descriptor** | This unit describes the skills required to perform laboratory tests using standard methods and procedures and with access to readily available advice. |

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| **Elements** | **Performance Criteria** |
| 1. Prepare samples for testing | 1.1 Identify samples to be collected.1.2 Collect samples ensuring that types, locations and times comply with requirements.1.3 Maintain integrity of samples during sampling.1.4 Assess and report abnormal characteristics and apply incident management principles.1.5 Label, register and record laboratory ***samples preparation*** ensuring that the required information is transcribed accurately and legibly.1.6 Identify samples to be tested, appropriate test method, equipment and safety requirements. |
| 2. Prepare for laboratory testing | 2.1 Set up test equipment and/or reagents in accordance with the specified test method.2.2 Conduct pre-use and safety checks.2.3 Identify and report faulty or unsafe equipment to appropriate personnel ***off-site/laboratory advanced tests for wastewater*** 2.4 Check the calibration status of equipment and conduct calibration or report calibration requirements to appropriate personnel. |
| 3. Perform tests on samples | 3.1 Preserve the integrity of samples ***tests for drinking water*** and eliminate the possibility of cross-contamination.3.2 Identify, prepare, and weigh or measure sample and standards to be tested.3.3 Follow test methods and perform sequence of tests using safety equipment. 3.4 Perform calculations.3.5 Shut down equipment.3.6 Store unused reagents and dispose of wastes as required by relevant regulations and codes. 3.7 Clean and store equipment. |
| 4. Finalize work | 4.1 Apply chain of custody principles.4.2 Record results.4.3 Identify and report ‘out of specification’ or atypical results.4.4 Report observations or measurements requiring further action.4.5 Clear and restore work area.  |

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| **Variable** | **Range** |
| sample preparation  | * May include:
* sub sampling
* dilution
* filtration
* digestion
* mixing/agitation
* heating/cooling
* neutralization/ quenching
 |
| Off-site/laboratory advanced tests for wastewater  | * May include:
* chlorine
* free ammonia
* color
* redox
* Sludge Volume Index
* alkalinity
* settle ability
* Mixed Liquor Suspended Solids
* Chemical Oxygen Demand, Biochemical Oxygen Demand
* total organic carbon
* nutrient testing
* filamentous organisms
* spectro photometric analysis
* potentiometric analysis
* colorimetric comparators
* volumetric analysis
* microscopy
* gravimetric analysis
 |
| tests for drinking water  | * May include:
* taste and odor
* chlorine
* free ammonia
* color redox
* UV absorbance and transmittance
* nutrient testing
* fluoride
* iron
* manganese
* microscopy
* Silt Density Index
* gravimetric analysis
* aluminium
* alkalinity
* hardness
* jar testing
* spectrophotometric analysis
* potentiometric analysis
* colorimetric comparators
* volumetric analysis
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| **Evidence Guide** |
| Critical aspects of Competence | Assessment requires evidence that the candidate:* comparing sample description with the specification, record results and report discrepancies
* adopting hygienic work practices
* limiting hazards and contamination to self, work area and environment
* using laboratory safety equipment and personal protective equipment
* interpreting laboratory test methods
* interpreting policies, procedures and standards
* interpreting and recording test results, including calculation of results from test data where required
* using potentiometric, ion selective, spectrophotometric, volumetric and gravimetric laboratory equipment
* performing sub-sample and testing products
* labelling samples for testing
* registering and preserving samples
* selecting the correct equipment and checking equipment performance
* maintaining a safe work environment
 |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:* purpose of tests
* principles of the standard method
* calibration and/or pre-use equipment checks and their basis
* relevant standards and specifications and their interpretation
* source of uncertainty in measurements and methods for control
* importance and appropriate use of certified reference materials
* procedures for recognition of unexpected or unusual results and likely causes
* WHS for sample and testing
* safety data sheets
 |
| Underpinning Skills | Demonstrates skills to:* producing laboratory reports and logs
* calibrate and use laboratory equipments
* use relevant standards , specifications and their interpretation
* use important and appropriate use of certified reference materials
 |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:* Interview / Written Test / Oral Questioning
* Observation / Demonstration
 |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level IV** |
| **Unit Title**  | **Develop an operation plan** |
| **Unit Code** | **[EIS WSO4 05 0217](#EIS_WSO4_05_1116)**  |
| **Unit Descriptor** | This unit describes the performance outcomes, skills and knowledge required to implement the operational plan by monitoring and adjusting operational performance, producing short term plans for the department/section, planning and acquiring resources and providing reports on performance as required. |

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| **Elements** | **Performance Criteria** |
| 1. Prepare and Develop operational plan | 1. Details of resource requirements are collated, analyzed and organized in consultation with relevant personnel, colleagues and specialist resource managers.
2. Operational plans are implemented to contribute to the achievement of organization’s performance/business plan
3. Key performance indicators (KPIs) are identified and used to monitor operational performance
4. Contingency planning and consultation processes are undertaken.
5. Assistance is provided in the development and presentation of proposals for resource requirements in line with operational planning processes.
 |
| 2. Implement resource acquisition | 1. Employees are recruited and inducted within organization’s policies, practices and procedures.
2. Plans are implemented for acquisition of physical resources and services within organization’s policies, practices and procedures and in consultation with relevant personnel.
 |
| 3. Monitor operational performance | 1. Performance systems and processes are monitored to assess progress in achieving profit/productivity plans and targets.
2. Budget and actual financial information are analyzed and used to monitor profit/productivity performance.
3. Unsatisfactory performance is identified and prompts action taken to rectify the situation according to organizational policies.
4. Mentoring, coaching and supervision are provided to support individuals and teams to use resources effectively, economically and safely.
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| **Variable** | **Range** |
| Resource requirements | * May include:
* goods and services to be purchased and ordered
* human, physical and financial resources - both current and projected
* stock requirements and requisitions
 |
| Relevant personnel***,*** colleagues and specialist resource managers | * May include:
* colleagues and specialist resource managers
* managers
* occupational health and safety committees and other people with specialist responsibilities
* other employees
* people from a wide range of social, cultural and ethnic backgrounds, and people with a range of physical and mental abilities
* supervisors
 |
| Operational plans | * May include:
* organizational plans
* tactical plans developed by the department or section to detail product and service performance
 |
| Key performance indicators | * May include:
* measures for monitoring or evaluating the efficiency or effectiveness of a system, and which may be used to demonstrate accountability and to identify areas for improvements
 |
| Contingency planning | * May include:
* contracting out or outsourcing human resources and other functions or tasks
* diversification of outcomes
* finding cheaper or lower quality raw materials and consumables
* increasing sales or production
* recycling and re-use
* rental, hire purchase or alternative means of procurement of required materials, equipment and stock
* restructuring of organization to reduce labor costs
* risk identification, assessment and management processes
* seeking further funding
* strategies for reducing costs, wastage, stock or consumables
* succession planning
* restructuring of organization to reduce labor costs
* risk identification, assessment and management processes
* seeking further funding
* strategies for reducing costs, wastage, stock or consumables
 |
| Consultation processes | * May include:
* mechanisms used to provide feedback to the work team in relation to outcomes of consultation
* meetings, interviews, brainstorming sessions, email/intranet communications, newsletters or other processes and devices which ensure that all employees have the opportunity to contribute to team and individual operational plans
 |
| Organization’s policies***,*** practices and procedures | * May include:
* organizational culture
* Standard Operating Procedures
* organizational guidelines which govern and prescribe operational functions, such as the acquisition and management of human and physical resources
* undocumented practices in line with organizational operations
 |
| Performance systems and processes***:*** | * May include:
* informal systems used by frontline managers for the work team in the place of existing organisation-wide systems
* formal processes within the organisation to measure performance, such as:
* feedback arrangements
* individual and teamwork plans
* KPIs
* specified work outcomes
 |
| Designated persons***/***groups | * May include:
* other affected work groups or teams and groups designated in workplace policies and procedures
* those who have the authority to make decisions and/or recommendations about operations such as workplace supervisors, other managers
 |
| Systems***,*** procedures and records | * May include:
* databases and other recording mechanisms for ensuring records are kept in accordance with organizational requirements
* individual and team performance plans
* organizational policies and procedures relative to performance
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| **Evidence Guide** |
| Critical aspects of Competence | * Assessment requires evidence that the candidate:
* monitored and adjusted operational performance, produce short-term plans for the department or section, plan and acquire resources, and provide reports on performance as required
* monitored and implemented operations and procedures
 |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:* principles and techniques associated with:
* contingency planning
* methods for monitoring and reporting on performance
* monitoring and implementing operations and procedures
* problem identification and methods of resolution
* relevant budgeting and financial analysis, interpretation and reporting requirements
* resource management systems at the tactical implementation level
* resource planning and acquisition
* tactical risk analysis including identification and reporting requirements
 |
| Underpinning Skills | Demonstrates skills to:* coaching and mentoring skills to provide support to colleagues
* literacy skills to access and use workplace information, and to prepare reports
* planning and organizing skills to monitor performance and to sequence work of self and others to achieve planned outcomes
 |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:Interview / Written Test / Oral QuestioningObservation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level IV** |
| **Unit Title**  | **Undertake surveying of monitoring sites** |
| **Unit Code** | **[EIS WSO4 06 0217](#EIS_WSO4_06_1116)** |
| **Unit Descriptor** | This unit of competence specifies the outcomes required to collect data using basic global positioning system (GPS) equipment and to be able to use suitable software to communicate with a GPS receiver. It requires the ability to combine technical application in a team environment with sound communication skills. Functions would be carried out under limited supervision and within organizational guidelines |

