

Training Package	Rural Production (RTE03)	HSC Requirements and Advice
Title	Maintain livestock water supplies	
Unit code RTE2110A	This competency standard covers the functions required to perform maintenance procedures on a range of water supply systems and equipment where specialist skills of another trade are not warranted or available. It requires a working knowledge of maintenance procedures and components of water supply systems and the application of skills to identify and rectify minor faults and carry out minor repairs. The work is likely to be carried out under routine supervision within enterprise guidelines.	HSC Indicative Hours 15

Evidence Guide

What evidence is required to demonstrate competence for this standard as a whole?

Competence in this standard requires evidence of the ability to select the correct tools and equipment and apply appropriate methods to carry out routine servicing and minor repairs on a range of water supply systems and equipment. It also requires the ability to recognise minor and major faults, refer complex repairs for specialist advice, carry out water quality testing and analysis and test and monitor machinery and equipment for correct operation. Evidence must also be demonstrated in the application of safe workplace and environmentally responsible practices.

The skills and knowledge required must be **transferable** to a different work environment. For example, if competence is evident in maintaining water supplies for a dairy enterprise, it must also be evident in the maintenance of water supplies in a sheep and wool production enterprise.

What specific knowledge is needed to achieve the performance criteria?	What specific skills are needed to achieve the performance criteria?	Are there other competency standards that could be assessed with this one?	Assessment guide	HSC Requirements and Advice
<p>Knowledge and understanding are essential to apply this standard in the workplace, to transfer the skills to other contexts, and to deal with unplanned events. The knowledge requirements for this competency standard are listed below:</p> <ul style="list-style-type: none"> • livestock requirements and average and peak demand for water • operational principles of various pumps and pumping systems • functions and components of a range of water supply systems • operation and maintenance of diesel and petrol engines • factors which affect water quality, various water 	<p>To achieve the performance criteria, appropriate literacy and numeracy levels as well as some complimentary skills are required. These include the ability to:</p> <ul style="list-style-type: none"> • operate vehicles safely and efficiently • use hand and power tools safely • arrange water supply system components and materials: work as part of a contract team as required • demonstrate safe and positive environmental working practices • identify the components of a range of water supply systems • test water quality as directed • read and interpret a water supply 	<p>This competency standard <u>could</u> be assessed on its own or in combination with other competencies relevant to the job function.</p>	<p>There is essential information about assessing this competency standard for consistent performance and where and how it may be assessed, in the Assessment Guidelines for this Training Package. All users of these competency standards must have access to the Assessment Guidelines. Further advice may also be sought from the relevant Sector Booklet.</p>	<p>Key Terms and Concepts</p> <ul style="list-style-type: none"> • contamination or deterioration of water supplies • diesel and petrol engines • environmental impacts • fault finding • flow rate • hazard • inspection • maintenance plan • manufacturer's specifications • minor faults and repairs • occupational health and safety (OHS) • personal protective equipment (PPE) • pumps and pumping systems • reporting processes

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<p>contaminants and remedial action</p> <ul style="list-style-type: none"> • advantages and disadvantages of different types of water supply systems • OHS legislative requirements • relevant legislative requirements with regard to property water supply systems • Environmental Code of Practice associated with maintenance activities. 	<p>plan</p> <ul style="list-style-type: none"> • communicate verbally with work team and supervisor • measure and calculate lubrication requirements. 			<ul style="list-style-type: none"> • use, maintenance and storage of tools, equipment and machinery • water delivery • water quality • water supply systems and equipment • water system maintenance • water testing.

