No. 413 **11 *May 2007***

SOUTH AFRICAN QUALIFICATIONS AUTHORITY (SAQA)

In accordance with Regulation 24(c) of the National Standards Bodies Regulations of 28 March *1998,* the Standards Generating Body (SGB) for

Chemical Industries

registered by Organising Field 06 – Manufacturing, Engineering and Technology, publishes the following qualification and unit standards for public comment.

This notice contains the titles, fields, subfields, NQF levels, credits, and purpose of the qualification and unit standards. The full qualification and unit standards can be accessed via the SAQA web-site at **www.saqa.org.za**. Copies may also be obtained from the Directorate of Standards Setting and Development at the **SAQA** offices, SAQA House, 1067 Arcadia Street, Hatfield, Pretoria.

Comment on the qualification and unit standards should reach SAQA at the address below and ***no later than 11 June 2007.*** All correspondence should be marked Standards **Setting** – Chemical Industries and addressed to

The Director: Standards Setting and Development
SAQA
Attention: *Mr. D. Mphuthing*
Postnet Suite 248
Private Bag X06
Waterkloof
0145
or faxed to 012 – 431-5144
e-mail: dmphuthing@saqa.org.za

DR. S. BHIKHA
DIRECTOR: STANDARDS SETTING AND DEVELOPMENT

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:
General Education and Training Certificate: Chemical Operations

SAQA QUAL ID	QUALIFICATION TITLE		
58514	General Education and Training Certificate: Chemical Operations		
SGB		PROVIDER	
Chemical Industries SGB			
ETQA			
National Certificate	6 -Manufacturing, Engineering and Technology	Manufacturing and Assembly	
ABET BAND	MINIMUM CREDITS	NQF LEVEL	QUAL CLASS
Undefined	120	Level 1	Regular-Unit Stds Based

PURPOSE AND RATIONALE OF THE QUALIFICATION
Purpose:

This qualification is used as an introduction to chemical process operations, This competence provides the foundation needed to take responsibility for a significant process in the chemical operations industry. It also provides the basis upon which further related learning and career development can take place.

Through the employment of competent operating personnel, employers and in turn the field and sub-field have confidence that this critical work in the industry is efficiently carried out.

Social development and economic transformation are enhanced through efficient production, and career development and personal job satisfaction of operating personnel are facilitated through the learning process used to achieve the competency specified.

Qualifying learners will:

Have an understanding of the various process operations that are used in chemical operations:

- Understand elementary chemistry and its application in industry.
- Understand and apply safety, health and environmental issues in the workplace.
- Understand and apply the basic principles of liquid, gas and solid storage and transfer to equipment in chemical process operations.
- Understand basic physics and its application in industry.
- Understand the role of the organisation and the industry in which it operates.

Rationale:

The General Education and Training Certificate in Chemical Operations is replacing the registered National Certificate in Chemical Operations, NQF Level 1. The qualification incorporates uptake feedback from the previous qualification. Chemical Industry has found that the only other qualifications with some relevance to this industry are those aimed at the manufacturing, glass production and pharmaceutical industries. Not one of these qualifications has enough relevance to the processing industry to be used as a basis for this qualification as this qualification is very specific to the technologies used in chemical or general process operations.

This qualification is the first in a series for people working in the chemical or processing industries who need to progress beyond NQF level 1 (ABET) and for learners who are entering the chemical operations industry. The qualification reflects the workplace-based common or non-specific needs that a learner requires in the chemical operations industry, before progressing to learning at a higher level.

Typical learners are operating personnel working in a chemical processing plant. The chemical processing industry is well established in South Africa and its success is dependant upon the efficient production of chemical products. Achievement of this objective is largely dependant upon the competence, recognised by this qualification, of the people who operate chemical processing equipment. An adequate number of people with these skills are needed to ensure that the production units in South Africa operate productively.

Competence in chemical process operations requires appropriate general, chemical specific technical & other knowledge and its application; as well as expertise in operating production equipment and controlling a chemical process. This knowledge and expertise can form a basis for further learning particularly in the production/operational, engineering and supervisory aspects of chemical operations and similar industries in the chemical and other sectors.

RECOGNIZE PREVIOUS LEARNING?
Y

LEARNING ASSUMED TO BE IN PLACE
It is assumed that learners are already competent in Communication and Mathematical Literacy at ABET Level 3.