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| **Elements** | **Performance Criteria** |
| 1. Plan and prepare
 | 1.1 Work instructions are confirmed and applied1.2 Safety requirements are obtained from the site safety plan, other regulatory specifications or legal obligations and applied1.3 Measuring and calculating equipment selected to carry out tasks are consistent with the requirements of the job, checked for serviceability and any faults are rectified or reported |
| 1. Prepare for GPS data collection.
 | 2.1 A data collection plan is developed, detailing key activities and timelines, which are scheduled with full consideration of the ***specifications*** and team activity. 2.2 ***Organizational GPS survey requirements*** are complied with and recorded.2.3 ***Equipment*** is prepared for the survey with consideration of the specific ***project parameters and requirements***. 2.4 Designated responsibilities are communicated to and by ***relevant personnel*** to ensure clarity of understanding of the work and to provide a basis for ongoing data assessment. 2.5 Skills and knowledge are updated to accommodate changes in GPS equipment. |
| 1. Collect GPS data.
 | 3.1 **GPS** equipment is operated according to ***manufacturer specifications*** and ***organizational guidelines***. 3.2 ***Point positional data*** is collected and related to a reference system based on specifications. 3.3 GPS data is collected using methodologies detailed in the data collection plan. 3.4 Conditions for obtaining optimum GPS positions are determined. 3.5 Basic methods to improve the accuracy of GPS point positioning are recognized and used. 3.6 GPS measurements are ***validated*** and recorded on the ***reference system*** according to the project specifications. 3.7 Any discrepancies between specifications and actual activities are identified and addressed. 3.8 ***OHS*** requirements are adhered to. 3.9 GPS equipment is operated according to manufacturer specifications and organizational guidelines. 1.3 The plan scale, contour interval, and level of detail are identified in accordance with job requirements. |
| 1. Finalize the collection process.
 | 4.1 Basic ***GPS software*** is used to communicate with basic GPS receivers. 4.2 GPS software is used to determine ***required information***. 4.3 Measured GPS data is compared against design. 4.4 Checks are completed according to organizational requirements.4.5 All ***required documentation*** is completed according to organizational guidelines. 4.6 Appropriate software is used to process the data in order to determine required information, according to organizational guidelines. |

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| **Variable** | **Range** |
| Specifications  | May include:* detailed technical descriptions of survey data and its requirements,
* Preparation of cross-sections and plans with all information included.
 |
| Organizational GPS survey requirements  | May include:* administration (e.g. postcodes, suburbs, and federal and state electoral counties) ,
* analysis of environmental, land and geographic information ,
* asset management,
* cartographic services ,
* integrated services – environmental, land and geographic related datasets ,
* mapping facilities ,
* programming GPS ,
* site analysis ,
* survey marks ,
* sewerage telecommunications
 |
| Equipment  | May include:* GPS receiver ,Associated equipment capable of differential and real time modes of operations
 |
| Project parameters and requirements  | May include:* Coordinate systems, datum, display formats, information displays, Outputs.
 |
| Relevant personnel  | May include:* colleagues ,
* registered surveyors ,
* site personnel ,
* staff or employee representatives ,
* supervisors or line managers ,
* suppliers ,
* Users.
 |
| GPS | May include:* hand held
* radian IS
 |
| Manufacturer specifications  | May include:* equipment specifications,
* Operator manuals
 |
| Organizational guidelines  | May include:* appropriate timelines ,
* code of ethics ,
* company policy ,
* final product formats ,
* formal design parameters ,
* legislation relevant to the work or service function, including equal employment opportunity (EEO)
* manuals ,
* OHS policies and procedures ,
* personnel practices and guidelines
* outlining teamwork,
* work roles and responsibilities ,
* Requirements for data processing.
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| **Evidence Guide** |
| Critical aspects of Competence | Assessment requires evidence that the candidate:* locating features on maps and plans, finding survey reference marks and plotting locations
* preparing, setting up and operating surveying equipment
* preparing and loading surveying equipment for transportation
* maintaining surveying equipment
* preparing and holding staves
* measuring horizontal distance by stadia
* identifying physically survey reference mark
* applying sightings and standard error checks
* gathering and interpreting complex documentation
* applying documentation to the development and maintenance of rating curves
* analysing and verifying data using standard procedures, softwares and databases
* applying a defined range of skills
* applying known solutions to a range of predictable problems
* assessing and recording information from varied sources
* demonstrating operational knowledge in a moderate range of areas
* performing a range of tasks where choice between a limited range of options is required
* taking responsibility for own outputs in work and learning
* applying data security and backup measures
* dealing with contingencies
* storing and retrieving basic spatial data
* using an index system
* preparing clear and accurate reports
* capturing, storing and archiving data
* identifying, reporting and providing solutions to a range of flow conditions
* using a GPS
* applying appropriate datum and projections
* carrying out collimation test to check accuracy
 |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:* mathematical and other scientific techniques relevant to the analysis of hydrographic data
* interaction of physico-chemical parameters of the process being monitored and the impact on data being recorded
* sensor and/or system characteristics and signal processing and/or algorithms, specifically with chemical sensors
* computer software relevant to the analysis and archiving of hydrographic data
* basic data collection methods using electronic equipment
* spatial and a spatial data acquisition using electronic equipment
* equipment capabilities, limitations and potential problems
* basic organizational policies and guidelines, such as OHS guidelines
* basic characteristics, capabilities and limitations of tools, technology and equipment used.
* classification systems, processes and products linked to specifications
* corporate information database environment (basic)
* current indexing systems
* basic data collection and retrieval methods, querying and browsing
* network and security guidelines
* organizational policies and guidelines, such as OHS guidelines
* reference systems and their relationship to each other
* risk management principles as applied to operational spatial data storage
* spatial a spatial data acquisition formats (basic)
* spatial data management practices (basic
* water sampling and testing procedures
* procedures for use of remote contact communication systems
 |
| Underpinning Skills | Demonstrates skills to:* ability to relate to people from a range of social, cultural and ethnic backgrounds and with a range of physical and mental abilities
* analytical skills (basic)
* communication skills to:
* discuss vocational issues effectively with colleagues
* impart knowledge and ideas through oral, written and visual means
* computer skills (technical user level) including
* ability to use basic networking
* literacy skills to:
* assess and use workplace information
* interpret and understand legal, financial and procedural requirements
* process workplace documentation
* read and record data
* numeracy skills to:
* accurately record and collate
* undertake basic computations
* organizational skills to prioritize daily activities
* spatial skills to:
* apply understanding of height, depth, breadth, dimension and position to actual operational activity and virtual representation
* perform basic spatial and a spatial data collection in an accurate manner
* use spatial information technology to perform basic data collection
* exercise precision and accuracy in relation to basic design application
* work effectively as part of a team
* use a range of equipment in the field safely, accurately and as required for the task
* problem solving (basic)
 |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:* Interview / Written Test / Oral Questioning
* Observation / Demonstration
 |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level IV** |
| **Unit Title**  | **Assess and optimize chemical dosing process**  |
| **Unit Code** | **[EIS WSO4 07 1116](#EIS_WSO4_07_1116)**  |
| **Unit Descriptor** | This unit describes the skills required to review, coordinate and optimise chemical addition processes and to evaluate and report on system performance and process quality control. |

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| **Elements** | **Performance Criteria** |
| 1. Evaluate chemical addition process performance | 1.1 Review existing process performance data against relevant organizational and legislative requirements.1.2 Identify the impact of **changing raw or influent water quality** on chemical addition processes.1.3 Identify and coordinate any additional sampling and **testing** required for valid evaluation of current process performance. |
| 2. Investigate chemical addition plant configuration | 2.1 Review existing fault reports and other plant asset information.2.2 Investigate the operational status of **plant components** with reference to **manufacturer and plant designer specifications**.2.3 Carry out plant configuration investigations to identify potential deficiencies. |
| 3. Investigate chemical options for process optimization | 3.1 Review current chemical addition practices with reference to organizational procedures to identify potential deficiencies.3.2 Investigate dosing options for current chemicals.3.3 Identify and investigate new or additional **chemicals** and related dosing options. |
| 4. Develop and record a plan for process optimization | 4.1 Determine **plant configuration** or chemical options for process optimization.4.2 Plan a trial to test the performance of the determined optimization options.4.3 Compile report with recommendations on optimization options. |

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| **Variable** | **Range** |
| Testing | * May include:
* jar testing
* flocculation growth
* mixing energy
* UV absorbance
* pH
* color
* turbidity
* residual aluminium or iron
* quality of treatment chemicals
 |
| Plant components | * May include:
* mixing equipment
* streaming current detector
* dosing pumps
* chemical injection equipment
* turbidity meter
* particle counter
 |
| Manufacturers' and plant designers' specifications | * May include:
* dosing pump capacity and calibration charts
* detention times
* mixing intensity for flash or rapid mixing and flocculation
 |
| Chemicals | * May include:
* Polyaluminium chloride (PACL)
* aluminium sulphate
* aluminium chlorohydrate (ACH)
* ferric chloride
* ferric sulphate
* polyDADMAC
* polyacrylamide
* sulphuric acid
* hydrated lime
* caustic soda
 |
| Plant configuration | * May include:
* location of chemical dosing points
* mixing or reaction detention times
* type of mixer or impeller
 |
| Organizational or legislative requirements | * May include:
* organizational performance quality standards
* standard operating procedures
* quality assurance guidelines
* federal, state and local environmental and water quality legislation
* occupational health and safety requirements
* water quality standards and guidelines
 |
| Changing raw water quality | * May include:
* pH
* turbidity
* color
* presence of algae
* temperature
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| **Evidence Guide** |
| Critical aspects of Competence | Assessment requires evidence that the candidate:* conducting investigations and reporting on operational and control system problems
* coordinating sampling and testing including at least one of:
* jar testing
* flocculation growth
* mixing energy
* UV absorbance
* pH
* colour
* turbidity
* residual inorganic compounds
* alkalinity
* conductivity
* assessing quality of treatment chemicals by conducting a full range of jar tests
* performing mathematical calculations to provide data for the analysis and development of options and solutions
* investigating chemical dosing
* interpreting a range of complex and technical documents, including at least one of:
* regulatory, legislative, licensing and organizational requirements
* codes and standards
* specifications
* organizational policies
* articulating complex ideas
* analyzing and evaluating reports and reference materials
* analyzing problems and recommending appropriate remedial solutions
* identifying and responding to risks and hazards
* identifying opportunities for improved water treatment
* reviewing existing process performance with reference to historical data, differences in raw water quality and plant configuration including at least one of:
* pH
* turbidity
* color
* presence of algae
* temperature
* identifying data deficiencies and plan additional data collection through appropriate sampling and testing
* assessing fault reports and investigating the current operational status of plant components
* investigating current and potential chemical addition practices
* planning trials to test the performance of the determined optimization options and compiling recommendation reports
 |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:* the role of chemical addition in water treatment
* the principles of chemical addition, including enhanced coagulation
* chemical addition plant and equipment and system layout including:
* mixing equipment
* streaming current detector
* dosing pumps
* chemical injection equipment
* turbidity meter
* particle counter
* flow meters
* chemical concepts and reactions relevant to chemical addition processes, including pH and alkalinity
* range and characteristics of chemicals used in chemical addition processes including:
* polyaluminium chloride (PACL)
* aluminium sulphate
* aluminium chlorohydrate (ACH)
* ferric chloride
* ferric sulphate
* polyDADMAC
* polyacrylamide
* sulphuric acid
* hydrated lime
* caustic soda
* functions of various chemicals in chemical addition processes
* factors influencing the effectiveness of chemicals in chemical addition processes
* factors affecting the selection of chemicals in chemical addition processes
* range of appropriate measuring and testing procedures
* investigation procedures
* risk management principles
* locating chemical dosing points including at least one of:
* mixing or reaction detention times
* type of mixer or impeller
* customer expectations and requirements
* dosing pump capacity and calibration chart including:
* detention times
* mixing intensity for flash or rapid mixing and flocculation
 |
| Underpinning Skills | Demonstrates skills to:* investigate and report on operational and control system problems
* coordinate sampling and testing
* conduct a full range of jar tests covering various water quality scenarios
* perform mathematical calculations to provide data for the analysis and development of options and solutions
* investigate chemical dosing
* interpret plans, charts and instructions
* operate control and communication systems
* use safety and personal protective equipment
* communicate with colleagues, consultants and suppliers
* produce optimization reports
* interpret a range of complex and technical documents, including relevant:
* regulatory, legislative, licensing and organizational requirements
* codes and standards
* specifications
* organizational policies
* articulate complex ideas clearly
* Analyze and evaluate reports and reference materials
* work collaboratively with relevant stakeholders and team members
* Analyses problems and recommend appropriate remedial solutions
* identify and respond to risks and hazards
* identify opportunities for improved water management
* participate in the provision of appropriate information to inform workplace processes
* manage work priorities
* use information effectively to improve work performance
 |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:* Interview / Written Test / Oral Questioning
* Observation / Demonstration
 |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level IV** |
| **Unit Title**  | **Prepare estimates, quotes and tenders** |
| **Unit Code** | **[EIS WSO4 08 0217](#EIS_WSO4_08_1116)** |
| **Unit Descriptor** | This unit covers the processes involved with preparation of estimates, quote and tenders and defines the standard and submit the completed tender to the client with supporting information including details of organizations previous work and client feedback; seek feedback from the client to ensure information supplied is sufficient. |