Element	Performance Criteria	Range of Variables	HSC Requirements and Advice
1 Identify maintenance requirements	1.1 Livestock water supplies are checked for quality and inspected for signs of contamination or deterioration, and low or interrupted supply.	<p>The Range of Variables explains the range of contexts within which the performance and knowledge requirements of this standard may be assessed. The scope of variables chosen in training and assessment may depend on the work situations available.</p> <p>For more information on contexts, environment and variables for training and assessment refer to the Sector Booklet.</p> <p>How might livestock water supplies be provided?</p> <p>Provision may be through external reticulated water supply, dams or storage tanks, troughs, channel supply, rivers, and pumped or flowing bores.</p> <p>What might be determined in the testing of water quality?</p> <p>Water quality testing may include salinity levels and pH levels.</p> <p>What relevant information may be assessed from inspections of livestock and water supplies?</p> <p>This may include the observation of water availability, quantity, flow rate, and the presence of algal bloom. It may also include the number of livestock using the water point, bogging around water supply points and the location of where livestock are grazing and under utilised feed.</p>	<p>Learning experiences for the HSC must address:</p> <p>Functions, advantages and disadvantages of a range of water supply systems including:</p> <ul style="list-style-type: none"> • storage dams • flowing streams, creeks and rivers • water troughs • self-watering devices • irrigation channels • flowing and pumped bore drains • reticulated water supply. <p>Inspection of water supplies and their surrounding areas:</p> <ul style="list-style-type: none"> • water testing including <ul style="list-style-type: none"> – pH – salinity – silt and mud – total soluble salts – turbidity – organic contamination – chemical pollutants – high water temperature – algal bloom – blue-green algae • contamination or deterioration of water supplies including <ul style="list-style-type: none"> – silt and mud – erosion of banks – damage to water fittings – failure of water supply systems – access of animals to the water supply • low or interrupted water supply • quantity of water available • flow rate • number of animals at the watering site • pasture observations including <ul style="list-style-type: none"> – location of grazing animals – under-utilised feed • bogging around the water supplies • estimates of water reserves.

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			<p>Factors influencing livestock consumption:</p> <ul style="list-style-type: none"> • familiarity of animals with <ul style="list-style-type: none"> – location of water – water delivery system • feed type • climate • physiological state • water quality.
	<p>1.2 Components of water supply systems are checked for wear, deterioration or malfunctions.</p>	<p>What range of components of water supply systems may be checked?</p> <p>This may include pumps, windmills and bores, pipes, troughs, timber dividing structures, air bleeders in long lines, line junctions or connections, and stone flagged areas around troughs.</p> <p>How might malfunctions or deterioration of piped water supplies be checked?</p> <p>This may include the need to examine the condition of bore, equipment and fencing, locate leaks and exposure of leaks, repair leak or breakage and reassemble and test for operation.</p>	<p>Learning experiences for the HSC must address:</p> <p>Knowledge of the components of water supply systems including:</p> <ul style="list-style-type: none"> • pipes • fittings • pumps • self-waterers • tanks • foot valves • tap and gate valves • float valves • water sources including windmills, bores, creeks, channels, troughs and dams • stone-flagged areas around drinking areas • air bleeders in long lines • filters • pressure gauge. <p>Indicators of wear, deterioration or malfunction including:</p> <ul style="list-style-type: none"> • low flow rates • leaking joints • cracked pipes • build-up of scale • wet areas • low pump efficiency • blocked foot valves • dirty water • low water pressure • water filters.