Recognition of Prior Learning:

Recognition of prior learning must be carried out in accordance with the policy and rules specified and used by the ETQA responsible for evaluation of people seeking RPL for a part of the whole qualification.

Access to the qualification:

There is open access to the qualification. However, access for learners with disabilities is dependant on the:

- Type and severity of the disability.
- Nature of the operational processes and requirements of the equipment

QUALIFICATION RULES
In the compulsory Fundamental Component of the qualification, a learner must demonstrate his/her competence in the 23 credits in the field of Communication plus 16 credits in the field *of* Mathematical Literacy.

The unit standards in the compulsory Core Component *of* the qualification reflect the skills and competencies needed for building expertise in the chemical operations field. In the Core Component, the learner must demonstrate his/her competence in the total of 66 credits.

The Elective Component of the qualification requires the learner to select additional general application Unit Standards covering aspects such as life skills, business, computer, mechanical, and cranage skills. In total the learner must demonstrate his/her competence in a minimum of 15 credits selected from the Elective component.

EXIT LEVEL OUTCOMES
1. Understand elementary chemistry, physics and its application in industry.

2. Understand and apply safety, health, environmental and quality principles in the workplace.

3. Understand and apply the elementary principles of liquid, gas and solid storage and transfer to equipment in chemical process operations.

4. Understand the role of the organisation and the industry in which it operates

Critical Cross-Field Outcomes:

Each critical cross-field outcome was considered in terms of its applicability to each of the specific outcomes for each unit standard. Where it was found to be applicable, the nature of the skills being developed was specified by the working group and captured in the standard.

Critical cross-field outcomes are assessed per unit standards and are part of all exit level outcomes.

Critical cross-field outcomes have been addressed by the exit level outcomes as follows:

While performing integrated chemical operation funciions, qualifying learners can:

Identify and solve problems in which response displays that responsible decisions, using critical and creative thinking, have been made by:

• Applying knowledge and comprehension of safety procedures and equipment. Evident in exit level outcomes 1,2.

• Applying knowledge of equipment used in chemical process operations. Evident in exit level outcome 3.

Work effectively with others as a member of a team, group, organisation or community by:

• Working in a coordinated team during the performance of safety procedures. Evident in exit level outcome 2.

• Co-ordinating one's work with that of others in the direct surrounding area. Evident in exit level outcome 3

Organise and manage oneself and one's activities responsibly and effectively by:

• Contributing *to* safety in the workplace by using and interpreting the MSDS. Evident in exit level outcome ***2.***

• Maintaining basic safety, health and environmental issues. Evident in exit level outcome 2

• Applying knowledge of pipes and fittings to activities. Evident in exit level outcome 3

• Using process instrumentation during the process of liquid, gas and solid storage and transfer. Evident in exit level outcome 3.

Collect, analyse, organise and critically evaluate information by:

• Understanding the applications of the chemical processing equipment and the impact of the equipment on the processing system. Evident in exit level outcome 3.

• Interpreting the MSDS during process operations.
• Evaluating basic safety, health and environmental issues.

Communicate effectively by using mathematical and/or language skills in the modes of oral and/or written presentations by:

- Reading and interpreting simple drawings in a process environment. Evident in exit level outcome 3.

- Sketching process systems using appropriate symbols for pumps, pipes and gas transfer equipment. Evident in exit level outcome 3.

- Sketching configurations of processing equipment. Evident in exit level outcome 3

Use science and technology effectively and critically, showing responsibility towards the environment and health of others by:

- Working according to health and safety regulations. Evident in exit level outcome 2

- Understanding the basic principles and applications of chemistry and physics in chemical processing operations. Evident in exit level outcomes 1,4.

- Working and interpreting technologically advanced instrumentation. Evident in exit level outcome 3.

Demonstrate an understanding *of* the world as a set of related systems by recognising that problem soiving contexts do not exist in isolation by:

- Understanding the organisation and its role in the industry. Evident in exit level outcome 5

- Understanding process operation equipment and machinery while taking cognisance of the impact of each piece of equipment on the complete system. Evident in exit level outcome 3.