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| **Elements** | **Performance Criteria** |
| 1. Carry out preliminary planning activities for estimating, quoting and/or tendering | 1.1.***Nature and scope of the project*** are identified in consultation with the client according to enterprise policy.1.2.Format, specifications and deadline for submission of the estimate, quote or tender are identified and confirmed with the client.1.3.Available relevant documentation is obtained and interpreted.1.4.Project site is inspected and reconciled with scaled drawings, project and other site plans in consultation with the client, agent or other authority. |
| 2. Determine resource requirements | 2.1.Detailed project information and monetary sums are interpreted and recorded from client specifications.2.2.Size, type and quantity of required project resources are identified and estimated according to client specifications.2.3.Sources are identified and evaluated for the procurement of suitable project resources consistent with client requirements.2.4.Appropriate tools and equipment are selected and used to calculate the correct size, type and quantity of each resource item.2.5.Unit and total cost for each resource item are calculated and documented.2.6.Necessary and appropriate contingency sums to complete the estimate, quote or tender are interpreted and documented.2.7.Calculations are accurately recorded on a price summary sheet. |
| 3. Prepare schedules for the estimate, quote or tender | 3.1.Works schedule is documented according to client specifications.3.2.Scheduling of resources is accurately documented consistent with the requirements of the works schedule.3.3.Scheduling of financial requirements is accurately documented according to enterprise guidelines. |
| 4. Prepare and document the estimate, quote or tender for submission to the client | 4.1.Estimate, quote or tender price is calculated and checked according to enterprise guidelines.4.2.Costed summaries and works, resource and financial schedules are compiled according to client specifications.4.3.Quality assurance requirements, enterprise customer service procedures, conventional formatting and industry standards are strictly adhered to in the development of documentation.4.4.Total estimate, quotation and/or tender is completed accurately and submitted to the client within the specified deadline.4.5.Further information is provided and adjustments made according to client requirements. |

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| **Variable** | **Range** |
| Nature and scope of the project | May include:* type of source
* method of supply
* source of project cost
* Topography
* distance of source from the target supply area
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| **Evidence Guide** |
| Critical aspects of Competence | Assessment requires evidence that the candidate:* research the details of the quoted service and clarify with the client
* identify requirements for estimate, quote or tender including format, specifications and deadline for submission
* identify and cost the resources and services required to fulfil the tender and check for availability
* investigate options for supplies, services, contractors and consultants with current pricing structures and availability
* develop a work schedule with timelines and expenditure
* consider potential problems and risks and develop contingency plans
* develop detailed costing sheets with the final quoted cost, including an estimated margin for risk
* submit the completed tender to the client with supporting information including details of organizations previous work and client feedback
* seek feedback from the client to ensure information supplied is sufficient.
 |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:* relevant State and Federal legislation, awards, enterprise agreements and management policies relating to labour hire and employment terms
* current pricing structures and options for supplies, services, contractors and consultants
* enterprise and industry standards and practices for formatting, organizing and presenting financial and quantitative information
* business ethics in relation to confidentiality and the tendering process.
 |
| Underpinning Skills | Demonstrates skills to:* research and evaluate information
* comply with legislative requirements
* use literacy skills to fulfill job roles as required by the organization. The level of skill may range from reading and understanding documentation to completion of written reports
* use oral communication skills/language competence to fulfill the job role as specified by the organization including questioning, active listening, asking for clarification, negotiating solutions and responding to a range of views
* use numeracy skills to estimate, calculate and record complex workplace measures
* use interpersonal skills to work with others and relate to people from a range of cultural, social and religious backgrounds and with a range of physical and mental abilities.
 |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:* Interview / Written Test / Oral Questioning
* Observation / Demonstration
 |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level IV** |
| **Unit Title**  | **Asses and optimize treatment process of sedimentation** **and Granular Media Filtration** |
| **Unit Code** | **[EIS WSO4 09 0217](#EIS_WSO4_09_1116)**  |
| **Unit Descriptor** | This unit describes the skills required to evaluate system performance and investigate and report on the optimisation of sedimentation, clarification andGranular Media Filtration processes. |

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| **Elements** | **Performance Criteria** |
| 1. Plan and prepare for work | 1.1 Determine work requirements relevant to organizational or  legislative requirements.1.2 Select and check equipment to meet safety requirements of task and site.1.3 Select, fit and use personal protective equipment. |
| 2. Investigate, Operate and control process | 2.1 Carry out routine inspection and Existing fault reports on assets and reviewing other relevant plant asset information. 2.2 Collect process samples from sedimentation, clarification and final filtrate.2.3 Carry out routine tests from sedimentation, clarification and final filtrate.2.4 Prepare samples for laboratory testing from sedimentation, clarification and final filtrate.2.5 Identify and report process faults and operational condition of assets.2.6 Carry out basic **processes** adjustments to enhance process performance.2.7 Monitor processes to maintain parameters of operation. 2.8 Existing fault reports and other relevant plant asset information are reviewed.2.9 The operational status of plant components is investigated  with reference to manufacturers' and plant designers'  specifications. |
| 3. Investigate the operational options for process optimization | 3.1 Relevant fault and incident reports are reviewed and remedial  actions taken.3.2 Current media status is investigated with reference to  manufacturers' or plant designers' specifications.3.3 Potential changes to operational processes are investigated  to identify possible optimization strategies. |
| 4. Complete documentation | 3.1 Collect and record and complete process data.3.2 Identify data that falls outside normal parameters and report for further action |

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| **Variable** | **Range** |
| Processes  | * May include:
* sedimentation and clarification
* slow granular media filters
* conventional granular media filters
* pressure and gravity granular media filters
 |
| Plant components  | * May include:
* valves
* blower
* wash water troughs
* under drain system
* nozzles and air scour components
* control systems
* filter cell
* surface washers
* turbidity meter
* particle counter
 |
| Media status  | * May include:
* regularity of surface
* media profile
* media depth
* media uniformity
* solids retention profile
* presence of contaminants
 |
| Potential changes to operational processes  | * May include:
* backwash rates, times and sequence
* filtration rates
* air scour rate and time
* filter aid addition
* storage of offline filters
 |
| Testing  | * May include:
* turbidity
* true color
* filter run profile
* particle counting
* head loss
* media expansion rates
* solids retention profile
 |

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| **Evidence Guide** |
| Critical aspects of Competence | Assessment requires evidence that the candidate:* identifying and reporting faults
* conducting routine plant inspections on asset conditions
* assess faults and incident reports and investigate the status of filtration plant components and media
* investigate potential changes to filtration operational processes to identify possible optimization strategies
* plan trials to test the performance of the determined filtration optimization options and compile reports making recommendations
* taking samples and performing basic tests, including at least one of:
* jar testing
* odour analysis
* UV274
* applying basic process formulae including at least one of:
* dosage (PAC)
* empty bed contact time
* bed expansion
* backwash flow rates (BAC, GAC)
* making basic process adjustments according to instructions including at least one of:
* dosage
* flow rate
* detention time (PAC)
* backwash flow rate
* backwash frequency
* process flow rate (BAC, GAC)
 |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:* principles that form the basis of granular media filtration processes
* environmental legislation requirements for water quality and environmental protection
* types of filters and their range of applications, conditions for use and manufacturers' requirements
* backwash principles and optimization
* filter run profiles
* the range and performance of filter aids
* filter media properties and selection
* filter inspection and sampling
* principles of filter maintenance, including cleaning filters, double backwashes, surface cleaning, lancing, caustic washing
* filter ripening and turbidity breakthrough
* pilot filters
* system layout
* pumping and valving systems
* risk factors and potential hazards associated with activated carbon
* adsorption principles
* principles that form the basis of activated carbon processes
* water quality characteristics
* TOC, DOC, AOC, BDOC
* features and components of activated carbon including feeders
 |
| Underpinning Skills | Demonstrates skills to:* conduct system investigation and report on operational or control system problems
* coordinate clarification and filter inspection, sampling and testing
* conduct trend analysis for long term Clarification and filter monitoring
* perform calculations to provide data for the analysis and development of options and solutions, such as backwash rates and filtration rates
* determine filter run and backwash profiles and times
* operate control and communication systems
* use safety and personal protective equipment
* communicate with colleagues, consultants and suppliers
* produce optimization reports
* interpret a range of complex and technical documents, including relevant:
* regulatory, legislative, licensing and organizational requirements
* codes and standards
* specifications
* organizational policies
* articulate complex ideas clearly
* work collaboratively with relevant stakeholders and team members
* Analyses problems and recommend appropriate remedial solutions
* identify risks and hazards
* identify opportunities for improved water management
* participate in the provision of appropriate information to inform workplace processes
* manage work priorities
* use information effectively to improve work performance
 |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:* Interview / Written Test / Oral Questioning
* Observation / Demonstration
 |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level IV** |
| **Unit Title**  |  **Assess and improve wastewater processes to control microbial impacts** |
| **Unit Code** | [EIS WSO4 10 0217](#EIS_WSO4_10_1116)  |
| **Unit Descriptor** | This unit describes the skills required to identify wastewater microorganisms and select appropriate measures to optimise the growth of beneficial microorganisms. |