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	1.3 Identified maintenance requirements are checked and confirmed according to the maintenance plan .	<p>What information may be included in a maintenance plan?</p> <p>This may include details of scheduled maintenance and servicing requirements and procedures, tools and supplies required to undertake maintenance tasks, power sources, pre-start and safety checks for tools and machinery, mechanical diagnostic procedures, common mechanical faults and adjustment or repair procedures, current operational details, supervisors instructions and reporting requirements.</p>	<p>Learning experiences for the HSC must address:</p> <p>Maintenance requirements including the replacement, removal, cleaning and/or repair of worn, deteriorated or malfunctioning parts of the system.</p> <p>Details contained in maintenance plans including:</p> <ul style="list-style-type: none"> • pre-start and safety check of equipment and machinery • service requirements • access to power • mechanical diagnosis procedures • common mechanical faults • common adjustment and repair methods • current operational details • supervisors instructions • reporting requirements • tools required to check and maintain water systems • supplies needed for repairs and maintenance common procedures.
2 Prepare for maintenance	2.1 Tools, equipment and materials appropriate to the job requirements are selected and checked for serviceability according to manufacturers specifications.	<p>What tools, equipment and materials may be used for maintenance activities?</p> <p>This may include hand tools, hand-held power tools, grease guns, spare machinery and equipment parts, cleaning and maintenance supplies including grease, fuel, oil, chemicals, water, steam, air and power supplies. Other equipment may include spare joiners, connectors, valves and taps. Power sources may include electricity, diesel or petrol engines and wind.</p>	<p>Learning experiences for the HSC must address:</p> <p>Knowledge of the range of tools, equipment and materials appropriate to work task including:</p> <ul style="list-style-type: none"> • hand tools • vices • stillson • thread tape • pvc glues and solvents • two-way radio • spare machinery and equipment parts • cleaning and maintenance supplies • spare joiners • connectors • valves • taps • power sources. <p>Tool, equipment and material checks for wear, breaks, malfunctioning and deterioration.</p>

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	<p>2.2 Faulty or unsafe tools are identified and segregated for repair or replacement and reported according to enterprise requirements.</p>	<p>What enterprise requirements may be applicable?</p> <p>Standard operating procedures (SOPs), industry standards, production schedules, MSDS, work notes and plans, product labels, manufacturers specifications, operators manuals, enterprise policies and procedures (including waste disposal, recycling and re-use guidelines), and supervisors oral or written instructions.</p>	
	<p>2.3 Existing and potential hazards to health and safety are identified and reported according to OHS requirements.</p>	<p>What hazards may be encountered?</p> <p>Hazards may include exposure to loud noise and fumes, solar radiation, dust, and hazardous substances. It may also include oil and grease spills; electricity associated with powered tools and equipment, mechanical malfunctions and exposed moving mechanical parts.</p> <p>What OHS requirements may be relevant to this standard?</p> <p>Safe systems and procedures for:</p> <ul style="list-style-type: none"> • the operation and maintenance of vehicles, machinery and equipment, including hydraulics and guarding of exposed moving parts • hazard and risk control • use of hand and power tools • safe lifting, carrying and handling • handling, application and storage of hazardous substances • outdoor work including protection from solar radiation, dust and noise • the appropriate use and maintenance of personal protective equipment • the servicing of windmills requires the need to ensure that sails are locked off before personnel are allowed onto the tower, and particular attention should be paid to the avoidance of hand injuries when using pipe handling equipment and tools. 	<p>Learning experiences for the HSC must address:</p> <p>An awareness of potential hazards including:</p> <ul style="list-style-type: none"> • physical <ul style="list-style-type: none"> – unsafe tools and equipment – uneven surfaces – electricity – fumes – hazardous substances – noise – dust – livestock movement and behaviour – exposed moving machinery parts – slippery surfaces – obstacles • ergonomic <ul style="list-style-type: none"> – inappropriate use of tools/equipment – poor manual handling • environmental <ul style="list-style-type: none"> – climate – disposal of waste – solar radiation • psychological <ul style="list-style-type: none"> – dealing with emergencies – isolation. <p>Methods or reporting hazards including:</p> <ul style="list-style-type: none"> • verbal communication to the supervisor • written communication in a log or notice board.