Contribute to the full personal development of each learner and the social and economic development of the society at large by:

- Maintaining and applying safety and quality practices in the processing operations environment. Evident in exit level outcomes 2,3.

- Understanding processing operation functions and own role in the process. Evident in exit level outcomes 3,5.

ASSOCIATED ASSESSMENT CRITERIA

1.

- Elementary chemical principles are explained in terms of accepted scientific principles.
- Chemical principles are explained in terms of actual industry applications.
- The methods to address different chemical hazards in the workplace are described according to the guidelines laid down in material safety data sheets (MSDS).
- Elementary principles of heat and thermal energy are explained in terms of accepted scientific principles.
- Principles of heat and thermal energy are explained in terms of actual industry applications.

2.

- Statutory rights, responsibilities and liabilities regarding safety are explained in simple terms an in accordance to the OHS Act.
- Safety, health, environmental and quality standards and objectives are explained in terms of both statutory guidelines as well as a workplace implementation framework.
- *A* hand held fire extinguisher is used in accordance to given instructions to extinguish a small fire.

3.
- The application and functioning of different process piping configurations, fittings, valves and instruments are explained in terms of accepted scientific principles and industry practice.
- The application and functioning of different solid, liquid and gas transfer and storage equipment components are explained in terms of accepted industry practice.
- Simple drawings used in a process environment are read and interpreted in accordance to accepted drawing conventions.

4.
- Working conditions in a processing environment are described in simplified terms based on key concepts from the "Basic Conditions of Employment Act".
- The workplace organisation is described in accordance to actual or typically employed organisational structures and principles.
- The functioning of the processing industry and its stakeholders are explained in line with the actual industry structure, business environment and the business principles applied.

Integrated Assessment:

The applied competence (practical, foundational and reflexive competencies) of this qualification will be achieved if a candidate is able to achieve all the exit level outcomes of this qualification.

Appropriate methods and tools must be used to assess practical, foundational and reflexive competence of the learner in all the exit level outcomes listed above, as well as to determine a learner's ability to solve problems, work in a team, organize him/herself, use applied science, and understand the implications of actions and reactions in the world as a set of related systems. Such an assessment process will determine development of the whole person, and the integration of applied knowledge and skills.

Assessors should develop, conduct, and ensure integration of, assessment by making use of a range of formative and summative assessment methods against the unit standards that make up the qualification. Combinations of applied, foundational and reflective competencies, including critical cross-field outcomes, should be assessed wherever possible.

Moderators should ensure that assessment is valid, consistent and integrated into work or learning, and that there is sufficient and authenticated evidence of learner competence against the whole qualification.

INTERNATIONAL COMPARABILITY

Benchmarking was done against the German Berufsschule as the German chemical industry is renowned for being international leaders in both technical and operational issues. From firsthand experience, the training provided in this field is partially responsible for their leading position. A contributing factor that has led to this conclusion is the international regard for German technology.

A comparison with the British NVQ, the Australian and New Zealand Qualifications Frameworks was done because they have comparable educational systems and their chemical industries are at a similar level of development. African countries with manufacturing facilities (including SADC countries) were scanned for applicable qualifications or training programmes, but no relevant qualifications are offered in any of these countries.

Both local and international qualifications place high emphasis on safety with a range of unit standards relating to emergencies, environmental protection and operating procedures forming the core. However, the rest of the Australian and British qualifications are made up of standards addressing operational functions with very little theoretical support. In contrast, the German qualification offers a model, which seems more in line with the objectives of the NQF and the South African industry than any of the others. A wide theoretical basis is established before

operational aspects are addressed, while menial tasks are not included to complete the qualification.

The G.E.T.C.: Chemical Operations was therefore broadly based on the German qualification model, except for the exclusion of laboratory practice, which is considered as a separate field of study. The compulsory theoretical content incorporated in the qualification will serve to support qualifying learners to make better informed, autonomous decisions within a more compact timeframe than most international learners and will increase transportability of the qualification considerably.

An extensive international comparability comparison was done which included Germany, Australia, New Zealand, Britain and relevant African countries.

Germany:

The German qualification was seen as the best benchmarking partner due to their position as international leaders in the chemical industry in both technical and operational issues. From our firsthand experience, the training provided in this field is 'partially responsible for their leading position. A contributing factor that leads us to this conclusion is the international regard for German technology. The German two year "Produktionsfachkraft Chemie" (Chemical Production Specialist) qualification was used as basis for the development of the NQF 1 and NQF 2 chemical operations qualifications.

The main deviations from the German qualification are:

- No laboratory work is done in either the NQF 1 or NQF 2 qualifications since this is considered a separate occupation.
- Some of the areas were addressed either earlier or later in the training process in order to minimise the workplace requirements for the NQF 1 qualification.
- Subjects were divided and combined in a somewhat different fashion.

Britain:

A comparison with the British qualification was included, because the British chemical industry is very well developed and the NVQ is an educational structure comparable to the NQF. An internet search revealed that the British Level 1 NVQ in Chemical, Pharmaceutical and Petrochemical Operations contains compulsory core units consisting of safety, teamwork and shift handover and a choice of two elective units ranging from cleaning, packaging, storage, processing products to quality management.

When compared to the British qualification, the South African NQF 1 qualification has a higher theory component while the British qualification is focused on job skills without any foundational science, process or equipment modules.

Australia:

The Australian processing industry is of a similar size and sophistication as the South African industry. For this reason a comparison with the Australian qualification was included, as well as the AQF being an educational structure comparable to the NQF. An internet search of the AQF revealed that the Australian Certificate 1 in Process Plant Skills contains compulsory core units on communication, safety, quality and work procedures and it allows the learner to choose elective unit standards in a range of operational areas.

The Australian qualification is designed to deliver the skills needed to perform basic functions in a chemical processing plant, whereas the proposed South African qualification aims to empower the learner for a career in the processing industry by giving a theoretical introduction to the plant operations, before proceeding to operational functions in the NQF 2 qualification.

New Zealand:

A comparison with the New Zealand qualification was included because the NZQA is an educational structure comparable to the NQF. The Research in the NZQA showed that no Level 1 qualification in Chemical Processing Operations is registered, although a Level 2 Certificate in Energy and Chemical Plant Operations (Process Operation) and a similar Level 4 Process Operation qualification is registered.

African countries with processing facilities (including SADC countries) were searched for applicable qualifications or training programmes, but no relevant qualifications are offered in any of these countries.

Both local and international qualifications place high emphasis on safety with a range of unit standards relating to hazards, emergencies and environmental protection included.

The Chemical Operations Qualification compares well with the best international qualifications and training programmes offered. The compulsory technical content incorporated in the qualification will serve to support qualifying learners to make better informed, autonomous decisions within a more compact timeframe than most international learners and will increase transportability of the qualification considerably.

ARTICULATION OPTIONS

This qualification is the first in a series of four chemical operations qualifications and it will allow the learner a vertical progression from the introductory NQF 1 qualification. The qualifying learner may progress to a NQF level 4 supervisory qualification in an internal process control role in the chemical or processing industry.

Vertical articulation within the processing industry can occur with the following registered NQF level 2 qualifications:

- Continuous Processes: Chemical Operations NQF Level 2.
- Electrics: Chemical Electrical NQF Level 2.
- Mechanics: Chemical Rigging NQF Level 2.
- Mechanics: Chemical Turning NQF Level 2.
- ID 24253: National Certificate: Batch Mixing NQF Level 2.
- ID 48890: National Certificate: Chemical Liquid, Gas Storage and Transfer NQF Level 2
- ID 36156: National Certificate: Chemical Manufacturing Operations NQF Level 2.
- ID 58515: National Certificate: Chemical Operations NQF Level 2.
- ID 21494: National certificate: Dry Lumber Processing NQF Level 2.
- ID 21490: National Certificate: Lumber Drying NQF Level 2.
- ID 35941: National Certificate: Pulp and Paper Manufacturing NQF Level 2.

Horizontal articulation can occur with the, ID 23253: GETC: Manufacturing, Engineering and Related Activities NQF Level 1.

MODERATION OPTIONS

- Anyone moderating the assessment of learners against this Qualification must be registered as a moderator with the relevant ETQA.

- Any institution offering learning that will enable the achievement of this Qualification must be accredited or recognised as a provider with the relevant ETQA.

- Assessment and moderation will be overseen by the relevant ETQA according to the ETQA`s policies and guidelines for assessment and moderation; in terms of agreements reached around assessment and moderation between ETQAs (including professional bodies); and in terms of the moderation guideline detailed immediately below.

• Moderation must include both internal and external moderation of assessments at exit points of the qualification, unless ETQA policies specify otherwise. Moderation should also encompass achievement of the competence described both in individual unit standards, exit level outcomes as well as the integrated competence described in the qualification.

e Anyone wishing to be assessed against this Qualification may apply to be assessed by any assessment agency, assessor or provider institution that is accredited by the relevant ETQA.

CRITERIA FOR THE REGISTRATION OF ASSESSORS
In order to assess this qualification, the assessor needs:

- Well developed interpersonal skills.
- Assessors to meet the requirements of the generic assessor standards.
- Competence against the unit standard "Conduct outcomes-based assessments".
- Detailed documentary proof of educational qualification, practical training undergone, and/or experience gained at an appropriate level in the work concerning the production of molten glass. This must meet the relevant ETQA policies and guidelines. The subject matter expertise of the assessor can be established through the recognition of prior learning.
- Registration with, or recognition by, the relevant ETQA as specified through an appropriate memorandum of understanding.

NOTES
This qualification replaces qualification 22865, "National Certificate: Chemical Operations", Level 1, 120 credits.

Range of equipment covered:

A system is understood to be equipment operated in combination to achieve a desired result in process operation.

Operating a system includes the integrated operation of the equipment that makes up the system.

Range statements:

This qualification addresses the theoretical knowledge required by learners in the processing industries.

Knowledge relating to the processing industries includes process specific technology, communication, mathematics, applied science, and SHEQ.

This qualification may be applicable to other processing operations. This is subject to its acceptance by appropriate subject matter experts.

UNIT STANDARDS

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Core	244061	interpret material safely data sheets **(MSDS)** in order lo address chemical safety in the workplace	Level 1	**4**
Core	244067	Read and interpret simple drawings in a process environment	Level 1	**3**
Core	12139	Demonstrate an understanding of quality principles used in the chemical industry	Level 1	8
Core	244062	Demonstrate understanding of elementary chemical principles and their applications in process industries	Level 1	8
Core	244064	Understand elementary process instrumentation	Level 1	5
Core	244063	Maintain basic safety. health and environmental issues	Level 1	6
Core	244069	Demonstrate understanding of solid, liquid and gas	Level 1	6

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
		storage methods		
Core	110075	Apply basic fire fighting techniques	Level 1	3
Core	244065	Demonstrate understanding of process piping, fittings and valves	Level 1	4
Core	244070	Demonstrate understanding of solid, liquid and gas transfer equipment	Level 1	12
Core	244068	Demonstrate understanding of the organisation and its relationships with stakeholders and the industry within which it operates	Level 2	3
Core	244066	Understand the principles of physics related to heat and thermal energy and its application in a processing environment	Level 1	4
Elective	12204	Use wastewater/sewage, effluent and storm water systems in industry	Level 1	2
Elective	14804	Demonstrate knowledge of Good Manufacturing Practices in a Chemical Manufacturing enviroment	Level 2	6
Elective	12208	Perform lubrication on production machinery	Level 2	3
Elective	116231	Operate a cab controlled overhead crane	Level 2	8
Elective	9599	Lift and move material and equipment by means of a forklift	Level 2	3
Elective	13165	Describe the properties of materials found in the workplace and describe their impact on the environment	Level 1	6
Elective	114936	Participate effectively in a team or group	Level 2	2
Elective	14664	Demonstrate knowledge of diversity within different relationships in the South African society	Level 1	3
Elective	113924	Apply basic business ethics in a work environment	Level 2	2
Elective	116511	Carry out basic first aid treatment in the workplace	Level 1	1
Elective	116527	Demonstrate knowledge pertaining to basic health and safety principles in and around a workplace	Level 1	2
Elective	14605	Take a representative sample in a manufacturing process line	Level 1	2
Elective	116937	Use a Graphical User Interface (GUI)-based spreadsheet application to create and edit spreadsheets	Level 2	4
Elective	116938	Use a Graphical User Interface (GUI)-based word processor to create and edit documents	Level 1	4
Elective	117943	Install a Personal Computer (PC) peripheral device, in a GUI environment	Level 1	2
Elective	117902	Use generic functions in a Graphical User Interface (GUI)-environment	Level 1	4
Elective	116932	Operate a personal computer system	Level 1	3
Elective	116235	Operate a pendant controlled overhead crane	Level 2	5
Elective	14706	Perform basic rigging procedures	Level 2	4
Elective	12207	Operate moving equipment to stack, de-stack and position materials	Level 2	4
Elective	12484	Perform basic fire fighting	Level 2	4
Fundamental	119631	Explore and use a variety of strategies to learn	Level 1	5
Fundamental	119635	Engage in a range of speaking/signing and listening interactions for a variety of purposes	Level 1	6
Fundamental	7461	Use maps to access and communicate information concerning routes, location and direction	Level 1	1
Fundamental	119364	Evaluate and solve data handling and probability problems within given contexts	Level 1	5
Fundamental	119373	Describe and represent objects in terms of shape, space and measurement	Level 1	5
Fundamental	119362	Work with numbers; operations with numbers and relationships between numbers	Level 1	4
Fundamental	14084	Demonstrate an understanding of and use the numbering system	Level 1	1
Fundamental	119640	Read/view and respond to a range of text types	Level 1	6
Fundamental	119636	Write/Sign for a variety of different purposes	Level 1	6

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Interpret material safety data sheets (MSDS) in order to address chemical safety in the workplace

SAQA US ID	UNIT STANDARD TITLE		
244061	Interpret material safety data sheets (MSDS) in order to address chemical safety in the workplace		
SGB		PROVIDER	
Chemical Industries SGB			
FIELD		SUBFIELD	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 1	4

SPECIFIC OUTCOME 1
Demonstrate an understanding of the purpose and structure of **MSDS.**

SPECIFIC OUTCOME 2
Use **MSDS** to identify and describe the main hazards associated with **a** substance in a processing environment.

SPECIFIC OUTCOME 3
Use MSDS *to* identify the correct response to hazards associated with a substance in a processing environment.

SPECIFIC OUTCOME 4
Use MSDS to describe the safe handling of a substance in a processing environment.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate understanding of elementary chemical principles and their applications in process industries

SAQA US ID	*UNIT STANDARD TITLE*		
244062	Demonstrate understanding of elementary chemical principles and their		
SGB		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 1	8

SPECIFIC OUTCOME 1
Describe the different disciplines within the field of chemistry supported by examples *of* process appiications.

SPECIFIC OUTCOME 2
Demonstrate an understanding of the atomic model of matter

SPECIFIC OUTCOME 3
Identify the basic structure and components of the periodic table.

SPECIFIC OUTCOME 4
Balance elementary chemical reactions

SPECIFIC OUTCOME 5
Demonstrate an understanding of the phases and properties *of* substances

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Maintain basic safety, health and environmental issues

SAQA US ID	UNIT STANDARD TITLE		
244063	Maintain basic safety, health and environmental issues		
SGB		PROVIDER	
Chemical industries SGB			
FIELD		SUBFIELD	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 1	6

SPECIFIC OUTCOME 1
identify and describe simple health and safety statutory and organisationai requirements.

SPECIFIC OUTCOME 2
Employ safe working practices and report health and safety risks associated within an industrial manufacturing environment.

SPECIFIC OUTCOME 3
Describe the environmental principles applicable to an industrial manufacturing environment.

SPECIFIC OUTCOME 4
Describe and implement simple emergency procedures.

SPECIFIC OUTCOME 5
Describe and implement good hygiene and housekeeping practices

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Understand elementary process instrumentation

SGB		***PROVIDER***	
Chemical Industries SGB			
FIELD		***SUBFIELD***	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	***UNIT STANDARD TYPE***	***NQF LEVEL***	***CREDITS***
Undefined	Regular	Level 1	5

SPECIFIC OUTCOME 1
Understand the general principles of process instrumentation.

SPECIFIC OUTCOME 2
Demonstrate understanding of pressure measurement and -gauges

SPECIFIC OUTCOME 3
Demonstrate understanding of temperature measurement and -gauges.

SPECIFIC OUTCOME 4
Demonstrate understanding of flow measurement and -gauges

SPECIFIC OUTCOME 5
Demonstrate understanding of level measurement and gauges.

SAQA

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate understanding of process piping, fittings and valves

SAQA US ID	*UNIT STANDARD TITLE*		
244065	Demonstrate understanding of process piping, fittings and valves		
SGB		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 1	4

SPECIFIC OUTCOME 1
Demonstrate an understanding of piping and fittings in process applications.

SPECIFIC OUTCOME 2
Demonstrate an understanding of pipe coverings.

SPECIFIC OUTCOME 3
Identify valve components and explain valve functioning in a process system

SPECIFIC OUTCOME 4
Trace and analyse pipe networks.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Understand the principles of physics related to heat and thermal energy and its application in a processing environment

SAQA US ID	*UNIT STANDARD TITLE*		
244066	Understand the principles of physics related to heat and thermal energy and its application in a processing environment		
SGB		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 1	4

SPECIFIC OUTCOME 1
Demonstrate an understanding of energy and the environmental principles related to energy.

SPECIFIC OUTCOME 2
Demonstrate an understanding of the nature of temperature and the measurement thereof.

SPECIFIC OUTCOME 3
Demonstrate an understanding of the nature of thermal energy.

SPECIFIC OUTCOME 4
Demonstrate an understanding of the nature of heat.

SPECIFIC OUTCOME 5
Demonstrate an understanding of the phases of matter.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Read andinterpret simple drawings in a process environment

SAQA US ID	*UNIT STANDARD TITLE*		
244067	Read and interpret simple drawings in a process environment		
SGB		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 1	3

SPECIFIC OUTCOME 1
Understandthe use of drawings and graphical representations in a process environment

SPECIFIC OUTCOME 2
Read and interpret block diagrams.

SPECIFIC OUTCOME 3
Read and interpret layout diagrams (plot plans),

SPECIFIC OUTCOME 4
Read and interpret elementary engineering component drawings

SPECIFIC OUTCOME 5
Read and interpret process flow diagrams (PFDs).

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate understanding of the organisation and its relationships with stakeholders and the industry within which it operates

SAQA US ID	*UNIT STANDARD TITLE*		
244068	Demonstrate understanding of the oraanisation and its relationships with stakeholders and the industry within which it operates		
SGB		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level *2*	3

SPECIFIC OUTCOME 1
Demonstrate understanding of the organisation and outline own role within the organisation.

SPECIFIC OUTCOME **2**
Describe the legislation that reflects the employer/employee relationship.

SPECIFIC OUTCOME 3
Explain the organisation's purpose and the environment within which it operates

SPECIFIC OUTCOME **4**
Explain the structure of the industry in which the organisation operates and the organisation's role within the industry.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate understanding *of* solid, liquid and gas storage methods

SAQA US ID	*UNIT STANDARD TITLE*		
244069	Demonstrate understanding of solid, liquid and gas storage methods		
SGB		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 1	6

SPECIFIC OUTCOME 1
Demonstrate an understanding of **the principles** of **storage.**

SPECIFIC OUTCOME 2
Describe different storage methods for liquids.

SPECIFIC OUTCOME 3
Describe different storage methods for gases.

SPECIFIC OUTCOME 4
Describe different storage methods for *solid* **materials.**

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate understanding of solid, liquid and gas transfer ***equipment***

SAQA US ID	***UNIT STANDARD TITLE***		
244070	Demonstrate understanding of solid, liquid and gas transfer equipment		
SGB		***PROVIDER***	
Chemical Industries SGB			
FIELD		***SUBFIELD***	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	***UNIT STANDARD TYPE***	***NQF LEVEL***	***CREDITS***
Undefined	Regular	Level 1	12

SPECIFIC OUTCOME 1
Demonstrate an understanding of the application of pumps in process applications.

SPECIFIC OUTCOME 2
Demonstrate an understanding of the operating principles of pump types.

SPECIFIC OUTCOME 3
Demonstrate an understanding of the application of gas transfer equipment in process applications.

SPECIFIC OUTCOME *4*
Demonstrate an understanding of the operating principles of simple compressors.

SPECIFIC OUTCOME 5
Demonstrate an understanding of the application of bulk solids handling equipment in process applications.

SPECIFIC OUTCOME 6
Demonstrate an understanding of the operating principles of bulk solids handling equipment.