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| **Elements** | **Performance Criteria** |
| 1. Investigate wastewater microorganisms | 1.1 Identify a range of typical **wastewater microorganisms**.1.2 Identify the **general characteristics** of different types of microorganisms.1.3 Identify **wastewater characteristics** that impact on microorganism growth.1.4 Identify the **problems caused by microorganisms** in specific wastewater treatment processes. |
| 2. Select strategies to optimize the growth of beneficial microorganisms | 2.1.The cause of effluent quality issues is investigated with  reference to organizational and legislative requirements.2.2.The operational status of the wastewater treatment process is  investigated with reference to manufacturers' or plant  designers' specifications.2.3. The effectiveness of various process control strategies is  assessed to optimize the growth of beneficial microorganisms  and the most appropriate method is selected. |
| 3. Identify and report on appropriate process controls | 3.1 Identify treatment process conditions for optimizing the growth of beneficial microorganisms.3.2 Report on appropriate treatment processes and associated sampling and testing requirements. |

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| **Variable** | **Range** |
| Wastewater microorganisms  | * May include:
* fungi
* bacteria:
* aerobic
* anaerobic
* facultative
* autotrophs
* heterotrophs
* filament and foam causing
* protozoa
* amoebae
* ciliates
* flagellates
* metazoa
* algae
* cyanobacteria
* helminths
 |
| General characteristics  | * May include:
* evolutionary development
* source
* structure
* life cycle
* growth rates and requirements
 |
| Wastewater characteristics  | * May include:
* presence of inhibitory substances, such as heavy metals, synthetic organics
* nutrients - macro and micro
* temperature
* dissolved oxygen
* organic loading
* pH
 |
| Problems caused by microorganisms  | * May include:
* bulking
* foaming
* inefficient nitrogen or phosphorus removal
* lack of nitrification
* high effluent suspended solids or biological oxygen demand (BOD)
* volatile solids reduction
* volatile acids to alkalinity ratio
* gas production rate - methane, carbon dioxide
 |
| Organisational and legislative requirements  | * May include:
* organizational performance standards
* standard operating procedures
* quality assurance
* federal, state and local environmental and water quality legislation
 |
| Manufacturers' or plant designers' specifications  | * May include:
* Food: Microorganism (F:M) ratio
* Mean Cell Residues Time (MCRT)
* Mixed Liquor Suspended Solids (MLSS)
* phase timing in intermittent or batch processes
* temperature
* recirculation rates
 |
| Process control strategies  | * May include:
* Food: Microorganism (F:M) ratio
* Mean Cell Residues Time (MCRT)
* Mixed Liquor Suspended Solids (MLSS)
* return and waste activated sludge rates
* chemical and nutrient addition
* pre-treatment to remove inhibitory or toxic substances
* alkalinity and pH correction
* mixed liquor recycle rates
* phase timing in intermittent or batch processes
* recirculation rates
* addition of nutrients
* temperature
* pre-treatment to remove inhibitory or toxic substances
* alkalinity and pH correction
* chemical addition, such as:
* chlorine
* nutrients
* aluminium and iron salts
* flow or feed rate
* mixing rate
* sludge wastage rate
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| **Evidence Guide** |
| Critical aspects of Competence | Assessment requires evidence that the candidate:* interpreting a range of complex and technical documents, including:
* regulatory, legislative, licensing and organizational requirements
* codes and standards
* specifications
* organizational policies
* Identifying a range of wastewater microorganisms, and their general characteristics and types of problems caused
* Identifying effluent quality and select process control strategies to optimize the growth of beneficial microorganisms
* Prepare reports outlining the optimum treatment for various microorganisms including measures to ensure validity
 |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:* types, lifecycle, characteristics of wastewater microorganisms
* operational problems caused by wastewater microorganisms
* effluent quality problems caused by wastewater microorganisms
* relevant legislation, standards and workplace policies and procedures
* principles of wastewater treatment processes
* process control strategies
* properties and mode of action of chemical additives
 |
| Underpinning Skills | Demonstrates skills to:* interpret a range of complex and technical documents, including relevant:
* regulatory, legislative, licensing and organizational requirements
* codes and standards
* specifications
* organizational policies
* communicate effectively with a range of relevant parties
* articulate complex ideas clearly
* Analyses and evaluate reports and reference materials
* work collaboratively with stakeholders and team members
* Analyses problems and apply appropriate remedial solutions
* perform various mathematical calculations to provide data for the analysis and development of options and solutions
* identify hazards and develop appropriate responses to control and mitigate risks in accordance with regulations and legislation
* participate in the provision of appropriate information to inform workplace processes
* apply capabilities and limitations of plant, equipment and tools
* manage work priorities
* use information effectively to improve work performance
 |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:Interview / Written Test / Oral QuestioningObservation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level IV** |
| **Unit Title**  | **Coordinate implementation of customer service strategies** |
| **Unit Code** | **[EIS WSO4 11 0217](#EIS_WSO4_11_1116)** |
| **Unit Descriptor** | This unit describes the skills and knowledge required to advise, carry out and evaluate customer service strategies. It applies to individuals who have well developed skills and a broad knowledge of customer service strategies for addressing customer needs and problems, and who may provide guidance or delegate work related tasks to others. |

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| **Elements** | **Performance Criteria** |
| 1 Advise on customer service needs | 1.1 Clarify and accurately assess customer needs using appropriate ***communication techniques***1.2 Diagnose problems matching service delivery to customers and develop options for improved service within organisational requirements1.3 Provide relevant and constructive advice to promote the improvement of customer service delivery1.4 Use business technology and/or online services to structure and present information on ***customer service*** needs |
| 2 Support implementation of customer service strategies | 2.1 Ensure customer service strategies and opportunities are promoted to designated individuals and groups2.2 Identify and allocate available budget resources to fulfil customer service objectives2.3 Promptly action procedures to resolve customer difficulties and complaints within organisational requirements2.4 Ensure that decisions to implement strategies are taken in consultation with designated individuals and groups |
| 3 Evaluate and report on customer service | 3.1 Review client satisfaction with service delivery using verifiable data in accordance with organisational requirements3.2 Identify and report changes necessary to maintain service standards to designated individuals and groups3.3 Prepare conclusions and recommendations from verifiable evidence and provide constructive advice on future directions of client service strategies3.4 Maintain systems, records and reporting procedures to compare changes in customer satisfaction |

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| **Variable** | **Range** |
| communication techniques | May include:* Formal communication
* In formal communication
* using technologies such as e-mail, fax, telephone etc.
 |
| customer service | May include:* receiving and handling clients
* requesting needs
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| **Evidence Guide** |
| Critical aspects of Competence | Assessment requires evidence that the candidate:* identify the needs and priorities of the organisation in delivering services to customers
* diagnose problems in delivery of customer service
* respond to and report on customer feedback and complaints
* review client satisfaction using verifiable data
* consult and communicate effectively with relevant people
* develop and implement strategies and methods to improve customer service delivery including:
* budgeting
* promotion to staff
* documentation and follow up.
 |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:* outline the principles of customer service
* explain sources of information and techniques for identifying customer needs and reviewing customer satisfaction
* explain the organizational business structure, products and services related to customer service
* describe product and service standards and best practice models.
 |
| Underpinning Skills | Demonstrates skills to:* Reviews textual information and comprehends details that relate to the interests or requirements of the client and organization
* Creates a range of formal texts using structure, grammar and clear and specialized language to describe customer needs, maintain information and support a particular position
* Uses pace, intonation, intelligible pronunciation and listening and questioning techniques to interact effectively with others
* Recognizes and interprets numerical information and performs calculations on familiar mathematical information
* Recognizes and applies organizational protocols and meets expectations associated with own work
* Selects the appropriate form, channel and mode of communication for a specific purpose relevant to own role
* Uses a range of strategies to establish a sense of connection and build rapport with customers
* Collaborates with others contributing knowledge and skills to achieve joint outcomes
* Applies formal and logical processes when planning and implementing tasks
* Applies standard procedures when responding to familiar problems within own work context
* Uses digital technologies to access, organise, present and store information relevant to own role
 |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:* Interview / Written Test / Oral Questioning
* Observation / Demonstration
 |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level IV** |
| **Unit Title**  | **Test and Commission Water and Wastewater Collection and distribution Systems** |
| **Unit Code** | **[EIS WSO4 12 1116](#EIS_WSO4_12_1116)**  |
| **Unit Descriptor** | This unit of competency describes the outcomes required to plan and implement the testing and commissioning of water collection and distribution systems. The ability to interpret technical information, identify and assess hazards and perform technical testing procedures are essential to performance. |

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| **Elements** | **Performance Criteria** |
| 1 Plan and prepare for testing and commissioning of systems  | 1.1 Check plans for the section to be tested and locate featureson site.1.2 Identify and interpret the system operation requirementscorrectly.1.3. Select, Check and use testing tools &**equipment’s** for accuracy.1.4. Identify and assess potential hazards and take required preventative measures.1.5. Confirm testing and commissioning tasks from relevant documentation and scheduled appropriately.1.6. Check vacuum testing tasks from relevant documentation and schedule appropriately. |
| 2 Conduct pipeline and access structure testing and commissioning performance and Maintain water system hygiene | 2.1 Select and install tensioning and measuring equipment correctly.2.2 Select and fit gauges of the correct range to test equipment.2.3 Carry out testing procedures according to organizational and statutory requirements.2.4 Fill the distribution system slowly and flush systematically to expel air and debris.2.5 Locate failed pipes, joints and fittings accurately and reschedule reporting and testing.2.6 Accurately locate and report failed maintenance holes, inspection shafts, maintenance shafts or other access structures and rescheduled testing.2.7 Arrange disinfection according to organizational and statutory requirements.2.8. Flush and/or slug clean or swab the relevant section of the distribution system according to the required standard using approved techniques.2.9.Dispose of flushing according to organizational requirements |
| 3 Ensure testing the Water and wastewater collection and distribution system**.** | 3.1 Ensure the Collection and distribution system is operational according to specifications and organizational procedures.3.2 Restore the work site to meet environmental and organizational requirements.3.3 Check, maintain and store equipment tools and materials according to manufacturer guidelines and organizational procedures.3.4 Restore the work site to meet environmental and organizational requirements  |
| 4 Finalizing and reporting the documentation work | 4.1 Maintain workplace records according to organizational and statutory requirements.4.2 Maintain calibration records and certificates in accordance with organizational and statutory requirements4.3. Report all the activities according to the organizational requirement |