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3 Carry out maintenance procedures	3.1 Suitable personal protective equipment is selected, used and maintained according to OHS requirements.	<p>What personal protective equipment may be relevant to this standard?</p> <p>Boots, hat/hard hat, overalls, gloves, protective eyewear, hearing protection, respirator or face mask, and sun protection (sun hat, sunscreen).</p> <p>What OHS requirements may be relevant to this standard?</p> <p>Safe systems and procedures for:</p> <ul style="list-style-type: none"> • the operation and maintenance of vehicles, machinery and equipment, including hydraulics and guarding of exposed moving parts • hazard and risk control • use of hand and power tools • safe lifting, carrying and handling • handling, application and storage of hazardous substances • outdoor work including protection from solar radiation, dust and noise • the appropriate use and maintenance of personal protective equipment • the servicing of windmills requires the need to ensure that sails are locked off before personnel are allowed onto the tower, and particular attention should be paid to the avoidance of hand injuries when using pipe handling equipment and tools. 	<p>Learning experiences for the HSC must address:</p> <p>Selection, use, maintenance and storage of personal protective equipment (PPE) appropriate to work task.</p> <p>A range of PPE including:</p> <ul style="list-style-type: none"> • footwear • head protection – hard hat, sun hat and helmet • gloves • overalls • apron • respirator • face mask • hearing protection • eye protection – goggles, safety glasses and face guard • sunscreen • waterproof clothing. <p>Importance of correct fitting PPE.</p> <p>Maintenance of PPE according to manufacturer’s instructions and enterprise Standard Operating Procedures (SOP):</p> <ul style="list-style-type: none"> • cleaning and decontamination • correct storage • regular checks for damage • repair/replacement of worn, malfunctioning or damaged equipment/parts • disposal of single-use equipment.
	3.2 Maintenance to water systems and equipment are carried out to manufacturers specifications and according to the maintenance plan.	<p>What maintenance procedures may be carried out?</p> <p>This may include changing oils, lubricants and fluids and cleaning and lubricating components and performing adjustments. It may also include checking systems and serviceable components for wear or damage, and remove or replace accordingly. Servicing of windmills may include greasing, checking oil baths and topping up as required. Servicing bore pumps (including</p>	<p>Learning experiences for the HSC must address:</p> <p>Maintenance of water systems as appropriate including:</p> <ul style="list-style-type: none"> • changing oils, lubricants and fluids • cleaning components • lubricating components • performing adjustments • checking for wear or damage.

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		<p>windmills) may include pulling of the bore suction.</p> <p>What information may be included in a maintenance plan?</p> <p>This may include details of scheduled maintenance and servicing requirements and procedures, tools and supplies required to undertake maintenance tasks, power sources, pre-start and safety checks for tools and machinery, mechanical diagnostic procedures, common mechanical faults and adjustment or repair procedures, current operational details, supervisors instructions and reporting requirements.</p>	<p>Procedures to ensure correct maintenance including:</p> <ul style="list-style-type: none"> • checking manufacturer’s specifications and maintenance plan before carrying out work • following supervisor’s instructions. <p>Operational principles of pumps including:</p> <ul style="list-style-type: none"> • piston • multi-stage centrifugal • single centrifugal • mono pump • jet pumps.
	<p>3.3 Maintenance and repair of motors where necessary, including fault finding, is carried out under the supervisors direction.</p>	<p>What maintenance procedures may be carried out?</p> <p>This may include changing oils, lubricants and fluids and cleaning and lubricating components and performing adjustments. It may also include checking systems and serviceable components for wear or damage, and remove or replace accordingly. Servicing of windmills may include greasing, checking oil baths and topping up as required. Servicing bore pumps (including windmills) may include pulling of the bore suction.</p>	<p>Learning experiences for the HSC must address:</p> <p>Operational maintenance of diesel and petrol engines.</p> <p>Fault finding includes checking for the following possible faults:</p> <ul style="list-style-type: none"> • fuel blockages • spark plug faults • oil levels • blocked air filter • blockages in exhaust • poor shaft seals.
	<p>3.4 More complex faults and repair requirements are reported to the supervisor according to enterprise requirements.</p>	<p>What tools, equipment and materials may be used for maintenance activities?</p> <p>This may include hand tools, hand-held power tools, grease guns, spare machinery and equipment parts, cleaning and maintenance supplies including grease, fuel, oil, chemicals, water, steam, air and power supplies. Other equipment may include spare joiners, connectors, valves and taps. Power sources may include electricity, diesel or petrol engines and wind.</p>	<p>Learning experiences for the HSC must address:</p> <p>Methods for reporting complex faults and repair requirements including:</p> <ul style="list-style-type: none"> • verbal reporting to supervisor • written reporting in notebook, log or notice board • written or oral communication to the repair shop in relation to history/observations of the fault.