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| **Variable** | **Range** |
| System operation requirements | * May include:
* calibration certificates
* NATA certifications
 |
| Tools and equipment | * May include:
* hand and power tools
* lifting and winching equipment
* testing equipment
* communication equipment
* line plugs
* gauges
* personal protective equipment
 |
| Potential hazards | * May include:
* work in confined spaces
* work involving lifting and moving materials
* working in a trench
* health hazards associated with working in wastewater collections systems
 |
| Relevant documentation | * May include:
* manufacturer's specifications
* organizational procedures
 |
| Testing procedures | * May include:
* hydrostatic test
* vacuum test
* low pressure air test
 |
| Organisational and statutory requirements | * May include:
* by-laws
* organizational policies
* standard operating procedures
* environmental protection
* occupational health and safety guidelines for:
* lifts and cranes
* mines
* road signage code
* electrical
* dangerous goods
 |
| System operation requirements | * May include:
* calibration certificates
* NATA certifications
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| **Evidence Guide** |
| Critical aspects of Competence | Assessment requires evidence that the candidate:* planning the testing of water systems
* identifying and analyzing the testing requirements of the system from relevant plans and documentation
* preparing and checking testing equipment
* assessing risks and hazards and taking appropriate preventive measures
* using testing equipment correctly
* applying testing procedures accurately
* maintaining the quality of water in the system
* identifying and reporting faulty system components
* restoring the worksite
* making the system operational and conducting post-commissioning checks
* completing relevant documentation
* completing required reports and records
 |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:* General occupational health and safety on work sites
* The risk factors and potential hazards of test procedures
* Water hygiene and system disinfection requirements
* Characteristics of pipes, materials and fittings
* An overview of Water and wastewater system in water industry operations
* Layout and construction of wastewater collection systems
* Testing procedures for wastewater systems
* equipment operation
* environmental aspects of test procedures
* Relevant definitions, terminology, symbols and language

testing methods used for water distribution systems |
| Underpinning Skills | Demonstrates skills to:* communicates effectively and appropriately with colleagues and contractors
* communicates the implementation of OHS policies and procedures
* interprets and applies a range of technical documents including relevant:
* regulatory, legislative, licensing and organizational requirements
* codes and standards
* specifications
* organizational policies
* conducts test procedures
* identifies system faults
* uses test equipment
* monitors work processes and ensures safe work practices
* identifies reports and records hazards and risks
* uses personal protective equipment
* participates in ensuring compliance with standards, regulations and policies
* maintains and checks records and documents
 |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:* Interview / Written Test / Oral Questioning
* Observation / Demonstration
 |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level II**  |
| **Unit Title**  | **Facilitate the use of SCADA systems in a team or work area** |
| **Unit Code** | **[EIS WSS4 13 0217](#EIS_WSS4_13_1116)**  |
| **Unit Descriptor** | This unit of competency covers the skills and knowledge required by a team leader or technical expert to personally use and facilitate the use of System Control and Data Acquisition (SCADA), or other similar systems, and support the team in their use of SCADA. |

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| **Elements** | **Performance Criteria** |
| 1. Communicate and Make decisions using the SCADA system | 1.1. Send and receive information or messages using by ***SCADA***1.2 Interrogate the SCADA system to find required current, historical or predicted information1.3 Take actions appropriate to the information |
| 2. Monitor the use of SCADA | 2.1. Routinely monitor SCADA information and use along the ***value chain***2.2. Identify poor uses of SCADA system within team and system inadequacies2.3. Identify team members who require additional support2.4. Take appropriate action to provide required support2.5. Take appropriate action to improve SCADA system and its use |
| 3. Support team use SCADA | 3.1. Regularly communicate with team, both using SCADA based communication and face to face3.2. Identify system improvements required3.3. Identify skill improvement needs3.4. Take appropriate actions to have the identified improvements implemented |

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| **Variable** | **Range** |
| Competitive systems and practices | * May include:
* agile operations
* preventative and predictive maintenance approaches
* monitoring and data gathering systems, such as Systems Control and Data Acquisition (SCADA) software, Enterprise Resource Planning (ERP) systems, Materials Resource Planning (MRP) and proprietary systems
* statistical process control systems, including six sigma and three sigma
* Just in Time (JIT), kanban and other pull-related operations control systems
* supply, value, and demand chain monitoring and analysis
* 5S
* continuous improvement (kaizen)
* breakthrough improvement (kaizen blitz)
* cause/effect diagrams
* overall equipment effectiveness (OEE)
* takt time
* process mapping
* problem solving
* run charts
* standard procedures
* current reality tree
* Competitive systems and practices should be interpreted so as to take into account:
* the stage of implementation of competitive systems and practices
* the size of the enterprise
* the work organization, culture, regulatory environment and the industry sector
 |
| SCADA | * May include:
* System Control and Data Acquisition (SCADA) is a general term applied to a number of systems which automatically collect critical process data, perform required mathematical manipulations on it and then make control decisions and/or give required information personnel for action. In the continuous manufacturing sector, the SCADA system is sometimes integrated into other sophisticated computer control systems such as Distributed Control System (DCS) and indeed these systems do merge in advanced systems. These organizations may simply refer to their SCADA as the DCS or other similar term (such as the proprietary name of the computer system).
 |
| Value chain | * May include:
* Competitive manufacturing organizations encompass the entire production system, beginning with the customer, and includes the product sales outlet, the final assembler, product design, raw material mining and processing and all tiers of the value chain (sometimes called the supply chain). Any truly 'competitive' system is highly dependent on the demands of its customers and the reliability of its suppliers. No implementation of competitive manufacturing can reach its full potential without including the entire 'enterprise' in its planning.
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| **Evidence Guide** |
| Critical aspects of Competence | Assessment requires evidence that the candidate:* identify team or area information and operations requirements and relate to SCADA system
* lead and motivate others in using SCADA system
* obtain regular and one-off information from SCADA system
* make decisions using SCADA generated information.
 |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:* hierarchy of SCADA system and operation
* information available from and controls exercised by/through the SCADA system
* query, control and other facilities and information offered by SCADA
* support/training/skill development mechanisms available for access by team member
* The person will not only be a competent user of SCADA but will also support their team using it.
* Evidence of competent use of SCADA and also of assisting the team to use it effectively and efficiently.
* Assessment will need to occur on an organization using SCADA or by use of SCADA simulation
* Access to an organization using SCADA.
 |
| Underpinning Skills | Demonstrates skills to:* entering and receiving information via SCADA terminals
* communicating with team and organisation SCADA support personnel
* engaging and motivating team in use of SCADA system
* identifying team or work area information requirements
* identifying scope of team or area processes controlled by SCADA system
* planning and organizing improvements in team’s use of SCADA
* keyboarding/mousing
* communication
* teamwork
* problem solving.
* planning and organizing
 |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:* Interview / Written Test / Oral Questioning
* Observation / Demonstration
 |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and sanitation Supervision Level IV** |
| **Unit Title**  | **Plan and Organize Work** |
| **Unit Code** | **[EIS WSO4 14 0217](#EIS_WSO4_13_1116)**  |
| **Unit Descriptor** | This unit covers the knowledge, skills and attitude required in planning and organizing work activities in a production application. It may be applied to a small independent operation or to a section of a large organization. |

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| **Elements** | **Performance Criteria** |
| 1. Set objectives
 | * 1. ***Objectives*** are planned consistent with and linked to work activities in accordance with organizational aims.
	2. Objectives are stated as measurable targets with clear time frames.
	3. Support and commitment of team members are reflected in the objectives.
	4. Realistic and attainable objectives are identified.
 |
| 1. Plan and schedule work activities
 | * 1. Tasks/work activities to be completed are identified and prioritized as directed.
	2. Tasks/work activities are broken down into steps in accordance with set time frames and achievable components.
	3. Task/work activities are assigned to appropriate team or individuals in accordance with agreed functions.
	4. ***Resources*** are allocated as per requirements of the activity.
	5. ***Schedule of work activities*** is coordinated with personnel concerned.
 |
| 1. Implement work plans
 | * 1. ***Work methods and practices*** are identified in consultation with personnel concerned.
	2. ***Work plans*** are implemented in accordance with set time frames, resources and ***standards.***
 |
| 1. Monitor work activities
 | * 1. Work activities are monitored and compared with set objectives.
	2. Work performance is monitored.
	3. Deviations from work activities are reported and recommendations are coordinated with appropriate personnel and in accordance with set standards.
	4. Reporting requirements are complied with in accordance with recommended format.
	5. Timeliness of report is observed.
 |
|  | * 1. Files are established and maintained in accordance with standard operating procedures.
 |
| 1. Review and evaluate work plans and activities
 | * 1. Work plans, strategies and implementation are reviewed based on accurate, relevant and current information.
	2. Review is done based on comprehensive consultation with appropriate personnel on outcomes of work plans and reliable feedback.
	3. Results of review are provided to concerned parties and formed as the basis for adjustments/simplifications to be made to policies, processes and activities.
	4. Performance appraisal is conducted in accordance with organization rules and regulations.
	5. Performance appraisal report is prepared and documented regularly as per organization requirements.
	6. Recommendations are prepared and presented to ***appropriate personnel/authorities***.
	7. ***Feedback mechanisms*** are implemented in line with organization policies.
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| **Variable** | **Range** |
| Objectives  | May include:* Specific
* General
 |
| Resources | may include:* Personnel
* Equipment and technology
* Services
* Supplies and materials
* Sources for accessing specialist advice
* Budget
 |
| Schedule of work activities | May include:* Daily
* Work-based
* Contractual

Regular |
| Work methods and practices | May include:* Legislated regulations and codes of practice
* Industry regulations and codes of practice
* Occupational health and safety practices
 |
| Work plans | May include:* + Daily work plans
	+ Project plans
	+ Program plans
	+ Resource plans
	+ Skills development plans
	+ Management strategies and objectives
 |
| Standards | May include:* + Performance targets
	+ Performance management and evaluation systems
	+ Occupational standards
	+ Employment contracts
	+ Client contracts
	+ Discipline procedures
	+ Workplace assessment guidelines
	+ Internal quality assurance
	+ Internal and external accountability and auditing requirements
	+ Training Regulation Standards
	+ Safety Standards
 |
| Appropriate personnel/ authorities | May include:* Appropriate personnel include:
* Management
* Line Staff
 |
| Feedback mechanisms | May include:* Feedback mechanisms include:
* Verbal feedback
* Informal feedback
* Formal feedback
* Questionnaire
* Survey
* Group discussion
 |

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| **Evidence Guide** |
| Critical Aspects of Competence | Assessment requires evidence that the candidate:* set objectives
* planned and scheduled work activities
* implemented work plans
* monitored work activities
* reviewed and evaluated work plans and activities
 |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:* organization’s strategic plan, policies rules and regulations, laws and objectives for work unit activities and priorities
* organizations policies, strategic plans, guidelines related to the role of the work unit
* team work and consultation strategies
 |
| Underpinning Skills | Demonstrates skill of:* planning
* leading
* organizing
* coordinating
* communication skills
* inter-and intra-person/motivation skills
* presentation skills
 |
| Resource Implications | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment | Competence may be assessed through:* Interview / Written Test
* Observation / Demonstration with Oral Questioning
 |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |

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| **Occupational Standard: Water Supply and sanitation Supervision Level IV** |
| **Unit Title**  | **Migrate to New Technology** |
| **Unit Code** | **[EIS WSO4 15 0217](#EIS_WSO4_14_1116)**  |
| **Unit Descriptor** | This unit defines the competence required to apply skills and knowledge in using new or upgraded technology. The rationale behind this unit emphasizes the importance of constantly reviewing work processes, skills and techniques in order to ensure that the quality of the entire business process is maintained at the highest level possible through the appropriate application of new technology. To this end, the person is typically engaged in on-going review and research in order to discover and apply new technology or techniques to improve aspects of the organization’s activities. |

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| **Elements** | **Performance Criteria** |
| 1. Apply existing knowledge and techniques to technology and transfer
 | 1. Situations are identified where existing knowledge can be used as the basis for developing new skills.
2. New or upgraded technology skillsareacquired and usedto enhance learning.
3. New or upgraded equipment areidentified, classified and usedwhere appropriate, for the benefit of the organization.
 |
| 1. Apply functions of technology to assist in solving organizational problems
 | 1. Testing of new or upgraded equipment isconducted according to the specification manual.
2. Features of new or upgraded equipmentare appliedwithin the organization
3. Features and functions of new or upgraded equipment areused for solving organizational problems
4. Sources of informationrelating to new or upgraded equipment areaccessed and used
 |
| 1. Evaluate new or upgraded technology performance
 | 1. New or upgraded equipment is evaluated for performance, usability and against OHS standards**.**
2. ***Environmental considerations*** are determinedfrom new or upgraded equipment.
3. ***Feedback*** is soughtfrom users where appropriate.
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| **Variables** | **Range** |
| Environmental Considerations | May include:* recycling, safe disposal of packaging (e.g. cardboard, polystyrene, paper, plastic) and correct disposal of waste materials by an authorized body
 |
| Feedback | May include:* Surveys, questionnaires, interviews and meetings.
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| **Evidence Guide** |
| Critical Aspects of Competence | Assessment requires evidence that the candidate:* Competence must confirm the ability to transfer the application of existing skills and knowledge to new technology
 |
| Underpinning Knowledge and Attitudes | Demonstrate knowledge of:* Broad awareness of current technology trends and directions in the industry (e.g. systems/procedures, services, new developments, new protocols)
* Knowledge of vendor product directions
* Ability to locate appropriate sources of information regarding metal manufacturing and new technologies
* Current industry products/services, procedures and techniques with knowledge of general features
* Information gathering techniques
 |
| Underpinning Skills | Demonstrate skills of:* Research skills for identifying broad features of new technologies
* Ability to assist in the decision making process
* Literacy skills in regard to interpretation of technical manuals
* Ability to solve known problems in a variety of situations and locations
* Evaluate and apply new technology to assist in solving organizational problems
* General analytical skills in relation to known problems
 |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment | Competence may be assessed through:* Interview / Written Test
* Observation / Demonstration with Oral Questioning
 |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |

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| **Occupational Standard: Water Supply and sanitation Supervision Level IV** |
| **Unit Title**  | **Establish Quality Standards**  |
| **Unit Code** | **[EIS WSO4 16 0217](#EIS_WSO4_15_1116)**  |
| **Unit Descriptor** | This unit covers the knowledge, skills and attitudes required to establish quality specifications for work outcomes and work performance. It includes monitoring and participation in maintaining and improving quality, identifying critical control points in the production of quality output and assisting in planning and implementing of quality assurance procedures. |

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| **Elements** | **Performance Criteria** |
| 1. Establish quality specifications for product
 | 1. Market specifications are***sourced*** and ***legislated requirements*** identified.
2. Quality specifications are developed and agreed upon
3. Quality specifications are documented and introduced to organization staff / personnel in accordance with the organization policy
4. Quality specifications are updated when necessary
 |
| 1. Identify hazards and critical control points
 | 1. Critical control points impacting on quality are identified.
2. Degree of risk for each hazard is determined.
3. Necessary documentation is accomplished in accordance with organization quality procedures
 |
| 1. Assist in planning of quality assurance procedures
 | 1. Procedures for each identified control point are developed to ensure optimum quality.
2. Hazards and risks are minimized through application of appropriate controls.
3. Processes are developed to monitor the effectiveness of quality assurance procedures.
 |
| 1. Implement quality assurance procedures
 | 1. Responsibilities for carrying out procedures are allocated to staff and contractors.
2. Instructions are prepared in accordance with the enterprise’s quality assurance program.
3. Staff and contractors are given induction training on the quality assurance policy.
4. Staff and contractors are given in-service training relevant to their allocated ***safety procedures***.
 |
| 1. Monitor quality of work outcome
 | 1. Quality requirements are identified
2. Inputs are inspected to confirm capability to meet quality requirements
3. Work is conducted to produce required outcomes
4. Work processes are monitored to confirm quality of output and/or service
5. Processes are adjusted to maintain outputs within specification.
 |
| 1. Participate in maintaining and improving quality at work
 | 1. Work area, materials, processes and product are routinely monitored to ensure compliance with quality requirements
2. Non-conformance in inputs, process, product and/or service is identified and reported according to workplace reporting requirements
3. Corrective action is taken within level of responsibility, to maintain quality standards
4. Quality issues are raised with designated personnel
 |
| 1. Report problems that affect quality
 | 1. Potential or existing quality problems are recognized.
2. Instances of variation in quality are identified from specifications or work instructions.
3. Variation and potential problems are reported to supervisor/manager according to enterprise guidelines.
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| **Variable** | **Range** |
| Sourced | May include:* End-users
* Customers or stakeholders
 |
| Legislated requirements  | May include:* Verification of product quality as part of consumer legislation or specific legislation related to product content or composition.
 |
| Safety procedures. | May include:* Use of tools and equipment for fabrication/production/ manufacturing works
* Workplace environment and handling of material safety,
* Following occupational health and safety procedures designated for the task
* Respect the policies, regulations, legislations, rule and procedures for manufacturing/production/fabrication works
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| **Evidence Guide** |
| Critical Aspect of Competence | Assessment requires evidence that the candidate:* Monitored quality of work
* Established quality specifications for product
* Participated in maintaining and improving quality at work
* Identified hazards and critical control points in the production of quality product
* Assisted in planning of quality assurance procedures
* Reported problems that affect quality
* Implemented quality assurance procedures
 |
| Underpinning Knowledge  | Demonstrates knowledge of: * work and product quality specifications
* quality policies and procedures
* improving quality at work
* hazards and critical points of operation
* obtaining and using information
* applying federal and regional legislation within day-today work activities
* accessing and using management systems to keep and maintain accurate records
* requirements for correct preparation and operation
* technical writing
 |
| Underpinning Skills | Demonstrates skills in:* monitoring quality of work
* establishing quality specifications for product
* participating in maintaining and improving quality at work
* identifying hazards and critical control points in the production of quality product
* assisting in planning of quality assurance procedures
* reporting problems that affect quality
* implementing quality assurance procedures
 |
| Resource Implications | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment | Competence may be assessed through:* Interview / Written Test
* Observation / Demonstration
 |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |

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| **Occupational Standard: Water Supply and sanitation Supervision Level IV** |
| **Unit Title**  | **Develop Individuals and Team** |
| **Unit Code** | **[EIS WSO4 17 0217](#EIS_WSO4_16_1116)**  |
| **Unit Descriptor** | This unit covers the knowledge, skills and attitudes required to determine individual and team development needs and facilitate the development of the workgroup. |