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4 Complete maintenance activities	4.1 Worksite, tools and materials are cleaned, returned to operating order and stored according to OHS and enterprise requirements.	What enterprise requirements may be applicable? Standard operating procedures (SOPs), industry standards, production schedules, MSDS, work notes and plans, product labels, manufacturers specifications, operators manuals, enterprise policies and procedures (including waste disposal, recycling and re-use guidelines), and supervisors oral or written instructions.	
	4.2 Malfunctions, faults, and wear or damage to tools is reported for repair or replacement according to enterprise requirements.	What OHS requirements may be relevant to this standard? Safe systems and procedures for: <ul style="list-style-type: none"> • the operation and maintenance of vehicles, machinery and equipment, including hydraulics and guarding of exposed moving parts • hazard and risk control • use of hand and power tools • safe lifting, carrying and handling • handling, application and storage of hazardous substances • outdoor work including protection from solar radiation, dust and noise • the appropriate use and maintenance of personal protective equipment the servicing of windmills requires the need to ensure that sails are locked off before personnel are allowed onto the tower, and particular attention should be paid to the avoidance of hand injuries when using pipe handling equipment and tools.	Learning experiences for the HSC must address: Reporting process for repair or replacement of tools including: <ul style="list-style-type: none"> • notification to supervisor of needs for repair or replacement • notification to the company carrying out repairs of requirements including observations of faults and malfunctions • clear and concise communication with the supplier to allow for the correct replacement.
	4.3 Unwanted materials and waste from maintenance activities is collected, treated and disposed or recycled according to enterprise environmental requirements.	What environmental implications may be associated with maintenance activities? Negative environmental impacts may result from excessive noise and exhaust emissions, the unsafe use and disposal of maintenance debris (oils containers, chemical residues) and hazardous substances. Unsafe cleaning and servicing activities may negatively impact in soil disturbance, dust problems and increased run-off flows.	

What processes should be applied to this competency standard?

There are a number of processes that are learnt throughout work and life, which are required in all jobs. They are fundamental processes and generally transferable to other work functions. Some of these are covered by the **key competencies**, although others may be added. The questions below highlight how these processes are applied in this competency standard. Following each question a number in brackets indicates the level to which the key competency needs to be demonstrated where

0 = not required

1 = perform the process

2 = perform and administer the process

3 = perform, administer and design the process

1. How can communication of ideas and information (1) be applied?	Procedures for carrying out maintenance on water supply systems may be discussed and confirmed with the supervisor.
2. How can information be collected, analysed and organised (1) ?	Information with regard to testing and analysing water quality may be detailed and organised by records and reports.
3. How are activities planned and organised (1) ?	Maintenance activities may be planned and co-ordinated around livestock watering routines or sequenced as required.
4. How can team work (1) be applied?	Team work may be applied in the communication and co-ordination of tasks to achieve specified work requirements to facilitate the continual supply of water to livestock.
5. How can the use of mathematical ideas and techniques (1) be applied?	Mathematics may be applied in the calculation of depth, flow rates and water requirements for livestock.
6. How can problem-solving skills (1) be applied?	Faults diagnosis and identification of best remedies for faults and malfunctions will require the application of problem-solving skills.
7. How can the use of technology (1) be applied?	Technology may be used to communicate, and calculate volumes and capacities.