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| **Elements** | **Performance Criteria** |
| 1. Provide team leadership
 | * 1. ***Learning and development needs*** are systematically identified and implemented in line with ***organizational requirements***
	2. Learning plan to meet individual and group training and developmental needs is collaboratively developed and implemented
	3. Individuals are encouraged to self-evaluate performance and identify areas for improvement
	4. ***Feedback on performance***of team members is collected from relevant sources and compared with established team learning process
 |
| 1. Foster individual and organizational growth
 | * 1. Learning and development program goals and objectives are identified to match the specific knowledge and skills requirements of Competence standards
	2. ***Learning delivery methods*** are made appropriate to the learning goals, the learning style of participants and availability of equipment and resources
	3. Workplace learning opportunities and coaching/ mentoring assistance are provided to facilitate individual and team achievement of competencies
	4. Resources and timelines required for learning activities are identified and approved in accordance with organizational requirements
 |
| 1. Monitor and evaluate workplace learning
 | * 1. Feedback from individuals or teams is used to identify and implement improvements in future learning arrangements
	2. Outcomes and performance of individuals/teams are assessed and recorded to determine the effectiveness of development programs and the extent of additional support
	3. Modifications to learning plans are negotiated to improve the efficiency and effectiveness of learning
	4. Records and reports of competence are maintained within organizational requirement
 |
| 1. Develop team commitment and cooperation
 | * 1. Open communication processes to obtain and share information is used by team
	2. Decisions are reached by the team in accordance with its agreed roles and responsibilities
	3. Mutual concern and camaraderie are developed in the team
 |
| 1. Facilitate accomplishment of organizational goals
 | * 1. Team members are actively participated in team activities and communication processes
	2. Individual and joint responsibility is developed by teams members for their actions
	3. Collaborative efforts are sustained to attain organizational goals
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| **Variable** | **Range** |
| Learning and development needs | May include:* + Coaching, monitoring and/or supervision
	+ Formal/informal learning program
	+ Internal/external training provision
	+ Work experience/exchange/opportunities
	+ Personal study
	+ Career planning/development
	+ Performance evaluation
	+ Workplace skills assessment
	+ Recognition of prior learning
 |
| Organizational requirements | May include:* Quality assurance and/or procedures manuals
* Goals, objectives, plans, systems and processes
* Legal and organizational policy/guidelines and requirements
	+ Safety policies, procedures and programs
	+ Confidentiality and security requirements
	+ Business and performance plans
	+ Ethical standards
	+ Quality and continuous improvement processes and standards
 |
| Feedback on performance | May include:* Formal/informal performance evaluation
* Obtaining feedback from supervisors and colleagues
* Obtaining feedback from clients
* Personal and reflective behavior strategies
* Routine and organizational methods for monitoring service delivery
 |
| Learning delivery methods | May include:* + On the job coaching or monitoring
	+ Problem solving
	+ Presentation/demonstration
	+ Formal course participation
	+ Work experience and involvement in professional networks
	+ Conference and seminar attendance
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| **Evidence Guide** |
| Critical Aspects of Competence | Assessment requires evidence that the candidate:* + identified and implemented learning opportunities for others
	+ gave and received feedback constructively
	+ facilitated participation of individuals in the work of the team
	+ negotiated plans to improve the effectiveness of learning
	+ prepared learning plans to match skill needs
	+ accessed and designated learning opportunities
 |
| Underpinning Knowledge and Attitude | Demonstrates knowledge of:* + coaching and monitoring principles
	+ understanding how to work effectively with team members who have diverse work styles, aspirations, cultures and perspective
	+ understanding how to facilitate team development and improvement
	+ understanding methods and techniques to obtain and interpreting feedback
	+ understanding methods for identifying and prioritizing personal development opportunities and options
	+ knowledge of career paths and competence standards in the industry
 |
| Underpinning Skills | Demonstrates skills in:* + reading and understanding a variety of texts, preparing general information and documents according to target audience; spell with accuracy; use grammar and punctuation effective relationships and conflict management
	+ communication including receiving feedback and reporting, maintaining effective relationships and conflict management
	+ planning skills to organize required resources and equipment to meet learning needs
	+ coaching and mentoring skills to provide support to colleagues
	+ reporting to organize information; assess information for relevance and accuracy; identify and elaborate on learning outcomes
	+ facilitation to conduct small group training sessions
	+ relating to people from a range of social, cultural, physical and mental backgrounds
 |
| Resource Implications | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment | Competence may be assessed through:* + Interview / Written Test
	+ Observation / Demonstration with Oral Questioning
 |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |

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| **Occupational Standard: Water Supply and sanitation Supervision Level IV** |
| **Unit Title**  | **Utilize Specialized Communication Skills** |
| **Unit Code** | **[EIS WSO4 18 0217](#EIS_WSO4_17_1116)**  |
| **Unit Descriptor** | This unit covers the knowledge, skills and attitudes required to use specialized communication skills to meet specific needs of internal and external clients, conduct interviews, facilitate group discussions, and contribute to the development of communication strategies. |

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| **Elements** | **Performance Criteria** |
| 1. Meet common and specific communication needs of clients and colleagues
 | 1. Specific communication needs of clients and colleagues are identified and met
2. Different approaches are used to meet communication needs of clients and colleagues
3. Conflict is addressed promptly and in a timely way and in a manner which does not compromise the standing of the organization
 |
| 1. Contribute to the development of communication strategies
 | 1. ***Strategies*** for internal and external dissemination of information are developed, promoted, implemented and reviewed as required
2. Channels of communication are established and reviewed regularly
3. Coaching in effective communication is provided
4. Work related network and relationship are maintained as necessary
5. Negotiation and conflict resolution strategies are used where required
6. Communication with clients and colleagues is appropriate to individual needs and organizational objectives
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| 1. Represent the organization
 | * 1. When participating in internal or external fora, presentation is relevant, appropriately researched and presented in a manner to promote the organization
	2. Presentation is made clear and sequential and delivered within a predetermined time
	3. Appropriate media is utilized to enhance presentation
	4. Differences in views are respected
	5. Written communication is made consistent with organizational standards
	6. Inquiries are responded in a manner consistent with organizational standard
 |
| 1. Facilitate group discussion
 | * 1. Mechanisms which enhance ***effective group interaction*** are defined and implemented
	2. Strategies which encourage all group members to participate are used routinely
	3. Objectives and agenda are routinely set and followed for meetings and discussions
	4. Relevant information are provided to group to facilitate outcomes
	5. Evaluation of group communication strategies is undertaken to promote participation of all parties
	6. Specific communication needs of individuals are identified and addressed
 |
| 1. Conduct interview
 | * 1. A range of appropriate communication strategies are employed in ***interview situations***
	2. Different ***types of interview*** is conducted in accordance with the organizational procedures
	3. Records of interviews are made and maintained in accordance with organizational procedures
	4. Effective questioning, listening and nonverbal communication techniques are used to ensure that required message is communicated
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| **Variable** | **Range** |
| Strategies  | May include:* + Recognizing own limitations
	+ Utilizing techniques and aids
	+ Providing written drafts
	+ Verbal and non verbal communication
 |
| Effective group interaction | May include:* + Identifying and evaluating what is occurring within an interaction in a non-judgmental way
	+ Using active listening
	+ Making decision about appropriate words, behavior
	+ Putting together response which is culturally appropriate
	+ Expressing an individual perspective
	+ Expressing own philosophy, ideology and background and exploring impact with relevance to communication
 |
| Interview situations  | May include:* + Establish rapport
	+ obtain facts and information
	+ Facilitate resolution of issues
	+ Develop action plans
	+ Diffuse potentially difficult situation
 |
| Types of Interview | May include:* + Related to staff issues
	+ Routine
	+ Confidential
	+ Evidential
	+ Non-disclosure
	+ Disclosure
 |

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| **Evidence Guide** |
| Critical Aspects of Competence | Assessment requires evidence that the candidate: * + Demonstrated effective communication skills with clients and work colleagues accessing service
	+ Adopted relevant communication techniques and strategies to meet client particular needs and difficulties
 |
| Underpinning Knowledge and Values | Demonstrates knowledge of:* + communication process
	+ dynamics of groups and different styles of group leadership
	+ communication skills relevant to client groups
 |
| Underpinning Skills | Demonstrates skills to:* + full range of communication techniques including:
* active listening
* feedback
* interpretation
* role boundaries setting
* negotiation
* establishing empathy
* communication strategies
	+ communication required to fulfill job roles as specified by the organization
 |
| Resource Implications | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment | Competence may be assessed through:* + Interview / Written Test
	+ Observation / Demonstration with Oral Questioning
 |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |

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| **Occupational Standard: Water Supply and sanitation Supervision Level IV** |
| **Unit Title**  | **Manage Micro, Small and Medium Enterprises (MSMEs)** |
| **Unit Code** | **[EIS WSO4 19 0217](#EIS_WSO4_18_1116)**  |
| **Unit Descriptor** | This unit covers knowledge, skills and attitude required in running Micro, Small and Medium enterprises. The strategies involve developing, monitoring and managing work activities and financial information, developing effective work habits, and adjusting work schedules as needed.  |

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| **Elements** | **Performance Criteria** |
| 1. Develop and communicate Strategic work plan
 | * 1. The importance of planning is sensitized before acting and about the importance of plans to reduce risks and to inhibit impulsive actions and discussed.
	2. The basics of planning and beginning with goal setting are communicated.
	3. The achievement of measurable and realistic short-term business objective is addressed.
	4. How to develop realistic activities plans and schedule is discussed.
	5. ***Major components of work plan*** are introduced and understood.
	6. The importance of constant reviewing their plans is understood by monitoring the results.
 |
| 1. Identify daily work requirements and Develop effective work habits
 | * 1. Basic concept about effect working culture is discussed and understood.
	2. Different approaches to work culture are developed and understood.
	3. Work requirements are identified for a given time period by taking into consideration of ***resources*** and constraints.
	4. Work activities are prioritized based on business needs, requirements and deadlines.
	5. If appropriate, work is allocated to relevant staff or contractors to optimize efficiency.
	6. Work and personal priorities are identified and a balance is achieved between competing priorities using appropriate ***time management strategies***.
	7. Input is sought from ***internal and external sources*** and used to develop and refine new ideas and approaches.
	8. Business or inquiries is/are responded to promptly and effectively.
	9. Information is presented in a format appropriate to the industry and audience.
 |
| 1. Manage Marketing of MSMEs
 | * 1. Information on market and business needs is analyzed and market opportunities identified.
	2. Marketing mix and components are evaluated.
	3. Marketing mix for specific target market is determined.
	4. Marketing mix is monitored and continual adjusted against marketing performance.
 |
| 1. Manage Human Resources
 | * 1. ***Human resource rules, regulations law and procedures*** are identified and determined.
	2. The existing human resource is audited, and gaps are identified.
	3. Recruitment and selection are conducted based on the organizational requirements.
	4. Selected candidates are oriented and placed for the appropriate position.
	5. Appraisal of employees’ performance is conducted.
	6. Appraisal result is used for training and development, promotion, compensation, disciplinary measures and other purposes as required.
	7. ***Employee relations*** are maintained.
 |
| 1. Manage production and Operation
 | * 1. Production /operation plan is developed and implemented.
	2. Required inputs are purchased and adequate inventories maintained.
	3. Production /operation process is checked and controlled.
	4. Quality control is applied and maintained.
 |
| 1. Maintain financial records and use for decision making
 | * 1. The objective and benefits of financial records are discussed and understood.
	2. Asset, liabilities and capital are identified and recorded.
	3. Balance sheet and different journals are discussed.
	4. Business transactions are discussed, analyzed, classified and recorded.
	5. Daily financial records are maintained correctly in accordance with legal and accounting requirements.
	6. Invoices and payments are prepared and distributed in timely manner and in accordance with legal requirements.
	7. Outstanding accounts are collected or followed-up.
	8. Revenue, expense and costs are identified and discussed.
	9. Different ledgers and subsidiary ledgers are discussed and maintained.
	10. Profit and loss report is prepared.
	11. Financial interpretation is conducted with assistant from the appropriate person.
	12. Financial manual is prepared.
 |
| 1. Monitor, Manage and Evaluate work performance
 | * 1. People, resources and/or equipment are coordinated to provide optimum results.
	2. Staff, clients and/or contractors are communicated within a clear and regular manner, to monitor work in relation to ***business goals*** or timelines.
	3. ***Problem solving techniques*** are applied to work situations to overcome difficulties and achieve positive outcomes.
	4. Opportunities for improvements are monitored according to business demands.
	5. Work schedules are adjusted to incorporate necessary modifications to existing work and routines or changing needs and requirements.
	6. Proposed changes are clearly communicated and recorded to aid in future planning and evaluation.
	7. Relevant codes of practice are used to guide an ethical approach to workplace practices and decisions.
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| **Variable** | **Range** |
| Major components of work plan | May include but is not limited to:* Objective
* Responsibilities
* Resources (human, materials, finance, time, etc)
* Activities
 |
| Resources  | May include but is not limited to:* Human resource
* Money
* Time
* Machines
* Equipment
* Space
 |
| Time managementstrategies  | May include but is not limited to:* Prioritizing and anticipating
* Short term and long term planning and scheduling
* Creating a positive and organized work environment
* Clear timelines and goal setting that is regularly reviewed and adjusted as necessary
* Breaking large tasks into smaller tasks
* Getting additional support if identified and necessary
 |
| Internal and external sources  | May include but is not limited to:* Staff and colleagues
* Management, supervisors, advisors or head office
* Relevant professionals such as lawyers, accountants, management consultants
* Professional associations
 |
| Human resource rules , regulations law and procedures | May include but is not limited to:* Recruitment and selection
* Orientation and placement
* Training and development
* Performance appraisal and reward system
* Disciplinary procedures
* Movement and separation
* Industrial relation
 |
| Employee relations | May include but is not limited to:* Relationship within employees
* Relationship among employees and management and labor union
* Relationship between labor union and government
 |
| Business goals  | May include but is not limited to:* Sales targets
* Budgetary targets
* Team and individual goals
* Production targets
* Reporting deadlines
 |
| Problem solving techniques  | May include but is not limited to:* Brainstorming
* Fish bone
* Focus group discussion
* Problem tree
 |

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| **Evidence Guide** |
| Critical Aspects of Competence | Demonstrate knowledge and skills to:* Ability to identify daily work requirements and allocate work appropriately
* Ability to interpret financial documents in accordance with legal requirements
* The ability to prepare strategic plan
* The ability to develop effective work habit
* The ability to manage marketing of MSEs
* The ability to manage human resources of MSEs
* the ability to manage production/operation of MSEs
* The ability to maintain financial records of MSEs
* The ability to manage, monitor and evaluate work performance of MSMEs
 |
| Underpinning Knowledge and Attitudes | Demonstrate knowledge of:* Strategic plan
* Working culture
* Time management strategy
* Marketing Mix
* Relevant marketing, operation/production, human resource and financial management
* Human resource functions
* Production/operation functions
* Monitoring and evaluation
* Problem solving techniques
* Federal and Local Government legislative requirements affecting business operations, especially in regard to Occupational Health and Safety (OHS), equal employment opportunity, industrial relations and anti-discrimination
* Relevant industry code of practice
* Planning techniques to establish realistic timelines and priorities
* Identification of relevant performance measures
* Quality assurance principles and methods
 |
| Underpinning Skills | Demonstrate skills to:* Technical or specialist skills relevant to the business operation
* Interpret legal requirements, company policies and procedures and immediate, day-to-day demands
* Strategic planning skills
* Human relation skills
* Communicate using questioning, clarifying, reporting, and giving and receiving constructive feedback
* Numeracy skills for performance information, setting targets and interpreting financial documents and reports
* Technical skills to interpret business document, reports and financial statements and projections
* Relate to people from a range of social, cultural and ethnic backgrounds and physical and mental abilities
* Solve problem and develop contingency plans
* Using computers and software packages to record and manage data and to produce reports
* Evaluate using assessment work and outcomes
* Observe for identifying appropriate people, resources and to monitor work
 |
| Resource Implications | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment | Competence may be assessed through:* Interview / Written Test
* Observation / Demonstration with Oral Questioning
 |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |

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| **Occupational Standard: Water Supply and sanitation Supervision Level IV** |
| **Unit Title** | **Apply Problem Solving Techniques and Tools** |
| **Unit Code** | **[EIS WSO4 20 0217](#EIS_WSO4_19_1116)**  |
| **Unit Descriptor** | This unit of competency covers the knowledge, skills and attitude required to apply scientific problem solving techniques and tools to enhance quality, productivity and other kaizen elements on continual basis.  |

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| **Elements** | **Performance criteria** |
| 1. Identify and select theme/problem.
 | * 1. ***Safety requirements*** are followed in accordance with safety plans and procedures.
	2. All possible problems related to the process /Kaizen elements are listed using ***statistical tools and techniques***.
	3. All possible problems related to kaizen elements are identified and listed on Visual Management Board/Kaizen Board.
	4. Problems are classified based on obviousness of cause and action.
	5. Critical factors like the number of customers affected, Potentials for bottlenecks, and number of complaints etc… is selected.
	6. Problems related to priorities of ***Kaizen Elements*** are given due emphasis and selected.
 |
| 1. Grasp current status and set goal.
 | 1. The extent of the problem is defined.
2. Appropriate and achievable goal is set.
 |
| 1. Establish activity plan.
 | * 1. The problem is confirmed.
	2. High priority problem is selected.
	3. The extent of the problem is defined.
	4. Activity plan is established as per ***5W1H***.
 |
| 1. Analyze causes of a problem.
 | 1. All possible causes of a problem are listed.
2. Cause relationships are analyzed using***4M1E***.
3. Causes of the problems are identified*.*
4. Root causes are selected.
5. The root cause which is most directly related to the problem is selected.
6. All possible ways are listed using ***creative idea generation*** to eliminate the most critical root cause.
7. The suggested solutions are carefully tested and evaluated for potential complications.
8. Detailed summaries of the action plan are prepared to implement the suggested solution.
 |
| 1. Examine counter measures and their implementation.
 | 1. Action plan is implemented by ***medium KPT*** members.
2. Implementation is monitored according to the agreed procedure and activities are checked with preset plan.
 |
| 1. Assess effectiveness of the solution.
 | 1. ***Tangible and intangibleresults*** are identified.
2. The results are verified over time.
3. Tangible results are compared with targets using ***various types of diagram***.
 |
| 1. Standardize and sustain operation.
 | 1. If the goal is achieved, the new procedures are standardized and made part of daily activities.
2. All employees are trained on the new ***Standard Operating Procedures (SOPs)***.
3. SOP is verified and followed by all employees.
4. The next problem is selected to be tackled by the team.
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| **Variables** | **Range**  |
| Safety requirements | * may include but not limited to:
* OHS requirements include legislation, material safety, managements system, hazardous substances and dangerous goods code and local safe operating procedures
* Work is carried out in accordance with legislative obligations, environmental legislations, relevant health regulation, manual handling procedure and organization insurance requirements
 |
| Statistical tools and techniques | * may include but not limited to:
* 7 QC tools may include:
* Stratification
* Pareto Diagram
* Cause and Effect Diagram
* Check Sheet
* Control Chart/Graph
* Histogram
* Scatter Diagram
* QC techniques may include:
* Brain storming
* Why analysis
* What if analysis
* 5W1H
 |
| Kaizen Elements | * may include but not limited to:
* Quality
* Cost
* Productivity
* Delivery
* Safety
* Moral
* Environment
* Gender equality
 |
| 5W1H | * may include but not limited to:
* Who: person in charge
* Why: objective
* What: item to be implemented
* Where: location
* When: time frame
* How: method
 |
| 4M1E | * may include but not limited to:
* Man
* Machine
* Method
* Material and
* Environment
 |
| Creative idea generation | * may include but not limited to:
* Brainstorming
* Exploring and examining ideas in varied ways
* Elaborating and extrapolating
* Conceptualizing
 |
| Medium KPT | * may include but not limited to:
* 5S
* 4M (machine, method, material and man)
* 4P (Policy, procedures, People and Plant)
* PDCA cycle
* Basics of IE tools and techniques
 |
| Tangible and intangible results | * may include but not limited to:
* Tangible result may include:
* Quantifiable data
* Intangible result may include:
* Qualitative data
 |
| Various types of diagram | * may include but not limited to:
* Line graph
* Bar graph
* Pie-chart
* Scatter diagram
* Affinity diagram
 |
| Standard Operating Procedures (SOPs) | * may include but not limited to:
* The customer demand
* The most efficient work routine (steps)
* The cycle times required to complete work elements
* All process quality checks required to minimize defects/errors
* The exact amount of work in process required
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| **Evidence Guide** |
| Critical Aspects of Assessment | Demonstrates skills and knowledge competencies to:* Apply all relevant procedures and regulatory requirements to ensure quality and productivity of an organization.
* Detect non-conforming products/services in the work area
* Apply effective problem solving approaches/strategies.
* Implement and monitor improved practices and procedures
* Apply statistical quality control tools and techniques.
 |
| Underpinning Knowledge and Attitude | Demonstrates knowledge of:* QC story/PDCA cycle/
* QC story/ Problem solving steps
* QCC techniques
* 7 QC tools
* Basic IE tools and techniques.
* SOP
* Quality requirements associated with the individual's job function and/or work area
* Workplace procedures associated with the candidate's regular technical duties
* Relevant health, safety and environment requirements
* organizational structure of the enterprise
* Lines of communication
* Methods of making/recommending improvements.
* Reporting procedures
 |
| Underpinning Skills | Demonstrates skills to:* Apply problem solving techniques and tools
* Apply statistical analysis tools
* Apply Visual Management Board/Kaizen Board.
* Detect non-conforming products or services in the work area
* Document and report information about quality, productivity and other kaizen elements.
* Contribute effectively within a team to recognize and recommend improvements in quality, productivity and other kaizen elements.
* Implement and monitor improved practices and procedures.
* Organize and prioritize activities and items.
* Read and interpret documents describing procedures
* Record activities and results against templates and other prescribed formats.
 |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment  | Competence may be assessed through:* Interview / Written Test
* Observation / Demonstration with Oral Questioning
 |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |