NATIONAL STANDARDS FOR DRINKING WATER TREATMENT CHEMICALS

Report to the

WATER RESEARCH COMMISSION

by

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EXECUTIVE SUMMARY

Although it is a statutory requirement that treated drinking water complies with the South African National Standard (SANS 241), the very chemicals used in the process of water purification are not subject to any control. It has been widely acknowledged and accepted by stakeholders that the continued use of such chemicals presents a high inherent risk from a public health point of view.

The Water Research Commission (WRC) Project K5/1600 was initiated by Umgeni Water, the terms of reference being to investigate current international systems used for regulating drinking water treatment chemicals (DWTCs), to propose a set of standards that could be adopted for use locally, and to create awareness of the existence of such standards through a series of workshops. The project commenced with an extensive consultative process with the WRC, the South African Bureau of Standards (SABS), the Department of Water Affairs and Forestry (DWAF), Water Service Authorities (WSAs), manufacturers, suppliers and end users in compiling an inventory of DWTCs. The relevant international standards were then reviewed in conjunction with national standards and practices. The *status quo* in South Africa (SA) revealed that although certain standards existed, they were deemed to be old and outdated and used analytical procedures that were long and laborious or considered to be obsolete. From a detailed literature review, it was noted that internationally, and in the more developed nations, stringent mechanisms exist for regulating DWTCs.

The World Health Organization recommends the use of legislation as the best means to control the quality of DWTCs rather than relying on the changes in the quality of the treated water. Australia does not have National processes for the regulation, control and use of DWTCs. The closest proactive management is at the point of retail, where there may be contractual agreements in place with chemical suppliers regarding minimum technical requirements. Similarly, Canada does not have any system in place and although attempts were made by Health Canada to introduce the Drinking Water Materials Safety Act, the intent of the Act, being to incorporate the relevant American National Standards Institute/National Sanitation Foundation (ANSI/NSF) standards to regulate DWTCs at the point of retail, it was not passed by parliament. New Zealand currently has five standards that are similar in structure to that of the European (CEN) and American Water Works Association (AWWA) standards. The standards provide manufacturers, purchasers, and suppliers guidance on the minimum technical requirements and methods for physical and chemical testing. In the United Kingdom (UK), DWTCs are heavily regulated using a unique approval system under the control of the Drinking Water Inspectorate (DWI). Product compliance is monitored at the water supplier rather than the product supplier. Furthermore, the minimum technical requirements are specified in legislation rather than in National Standards. Chemicals that conform to BS:EN (British European) standards, do not require DWI approval. In the United States of America (USA), adhesion to the Safe Drinking Water Regulation (SDWR) as well as compliance with ANSI/NSF standards is mandatory. Two types of standards exist, the health standards (NSF/ANSI 60 and 61) and the technical requirements standards (ANSI/AWWA, ASTM International (originally known as the American Society for Testing and Materials (ASTM)), or ANSI standards). The Netherlands have a system similar to that used in the USA. Two pieces of legislation, the European Union Drinking Water Directive and the Dutch Drinking Water Decree specifies the final treated water quality and that the

quality must not be compromised by the treatment chemical. The Dutch Independent not for Profit Organization (KIWA), the Dutch equivalent to the NSF, evaluates DWTCs based on criteria known as the Assessment on Toxicological Aspects (ATA). In SA, DWTCs were regulated by the Health Act No. 63, Section 37c and approvals were granted based on whether the said chemicals complied with the AWWA or other international standards. The legislation did not have any legal standing and was discontinued in 1994, leaving the industry exposed to a potential high risk. A further twelve countries were researched and of these eight was found to be without any system of regulation.

In terms of the Standards Act (Act 29 of 1993), the SABS is the recognized institution for the development of standards in SA. However it was acceptable that the WRC project team work in collaboration with the SABS to propose a set of standards for adoption, all in an attempt to fast track the process. Out of a total of 46 BS:EN standards recommended for adoption, all but three were approved and published. The option of using the ANSI/AWWA standards is also being made available subject to approval by the AWWA standards committee. Three workshops were hosted on the development and implementation of the standards to create awareness on best practices for the production and use of DWTCs. Two members of staff from disadvantaged backgrounds were involved with the project and were trained as research assistants. The project leader and author of this report also benefited from this research and submitted some aspects of this work in part fulfilment of a PhD dissertation.

In terms of developing and proposing a regulatory framework as a basis for implementation in RSA, this was beyond the scope of this project. However some proposals are presented for consideration as possible options in the SA context. The new Water Services Act currently being drafted is to include DWTCs and will seek to clarify the minimum chemical requirements and maximum contamination levels present in DWTCs and it proposes to use the National Department of Health (DOH) to audit suppliers and DWAF to audit WSAs.

A risk assessment study of the occupational hazards and environmental effects of DWTCs was undertaken. The ecological, acute, and chronic health effects for all process chemicals used in SA were obtained from the relevant material safety data sheets (MSDS) and presented. The penultimate chapter describes the procurement of DWTCs and provides guidelines for inviting and evaluating tenders. The final chapter presents some concluding remarks and recommendations for future studies to be carried out in this critical field of study.

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LIST OF ABBREVIATIONS

ANSI	American National Standards Institute
ASTM	American Society for Testing of Materials
ATA	Assessment on Toxicological Aspects
AWWA	American Water Works Association
BS:EN	British European
BSI	British Standards Institute
CEN	European Standards Institution
DOH	Department of Health
DWAF	Department of Water Affairs and Forestry
DWD	Drinking Water Decree
DWI	Drinking Water Inspectorate
DWTC	Drinking water treatment chemical
EC_{50}	Effect concentration, 50%
EEC	European Economic Community
EU	European Union
KIWA	Dutch independent not for profit development organization
KWR	Formerly KIWA Water Research
LC	Lethal concentration, qualified by a duration of exposure (e.g. 10 minutes).
LD_{50}	Lethal dose, 50% mortality (or Median lethal dose)
MD	Maximum dosage
MSDS	Material Safety Data Sheet
NHMRC	National Health and Medical Research Council
NICNAS	National Industrial Chemicals Notification and Assessment Scheme
NRF	National Research Foundation
NS	National Drinking Water Standard
NSF	National Sanitation Foundation
RFD	Reference dose
RMIC	Recommended maximum impurity content
SA	South Africa
SAAWU	South African Association of Water Utilities
SABS	South African Bureau of Standards
SALGA	South African Local Government Association
SANS	South African National Standards
SDWA	Federal Safe Drinking Water Act
SDWR	Safe drinking water regulation
SF	Safety factor
SPAC	Single product allowance concentration
TAC	Total allowable concentration
TDS	Total dissolved solids
VROM	Ministry of Housing, Spatial Planning and the Environment
WHO	World Health Organisation
WRC	Water Research Commission
WSA	Water Services Authorities

CHAPTER ONE
INTRODUCTION

1.1 Drinking Water Treatment Chemicals

The production of safe drinking water in bulk is vital to sustain livelihoods. However, there have been numerous examples in the recent past, worldwide, of poor water quality impacting adversely on human health. A case in point is the outbreak of typhoid and diarrhoea that occurred in September to October 2005 and more recently in November 2007 in Delmas. Similarly outbreaks of cholera have resulted in widespread epidemic in Zimbabwe with over 15 000 cases of infection reported and more than 750 deaths as at 10th December 2008. Increased monitoring and laboratory testing confirmed the cause as microbial contamination of the drinking water supply. The dire consequences of compromised water treatment processes and disinfection reinforced the critical need for effective water treatment.

The addition of drinking water treatment chemicals (DWTCs) to make raw water potable is widely practiced by the water industry and is generally accepted by the community. However, safeguards must be sufficient to ensure that any residual amounts of these chemicals, by-products and other contaminants in their formulations, do not pose an unacceptable health risk. Drinking water treatment chemicals are added mainly to reduce or eliminate the incidence of water-borne diseases, for other public health measures, and to improve the aesthetic quality of the water.

Impurities in natural raw water cover a wide range of materials and in general occur at relatively low concentrations and may originate from a variety of sources, including natural sources such as release from rocks and soils, industrial and domestic sources, from agricultural activities, pesticides, cyanobacteria, materials of construction (pipes, joining and sealing materials, process media and mechanical devices) which comes into contact with drinking water and finally, the treatment chemicals themselves. Both the treatment chemicals and construction materials may release contaminants into the drinking water [AWWA Water Quality and Treatment, 1990; ANSI/NSF 60; ANSI/NSF 61]. It is important to note that natural raw water is usually purer than commercial chemicals. To illustrate this, the total dissolved solids (TDS) concentration in raw water rarely exceeds 0.05%. This degree of contamination is 80 times less than that of commercial lime which contains approximately 4% impurities. Even analytical reagent grade chemicals are more heavily contaminated. Research grade caustic soda and sodium chloride contain 1% and 0.07% impurities, respectively.

Processes used for manufacturing of water treatment chemicals may result in the presence of impurities that are of potential health concern. As an example, there is increasing concern with the levels of unreacted monomers and other starting materials present in polymers for water purification. Some of the more notorious and common chemicals that may originate from the use of these polymers are the acrylamide monomer, epichlorohydrin, formaldehyde, ethylene dichloride, or ammonia. Chlorine used for disinfection has sometimes been found to contain carbon tetrachloride and mercury. Metals such as arsenic, barium, cadmium, chromium, lead, mercury, tin, selenium and silver may be found in a variety of water treatment chemicals.

During the development of the 1993 World Health Organization (WHO) Guidelines for Drinking Water Quality, the conclusion reached by experts was that the quality of treatment chemicals or materials was best controlled by the application of national regulations

governing the quality of the products themselves rather than the quality of the water. This sentiment is shared with all major international stakeholders. National authorities in some countries such as the Dutch independent not for profit organization, KWR (formerly KIWA Water Research) in the Netherlands, the Drinking Water Inspectorate (DWI) in the United Kingdom (UK) and the ANSI/NSF in the United States of America (USA), have issued specifications and recommendations for chemicals and construction materials. Where specifications have not been developed, contamination from these sources may adversely affect the quality of drinking water.

Most chemicals arising in drinking water result in chronic health effects rather than acute effects. Adverse health effects only begin to manifest themselves in humans after prolonged exposure of many years through drinking water. Typically, changes in water quality occur progressively except for those substances that are discharged or leached intermittently to ground or surface water.

1.2 Water Quality Assurance in South Africa

In South Africa (SA), the quality of the domestic supply that is considered safe for human consumption is assured by monitoring for compliance with the South African National Standard (SANS 241), after treatment with a wide range of DWTCs. These chemicals include, but are not limited to, coagulation and flocculation chemicals, softening, precipitation, sequestering, pH adjustment, corrosion control, scale control, disinfection/oxidation, and miscellaneous treatment chemicals (fluoridation, defluoridation, algae control, de-chlorination, antioxidants, dyes and tracers).

Some of these chemicals added to water are intended to be present in the finished water while others are not. The irony however, is that the very chemicals added to treat water, are not subject to any form of regulation and control. There is increasing concern from various stakeholders that the addition of these unnatural chemicals to treat natural water to make it potable, may contribute unhealthy levels of contaminants to the final water, posing a potentially high risk to consumers. The National Department of Health (DOH) in SA, having acknowledged this fact, made an attempt to manage and mitigate the risks by initiating an extensive consultative process with the major role players. The objectives were to obtain individual opinions on the need for the development and implementation of a scheme for the approval and registration of DWTCs. During the consultation process conducted in 1999 to 2000, water services authorities (WSAs), industry and government were unanimous in support of the proposal. Unfortunately this initiative did not materialize and no further progress was reported in this area.

Umgeni Water, having been in the forefront of water research for many years, recognized the dire need to proceed with this initiative and submitted a proposal to the Water Research Commission of SA (WRC), to commence research in the field of DWTCs with special focus on a risk management approach. The project received unanimous support from all stakeholders and full funding from the WRC.

1.3 Rationale

In SA, national standards for the majority of water treatment chemicals either do not exist at all or are out-dated and describe analytical procedures that are in some cases obsolete or extremely long and laborious. The standard for lime, SANS 459-1955, Lime for Chemical and

Metallurgical Purposes, was devised in 1955 and despite four revisions, still recommends gravimetry for calcium and magnesium oxide analysis. Other standards issued more than 20 years ago include CKS 38 for Sodium Aluminate (1966), CKS 105 for Liquid Ammonia (1967), CKS 587:1983 for Trichloroisocyanurate Tablets (1983). The development and use of synthetic organic polymers for water purification have become widespread in most countries worldwide. They have replaced the traditional inorganic coagulants such as aluminium sulphate. Despite the potential for adverse health effects, these polymers are not subject to any form of regulation in SA to protect human health. Similarly, other DWTCs including ferric sulphate, ferric chloride, bentonite, and activated silica amongst others, are also used without any guideline standards in place. There was therefore an urgent need for a comprehensive set of standards for DWTCs in SA.

1.4 Aims and Objectives

The main aims of the project were to undertake research in the field of DWTCs and investigate current international systems used for the regulation and control of these chemicals, to review standards that are available, and finally to research and establish the *status quo* of DWTCs in SA. Specific aims and objectives were to research the following areas:

- International systems for regulating DWTCs
- Consultation with stakeholders to establish industry needs
- DWTCs in SA
- Current standards for DWTCs in SA
- Proposed framework for regulating DWTCs in SA
- International standards for DWTCs
- A gap analysis of DWTCs in SA
- Local needs of the SA drinking water industry.

1.5 Research Products

The key deliverable of this project was to prepare or recommend a full set of standards for use in SA and to produce a detailed report of international systems for DWTCs that could be used as a basis for the promulgation of legislation for regulating these chemicals in SA. This was achieved by preparing:

- A list of DWTCs in SA
- A list of standards for DWTCs currently available in SA
- A full set of new and approved standards
- Training material for stakeholders
- A report containing material on DWTCs
- Presentations and workshops to create awareness of the existence of standards
- A proposed regulatory framework for DWTCs in SA
- Capacity building.

1.6 Methodology

After conducting an international search on DWTCs, with specific reference to legislation and standards proposed by various organizations and countries, all key role-players in SA were

consulted in compiling a comprehensive list of DWTCs. The list was not considered exhaustive, but rather a priority list of the most frequently used chemicals in SA. This was followed by an investigation of all available SA standards for each of the chemicals.

The relevant international standards governing chemicals used for the treatment of water intended for human consumption was then carefully reviewed in conjunction with present national standards and practices. After a process of consultation with role players in the industry, a set of new standards was proposed for adoption in SA. A report was compiled containing recommendations to be used as a basis for updating and reissuing of all standards and as a medium to disseminate information on the findings of the research. Presentations and workshops for this purpose were conducted to create awareness and sensitize WSAs, industries, and government, on the Umgeni Water/WRC initiatives in DWTCs.

A study of the various International Systems for regulating DWTCs was undertaken and a proposed framework for SA was recommended. The study also involved a risk assessment associated with the production and use of DWTCs and finally guidance is provided on the procurement of chemicals through the tender process.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

In this chapter, a detailed study of international trends for the production and use of process chemicals was undertaken. The system used in SA was also researched and the reasons for discontinuing are presented. Specific reference is made to the WHO, the Australian, and the Canadian guidelines. Countries such as New Zealand, the UK, the USA and Netherlands that do have standards for DWTCs, were reviewed and presented. The *status quo* in the other developed countries of the world was also highlighted in this chapter.

2.2 International trends

The international trend in the more developed countries of the world is the existence of stringent mechanisms for regulating the production and use of DWTCs. Currently, there is much controversy and concern over health and safety issues arising from the use of polymers in treating potable water. Polymer manufacturing companies are therefore required to submit their products to a recognized certification body, such as the National Sanitation Foundation (NSF) for assessment. The products are tested rigorously before approval for use is granted and the product becomes registered. It is not mandatory for DWTC manufacturers in SA as well as several of the more highly developed countries, to submit their products for approval or registration, hence subjecting the drinking water industry to enormous risks especially from unscrupulous suppliers.

2.3 The *status quo* in South Africa

Prior to 1994, certification was issued on an *ad hoc* basis by the Department of National Health (DOH), subject to the supplier being able to supply evidence of certification or approval of the chemicals from a recognized institution such as the World Health Organization (WHO), the European Economic Community (EEC), or the NSF. This was subsequently discontinued and to date, there are no longer regulatory mechanisms in place to control the quality of DWTCs.

There is therefore an urgent need in the South African water and wastewater sector, for a comprehensive and revised set of standards that compare favorably to that of international standards such as those of the Europeans, the British, the Dutch, or the Americans. Some options for consideration in the SA water and wastewater industries were to:

- Review, revise and reissue old standards
- Prepare new standards
- Rewrite existing international standards
- Adopt existing international standards in part or in whole from developed countries.

Considering that Project K5/1600 was a relatively low budget project of short duration, straight adoption of standards was proposed as the best option.

2.4 Current Approval and Registration Schemes for DWTCs

Most, if not all, international organizations and countries have come to the conclusion that chemical contaminants originating from water treatment chemicals, are best controlled by national regulations governing the quality of the products rather than monitoring for changes in the quality of the treated water. A review of current international systems revealed that there was still an enormous amount of work to be done worldwide in addressing the problem of regulating water treatment chemicals.

2.5 WHO Guidelines

The WHO guideline for DWTCs [WHO, 1993] recommends the use of legislation as the best means to control the quality of the substances used in water treatment rather than relying on changes in the quality of the treated water as a mechanism of alerting to contamination caused by DWTCs. In 2001, WHO developed a training package for establishing the Recommended Maximum Impurity Content (RMIC) in the treatment chemical [WHO, 2001]. For chemicals that have impurities for which national standards exist, WHO recommends the use of a dilution equation used by the National Research Foundation (NRF) and the NSF to derive a RMIC in the treatment chemical as follows:

$$RMIC(mg/kg) = \frac{NS(mg/L) \times 10^6 (mg/kg)}{MD(mg/L) \times SF}$$

Where:

RMIC	=	Recommended maximum impurity content
NS	=	National drinking water standard
MD	=	Maximum dosage
10^6	=	Conversion factor
SF	=	Safety factor

For impurities that do not have suitable guideline standards, toxicity testing is required to calculate a NS value that can then be used to determine the RMIC.

2.6 Australian Guidelines

Australia does not have national processes for the regulation, control and use of chemicals to treat drinking water. The National Health and Medical Research Council (NHMRC) have examined a wide range of chemicals for treating water in Australia and have recommended those chemicals that already have approval by the American Water Works Association (AWWA). To be acceptable, a chemical must have practical application; that is, it must clarify dirty water or remove harmful organisms, and none must be toxic when ingested in small doses from drinking water. There are no specific requirements in the management process pertaining to the selection and use of drinking water treatment chemicals. However, if a water authority wishes to utilize a chemical not listed, it is the responsibility of the water authority to seek advice from the appropriate state health regulatory agency, and to take into consideration health, environmental, and occupational health and safety issues. Currently in Australia, the closest proactive management of DWTC quality appears to be at the point of sale, where there may be a contractual agreement with the chemical supplier regarding the technical requirements of the chemical being supplied [Drew and Frangor, 2002].

The onus is on manufacturers of new chemicals to seek inclusion into the NHMRC Australian Drinking Water Guidelines. A comprehensive assessment of toxicological information is required, and this is carried out by the National Industrial Chemicals Notification and Assessment Scheme (NICNAS). This organization undertakes reviews through a cost recovery arrangement with the supplier of the chemicals and is required prior to final consideration by the NHMRC [NHMRC, 2007]. An Australian Standard (AS 4020) exists that details requirements for materials in contact with drinking water but this is not intended, nor applicable for DWTCs [Drew and Frangor, 2002].

2.7 Canadian Guidelines

To date there are no certification requirements for DWTCs in Canada. Health Canada conducted a survey of the compliance of DWTCs in provinces and territories using the American National Standard (ANSI/NSF Standard 60). Out of the 1206 products tested only 50% were found to be compliant with the standard [Health Canada, 2007]. The provinces and territories are responsible for the safety of drinking water supplies in their jurisdiction. In 2000, Health Canada introduced The Drinking Water Materials Safety Act 1997, to parliament. The intent of the bill was to incorporate the relevant ANSI/NSF Standards by reference and regulate drinking water materials from the point of retail [Giddings, 2000]. It is interesting to note that this bill was not passed due to industry concern regarding costs and resources involved in the certification of products to ANSI/NSF Standard 60. Health Canada then recommended that "where possible" water utilities and consumers should use ANSI/NSF certified drinking water materials [Health Canada, 2007].

2.8 New Zealand Standards

The safety of drinking water is regulated by the Drinking Water Standards for New Zealand. Currently five DWTCs, including hydrated lime, aluminium sulfate, fluoride, EPI-DMA polymers and chlorine, have standards. The standards are similar in structure to that of the European Standards Institution (CEN) and the AWWA Standards. The standards provide manufacturers, purchasers and suppliers with guidance on the minimum technical requirements of the chemicals and provide methods for physical and chemical testing. Regional councils are responsible for the provision of safe drinking water supplies under the guidance of the Ministry of Health [New Zealand Ministry of Health, 2007].

2.9 United Kingdom Standards

The Secretary of State for the Environment, Transport and the Regions together with the National Assembly, approve substances, products and processes used in the provision of public water supplies. The two authorities are advised on approval issues by the Committee on Chemicals and Materials for use in Public Water Supply and Swimming Pools. The Drinking Water Inspectorate (DWI) operates the approval scheme on behalf of the Secretary of State. The approval system for DWTCs is unique in that product compliance audits are carried out by the approval agency (DWI) on the water supplier rather than the product supplier. Furthermore the technical requirements are specified in legislation rather than in National Standards. With the development of the European Union's single market programme, the European Standards Institution (CEN) is developing a set of harmonized standards that will remove technical barriers to trade resulting from the national testing and checking requirements of the DWI. The British Standards Institute (BSI) states that water treatment chemicals that conform to a British European (BS:EN) Standard, may be used

without the need for formal approval by the Secretary of State, provided that all national conditions for use are observed [DWI, 2007].

2.10 American Standards

In the US, the Federal Safe Drinking Water Act (SDWA) ensures the quality of drinking water by making it the responsibility of each state. At the federal level, there is no specific regulatory framework for DWTCs. Many of the states include specific provisions for DWTCs within their Safe Drinking Water Regulations (SDWR) and rules [Drew and Frangor, 2002]. However, the majority of states require compliance to a relevant standard, which are published either by the NSF or the American Water Works Association (AWWA). There are two types of standards used to specify requirements for DWTCs. The Health Standards (NSF/ANSI 60 and 61) were developed to establish the minimum requirements for the control of adverse health effects from process chemicals. These standards do not include product performance or the technical requirements, which are currently addressed by the AWWA Standards (ANSI/AWWA Standards) as well as standards from organizations such as the American Society for Testing and Materials (ASTM) and the American National Standards Institute (ANSI), the latter being the accreditation body in the USA.

2.11 Netherlands Standards

The Netherlands system for the evaluation of DWTCs is very similar in structure to that of the USA. Legislation specifies the final treated water quality, and that the quality must not be compromised by the treatment chemicals. The overarching legislation is the European Union Drinking Water Directive [EU, 1994], supported by the Drinking Water Decree (DWD) and the Dutch Water Works Decree. These pieces of legislation provide specific guidance to water works in the Netherlands regarding the allowed range of organic and inorganic contaminants in drinking water. The Chief Inspector of Public Health and Environmental Protection of the Ministry of Housing, Spatial Planning and the Environment (VROM) is the authority responsible for drinking water quality. Each water works must meet their statutory obligations to supply good quality drinking water according to the EU directive. The Dutch Government via VROM in collaboration with the Dutch Water Works Association established a central evaluation system for materials used in the preparation of drinking water. The evaluation is carried out against criteria known as the Assessment on Toxicological Aspects (ATA). KIWA, the Dutch equivalent to the NSF, administer the regulations and coordinate the health aspects of the chemical product evaluation [Drew and Frangor, 2002]. Once the product is found to comply with the criteria established by VROM, then a certificate is issued.

2.12 South African Standards

The Health Act No. 63 of 1977, Section 37(c) provided the DOH with a mandate to regulate the use of DWTCs. Evaluation and approval were carried out *ad hoc* and were based on whether the chemicals met US EPA or other international standards. This approval process with no formal registration system was subsequently discontinued in 1994 for fear that legal implications could arise from granting such approvals. In 1998 the Directorate of Environmental Health having acknowledged the potential risks that existed with the use of DWTCs, initiated a consultative process with WSAs, chemical manufacturers, chemical suppliers and the major metropolitan councils, to obtain individual opinions on the need for legislation to regulate water treatment chemicals. Workshops were conducted between 1999 and 2000 with the focus on different models to establish an efficient, cost effective

approval/registration system for all process chemicals. Proposed guidelines for the registration system were that it should be:

- All encompassing (legally binding for all chemicals and materials)
- Chemically unbiased (the system should not favor one chemical over another)
- Economically unbiased (should not favor large or international companies over local or small companies)
- Reduce human health risks
- Stakeholder driven (registration procedure should be drafted in consultation with stakeholders).

Although the workshops resulted in the production of several reports with recommendation for a legislative framework in SA [Barnes and Makwela, 1999a; 1999b], this came to an abrupt end in 2000 and no further work was reported.

With the promulgation of the New National Health Act No. 61 of 2003, the mandate previously given to the DOH to regulate the use of DWTCs, was not included, and this was cause for considerable concern amongst the different role-players. The industry was faced with a significant risk arising from the use of DWTCs that was not subject to complying with any health or performance requirements.

Although SANS 241:2005 Edition 6 regulates final drinking water quality and provides some protection to the consumer, no regulatory mechanism exists on the quality of the very chemicals used to treat the water.

2.13 The *Status Quo* in Other Countries

A summary of the schemes and guidelines used in other countries of the world (Table 2.1) indicates that the issue of regulating DWTCs is an international problem, with only a handful of countries having proper guidelines or standards.

Table 2.1: Status of DWTCs in other countries.

No.	Country	Standard/Guideline
1	Japan	None
2	Austria	Austrian standards (only approved products used)
3	Belgium	None (four exist for products in contact with water)
4	Denmark	None (nine exist for products in contact with water)
5	Finland	Guidelines 1987
6	France	None (exist for products in contact with water)
7	Germany	None (exist for products in contact with water)
8	Italy	None (exist for products in contact with water)
9	Norway	Norwegian Standards
10	Spain	None
11	Sweden	Drinking Water Ordinance 1993:35
12	Switzerland	None (exist for products in contact with water)

2.14 Conclusions

The findings from a detailed study of international systems revealed the existence of stringent mechanisms for regulating the production and use of DWTCs in the more developed countries of the world. However there is still an enormous amount of work to be done worldwide in regulating these chemicals. SA is no exception and has in a sense retrogressed from having a system of certification prior to 1994 to having none at all currently.

Australia does not have a national process for the control and use of DWTCs. However there are some mechanisms to manage the quality of the products at the point of retail by having signed contractual agreements with manufacturers and suppliers of chemicals with respect to the minimum technical requirements. The NHMRC recommends the use of chemicals endorsed by AWWA. New chemicals are assessed by NICNAS using toxicity data as criteria for approval. Similarly Canada has no certification system.

New Zealand has a set of standards for protecting the safety of drinking water. The UK specifies technical requirements in legislation rather than national standards and the approval system is unique in that product compliance audits are carried out on the water suppliers rather than the product suppliers. In the USA, the various states either make provision in their SDWR or require compliance with the relevant standard. The Netherlands have a similar system to that of the USA.

A survey of a further twelve countries indicated only four had standards or guidelines for DWTCs. Hence the problem is not unique to SA but an international problem.

CHAPTER THREE
NATIONAL STANDARDS FOR DRINKING WATER TREATMENT CHEMICALS

3.1 Introduction

After an extensive consultation process with the WRC, South African Bureau of Standards (SABS), Department for water Affairs and Forestry (DWAF), water Services Authorities (WSAs), DOH, South African Local Governments Association (SALGA), South African Association of Water Utilities (SAAWU), manufacturers, suppliers and end users, a list of DWTCs used in SA was compiled (Table 3.1). Although the list is not intended to be exhaustive, it covered the majority of the DWTCs that were deemed to be the priority chemicals. From 46 chemicals, seven have standards of which one is deemed to be outdated in that it makes use of long and laborious methodologies.

3.2 Chemicals Not Recommended

Standards were approved for 43 out of a total of 46 DWTCs. The remaining three are pending the review/approval process, and as such, was not complete during the writing up of this report. Each of the 46 chemicals was identified by extensive consultation with stakeholders and constitutes what is deemed to be a priority list of DWTCs. As such, chemicals that do not appear in the list are not recommended for use.

Users of DWTCs are cautioned that chemicals considered for water treatment in industries such as cooling towers, boiler water, pulp and paper, food and beverage, industrial processes and agricultural processes are not considered potable water treatment chemicals and should not be considered for use either. Also some chemicals originating from unknown suppliers in the East should be carefully inspected and tested prior to use or entirely avoided if uncertainty exits. To illustrate the magnitude and potential seriousness of using chemicals of poor quality, an entire pineapple crop and hundreds of acres of land in the Eastern Cape have been declared “unusable” due to cadmium contamination. This was as a direct consequence of the use of fertilizer of poor quality. If DWTCs are not from a reputable supplier within SA, they should be avoided at all costs.

3.3 Modified Filter Sand

In a training course presented by Prof. Johannes Haarhoff at Umgeni Water [Haarhoff, 2007] it became evident that there are presently adequate techniques for the assessment of filters and the characterization of filter media. The procedures used are based on the AWWA methods of analysis and deals with procedures whereby filters can be routinely assessed. The quality of the filter media is measured by evaluating physical characteristics such as grain size, grain distribution, grain shape, porosity, and durability. The chemical properties of filter media play an equally important role in the treatment efficiency of sand filters. Two requirements, the silica content and acid solubility, are often specified while a third, base solubility, is usually mentioned on certain newer media alternatives.

The training course placed equal emphasis on theoretical and practical aspects of sand filters and included, but not limited, to filtration modelling and filter design, media characterization, backwashing, filter nozzle hydraulics, and trouble shooting of filters. The course is recommended for all plant operators, engineers, scientists and technicians.

Table 3.1: Chemicals used in potable water purification in SA.

No.	Chemical	Synonyms	Formula	Use
1	Filtering material	Anthracite, silica sand		Filtration
2	Sodium chlorite *		$NaClO_2$	Disinfection/oxidation
3	Sodium carbonate	Soda ash	Na_2CO_3	pH adjustment
4	Calcium oxide	Lime, quicklime	CaO	pH adjustment
5	Calcium hydroxide **	Slaked or hydrated lime	$Ca(OH)_2$	pH adjustment
6	Liquid oxygen for ozone generation		O_2	Disinfection/oxidation
7	Hypochlorites: sodium hypochlorites *	Liquid bleach	NaOCl	Disinfection/oxidation
8	Chlorine	Chlorine gas	Cl_2	Disinfection/oxidation
9	Ammonium sulphate	Dry ammonia	$(NH_4)_2SO_4$	Disinfection/oxidation
10	Anhydrous ammonia	Ammonia gas	NH_3	Disinfection/oxidation
11	Hydrogen peroxide *		H_2O_2	Disinfection/oxidation
12	Powdered activated carbon	Pac	C	Adsorption
13	Copper sulphate	Cupric sulphate	$CuSO_4$	Algicide
14	Potassium permanganate	Permanganate	$KMnO_4$	Disinfection/oxidation
15	Granular activated carbon	GAC	C	Adsorption
16	Reactivation of granulated activated carbon	GAC/PAC	C	Reuse
17	Aluminium sulphate (liquid, ground, lump) **	Alum	$Al_2(SO_4)_3.nH_2O$	Coagulation
18	Liquid sodium silicate	Water glass	Na_2SiO_3	Coagulation aid
19	Sodium aluminate	Aluminium sodium oxide	$Na_2Al_2O_4$	Coagulation
20	Ferric sulphate	Iron (III) sulphate	$Fe_2(SO_4)_3.nH_2O$	Coagulation
21	Liquid ferric chloride	Iron (iii) chloride	$FeCl_3.nH_2O$	Coagulation
22	Liquid polyaluminium chloride	Polybasic aluminium	$Al_2(OH)_xCl_y.nH_2O$	Coagulation
23	Poly (Diallyldimethylammonium chloride)	Poly(DADMAC)	CAS 26062-79-3	Coagulation
24	Poly(epichlorohydrin/Dimethylamine)	Epidma polyamines	CAS 25988-97-0 or 42751-79-1	Coagulation
25	Polyacrylamides	Pam	$(C_3H_5NO)_n$ or CAS 9003-05-8	Coagulation
26	Sodium hydroxide	Caustic soda	NaOH	pH adjustment
27	Carbon dioxide		CO_2	pH adjustment
28	Sodium fluoride *	Florocid	NaF	Fluoridation
29	Sodium fluosilicate *	Sodium silicofluoride	Na_2SiF_6	Fluoridation
30	Fluosilicic acid *	Hydrofluosilicic acid	H_2SiF_6	Fluoridation
31	Bromine		Br_2	Disinfection/oxidation

No.	Chemical	Synonyms	Formula	Use
32	Chlorine dioxide		ClO_2	Disinfection/oxidation
33	Sodium silicate	Activated silica	Na_2SiO_3	Coagulation aid
34	Polyaluminium chloride hydroxide Polyaluminium chloride hydroxide sulphate	Polybasic aluminium chloride	$Al_2(OH)_xCl_{y.}nH_2O$	Coagulation
35	Polyaluminium chloride hydroxide silicate		AlnCl(3n-m)(OH)m	Coagulation
36	Polyaluminium chloride silicate sulphate		CAS 53810-32-5 $Al_nCl_{(3n-m)}(OH)_m$	Coagulation
37	Aluminium iron (111) sulphate		$FeSO_4$	Coagulation
38	Sodium hydrogen carbonate	Baking soda	$NaHCO_3$	pH
39	Sulphuric acid		H_2SO_4	
40	Ozone		O_3	Disinfection/oxidation
41	Chlorine dioxide		ClO_2	Disinfection/oxidation
42	Bentonite	Clay	$RO.33(Al,Mg)_2.Si_4O_{10}(OH)_2.nH_2O$ (R=Na, K, Mg, Ca)	Coagulant aid
43	Sodium dichloroisocyanurate, anhydrous	NADCC	$NaC_3N_3O_3Cl_2$	Emergency disinfection only
44	Sodium dichloroisocyanurate, dihydrate	NADCC	$aC_3N_3O_3Cl_2 – 2H_2O$	Emergency disinfection only
45	Trichloroisocyanuric acid			Emergency disinfection only
46	Aluminium chloride (monomeric) Aluminium chloride hydroxide (monomeric) Aluminium chloride hydroxide sulphate (monomeric)		$AlCl_3$	Coagulation

* Current standards exist and in use
** Very old SABS standards exist and in use

3.4 Blended Chemicals

Blended chemicals are products composed of two or more individual chemicals that do not react with one another. There are no standards for such chemicals. The NSF recommendations are that products which are blended entirely of treatment chemicals which have met the requirements of the NSF/ANSI 60 standard as individual chemicals shall have contaminant concentrations from the individual chemicals that comply with that specified in the standard. Consideration must also be given during the evaluation of blends whether contaminant concentrations from the individual chemicals are changed by the use of chemicals in combination.

3.5 Approval of Branded Products

Brand names and branded products are used to exclusively identify the brand owner as the commercial source of products and services. This is used not only as a marketing strategy, but also for purposes of protecting trade secrets. The true identity of the constituents is kept confidential. Branded products can either be individual chemicals or formulations. In both cases the standards shall apply.

3.6 National Standards for South Africa

Following two steering committee meetings and a workshop held on the 9th January 2007 with various role-players, it was recommended that the project be undertaken in collaboration with the SABS and that all standards undergo the process of voting and public comment, for it to be acceptable as a National SA standard. International standards for DWTCs currently available include the BS:EN, AWWA and the Dutch standards, amongst others.

As the BS:EN and AWWA standards are known to be the most widely accepted standards, and have been adopted by many countries worldwide, it was recommended that the project team review these standards, and submit all appropriate standards to the Water Standards Committee for approval. The SABS also proposed to seek approval from the AWWA Standards Committee to adopt the full set of the ANSI/AWWA standards, and giving SA the flexibility to use either standard. The workshop also addressed the issue of regulating water treatment chemicals. Some proposals from the stake holders were as follows:

- The promulgation of new legislation that would be similar to SANS 241
- The amendment of SANS 241 to include standards for DWTCs
- The development and implementation of a registration system similar to that of the Department of Agriculture for pesticides
- The issuing of registration permits by the Department of Health
- Other mechanisms of regulation.

The preferred option was a database of approved chemicals similar to that for pesticide registration.

3.7 Who is Responsible for DWTCs

The question of who is responsible for the quality of DWTCs has been debated at length and the general consensus of the members of the steering committee points to suppliers. This was supported by the findings of the project team that apart from the UK, where product quality is

the responsibility of the user, international practice is for suppliers/manufacturers to obtain certification and the rationale for this is as follows:

- The manufacturer is generally better equipped to test the quality of their products.
- Analysis of contaminants in the product is far easier than testing for it in final treated water due to the dilution effect.
- There are fewer manufacturers than end users and this makes regulating the products far easier.
- In most cases, the users are unsophisticated and not adequately informed of what compounds are used in the manufacturing process and are therefore not geared to determine the concentration of harmful contaminants.

Water Service Authorities are also strongly encouraged to use approved products and hence pressurize manufacturers to acquire product certification. This can also be achieved by entering into contractual agreements with manufacturers that only certified products are to be used.

3.8 Comments from the National Department of Health

From discussions between the Department of Water Affairs and Forestry (DWAF) and the National Department of Health (DOH), it has been proposed that once the standards are in place, the DOH will prepare a database of the DWTCs that are either SANS, EN, AWWA or NSF compliant. All these chemicals will be acceptable to the SA water industry.

Manufacturers and suppliers of chemicals will then be regulated and only those with listed chemicals will be permitted to trade. The onus will be on the manufacturer and supplier to provide the necessary documentation to allow the DOH to list the product on their database. DWAF will be responsible for regulating all water service institutions to ensure that only approved chemicals are used in the treatment of drinking water via amendments to Regulation 5 of the Water Services Act.

Changes to SANS 241 are also imminent and will include the quality of DWTCs. It is intended that the standard be aligned with the WHO and other international requirements for drinking water quality, and that the informative sections will become normative and words such as “compare” become “comply”. Currently SANS 241 does not mention DWTCs.

3.9 Conclusions

A list of 46 DWTCs was prepared after consultation with stakeholders. Standards were approved for 43 chemicals by the SABS Standards Committee. Chemicals not present in the list were deemed unsuitable for potable water purification due to the exposure to a high level of risk of contamination during treatment. For filter sand, it was found that the methods available for assessment were adequate. Blended and branded chemicals must comply with the standards of the individual chemicals. The BS:EN standards were recommended for adoption in SA and if permitted, the ANSI/AWWA standards will also be available as an alternative option. It has also been unanimously accepted that onus will rest on manufacturers and suppliers to ensure the quality of their products and WSAs are encouraged to use approved products. Manufacturers and suppliers will be regulated by the DOH and WSAs by DWAF according to the new water legislation.

CHAPTER FOUR
DEVELOPMENT OF SOUTH AFRICAN STANDARDS

4.1 Introduction

The SABS is, in terms of the Standards Act, 1993 (Act 29 of 1993), the recognized national institution for the promotion and maintenance of standards in SA. Standards South Africa, a division of the SABS, acts as a facilitator and provides secretarial, technical writing facilities and services to the committee responsible for this task and also acts as a publishing house. Once the committee has reached consensus, the draft standards are submitted to a public enquiry stage. An appeal procedure also exists for the resolution of disputes. Standards South Africa has the right to adopt ISO, IEC and certain international standards as South African standards. The standards may be declared as compulsory specifications by the Minister of Trade and Industry in terms of the Standards Act. This will require a notice of intent to be published in the Government Gazette for public comment for a period of 60 days. All other standards are submitted to the Standards Approval Committee for ratification and once ratified, are released for publication [SANS 1-1, 2003].

4.2 The BS:EN Standards

According to the SABS, the British Standard (BS:EN) could be adopted without any change or modifications. There are no copyright constraints prohibiting its use.

4.3 The AWWA Standards

The American Standards could not be adopted in SA without special permission being granted by the Standards Committee of AWWA. The SABS has made a written submission and await a response from AWWA.

4.4 Implementation of the Standard

The Americans, the British and the Dutch are considered to have the most highly developed regulatory and approval systems in the world. They have produced the majority of standards for process chemicals that are widely accepted. Our studies indicate that the area of DWTCs has been thoroughly researched over several decades, and hence there was little merit in preparing totally novel techniques and standards for SA. This would prove to be a time consuming and a very expensive process. It was therefore proposed to review the most popular standards of the USA and UK and make recommendations on those that were deemed to be suitable in the South African context. Although the process of preparing or adopting standards is by law the responsibility of the SABS, it was agreed upon by the SABS and the WRC project team that a joint effort would be acceptable and would speed up the process of preparing DWTC standards for SA. The BS:EN and AWWA standards were reviewed and recommended to Standards SA for approval (Table 4.1).

Table 4.1: List of BS:EN standards submitted to Standards South Africa for approval.

No.	SANS/EN No.	Title	Date published
1	SANS 12173/EN 12173	Chemicals used for treatment of water intended for human consumption – sodium fluoride (edition 2)	2007-01-05
2	SANS 12174/EN 12174	Sodium hexafluosilicate (edition 2)	2007-06-15
3	SANS 12175/EN 12175	Sodium hexafluosilicic acid (edition 2)	2007-06-20
4	SANS 50878/EN 878	Aluminium sulphate	2008-03-14
5	SANS 50881/EN 881	Aluminium chloride (monomeric), aluminium chloride hydroxide (monomeric) and aluminium chloride hydroxide sulphate (monomeric)	2007-10-24
6	SANS 50882/EN 882	Sodium aluminate	2008-03-14
7	SANS 50883/EN 883	Polyaluminium chloride hydroxide and polyaluminium chloride hydroxide sulphate	2007-10-19
8	SANS 50885/EN 885	Polyaluminium chloride hydroxide silicate	2007-11-02
9	SANS 50886/EN 886	Polyaluminium chloride silicate sulphate	2007-10-24
10	SANS 50887/EN 887	Aluminium iron (III) sulphate	2008-03-14
11	SANS 50888/EN 888	Iron (III) chloride	2008-04-25
12	SANS 50889/EN 889	Iron (II) sulphate	2008-04-25
13	SANS 50890/EN 890	Iron (III) sulphate liquid	2008-04-25
14	SANS 50891/EN 891	Iron (III) chloride	2008-04-25
15	SANS 50896/EN 896	Sodium hydroxide	2007-09-19
16	SANS 50897/EN 897	Sodium carbonate	2007-09-19
17	SANS 50898/EN898	Sodium hydrogen carbonate	2007-09-19
18	SANS 50899/EN899	Sulphuric acid	2008-04-25
19	SANS 50901/EN 901	Sodium hypochlorite (national amdt 1)	2007-01-19
20	SANS 50902/EN 902	Hydrogen peroxide (national amdt 1)	2007-01-19
21	SANS 50935/EN 935	Aluminium iron (III) chloride (monomeric) and aluminium iron (III) chloride hydroxide (monomeric)	2008-03-14
22	SANS 50936/EN 936	Carbon dioxide	2008-03-14
23	SANS 50937/EN 937	Chlorine	2007-12-21
24	SANS 50938/EN 938	Sodium chlorite (national amdt 1)	2007-01-19
25	SANS 51209/EN 1209	Sodium silicate	2007-12-21
26	SANS 51278/EN 1278	Ozone	2008-04-25
27	SANS 51302/EN 1302 & corrig 1	Aluminium-based coagulants-analytical methods	2007-10-24
28	SANS 51407/EN 1407	Anionic and non-anionic polyacrylamides	2007-10-24
29	SANS 51409/EN 1409	Polyamines	2007-10-24
30	SANS 51410/EN 1410	Cationic polyacrylamides	2007-10-24
31	SANS 52122/EN 12122	Ammonia solution	2007-07-18
32	SANS 52386/EN 12386	Copper sulphate	2007-12-21

No.	SANS/EN No.	Title	Date published
33	SANS 52485/EN 12485	Calcium carbonate, high-calcium lime and half-burnt dolomite test methods	2007-07-18
34	SANS 52671/EN 12671	Chlorine dioxide	2007-12-21
35	SANS 52672/EN 12672	Potassium permanganate	2007-07-18
36	SANS 52876/EN 12876	Oxygen	2008-04-25
37	SANS 52901/EN 12901	Products used for treatment of water intended for human consumption - inorganic supporting and filtering materials: definitions	2007-12-21
38	SANS 52902/EN 12902	Inorganic supporting and filtering materials: methods of test	2007-12-21
39	SANS 52903/EN 12903	Powdered activated carbon	2007-12-21
40	SANS 52904/EN 12904	Sand and gravel	2007-12-21
41	SANS 52915-1/EN 12915-1 & corrig 1	Granular activated carbon: virgin granular activated carbon	2008-01-25
42	SANS 52915-2/EN 12915-2 & corrig 1	Granular activated carbon: reactivated granular activated carbon	2008-01-25
43	SANS 52931/EN 12931	Chemicals used for treatment of water intended for human consumption - chemicals for emergency use-sodium dichloroisocyanurate, anhydrous	2008-10-31
44	SANS 52932/EN 12932	Chemicals for emergency use - sodium dichloroisocyanurate, dihydrate	2008-10-31
45	SANS 52933/EN 12933	Chemicals for emergency use - trichloroisocyanuric acid	2008-10-31
46	SANS 53754/EN 13754	Products used for treatment of water intended for human consumption - bentonite	2008-01-25

4.5 Workshops and Training Materials

Three workshops were hosted, the first on 9th January 2007 at the SABS in Pretoria. This workshop was of paramount importance and it provided a better focus on what processes were required to be followed in the preparation of standards. The workshop was attended by representatives from DWAF, WRC, SABS, StanSa Water Committee and the project team. Although the SABS is the custodian of all standards in SA, collaboration with the WRC in this project was permitted in order to fast-track the preparation of the national standards. A second workshop was hosted at WISA, on 18th May 2008, at Sun City, and the third at the Drinking Water Quality Conference, 28th July 2008 in Johannesburg. The objectives were primarily to create awareness of the findings of this research and to transfer knowledge related to best practices in respect of the production and use of DWTCs.

The workshops also provided useful information on amendments that were proposed to Regulation 5, SANS 241 and Regulation 2834. The project was well received in both instances. Some concerns were raised with the implementation of the standards and that it would be too stringent for SA. Stakeholder fears were allayed by highlighting the fact that the standards could be revised if found to be unsuitable after implementation. It was also suggested that training materials be prepared at the conclusion of the project, the objectives being to inform stakeholders of the presence of the new standards, details of where they could

be obtained, websites, email details, and telephone numbers. The SABS, being the ultimate custodian of the standards, voluntarily agreed to design and develop the training brochure which will be made available on their website.

4.6 Revision of Standards

Any standard that has been adopted for use by the SABS or developed from scratch (locally known as "homegrowns" e.g. SANS 241), can be revised. The protocol for revision is outlined as follows:

Adoptions: An adoption can only be revised when the original standard is revised. If the original adoption was an ISO/IEC standard, then Standards SA, being a member of ISO/IEC, could request the relevant International Committee to consider revision of a standard. This is not the case with EN standards. Standards SA is not a member of CEN and hence cannot request a revision of any of their standards, no matter how well it is motivated for.

Homegrowns: If any public or committee member feels that a homegrown standard is in need of revision a formal written request together with a strong motivation is required by the SABS Standards Division. This is followed by the preparation of a New Work Item that is then circulated to the Standards Committee for review. Once accepted, the route for standards adoption is followed as indicated in Section 4.1.

4.7 Conclusions

Although the SABS is the recognized institution for the development of standards in SA, it was acceptable that the WRC project team work in collaboration with them to recommend standards for adoption. Of the 46 standards recommended for adoption, all were approved and published. Only BS:EN standards were adopted and the option of using the ANSI/AWWA standards is also being considered, subject to approval from the AWWA Standards Committee. Three workshops were hosted on the development and implementation of the standards to create awareness on best practices for the production and use of DWTCs. The standards, if deemed to be too stringent, can be revised through a formal request made via the Standards Committee.

CHAPTER FIVE
A RISK ASSESSMENT OF DRINKING WATER TREATMENT CHEMICALS

5.1 Introduction

International assessments of risks from exposure to DWTCs can assist WSAs in identifying problems areas and establishing specifications for all chemicals and materials in contact with drinking water. In countries that require the use of approved and registered DWTCs, a detailed toxicological review process is undertaken to establish the human health effects of the substances used in the process. The general procedure recommended by NSF/ANSI, involves the following:

- Establish whether a peer reviewed quantitative risk assessment of the chemical substance is available.
- If the assessment is used in the promulgation of drinking water regulations, the Single Product Allowable Concentration (SPAC) is derived from the regulatory values. If the assessment is not used as a basis for drinking water regulation, then the assessment and its corresponding Reference Dose (RfDs) is used to determine the human health risks of the chemical.
- If a published and peer reviewed quantitative risk assessment is not available, the Total Allowable Concentration (TAC) and SPAC is derived from the toxicology data for the substance [NSF/ANSI 60, 2005].

Toxicity data to be used may include, but not limited to, assays of genetic toxicity, acute toxicity (1 to 14 day exposure), short term toxicity (14 to 28 day exposure), subchronic toxicity (90 day), reproductive toxicity, developmental toxicity, immunotoxicity, neurotoxicity, chronic toxicity, and epidemiological data.

5.2 Toxicity and Ecological Information

In studying DWTCs, it was deemed essential to have a sound knowledge of the occupational hazards and environmental effects of the chemical substances. The acute health, chronic health, and ecological effects for all process chemicals used in SA, were obtained from the relevant material safety data sheets (MSDS) and are summarized in Appendix 1.

CHAPTER SIX
PROCUREMENT OF DRINKING WATER TREATMENT CHEMICALS

6.1 Introduction

In SA the more traditional way of doing business is still applied to a large extent; that is an organization buys from a supplier and sells to a consumer and the relationship between the parties is distant. However, in October 2005 the National Treasury of the Republic of SA issued guidelines for the implementation of Supply Chain Management (SCM), to bring SA in line with global trends and to increase productivity. Organizations are beginning to include more parties in their supply chains in decision making processes, to enable all parties to benefit from improved management of the supply chain. The supply chain includes all the activities associated with the flow and transformation of goods and services, from the raw material stage and through to the end user [National Treasury, 2005].

Stock and Lambert define SCM as the process for designing, developing, optimizing and managing the internal and external components of the supply system, including material supply, transforming materials and distributing finished products or services to customers. The overall objectives and strategies of SCM are rather complex, and involve several processes and parties. Key requirements for the successful implementation of SCM are executive or top management support, leadership and commitment to change and empowerment. SCM is therefore a highly interactive, complex systems approach and requires simultaneous consideration of many trade-offs [Stock and Lambert, 2001].

6.2 The Public Finance Management Act

According to the Public Finance Management Act (PFMA) water authorities are currently classified as "3B" entities (government business enterprises). This in effect exempts them from complying with the Supply Chain Regulations contained in the Act. However the new PFMA is currently being drafted. In terms of the new Act, it is understood that water authorities will no longer be exempt and will be obliged to follow the guiding principles of Supply Chain Management (SCM). Regulations that necessitates a tender process will be required to be followed in accordance with the threshold values of the items being purchased and structure themselves into sections, namely Demand (Planning), Acquisition (procurement), Disposal (of fixed and movable assets), Logistics (Inventory), and Supply Chain Performance (self audit of compliance to legislation, policy and procedures). Critical to the SCM process are segregation of duties and the formation of three SCM Committees namely:

- The Bid Specification Committee – Approves the specification
- Bid Evaluation Committee (BEC) – Evaluates the offers received and recommend bids (offers) to the Bid Adjudication Committee (BAC).
- Bid Adjudication Committee – This committee receives bids from the BEC and makes the award.

Critical to this is again segregation of duties where a member of the BSC may not be a member of the BAC to stop collusion and corruption. SCM requires that tenders of over R500 000 are open tenders (advertised in the press and open to all suppliers that qualify in terms of the SCM regulations). Supply Chain Management has introduced the criteria of functionality, price and eligibility. The BSC agrees to a number of points split between

functionality and price, higher functionality for more complex work, e.g. design, which must add up to 100 points. Points scored are adjusted from 100 points to 90 points through the use of a formula. Eligibility is not scored. The BSC agree to eligibility criteria and the supplier or service provider are either eligible or not. This committee does not rate or awards scores to each bid.

The other two acts critical to SCM are the Preferential Procurement Policy Finance Act (PPPFA) and Broad Based Black Economic Empowerment Act (BBBEEA). Unfortunately there is conflict between these two acts, but both acts cover the other 10 preference points (90 are for price/functionality). These must include points for historically disadvantaged individuals (HDIs), namely women and disabled persons, plus other points which the organization may wish to add including locality. The total for these criteria may not add up to more than 10 points.

A tenderer is eligible if all documentation pertaining to the operation of a legally compliant business entity (CK documentation, tax clearance, etc), is furnished. The tenderer then proceeds to the next phase of the evaluation process. The tenderer is then evaluated on price and awarded a score using a prescribed formula. Finally the tenderer is evaluated on functionality, a parameter that specifies what quality of products or services is required. The tender is awarded to the tenderer scoring the highest number of points and not the lowest price. Tenderers which do not comply with eligibility are not evaluated

6.3 The Tender Process

The tender process is used in the procurement of goods or services and the process requires the organisation to define the rights, risks and obligations of the parties concerned, and to define the nature, quality and quantity of the goods or service required. The process could be an Open Tender in which it is open to the public, or a Closed Tender, in which only selected vendors are invited to tender. There are five stages to any tender process and these are as follows:

- Compiling tender documents
- Inviting tenders
- Receiving tenders
- Evaluating tenders
- Clearing successful tenderers and awarding contracts.

There are no generic tender documents available. Each set of documents is specially adapted to cater for industry needs. Typical documents utilized in the procurement of DWTCs are provided in Appendix 2.

CHAPTER SEVEN
CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

The addition of unnatural chemicals to make natural water potable is widely practiced, and found to be acceptable by WSAs worldwide. However, it has been acknowledged that the very chemicals added to treat water may contribute unhealthy levels of contaminants to the final water, and thus pose a serious health risk to consumers. The best mechanism of mitigating such risks is to regulate the DWTC industry; that is imposing stringent standards that specify the maximum contaminant levels and the minimum chemical requirements, to maintain good quality control.

Although it was established that there is yet much work to be done worldwide in regulating DWTCs, locally stakeholders are concerned with the *status quo* in SA. That we have moved from having some degree of control of DWTCs through legislation prior to 1994 to none at all currently, is an area of urgent concern. It indicates an enormous failure and inadequacy of the relevant pieces of legislation. However a considerable amount of research was undertaken in addressing these concerns faced by the water sector. As at 10th December 2008, significant progress was made and 46 new standards covering the majority of the so called priority DWTCs, were adopted by the SABS for use in SA. This was achieved by the WRC project team working in collaboration with the SABS.

The project not only proved to be extremely successful by the very relevant and critical nature of the area of study, but also benefited individuals that formed part of the project team. Two laboratory technicians from previously disadvantaged backgrounds were exposed to a research environment and were provided with basic research skills. More importantly, the project leader and author of this report, was able to utilize some of the information in another more detailed study of synthetic organic polymers for water purification. This study was expanded to an advanced level of research that was accepted as a PhD dissertation (Synthesis, Properties and Analysis of PolyDADMAC for Water Purification), at the University of Stellenbosch, in April 2008.

Contamination in DWTCs generally results in chronic health effects. However, acute health, and ecological effects may also arise from the production and use of DWTCs. These effects have been identified and presented in the report. Finally, guidelines are provided on SCM processes for the procurement of DWTCs, while complying with good corporate governance.

7.2 Recommendations

Project K5/1600 was originally of a two year duration. A further two year extension was requested due to breaks in continuity as a result of changes in the project management team. During this period, the terms of reference were revised, and made more relevant with emphasis on the urgent needs of the drinking water sector in SA. The project team and steering committee noted that the final research undertaken far exceeded the scope of the project and it was therefore recommended that no further work be undertaken. However, similar work will be required in developing standards for the wastewater industry and this should form part of a new project.

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APPENDIX 1
MATERIAL SAFETY DATA INFORMATION FOR DRINKING WATER TREATMENT CHEMICALS

A1.1 Introduction

Material Safety Data Sheets were acquired from various sources and summarized to provide some critical information on the priority list of DWTCs used in SA (Table A1). The key issues relate to acute and chronic health effects and ecological effects of DWTCs.

Table A1: Acute and chronic health effects and ecological effects of DWTCs.

Acute Health Effects	Chronic Health Effects	Ecological Effects
Fluosilic Acid, CAS 16961-83-4		
Extremely corrosive to skin, eye, mucus membranes of mouth and respiratory tracts.	Hazardous in case of skin contact, eye contact, ingestion and inhalation. Carcinogenic: no data. Mutagenic: no data. Teratogenic: no data. Developmental toxicity: no data.	Ecotoxicity data: not available. Biodegradation: short term not likely, possible long term.
Ferric Sulphate, CAS 10028-22-5		
Very hazardous in case of ingestion. Hazardous in case of skin contact, eye contact, and inhalation.	Toxic to lungs and mucous membranes. Carcinogenic: no data. Mutagenic: no data. Teratogenic: no data. Developmental toxicity: no data.	Ecotoxicity data: not available. Biodegradation: short term not likely, possible long term.
Sodium Fluorosilicate, CAS 16893-85-9		
Irritating to mucous membranes, skin and eyes. Ingestion causes convulsions, loss of consciousness, deep coma and cardiopulmonary arrest. LD_{50}, oral, rat, 125 mg/kg (sodium hexafluorosilicate)	Chronic exposure causes bone fluorosis, nervous problems, cardiac arrhythmia, sore throat, nose bleeds and chronic bronchitis. Carcinogenic: none. Mutagenic: no data. Teratogenic: no data. Developmental toxicity: no data.	Ecotoxicity: data not available. Biodegradation: data not available. Stability: decomposes to hydrofluoric acid and fluorine.
Hydrated Lime, CAS 1305-62-0		
Eye contact can cause chemical burns and blindness, skin contact and ingestion causes burns to skin, mouth, throat, respiratory, stomach and digestive tract. LD_{50}, oral, mouse, 7300 mg/kg	Causes autoimmune diseases such as scleroderma, systemic lupus, erythematosus, rheumatoid arthritis. Also known to increase the risk of tuberculosis and chronic kidney disease and end-stage renal disease. Chronic inhalation causes silicosis. Contains crystalline silica that is known to be carcinogenic.	Ecotoxicity: data not available. Biodegradation: data not available. Stability: stable but reacts slowly with CO_2.

Acute Health Effects	Chronic Health Effects	Ecological Effects
Sodium Carbonate, CAS 497-19-8		
Exposure causes irritation to eyes, skin, mucous membranes and upper respiratory tract. LD_{50}, oral, rat, 4090 mg/kg	No data available for chronic effects.	Ecotoxicity: no significant toxicity to aquatic organisms (LC_{50}, 96 hr, *Daphnia magna*, 265 to 565 mg/L; LC_{50}, 96 hr, Bluegill sunfish, 300 to 320 mg/L) Biodegradation: not applicable to inorganic substances. Stability: stable.
Ferric Chloride, CAS 7732-18-5		
Very hazardous in case of skin contact, eye contact and ingestion. Severe over- exposure may result in death. Inhalation of spray mist may cause severe irritation to respiratory tract, coughing, choking and shortness of breath. LD_{50}, oral, rat, 900 mg/kg.	Carcinogenic: no data. Mutagenic: mutagenic to mammalian somatic cells. Teratogenic: no data. Developmental Toxicity: no data.	Ecotoxicity: no data. Biodegradation: short term not likely, possible long term.
Bentonite, CAS 1302-78-9		
Hazardous in case of eye contact and inhalation. Slight hazard in case of skin contact and ingestion.	Hazardous by inhalation and is toxic to lungs. Carcinogenic: no data. Mutagenic: no data. Teratogenic: no data. Developmental Toxicity: no data.	Ecotoxicity: not data. Biodegradation: short term not likely, possible long term. Stability: stable.
Sodium Silicate, CAS 1344-09-8		
Moderate irritation to eyes and skin. Inhalation of spray mist may cause irritation of respiratory tract. Ingestion may cause irritation to mouth oesophagus and stomach. LD_{50}, oral, rat, 1500 to 3200 mg/kg	No known chronic hazards. Carcinogenic: no data. Mutagenic: no data. Teratogenic: no data. Developmental Toxicity: no data.	Ecotoxicity: 96 hr, median tolerance, *Gambusia affnis*, 2320 mg/L; 96 hr, median tolerance, *Daphnia magna*, 247 mg/L; 96 hr, median tolerance, *Lymnea*, 160 mg/L. Biodegradation: this substance is not persistent in aquatic systems but its high pH is acutely harmful to aquatic life. Stability: stable under all conditions of storage and use.
Sodium Hypochlorite, CAS 7681-52-9		
Inhalation may cause irritation to respiratory tract, coughing and sore throat. Contact with skin and eyes may cause irritation and damage.	Chronic exposure may cause constant irritation to eyes and throat. Investigated as a tumorigen and mutagen.	Ecotoxicity: not data. Biodegradation: not data. Stability: decomposes on exposure to air, sunlight, and temperature. Chlorine and sodium oxide are decomposition products.
Copper Sulphate, CAS 7758-99-8		
Inhalation of dust may cause irritation of respiratory tract. Toxic by ingestion. Non toxic on skin contact. Copper sulphate is emetic. LD_{50}, oral, rat, 472 mg/kg.	Prolonged ingestion may increase the liver copper content.	Ecotoxicity: Toxic to fish, and plants. LC_{50}, fish, 235 mg/L; LC_{50}, plants, 25 mg/L. Biodegradation: no data. Stability: stable

Acute Health Effects	Chronic Health Effects	Ecological Effects
Aluminium Sulphate, CAS 10043-01-3		
Contact with eyes may cause risk of permanent loss of vision. May cause irritation to mucous membrane if inhaled and very astringent to mouth, nose and throat if ingested. LD_{50}, oral, rat, 6207 mg/kg.	Prolonged contact with skin may cause dermatitis and general long term exposure causes an accumulation of aluminium in the brain tissue resulting in seizures and brain dysfunction.	Ecotoxicity: causes acidification and is toxic to aquatic life and soil micro-organisms. Biodegradation: remains indefinitely in the environment as the hydroxide. Stability: stable.
Calcium Chloride, CAS 10043-52-4		
Exposure may cause moderate to severe irritation to skin and eyes. Inhalation may cause irritation to nose, throat, mucous membranes, and could result in coughing and difficulty in breathing. The chemical is moderately toxic by ingestion and may cause nausea, sore throat and stomach pains. LD_{50}, oral, mouse, 1940 mg/kg. LD_{50}, IV, mouse, 42 mg/kg.	Repeated or prolonged exposure may cause conjunctivitis, corneal injury and dermatitis. Carcinogenic: no data.	Ecotoxicity: large spills may damage vegetation and cause fish kills. Stability: stable under all conditions of storage and use.
Ammonia, CAS 7664-41-7		
Extreme exposure (5000 mg/L) can cause immediate death from spasm, inflammation or oedema of the larynx. Exposure to eye cause lachrymation, oedema, and blindness. Skin exposure causes irritation, corrosive burns and blister formation. Contact with the liquid will freeze tissue and cause caustic burns. Acute exposure through inhalation may cause severe irritation of the respiratory tract, glottal oedema, bronchial spasm, pulmonary oedema and respiratory arrest.	Chronic effects: bronchitis. Carcinogenic: not listed as a carcinogen.	Ecotoxicity: toxic to aquatic organisms. Classed as hazardous waste. Suitably diluted product may be disposed of on agricultural land as fertilizer. Stability: stable at room temperature. Reacts exothermally with water and mineral acids. Decomposes to hydrogen and nitrogen at high temperature.
Liquid Chlorine, CAS 7681-52-9		
Exposure by ingestion result in nausea, vomiting, diarrhoea, stomach pains and chemical burns to the gastrointestinal tract. It is corrosive to the eyes and may cause corneal burns and result in permanent injury. Skin contact will result in severe irritation and corrosive burns. Inhalation of aerosols may produce respiratory irritation and fluid build up in lungs. LD_{50}, oral, mouse, 5800 mg/kg.	Chronic exposure: no data.	Ecotoxicity: very toxic to aquatic organisms, LC_{50}, 48 hr, fish, 0.07 - 5.9 mg/L; expected to be harmful to terrestrial species. Biodegradation: this material is biodegradable. Stability: incompatible with acids, metal salts, metals, reducing agents and peroxides.

Acute Health Effects	Chronic Health Effects	Ecological Effects
Hydrogen Peroxide, CAS 7722-84-1		
Eye exposure produces burns and corneal injury. Ingestion may cause permanent damage (perforations) to the digestive tract. The substance is harmful if inhaled and may result in irritation of the respiratory tract with shortness of breath, pulmonary oedema, nervous tremors, numb extremities, chemical pneumonia and death. LD_{50}, oral, rat, 2000 mg/kg.	Prolonged exposure causes dermatitis. Carcinogenic: known animal carcinogen. Mutagenic: no data. Teratogenic: no data. Developmental Toxicity: no data.	Ecotoxicity: no data. Biodegradation: no data. Stability: decomposes slowly to release oxygen and hydrogen gas.
Carbon Dioxide, CAS 124-38-9		
Contact with eyes may cause drying or irritation due to hydrogen sulphide. Skin contact may be mildly irritating. Pressurized gas may damage ear canal. Ingestion is unlikely but may cause drying or irritation of the digestive tract. Inhalation of the substance can cause headaches, dizziness, shortness of breath, muscular weakness, heart beat irregularities, drowsiness, ringing in the ears, convulsions, coma, and eventually death. LC_{50}, Human, 100 000 ppm/min.	Chronic exposure to the substance produces metabolic acidosis and cause stress to the adrenal cortex. Carcinogenic: not listed as a carcinogen.	Ecotoxicity: linked to global warming. May decrease the pH of aquatic systems and impact on aquatic organisms. Biodegradation: the substance is a degradation product of all organic matter. Product will be absorbed through the natural carbon and sulphur cycles without any long term effects
Activated Carbon Powder, CAS 7440-44-0		
May cause slight eye irritation due to physical nature of substance. Not considered to be a skin irritant and non toxic by inhalation or ingestion. LD_{50}, oral, rat, 10 g/kg.	The effects of long term, low-level exposure have not been determined. Carcinogenic: not listed.	Ecotoxicity: not considered harmful to the environment in its original state. Degradation: degrades to carbon monoxide when burned. Stability: stable.
Ferric Sulphate, CAS 10028-22-5		
Very hazardous in case of ingestion. Also hazardous if exposure through skin, eyes or inhalation. Slightly hazardous as skin permeator.	Toxic to lungs and mucous membranes. Carcinogenic: no data. Mutagenic: no data. Teratogenic: no data. Developmental Toxicity: no data.	Ecotoxicity: no data. Biodegradation: no short term degradation. Stability: stable.
Sodium Hydroxide, CAS 1310-73-2		
Exposure to eyes causes severe eye damage and blindness. Similarly chemical burns and tissue damage is caused by exposure to the skin. Inhalation of dusts and mists cause irritation and burns to the respiratory tract. Ingestion may result in irritation of the gastrointestinal tract, severe stomach pains, vomiting and diarrhoea.	Chronic exposure: no data.	Ecotoxicity: no data.

Acute Health Effects	Chronic Health Effects	Ecological Effects
Potassium Permanganate, CAS 7722-64-7		
Highly toxic if ingested. Causes swelling in mouth and throat, shortness of breath, liver damage, kidney damage and death. Can permanently damage eyes and skin tissue. Inhalation of dust and mist causes irritation to nose, throat, and respiratory tract resulting in shortness of breath and pulmonary oedema and death. LD_{50}, oral, mouse, 1090 mg/kg.	Chronic exposure to manganese compounds results in harmful effects to the central nervous system, resulting in difficulty in walking, weakness or cramps in the legs, trouble with memory and unstable emotions.	Ecotoxicity: no data.
Sodium Chlorate, CAS 7775-09-9		
Toxic by ingestion or inhalation. Corrosive and very destructive to respiratory tract and mucous membranes. LD_{50}, oral, rat, 1200 mg/kg.	Chronic exposure: no data.	Stability: stable, but can form explosive compounds when mixed with a variety of other materials.
PolyDADMAC, CAS 26062-79-3		
Exposure may cause skin irritation and eye irritation. Inhalation results in irritation of the mucous membranes and upper respiratory tract. Ingestion may result in harmful effects. LD_{50}, oral, rat, 3000 mg/kg.	Chronic toxicity: no data.	Ecotoxicity: LC_{50}, 48 hr, *Daphnia magna*, 0.23 mg/L; LC_{50}, 96 hr, *Pimephales promelas*, 6.51 mg/L. Degradation: forms hazardous decomposition products such as carbon monoxide, carbon dioxide, nitrogen oxides, hydrogen chloride gas. Stability: stable.
Granular Ammonium Sulphate, CAS 19-2-0-22		
This product may irritate skin and eyes. Over-exposure by inhalation may produce respiratory tract irritation. Ingestion may produce gastrointestinal tract irritation, stomach pains and diarrhoea. LD_{50}, oral, rat, 3000 mg/kg.	Chronic exposure: no known effects. Carcinogenic: none. Mutagenic: none. Teratogenic: none.	Ecotoxicity: very low toxicity to humans or animals. Will release ammonium ions and ammonia is toxic to fish. Biodegradation: produces nitrogen and sulphur oxides. Degradation products will promote algal growth and degrade water quality and taste. Stability: stable.
Polyaluminium Chloride, CAS 1327-41-9		
Irritant to skin that results in dermatitis. Can cause permanent damage to eyes and blindness. Product does not fume. Strong astringent to mouth, nose and throat. LD_{50}, oral, rat, 12.79 g/kg.	Chronic exposure: no data.	Ecotoxicity: contributes to acidification of the treatment system and will injure treatment organisms. Biodegradation: remains indefinitely in the environment as chloride. Stability: stable.

Acute Health Effects	Chronic Health Effects	Ecological Effects
Sodium Aluminate, CAS 1302-42-7		
Exposure to skin causes redness and blisters. Exposure to eyes results in redness, blurred vision and severe deep burns. Ingestion results in stomach pains, shock or collapsing.	Chronic toxicity: no data.	Ecotoxicity: no data. Stability: strong base, reacts violently with acids and is corrosive to aluminium, tin, and zinc.
Chlorine Gas, CAS 7782-50-5		
Extremely corrosive and can burn and damage eyes, skin, mucous membranes and any other exposed tissue. If inhaled, irritation of the respiratory system may occur with coughing and breathing difficulty. Overexposure to this gas may be fatal. LC_{50}, inhalation, mouse, 137 ppm/min	Persistent irritation may result from repeated exposure, can result in emphysema and erosion of tooth enamel. Carcinogenic: not listed. Mutagenic: noted in specific human and animal tissue. Teratogenic: not noted in humans. Embryo toxicity: no effect on humans. Reproductive: does not cause adverse reproductive effects in humans.	Ecotoxicity: has potential to kill fish and aquatic life, LC_{50}, *Daphnia magna*, 0.097 mg/L. Animals exposed to chlorine will experience tissue damage, burns and may be killed. Stability: stable, hydrolyzes in water to produce hypochlorous acid.
Polyacrylamide, CAS 79-06-1		
Exposure may cause skin irritation and eye irritation. Inhalation results in irritation of the mucous membranes and upper respiratory tract. Ingestion may result in harmful effects. LD_{50}, oral,rat,124mg/kg	Chronic inhalation and ingestion may cause effects similar to those of acute inhalation and ingestion. Confirmed animal carcinogen with unknown relevance to humans.	Ecotoxicity: no data. Degradation: forms carbon monoxide, oxides of nitrogen, carbon dioxide and ammonia. Stability: stable.
Sodium dichloroisocyanurate anhydrous, CAS 2893-78-9		
Harmful if swallowed or inhaled. Exposure to skin is corrosive and may cause burns. Inhalation may be fatal, destructive to mucous membranes. LD_{50}, oral,rat,1400mg/kg	Chronic toxicity data not available.	Stable. Oxidizing agent – contact with combustible material may lead to fire. Incompatible with strong bases, strong oxidizing agents. Reacts readily with many nitrogen containing compounds to generate explosive nitrogen triiodide. Moisture sensitive. Ecotoxicity: no data.
Ozone, CAS 10028-15-6		
Toxic by inhalation. Respiratory and skin irritant. TCLO human, 1 ppm/2 hours	Chronic toxicity data not available.	Stability: Unstable. Decomposes spontaneously and violently oxygen. May react violently with combustible materials and reducing agents such as organics. Ecotoxicity: no data.

Acute Health Effects	Chronic Health Effects	Ecological Effects
Sulphuric acid, CAS 7664-93-9		
Extremely corrosive causes serious burns. Highly toxic. Harmful by inhalation, ingestion and through skin contact. Ingestion may be fatal. Skin contact may lead to extensive and severe burns. LD_{50}, oral, rat, 0.51mg/L.	Chronic exposure may result in lung damage and possible cancer.	Stability: Stable, but reacts with moisture very exothermically, which may enhance its ability to act as an oxidising agent. Reacts violently with water - when diluting always carefully add acid to water never reverse, reaction to many metals is rapid or violent and generates hydrogen (flammable, explosion hazard) Ecotoxicity: no data.
Liquid oxygen, CAS 7782-44-7		
Harmful if swallowed or inhaled in large volumes. Exposure to skin and eyes can cause frostbite; inhalation may lead to breathing difficulties. LD50 not available.	Chronic toxicity data not available.	Stability: stable. Ecotoxicity: no data.
Bromine, CAS 7726-95-6		
May be fatal if inhaled. Highly toxic by inhalation, ingestion or skin contact. Causes severe burns. LD_{50}, oral, rat, 2600mg/kg	Chronic toxicity data not available.	Stability: Stable. Incompatible with reducing agents, alkali metals, powdered metals, steel, iron, copper and organic materials. Ecotoxicity: no data.
Chlorine dioxide, CAS 10049-04-4		
Exposure by ingestion result in nausea, vomiting, diarrhoea, stomach pains and chemical burns to the gastrointestinal tract. It is corrosive to the eyes and may cause corneal burns and result in permanent injury. Skin contact will result in severe irritation and corrosive burns. Inhalation of aerosols may produce respiratory irritation and fluid build up in lungs. LD_{50}, oral, rat 292 mg/kg.	Chronic exposure: no data.	Ecotoxicity: toxic to aquatic organisms, LC_{50}, 96 hr, fathead minnows, juvenile, 0.02 mg/L; expected to be harmful to terrestrial species. Biodegradation: this material is biodegradable. Stability: incompatible with acids, metal salts, metals, reducing agents and peroxides.
Liquid sodium silicate, CAS 1344-09-8		
Exposure to eyes causes severe eye damage and blindness. Similarly chemical burns and tissue damage are caused by exposure to the skin. Inhalation of dusts and mists causes irritation and burns to the respiratory tract. Ingestion may result in irritation of the gastrointestinal tract, severe stomach pains, vomiting and diarrhoea.	Chronic toxicity data not available.	Stability: stable. Ecotoxicity: no data.

Acute Health Effects	Chronic Health Effects	Ecological Effects
Sodium fluoride, CAS7684-49-4		
DANGER! May be fatal if swallowed or inhaled. Affects respiratory system, heart, skeleton, circulatory system, central nervous system and kidneys. Causes irritation to skin, eye and respiratory tract. LD_{50}, oral, rat, 52 mg/kg	Chronic toxicity data not available.	Ecotoxicity: 48 hour EC_{50} *Daphnia magna* (water flea): 338 mg/L. 96 hour LC_{50} *Lepomis macrochirus* (bluegill): >530 mg/L. 96 hour EC_{50} *Selenastrum capricornutum* (green algae): 272 mg/L. This material is not expected to be toxic to aquatic life. Stability: Stable.
Sodium chlorite, CAS 7758-19-2		
Toxic by ingestion or inhalation. Corrosive and very destructive to respiratory tract and mucous membranes. LD_{50}, oral, rat, 165mg/kg.	Chronic toxicity data not available.	Stability: stable. Ecotoxicity: no data.
Polyaluminium chloride hydroxide sulphate, CAS 39290-78-3		
Irritant to skin that results in dermatitis. Can cause permanent damage to eyes and blindness. Product does not fume. Strong astringent to mouth, nose and throat. LD_{50}, oral, rat, 11800mg/kg	Chronic toxicity data not available.	Stability: stable Ecotoxicity: EC> 100mg/L, 48 hours, *Daphnia*.
Filtering medium, silica sand, CAS 14808-60-7		
Toxic via inhalation.	Acute and Chronic Health Hazards: Prolonged exposure to crystalline silica by inhalation may cause silicosis, a fibrosis (scarring) of the lungs which can be progressive and may lead to death. Silica as related to carcinogenicity: crystalline silica (quartz) inhaled from occupational sources is classified by the International Agency for Research on Cancer (IARC) as class I: carcinogenic to humans.	Stability: stable. Ecotoxicity: no data.
Calcium oxide, CAS 1305-78-8		
Causes severe irritation and burns. Harmful if swallowed. Avoid breathing vapour or dust. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling.	Chronic health hazards: May cause severe eye damage and severe burns to the skin. Causes gastrointestinal tract burns, severe pain, nausea, vomiting. May cause circulatory system failure. May cause coughing and difficulty in breathing. May cause chemical bronchitis. Conditions aggravated/target organs: Persons with pre-existing eye, skin, or respiratory conditions are more susceptible.	Stability: stable. Ecotoxicity: no data.

Acute Health Effects	Chronic Health Effects	Ecological Effects
EPI_DMA Polyamines, CAS 42751-79-1		
Exposure may cause skin irritation and eye irritation. Inhalation results in irritation of the mucous membranes and upper respiratory tract. Ingestion may result in harmful effects.	Chronic toxicity data not available.	Stability: stable. Ecotoxicity: not available.
Polyaluminium chloride silicate sulphate, CAS 53810-32-5		
Exposure may cause skin irritation and eye irritation. Inhalation results in irritation of the mucous membranes and upper respiratory tract. Ingestion may result in harmful effects. LD_{50}, oral, rat, >5000 mg/kg.	Chronic toxicity data not available.	Stability: stable Ecotoxicity: not available.
Sodium hydrogen carbonate, CAS 144-55-8		
Eye contact can cause chemical burns and blindness, skin contact and ingestion causes burns to skin, mouth, throat, respiratory, stomach and digestive tract.	Chronic toxicity data not available.	Ecotoxicity**:** 48 hour EC_{50} *Daphnia magna* (water flea): 2350 mg/L. 96 hour LC_{50} *Lepomis macrochirus* (bluegill): >5000 mg/L. 120 hour EC_{50} *Nitzschia linearis* (diatom): 650 mg/L. This material is not expected to be toxic to aquatic life.
Sodium dichloroisocyanurate dehydrate, CAS 51580-86-0		
Harmful if swallowed or inhaled. Exposure to skin is corrosive and may cause burns. Inhalation may be fatal, destructive to mucous membranes.	Chronic toxicity data not available.	Stable. Oxidizing agent – contact with combustible material may lead to fire. Incompatible with strong bases, strong oxidizing agents. Reacts readily with many nitrogen containing compounds to for explosive nitrogen triiodide. Moisture sensitive. Ecotoxicity: no data.
Trichloroisocyanuric acid, CAS 87-90-1		
Harmful if swallowed or inhaled. Exposure to skin is corrosive and may cause burns. Inhalation may be fatal, destructive to mucous membranes. LD_{50}, oral, rat, 406 mg/kg	Chronic toxicity data not available.	Ecotoxicity: no data.

APPENDIX 2
TENDER DOCUMENTATION

COMPANY

BID NO:
2007/006

REQUEST FOR BIDS TO:

SUPPLY, DELIVER AND OFF-LOAD LIME

PUBLICATION DATE
13-22 MARCH 2007

CLOSING DATE & TIME
29 MARCH 2007 AT 12H00

BID/CONTRACT DOCUMENTS

TABLE OF CONTENTS

PART A1: STANDARD TENDER NOTICE AND INVITATION TO TENDER

Tender No.: 2007/005: supply, delivery and off-loading of lime.

Company is a state owned business enterprise and it operates within the South African legislative parameters of the Water Services Act 108 of 1997, PFMA 1 of 1999 and Public Audit Act of 2004. The organization is directly accountable to the Department of Water Affairs and Forestry.

The primary function of Company is to supply treated water in bulk to its municipal customers.

Competent suppliers are therefore invited to tender for the supply and delivery of lime.

Evaluation criteria: 90/10 point scoring system will used to evaluate this tender

Collection of Bids Documents
Date: 13-22 March 2007
Time: 12H00
Address: Company
Head Office
310 Burger Street, Pietermaritzburg

A non-refundable tender deposit of R200.00 payable in cash or by bank guaranteed cheque is required on collection of the tender documents. Company cashier's office closes at 15H30.

Closing date and time for the submission of bids and samples
Date: 29 March 2007
Time: 12H00

Please direct all your enquiries of this tender to Zethu Khumalo on 033 341 1075
Venue: Company Tender Box-310 Burger St. Pietermaritzburg.

For other public tenders please visit our websites for more tenders @ www.company.co.za

Company reserves the right not to award this bid to any Bidder/s or to award any bid in part.

INVITATION TO BID

YOU ARE HEREBY INVITED TO BID FOR THE ----------

BRIEF DESCRIPTION OF GOODS: TO SUPPLY, DELIVER AND OFFLOAD LIME

Bid documents must be placed in a sealed envelope marked with the disposal number and placed in the TENDER BOX, which is situated outside of the Reception Area of Company at 310 Burger Street, Pietermaritzburg.

Bidders must ensure that bids are placed into the tender box prior to the closing date. If the tender is late it will not be accepted.

The Tender Box is available to the public 24 hours per day, 7 days per week.

ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS – (NOT TO BE RE-TYPED)

This bid is subject to the GENERAL CONDITIONS OF CONTRACT (GCC) and SPECIAL CONDITIONS OF PURCHASE detailed in the tender document.

THE FOLLOWING PARTICULARS MUST BE FURNISHED
(FAILURE TO DO SO MAY RESULT IN YOUR BID BEING DISQUALIFIED)

NAME OF BIDDER: ----------

POSTAL ADDRESS: ----------

STREET ADDRESS: ----------

TELEPHONE NUMBER: ---------- FAX NUMBER: ----------

CELLPHONE NUMBER: ---------- OTHER NUMBER: ----------

VAT REGISTRATION NUMBER: ----------

HAS A TAX CLEARANCE CERTIFICATE BEEN SUBMITTED (SBD 2)? YES/NO

DO YOU HAVE THE AUTHORITY TO SUBMIT/APPROVE THIS BID? YES/NO
(IF YES ENCLOSE PROOF)

SIGNATURE OF BIDDER: ---------- DATE: ----------

CAPACITY UNDER WHICH THIS BID IS SIGNED: ----------

TOTAL BID PRICE: ----------

TOTAL NUMBER/WEIGHT OF ITEMS BID FOR (IF APPLICABLE) ----------

A2: COMPANY STANDARD BID CONDITIONS

1. INTERPRETATIONS

1.1 Unless clearly indicated to the contrary, the words set out hereunder shall bear the meanings ascribed to them in this clause:

"Comparative offer" means the bidder's financial offer after the factors of non-firm prices, all unconditional discounts and any other bid e.g. parameters that will affect the value of the financial offer have been taken into consideration

"Corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of **Company** or its staff or agents in the bid process

"Fraudulent practice" means the misrepresentation of the facts in order to influence the bid process or the award of a contract arising from a bid to the detriment of Company, including collusive practices intended to establish prices at artificial levels.

"Bid/Tender" means a written offer in a prescribed or stipulated form in response to an invitation by an organ of state for the provision of goods, works or services. These words will used interchangeable in the document

"Employer" shall mean **Company**

"Company Representative" shall be: Buyers name

"Special Conditions of Bids " means Schedule 1 "**Company Special Conditions of Bids "** annexed hereto which sets out the special condition of bid applicable to this bid and which shall, in the event of any inconsistency between it and the Standard Conditions of Bid, take precedence over the Standard Condition of Bid .

1.2 The Special Conditions of Bids and additional requirements contained in the bid schedules that are included in the returnable documents are deemed to be part of these conditions of bid.

1.3 These conditions of bid, the Special Conditions of Bids and bid schedules which are only required for bid evaluation purposes, shall not form part of any contract arising from the invitation to bid except where they are included in the contract data by the parties prior to acceptance by Company of the bidder offer.

2. GENERAL CONDITIONS

2.1 Communication

2.1.1 Each communication between Company and a bidder shall be to or from Company's agent only, and in a form that can be read, copied and recorded. Writing shall be in the English language. Company shall not take any responsibility for non-receipt of communications from or by a bidder. The name and contact details of Company's agent are stated in the Special Conditions of Bids.

2.1.2 Bidders should check the numbers of the pages to satisfy themselves that none are missing or duplicated. Company will accept no liability in regard to anything arising from the fact that pages are missing or duplicated.

2.2 Acceptance of a Bid

2.2.1 Company may accept or reject any variation, deviation, bid, or alternative bid, and may cancel the bid process and reject all bids at any time before the formation of a contract. Company

shall not accept or incur any liability to a bidder for such cancellation and rejection, but will give reasons for such action upon written request to do so.

2.3 Conduct of the Parties

Company and each bidder submitting a bid shall comply with these conditions of bid. In their dealings with each other, they shall discharge their duties and obligations as set hereinafter timeously and with integrity, and behave equitably, honestly and transparently.

2.4 Documents

The documents issued by Company for the purpose of a bid are as the following:
A1: Tender Notice and Invitation to Tender
A2: Company Standard Bid Conditions
A3: Company Special Condition of Tender
A4: Returnable Documents
Part B: Contract Data

3. BIDDER'S OBLIGATIONS

3.1 Eligibility

Submit a bid only if the bidder comply criteria stated in the Special Conditions of Bids. The bidder, or any of his principals, should not be under any restriction to do business with employer.

3.2 Issuing of Documents and Cost of Bidding

Bidders accept that Company will not compensate the bidder for any costs incurred in the preparation and submission of a bid, including the costs of any testing necessary to demonstrate that aspects of the offer satisfy requirements. Bidders may also be required to pay a non refundable fee for bid documents issued by Company.

3.3 Check Documents

The bidder shall check the bid documents on receipt for completeness and notify Company of any discrepancy or omission.

3.4 Confidentiality and Copyrights

3.4.1 Company considers this Bid and all related information, either written or verbal, which are provided to the bidder to be proprietary to Company. It shall be kept confidential by the bidder and its officers, employees, agents and representatives. The bidder shall not disclose, publish, or advertise this specification or related information to any third party without the prior written consent of Company. Company reserves the right to verify any information supplied by the bidder within the context of confidentiality.

3.4.2 No part of this document and any document enclosed with this enquiry may be copied, photographed or repeated in any manner or by any process without the written consent of Company. Copyright is reserved on specifications, systems and processes contained in the document. The person, firm, body or consultant is to be responsible jointly and severally, in their personal and corporate capacities, for any contravention of this requirement for bidding and/or copyright clauses contained in the document.

3.5 Reference documents

Bidders shall obtain, as necessary for submitting a bid offer, copies of the latest versions of standards, specifications, conditions of contract and other publications, which are not attached but which are incorporated into the bid documents by reference.

3.6 Amendments and Issuing of Addenda

3.6.1 Company is entitled to amend any bid condition, validity period, specifications/scope of work, or extend the closing date of bids before closing date. All bidders, to whom the bid documents have been issued, will be advised in writing of such amendments in good time.

3.6.2 Company will adjust arithmetical errors in the extension of rates and totals in the bid and the bidder will be informed of the effect of any corrections on his bidsum prior to the award of the contract. In such cases the unit rate will be taken as being correct.

3.6.3 To communicate the amendments anticipated in 3.6.1 and 3.6.2, Company will issue an addendum to bidders. Bidders should, therefore, acknowledge receipt of an addendum to the bid documents, which Company may issue, and if necessary apply for an extension to the closing time stated in the Special Conditions of Bid, in order to take the addenda into account.

3.7 Site and Clarification Meetings

The bidder must attend, where required, a site visit and clarification meeting at which bidders may familiarize themselves with aspects of the proposed work, services or supply and raise questions. Details of the meeting(s) are stated in the Special Conditions of Bids.

3.8 Seek clarification

Bidders should request clarification of the bid documents, if necessary, by notifying Company at least five working days before the closing time stated in the Special Conditions of Bids.

3.9 Insurance

Bidders should be aware that the extent of insurance to be provided by Company (if any) may not be for the full cover required in terms of the conditions of contract identified in the contract data. The bidder is advised to seek qualified advice regarding insurance.

3.10 Pricing the bid

Bidders should:

3.10.1 include in the rates, prices, and the tendered total of the prices (if any), all duties, taxes (except Value Added Tax (VAT), and other levies payable by the successful bidder, such duties, taxes and levies being those applicable 14 days before the closing time stated in the Special Conditions of Bids;

3.10.2 show VAT payable by Company separately as an addition to the tendered total of the prices;

3.10.3 provide rates and prices that are fixed for the duration of the contract and not subject to adjustment except as provided for in the conditions of contract identified in the contract data; and

3.10.4 state the rates and prices in Rand unless instructed otherwise in the Special Conditions of Bids . The conditions of contract identified in the contract data may provide for part payment in other currencies.

3.11 Alterations or Corrections

3.11.1 No unauthorized alteration or addition shall be made to the Agreement, the Price Schedule, or to any other portion of the original text in the Bid Documents. If such addition is made, or if the Price Schedule is not properly completed, the Bid may be rejected.

3.11.2 Any amendment or correction in the Bid Document of a tendered amount/sum/rate or other entry must be effected only by deleting the incorrect entry and writing the correct amount/sum/rate/entry just above it in INK.

3.11.3 Each and every amendment must be initialled by all signatories to the Bid. The use of **"TIPPEX"** correcting fluid or any other similar substance to make corrections and/or alterations **ANYWHERE** in the Bid Document is NOT permitted and any Bid altered/amended in such a manner may be declared invalid

3.12. Alternative Bids

3.12.1 Bidders shall submit alternative bids as specified in Special Conditions of Bids only if a main bid, strictly in accordance with all the requirements of the bid documents, is also submitted. The alternative bid is to be submitted with the main bid together with a schedule that compares the requirements of the bid documents with the alternative requirements the bidder proposes.

3.12.2 Bidders accept that an alternative bid may be based only on the criteria stated in the Special Conditions of Bids or criteria otherwise acceptable to Company.

3.13 Submitting a bid

Bidders shall:

3.13.1 submit a bid offer to provide the whole of the works, services or supply identified in the contract data, unless stated otherwise in the Special Conditions of Bids;

3.13.2 return all returnable documents to Company after completing them in their entirety by writing in black ink;

3.13.3 submit the parts of the bid offer communicated on paper as an original plus the number of copies stated in the Special Conditions of Bids, with an English translation of any documentation in a language other than English, and the parts communicated electronically in the same format as they were issued by Company;

3.13.4 sign the original and all copies of the bid where required in terms of the Special Conditions of Bids. Company will hold all authorized signatories liable on behalf of the bidder. Signatories for bidders proposing to contract as joint ventures shall state which of the signatories the lead partner is and whom Company shall hold liable for the purpose of the bid;

3.13.5 seal the original and each copy of the bid as separate packages marking the packages as “ORIGINAL” and “COPY”. Each package shall state on the outside Company’s address and identification details stated in the Special Conditions of Bids, as well as the bidder’s name and contact address;

3.13.6 seal the original bid offer and copy packages together in an outer package that states on the outside only Company’s address and identification details as stated in the Special Conditions of Bids.

3.14 Misplaced Bids

Bidders shall accept that Company shall not assume any responsibility for the misplacement or premature opening of the bid if the outer package is not sealed and marked as stated and deposited in the tender box as stated.

3.15 Delivery Point

Bidders shall deliver bid documents at the delivery point specified in the Special Conditions of Bid.

3.16 Information and data to be completed in all respects

Bidders shall accept that bids which do not provide all the data or information requested completely and in the form required may be regarded by Company as non-responsive.

3.17 Closing time

3.17.1 Bidders should ensure that the bid is placed in the tender box at the address specified in the Special Conditions of Bids not later than the closing time stated in the Special Conditions of Bids. Proof of receiving waybill for documents couriered will not be accepted as proof of delivery if the bid document is not in the tender box before closing date and time. Proof of posting shall not be accepted as proof of delivery. Company shall not accept bids submitted by post, telegraph, telex, facsimile or e-mail, unless stated otherwise in the Special Conditions of Bids.

3. 17.2 Bidders accept that, if Company extends the closing time stated in the Special Conditions of Bids for any reason, the requirements of these conditions of bid apply equally to the extended deadline.

3.18 Bid validity

3.18.1 Bids are valid for acceptance by Company at any time during the validity period stated in the Special Conditions of Bids. Should Company request extension of the bid validity period, the bidder shall consider extending the validity period stated in the Special Conditions of Bids for an agreed additional period.

3.19 Clarification of bid after submission

The bidder shall provide clarification of a bid in response to a request to do so from Company during the evaluation of bids. This may include providing a breakdown of rates or prices and correction of arithmetical errors by the adjustment of certain rates or item prices (or both). No change in the total of the prices or substance of the bid is sought, offered, or permitted. The total of the prices stated by the bidder shall be binding upon the bidder.

3.20 Provide other material

The bidder shall:

3.20.1 provide any other material that has a bearing on the bid offer, the bidder's commercial position (including joint venture agreements), preferencing arrangements, or samples of materials, considered necessary by Company for the purpose of a full and fair risk assessment. Should the bidder not provide the material, or a satisfactory reason as to why it cannot be provided, by the time for submission stated in Company's request, Company may regard the bid offer as non-responsive;

3.20.2 dispose of samples provided for evaluation by Company, where required.

3.21 Inspections, tests and analyses

The bidders shall provide access during working hours to premises for inspections, tests and analyses as provided for in the Special Conditions of Bids.

3.22 Submit securities, bonds, policies, etc.

If requested, the bidder shall submit for Company's acceptance before formation of the contract, all securities, bonds, guarantees, policies and certificates of insurance required in terms of the conditions of contract identified in the contract data.

3.23 Check final draft

Check the final draft of the contract provided by Company within the time available for Company to issue the contract.

3.24 Return of other bid documents

If so instructed by Company, bidders shall return all retained bid documents within 28 days after the expiry of the validity period stated in the Special Conditions of Bids.

3.25 Certificates

Include in the bid submission or provide Company with any certificates as stated in the Special Conditions of Bids.

4. EMPLOYERS UNDERTAKINGS

Company undertakes to:

4.1 Respond to clarification

Respond to a request for clarification received up to five working days prior to the bid closing time stated in the Special Conditions of Bids and notify all bidders who paid for and took procurement documents

4.2 Issue Addenda

If necessary, issue addenda that may amend or amplify the bid documents to each bidder during the period from the date of the Bid Notice until seven days before the bid closing time stated in the Special Conditions of Bids. If, as a result a bidder applies for an extension to the closing time stated in the Special Conditions of Bids, Company may grant such extension and will then notify it to all bidders who drew documents.

4.3 Return late bids

Return bids received after the closing time stated in the Special Conditions of Bids, unopened, (unless it is necessary to open a bid submission to obtain a forwarding address), to the bidder concerned.

4.4 Non-disclosure

Not disclose to bidders, or to any other person not officially concerned with such processes, information relating to the evaluation and comparison of bids, the final evaluation price and recommendations for the award of a contract, until after the award of the contract to the successful bidder.

4.5 Grounds for rejection and disqualification

Determine whether there has been any effort by a bidder to influence the processing of bids and instantly disqualify a bidder (and his bid) if it is established that he engaged in corrupt or fraudulent practices.

4.6 Test for responsiveness

4.6.1 Determine, on opening and before detailed evaluation, whether each bid properly received:

- meets the requirements of these Conditions of Bid,
- has been properly and fully completed and signed, and is responsive to the other requirements of the bid documents.

A responsive bid is one that conforms to all the terms, conditions, and specifications of the bid documents without material deviation or qualification. A material deviation or qualification is one which, in Company's opinion, would:

- detrimentally affect the scope, quality, or performance of the works, services or supply identified in the Scope of Work/Statement of Services/Schedule of Supplies,
- change Company's or the bidder's risks and responsibilities under the contract, or
- affect the competitive position of other bidders presenting responsive bids, if it were to be rectified.

4.6.2 Reject a non-responsive bid, and not allow it to be subsequently made responsive by correction or withdrawal of the non-conforming deviation or reservation.

4.7 Arithmetical errors

4.7.1 Check responsive bids for arithmetical errors, correcting them in the following manner:

- Where there is a discrepancy between the amounts in figures and in words, the amount in words shall govern.
- If a bill of quantities (or schedule of quantities or schedule of rates) applies and there is an error in the line item total resulting from the product of the unit rate and the quantity, the unit rate shall govern and the line total shall be corrected. Where there is an obviously gross misplacement of the decimal point in the unit rate, the line item total as quoted shall govern, and the unit rate will be corrected.
- Where there is an error in the total of the prices either as a result of other corrections required by this checking process or in the bidder's addition of prices, the total of the prices shall govern and the bidder will be asked to revise selected item prices (and their rates if a bill of quantities applies) to achieve the tendered total of the prices.

4.7.2 Consider the rejection of a bid if the bidder does not correct or accept the correction of his arithmetical errors in the manner described above.

4.8 Clarification of a bid

Obtain clarification from a bidder on any matter that could give rise to ambiguity in a contract arising from the bid.

4.9 Evaluation of bids

4.9.1 General

Appoint an evaluation panel of not less than three persons. Reduce each responsive bid to a comparative offer and evaluate it using the bid evaluation method that is indicated in the Special Conditions of Bids and described below:

Method 1: Financial offer	1. Rank bids from the most favourable to the least favourable comparative offer. 2. Recommend highest ranked bidder for the award of the contract, unless there are compelling and justifiable reasons not to do so.
Method 2: Financial offer and preferences	1. Score bid evaluation points for financial offer. 2. Confirm that bidders are eligible for the preferences claimed and if so, score bid evaluation points for preferencing. 3. Calculate total bid evaluation points. 4. Rank bids from the highest number of bid evaluation points to the lowest. 5. Recommend bidder with the highest number of bid evaluation points for the award of the contract, unless there are compelling and justifiable reasons not to do so.
Method 3: Financial offer and quality	1. Score quality, rejecting all bids offers that fail to score the minimum number of points for quality stated in the Special Conditions of Bids. 2. Score bid evaluation points for financial offer. 3. Calculate total bid evaluation points. 4. Rank bids from the highest number of bid evaluation points to the lowest. 5. Recommend bidder with the highest number of bid evaluation points for the award of the contract, unless there are compelling and justifiable reasons not to do so.
Method 4: Financial offer, quality and preferences	1. Score quality, rejecting all bids that fail to score the minimum number of points for quality stated in the Special Conditions of Bids. 2. Score bid evaluation points for financial offer. 3. Confirm that bidders are eligible for the preferences claimed, and if so, score bid evaluation points for preferencing. 4. Calculate total bid evaluation points. 5. Rank bids from the highest number of bid evaluation points to the lowest. 6. Recommend bidder with the highest number of bid evaluation points for the award of the contract, unless there are compelling and justifiable reasons not to do so.

Score financial offers, preferences and quality, as relevant, to two decimal places.

4.9.2 Scoring Financial Offers

Score the financial offers of remaining responsive bids using the following formula:

$N_{FO} = W_1 \times A$

Where:
N_{FO} = the number of bid evaluation points awarded for the financial offer.
W_1 = the maximum possible number of bid evaluation points awarded for the financial offer as stated in the Special Conditions of Bids.
A = a number calculated using either formula options 1 or 2 below as stated in the Special Conditions of Bids:

Formula	Basis for comparison	Option 1	Option 2
1	Lowest price or percentage commission/fee	$(1 - \frac{(P - P_m)}{P_m})$	P_m/P

where:
P_m = the comparative offer of the most favourable bid offer.
P = the comparative offer of bid offer under consideration.

4.9.3 Scoring quality (functionality)

Score quality in each of the categories stated in the Special Conditions of Bids and calculate total score for quality. The following formula will be applied:

$P_s = \frac{S_o}{M_s} \times A_p$

Where:
P_s =percentage scored for functionality for the bid under consideration
S_o =total score for bid under consideration
M_s = maximum possible score, i.e. 5 × a = 300
A_p = percentage allocated for the functionality (in this bid)

4.10 FINANCIAL OFFER AND PREFERENCES

Preference Point System (80/20): Consideration of bids for the procurement of goods and services with an estimated value of R 30 000 up to R 500 000

4.10.1

The following formula will be used to calculate the points for price in respect of bids/procurement with a Rand value equal to or above R 30 000 and up to a Rand value of R 500 000.

$P_s = 80 \left\{1 - \frac{P_t - P_{min}}{P_{min}}\right\}$

Where
P_s = Points scored for price of bid under consideration
P_t = Rand value of bid under consideration.
P_{min} = Rand value of lowest acceptable bid.

(1) A maximum of 20 preference points may be awarded to a bidder for achieving the following specified goals on 80/20 preference point system:

- No Franchise
- Women Equity

- Disability

4.10.2

The following formula must be used to calculate the points for price in respect of bids/procurement with a Rand value above R500 000:

$$P_s = 90 \left\{1 - \frac{P_t - P_{min}}{P_{min}}\right\}$$

Where
P_s = Points scored for price of bid under consideration
P_t = Rand value of bid under consideration
P_{min} = Rand value of lowest acceptable bid

(1) A maximum of 10 preference points may be awarded to a bidder for achieving the following specified goals on preference point system:
- No Franchise
- Women Equity
- Disability

4.11 Insurance provided by Company

If requested by the proposed successful bidder, submit for the bidder's information the policies and/or certificates of insurance which the conditions of contract identified in the contract data, require Company to provide.

4.12 Acceptance of bid

4.12.1 Accept bid only if the bidder satisfies the legal requirements stated in the Special Condition of Bid

4.12.2 Notify the successful bidder of Company's acceptance of his bid by completing and returning one copy of the form of offer and acceptance before the expiry of the validity period stated in the Special Conditions of Bids, or agreed additional period. Providing the form of offer and acceptance does not contain any qualifying statements, it will constitute the formation of a contract between Company and the successful bidder as described in the form of offer and acceptance.

4.13 Notice to unsuccessful bidders

After the successful bidder has acknowledged Company's notice of acceptance, notify other bidders that their bids have not been accepted.

4.14 Prepare contract documents

If necessary, revise documents that shall form part of the contract and that were issued by Company as part of the bid documents to take account of:

a) addenda issued during the bid period,
b) inclusion of some of the returnable documents,
c) other revisions agreed between Company and the successful bidder, and
d) the schedule of deviations attached to the form of offer and acceptance, if any.

4.15 Issue final contract

Prepare and issue the final draft of contract documents to the successful bidder for acceptance as soon as possible after the date of Company's signing of the form of offer and acceptance (including the schedule of deviations, if any). Only those documents that the conditions of bid require the bidder to submit, after acceptance by Company, shall be included.

4.16 Complete adjudicator's contract

Unless alternative arrangements have been agreed or otherwise provided for in the contract, arrange for both parties to complete formalities for appointing the selected adjudicator at the same time as the main contract is signed.

4.17 Provide copies of the contracts

Provide to the successful bidder the number of copies stated in the Special Conditions of Bids of the signed copy of the contract as soon as possible after completion and signing of the form of offer and acceptance.

A3: COMPANY SPECIAL CONDITIONS OF BIDS

1. Company Standard Terms and Conditions of Bid makes several references to the **Special Conditions of Bids** for details that apply specifically to this tender. The Special Condition of Tender shall have precedence in the interpretation of any ambiguity or inconsistency between it and the standard conditions of tender. Each item of data given below is cross-referenced to the clause in Company Standard Conditions of Tender to which it mainly applies.

2. Company communication agents are:

Commercial Aspects:	Buyers Name
Telephone Number:	033 341 1075
Fax Number:	033 341 1101
E-mail Address:	Buyers email address
Technical Aspects:	Mr XYZ
Telephone Number:	033 396 8033
Fax Number:	033 396 9387
E-mail Address:	Mr XYZ's email address

3. Documents

The tender documents issued by Company comprise:

Part A Tendering Procedure

A1: Tender notice and invitation to tender
A2. Standard conditions of tender
A3: Special conditions of tender
A4: List of returnable documents and schedules

Part B Contract Data

- B1 Specification
- B2 Requirements and Price Schedule
- B3 Cost Analysis Sheet
- B4 Special Conditions of Contract
- B5 Form of Offer and Acceptance
- General Conditions of Contract (Annexure B6)

4. Alternative Bids

If the bidder wishes to submit an alternative bid, the only criterion permitted for such alternative bid is that it demonstrably satisfies Company's standards and requirements, the details of which may be obtained from Company's Technical Officer.

Calculations, drawings and all other pertinent technical information and characteristics as well as modified or proposed Pricing Data must be submitted with the alternative bid to enable Company to evaluate the efficacy of the alternative and its principal elements, to take a view on the degree to which the alternative complies with Company's standards and requirements and to evaluate the acceptability of the pricing proposals. Calculations must be set out in a clear and logical sequence and must clearly reflect all design assumptions. Pricing Data must reflect all assumptions in the development of the pricing proposal.

Acceptance of an alternative bid will mean acceptance in principle of the offer. It will be an obligation of the contract for the Bidder, in the event that the alternative is accepted, to accept full responsibility and liability that the alternative offer complies in all respects with Company's standards and requirements.

The modified Pricing Data must include an amount equal to 5% of the amount tendered for the alternative offer to cover Company's costs of confirming the acceptability of the detailed design before it is constructed.

5. Copies

Parts of each bid communicated on paper shall be submitted as original, plus 2 copies.

6. Delivery Point for Bid Document

Company's address for delivery of tender offers and identification details to be shown on each bid package are:

Location of tender box: Main Entrance, Company Head Office.
Physical address: 310 Burger Street, Pietermaritzburg, 3201.
Identification details: Reference number, title of bid and the closing date and time of the bid.

7. Delivery Point for Samples

7.1 Bidders are limited to submitting two samples of 500g of lime. The samples must be submitted to the following address:

Head Office – Reception
310 Burger Street
Pietermaritzburg

7.2 Bidders are requested to put the Supplier's name, contact details, tender number, and price per kg on the samples.

8. Closing Date

The closing time for submission of bid documents and samples is as stated in the Tender Notice and Invitation to Tender.

9. Faxed, Telephone Submissions and *etc*.

Telephonic, telegraphic, telex, facsimile or e-mailed tender offers will not be accepted.

10. Validity

The bid validity period is 120 days.

11. Evaluation Procedure

Step 1: The bids will be checked for responsiveness in terms of ----------. All non-responsive bids will be rejected.

Step 2: The remaining bids are evaluated on technical ability taking into account the components set out below. The maximum score is 100. Only Bidders scoring 60 or above will be considered further. Bidders are advised to provide as much information as possible in this regard.

The quality criteria and maximum score in respect of each of the criteria are as follows:

CRITERIA	WEIGHTING
Quality assurance plan and control procedure	20
Financial resources	20
Previous and current contracts	10
Assurance of supply from the bidder's supplier	10
Committed to occupational health and safety	10
Commitment to environmental management	10
Response to the requested for bid	10
Reputation in the industry	5
Managerial capacity, reliability and experience	5
TOTAL	

Step 3: The remaining bids from step 2 are evaluated financially using Method 2

The financial offer will be scored using Formula 2 (option 1) where the value of W_1 is 90% where the financial value exclusive of VAT of all responsive tenders received have a value.

12. Eligibility

Bids will only be accepted if:

a) The bidder has in his or her possession an original valid Tax Clearance Certificate issued by the South African Revenue Services or has made arrangements to meet outstanding tax obligations;
b) The bidder or any of its Directors is not listed on the Register of Tender Defaulters in terms of the Prevention and Combating of Corrupt Activities Act of 2004 as a person prohibited from doing business with the public sector;
c) The bidder has not:
    i) abused Company's Supply Chain Management System; or
    ii) failed to perform on any previous contract and has been given a written notice to this effect; and
d) The bidder has completed the compulsory Declaration of Interest and Declaration of Bidder Past SCM Practise (SBD 8) and there are no conflicts of interest which may impact on the Bidder's ability to perform the contract in the best interests of Company or potentially compromise the bid process.
e) They meet functionality requirements. Bids only qualify to be evaluated using the method specified in ------above only if tenders achieved a minimum of score of 60 % for functionality.

Part A: RETURNABLE SCHEDULES AND OTHER DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES

- A4.1 Authority to sign a bid
- A4.2 Conditions of bid
- A4.3 Declaration of interest
- A4.4 Amendments, qualifications and alternatives
- A4.5 Declaration of bidder's past supply chain management practices
- A4.6 Record of addenda to tender documents
- A4.7 Tax clearance certificate requirements
- A4.8 Previous/current contracts of bidder
- A4.9 Organisational details
    - A4.9.1 Quality assurance plan and control procedure
    - A4.9.2 Financial standing (financial statement)
    - A4.9.3 Assurance of supply from the bidder's supplier
    - A4.9.4 Commitment to occupational health
    - A4.9.5 Commitment to environmental management
    - A4.9.6 Managerial capacity, reliability and experience
- A4.10 Supplier evaluation questionnaire
- A4.11 Preference points claim form in terms of the preferential procurement regulations 2001

Part B: RETURNABLE SCHEDULES AND OTHER DOCUMENTS THAT WILL BE INCORPORATED INTO THE CONTRACT

B1: Technical specification

B2: Requirements and price schedule

B3: Cost analysis sheet

B4: Special conditions of contract

B5: Form of offer and acceptance

B6: General information questionnaire

B7: General conditions of contract (annexure)

A4: RETURNABLE DOCUMENTS

A4.1: AUTHORITY TO SIGN A BID

A. COMPANIES

If a Bidder is a company, a certified copy of the resolution by the board of directors, personally signed by the chairperson of the board, authorising the person who signs this bid to do so, as well as to sign any contract resulting from this bid and any other documents and correspondence in connection with this bid and/or contract on behalf of the company must be submitted with this bid, that is before the closing time and date of the bid.

AUTHORITY BY BOARD OF DIRECTORS

By resolution passed by the Board of Directors on….....20....., Mr/Mrs……..

..... (whose signature appears

below) has been duly authorised to sign all documents in connection with this bid on behalf of

(Name of Company) …….....

IN HIS/HER CAPACITY AS: …….....

SIGNED ON BEHALF OF COMPANY: .....
(PRINT NAME)

SIGNATURE OF SIGNATORY: ..... **DATE**: .....

WITNESSES: 1 .....

2 .....

B. SOLE PROPRIETOR (ONE - PERSON BUSINESS)

I, the undersigned..... hereby confirm that I am the

sole owner of the business trading as …….....

.....

....
SIGNATURE **DATE**

C. PARTNERSHIP

The following particulars in respect of every partner must be furnished and signed by every partner:

Full name of partner	Residential address	Signature
.....	.....	
.....	.....	
.....	.....	.....
.....	.....	

We, the undersigned partners in the business trading as.....

hereby authorise .....to sign this bid as well as any contract resulting from the bid and any other documents and correspondence in connection with this bid and/or contract on behalf of

.....	.....	
SIGNATURE	**SIGNATURE**	**SIGNATURE**
.....	.....	
DATE	**DATE**	**DATE**

D. CLOSE CORPORATION

In the case of a close corporation submitting a bid, a certified copy of the Founding Statement of such corporation shall be included with the bid, together with the resolution by its members authorising a member or other official of the corporation to sign the documents on their behalf.

By resolution of members at a meeting on.....20.....at …….....

Mr/Ms....., whose signature appears below, has been authorised to sign all documents in connection with this bid on behalf of (name of close corporation)
…….....

SIGNED ON BEHALF OF CLOSE CORPORATION: ……
(PRINT NAME)

IN HIS/HER CAPACITY AS: ..... **DATE**: .....

SIGNATURE OF SIGNATORY: .....

WITNESSES: 1 .....

2 .....

E CO-OPERATIVE

A certified copy of the Constitution of the co-operative must be included with the bid, together with the resolution by its members authorising a member or other official of the co-operative to sign the bid documents on their behalf.

By resolution of members at a meeting on ..... …….. 20..... at…….....

Mr/Ms....., whose signature appears below, has been authorised to sign all documents in connection with this bid on behalf of (name of co-operative).....……

SIGNATURE OF AUTHORISED REPRESENTATIVE/SIGNATORY:

.....

IN HIS/HER CAPACITY AS:.....……

DATE: .....……..

SIGNED ON BEHALF OF CO-OPERATIVE:.....

NAME IN BLOCK LETTERS:……..

WITNESSES: 1 .....

2 .....

A4.1.2 REGISTRATION CERTIFICATE/AGREEMENT/ID DOCUMENT

[Important note to Bidder: Registration Certificates for Companies, Close Corporations and Partnerships, or Agreements and Powers of Attorney for Joint Ventures, or ID documents for Sole Proprietors, all as referred to in the foregoing forms and in T2.1, must be inserted here]

A4.2: CONDITIONS OF BID

1. I/We hereby bid to supply all or any of the supplies and/or to render all or any of the services described in the attached documents to Company on the terms and conditions and be in accordance with the specifications stipulated in the bid documents (and which shall be taken as part of and be incorporated into this bid) at the prices and on the terms regarding time for delivery and/or execution inserted therein.

2. I/We agree that:

a) the offer herein shall remain binding upon me and open for acceptance by Company during the validity period indicated and calculated from the closing time of the bid;
b) this bid and its acceptance shall be subject to Treasury Regulations 16A issued in terms of the Public Finance Management Act, 1999, Supply Chain Management Policy Framework, the National Treasury issued Practice Notes, and the National Treasury General Conditions of Contract, with which I/we am fully acquainted;
c) if I/we withdraw my bid within the period for which I/we have agreed that the bid shall remain open for acceptance, or fail to fulfil the contract when called upon to do so, Company may, without prejudice to its other rights, agree to the withdrawal of my bid or cancel the contract that may have been entered into between me and Company. I/we will then pay to Company any additional expenses incurred by Company having either to accept any less favourable bid or, if fresh bids have to be invited, the additional expenditure incurred by the invitation of fresh bids and by the subsequent acceptance of any less favourable bid. Company shall have the right to recover such additional expenditure by set-off against monies which may be due to me under this or any other bid or contract or against any guarantee or deposit that may have been furnished by me or on my behalf for the due fulfilment of this or any other bid or contract and pending the ascertainment of the amount of such additional expenditure to retain such monies, guarantee or deposit as security for any loss Company may sustain by reason of my default;
d) if my bid is accepted, the acceptance may be communicated to me in writing.
e) the law of the Republic of South Africa shall govern the contract created by the acceptance of my bid and I choose *domicilium citandi et executandi* in the Republic at (full physical address):
   .....

   .....

3. I/we furthermore confirm that I/we have satisfied myself as to the correctness and validity of my bid: that the price(s), rate(s) and preference quoted cover all of the work/item(s) and my obligations under a resulting contract, and I accept that any mistakes regarding the price(s) and calculations will be at my risk.

4. I/we hereby accept full responsibility for the proper execution and fulfilment of all obligations and conditions devolving on me under this agreement, as the Principal(s) liable for the due fulfilment of this contract.

5. I/we agree that any action arising from this contract may in all respects be instituted against me and I/we hereby undertake to satisfy fully any sentence or judgement which may be pronounced against me as a result of such action.

6. I/we confirm that I/we have declared all and any interest that I or any persons related to my business has with regard to this bid or any related bids by completion of the Declaration of Interest Section.

7. CERTIFICATION OF CORRECTNESS OF INFORMATION SUPPLIED IN THIS DOCUMENT

I/we, THE UNDERSIGNED, WHO WARRANT THAT I AM DULY AUTHORISED TO DO SO ON BEHALF OF THE BIDDER, CERTIFY THAT THE INFORMATION SUPPLIED IN TERMS OF THIS DOCUMENT IS CORRECT AND TRUE, THAT THE SIGNATORY TO THIS DOCUMENT IS DULY AUTHORISED AND ACKNOWLEDGE THAT:

(1) The bidder will furnish documentary proof regarding any bidding issue to the satisfaction of Company, if requested to do so.

(2) If the information supplied is found to be incorrect and/or false then Company, in addition to any remedies it may have, may:-

(a) Recover from the contractor all costs, losses or damages incurred or sustained by Company as a result of the award of the contract, and/or

(b) Cancel the contract and claim any damages which Company may suffer by having to make less favourable arrangements after such cancellation.

SIGNED ON THIS ..... **DAY OF** .....**20** .....**AT** ……...

....
SIGNATURE OF BIDDER OR DULY NAME IN BLOCK LETTERS
AUTHORISED REPRESENTATIVE

ON BEHALF OF (BIDDER'S NAME):
.....

CAPACITY OF SIGNATORY: .....
NAME OF CONTACT PERSON (IN BLOCK LETTERS, PLEASE):

…….....

POSTAL ADDRESS:
……..……
.....

TELEPHONE NUMBER: .....

FAX NUMBER: .....

CELLULAR PHONE NUMBER: .....

E-MAIL ADDRESS: …….....

A4.3: DECLARATION OF INTEREST

1. Any legal person, including persons employed by Company, or persons who act on behalf of Company or persons having a kinship with persons employed by Company, including a blood relationship, may make an offer or offers in terms of this bid invitation. In view of the possible allegations of favouritism, should the resulting bid, or part thereof, be awarded to persons employed by Company, or to persons who act on behalf of Company, or to persons connected with or related to them, it is required that the bidder or his/her/their authorized representative shall declare his/her/their position vis-á-vis the evaluating authority and/or take an oath declaring his/her/their interest, where

   1.1 the bidder is employed by Company or acts on behalf of Company; and/or

   1.2 the legal person on whose behalf the bid document is signed, has a relationship with a person/persons who are involved with the evaluation of the bid(s), or where it is known that such a relationship exists between the person or persons for whom or on whose behalf the declarant acts and persons who are involved with the evaluation of the bid.

   IN ORDER TO GIVE EFFECT TO THE ABOVE, THE FOLLOWING QUESTIONNAIRE SHALL BE COMPLETED AND SUBMITTED WITH THE BID:

2. Are you or any person connected with the bid employed by Company? **YES/NO**

   2.1 If "YES", state particulars….....

   ….....

3. Do you or any person connected with the bid, have a relationship (family, friend, other) with a person employed by Company, concerned with any Bid Committee or Supply Chain Management Unit, and who may be involved with the evaluation or adjudication of this bid? **YES/NO**

   3.1 If "YES", state particulars.....

   ...…….....

4. Are you or any person connected with the bid aware of any relationship (family, friend, other) between another bidder and any person employed by Company, concerned with any Committee or Supply Chain Management Unit, who may be involved with the evaluation or adjudication of this bid? **YES/NO**

   4.1 If "YES", state particulars.....

   …….

SIGNATURE OF DECLARANT	**BID NUMBER**	**DATE**
POSITION OF DECLARANT	**NAME OF BIDDER**	

A4.4 AMENDMENTS, QUALIFICATIONS AND ALTERNATIVES

(This is not an invitation for amendments, deviations or alternatives but should the Bidder desire to make any departures from the provisions of this contract he shall set out his proposals clearly hereunder. Company will not consider any amendment, alternative offers or discounts unless forms (a), (b) and (c) have been completed to the satisfaction of the Employer).

I/We herewith propose the amendments, alternatives and discounts as set out in the tables below:

(a) AMENDMENTS

PAGE, CLAUSE OR ITEM NO.	PROPOSED AMENDMENT

[Notes:
(1) Proposals for amendments to the General and Special Conditions of Contract are not acceptable, and will be ignored;
(2) The Bidder must give full details of all the financial implications of the amendments and qualifications in a covering letter attached to his tender.]

(b) ALTERNATIVES

PROPOSED ALTERNATIVE	DESCRIPTION OF ALTERNATIVE

[Notes:
(1) Individual alternative items that do not justify an alternative tender, and an alternative offer for time for completion should be listed here.
(2) In the case of a major alternative to any part of the work, a separate Bill of Quantities, programme, etc, and a detailed statement setting out the salient features of the proposed alternatives must accompany the tender.
(3) Alternative tenders involving technical modifications to the design of the works and methods of construction shall be treated separately from the main tender offer.]

(c) DISCOUNTS

ITEM ON WHICH DISCOUNT IS OFFERED	DESCRIPTION OF DISCOUNT OFFERED

[Note:The Bidder must give full details of the discounts offered in a covering letter attached to his tender, failing which, the offer for a discount may have to be disregarded.]

SIGNATURE: .....…….. DATE: …….....

A4.5: DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES
(To be completed by Bidder.)

1 This Section must form part of all bids invited.
2 It serves as a declaration to be used by Company in ensuring that when goods and services are being procured, all reasonable steps are taken to combat the abuse of the supply chain management system.
3 The bid of any bidder may be disregarded if that bidder, or any of its directors have-
   a. abused Company's supply chain management system;
   b. committed fraud or any other improper conduct in relation to such system; or
   c. failed to perform on any previous contract.

4 <u>In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.</u>

Item	Question	Yes	No
4.1	Is the bidder or any of its directors listed on the National Treasury/Company's database as companies or persons prohibited from doing business with the public sector?	Yes ☐	No ☐
4.1.1	If so, furnish particulars:……..... ……. …….		
4.2	Is the bidder or any of its directors listed on the Register for Bid Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)?	Yes ☐	No ☐
4.2.1	If so, furnish particulars:……... ……. …….		
4.3	Was the bidder or any of its directors convicted by a court of law (including a court outside of the Republic of South Africa) for fraud or corruption during the past five years?	Yes ☐	No ☐
4.3.1	If so, furnish particulars:……... ……. …….		
4.4	Was any contract between the bidder and any organ of state terminated during the past five years on account of failure to perform on or comply with the contract?	Yes ☐	No ☐
4.4.1	If so, furnish particulars:……... ……. …….		

CERTIFICATION

I, THE UNDERSIGNED (FULL NAME)……
CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS TRUE AND CORRECT.

I ACCEPT THAT, IN ADDITION TO CANCELLATION OF A CONTRACT, ACTION MAY BE TAKEN AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

SIGNATURE DATE

POSITION NAME OF BIDDER

A4.6: RECORD OF ADDENDA TO BID DOCUMENTS

I/We confirm that the following communications amending the bid documents that I/we received from Company or his representative before the closing date for submission of this tender offer, have been taken into account in this bid.

ADDENDUM No	DATE	TITLE OR DETAILS

SIGNATURE: …….. DATE: ……..
(of person authorized to sign on behalf of the Bidder)

A4.7: TAX CLEARANCE CERTIFICATE REQUIREMENTS

It is a condition of a bid that the taxes of the successful bidder **must** be in order, or that satisfactory arrangements have been made with South African Revenue Service (SARS) to meet the bidder's tax obligations.

1. The original Tax Clearance Certificate must be submitted together with the bid. Failure to submit the original and valid Tax Clearance Certificate will result in the invalidation of the bid. Certified copies of the Tax Clearance Certificate will not be acceptable.

2. In bids where Consortia/Joint Ventures/Sub-contractors are involved, each party must submit a separate Tax Clearance Certificate.

3. Applications for the Tax Clearance Certificates may also be made via eFiling. In order to use this provision, taxpayers will need to register with SARS as eFilers through the website www.sars.gov.za.

A4.8: PREVIOUS/CURRENT CONTRACTS OF BIDDER

COMPANY NAME, CONTACT PERSON AND TELEPHONE NUMBER	DESCRIPTION OF CONTRACT	CONTRACT VALUE (incl. of VAT)	DURATION OF CONTRACT

SIGNATURE: .....……..... DATE: ….....
(of person authorised to sign on behalf of the Bidder)

A4.9: ORGANISATIONAL DETAILS

A4.9.1	Quality assurance plan and control procedure
A4.9.2	Financial standing (financial statement)
A4.9.3	Assurance of supply from the bidder’s supplier
A4.9.4	Commitment to occupational health
A4.9.5	Commitment to environmental management
A4.9.6	Managerial capacity, reliability and experience

A4.10: SUPPLIER INFORMATION QUESTIONNAIRE

SUPPLIER EVALUATION QUESTIONNAIRE

ORGANISATIONAL DETAILS

Name of Company	
Physical Address	
Postal Address	
Contact Person	
Telephone Number	
Fax Number	
E-mail address	
Company Registration number	
VAT Registration number	
Average annual turnover	
Type of Organization	
Service/Goods provided	

BANKING DETAILS

Name of Bank**:**	Type of Account:
Branch Name and Code:	Current:
Account Number:	Trans:
Account Opened On:	Cheque:

RATING DETAILS

Which sector does your company belong to?	
Has the company been independently accredited?	
Name the BEE auditor.	
What was the company's accreditation?	
When was the accreditation obtained?	

SHAREHOLDERS OWNERSHIP

Legal ownership and economic benefit accruing to the shareholding.
Please provide information on your company's shareholding:
(Black is defined as African, Coloured and Indian)

Name	**Percentage shares held by black people**	**Percentage shares held by black women**

Additional documentation to be attached:

- Shareholders Agreement(s)
- Certificate(s) of Ownership and Share register(s)

OWNERSHIP STRUCTURE

Please tick the relevant one:

Traditional white company	
Black Company (75.1 – 100 % black owned)	
Black Company (50.1% - 75% black owned)	
Black empowered company (25.1% - 50% black owned)	
Black influenced companies (5% - 25%)	
Engendered company (30% owned and managed by black women)	

BOARD MEMBERS
Please indicate percentage BEE control at board level if any.

Additional documentation to be attached:

- List of Directors (CM 29)
- Copy of ID documents

Full name	**Designation**	**Exec/Non Exec**	**Race**	**Gender**

CURRENT EMPLOYED PORTFOLIO
(EMPLOYMENT EQUITY)

Occupational level of permanent employees

Organisational Structure	Senior Management		Middle/Junior Management		Skilled technical and academically qualified workers, supervisory and foremen		Semi skilled		Unskilled and defined decision making		Total	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Black												
Coloured												
Indian												
White												
Other												
Disabled												
Total permanent employed												
Total employed												

Additional documentation to be attached:

- Employment Equity Plan

SKILLS DEVELOPMENT

Course/education detail	Service provider	Total no. of trainees	Black personnel attending course (%)	Internal/external	Expenditure in monetary value
Total					

Additional documentation to be attached:

- Workplace Skills Plan

* What percentage of your company's total payroll goes to the National Skills Fund p.a.? _____

* How much is your company's total payroll? R_____

* where total contribution per annum is above R500 000.

PREFERENTIAL PROCUREMENT (Past financial year)

Procurement from black owned or black empowered enterprises as a percentage of total procurement.

Supplier(s) name and contact details	Total procurement spend	Total BEE spend	BEE spend (%)	Spend on black women owned companies (%)

ENTERPRISE DEVELOPMENT

Enterprise Development is the investment in, and or joint ventures with BEE enterprises, with real economic benefit flowing to the recipient enterprise allowing it to be set up and run on a sustainable basis. Please calculate this as a percentage of your total procurement spend in rand value.

BEE company/enterprise	Black shareholding of company (%)	Total procurement spend	Investment in monetary value	Details of investment

BEE Enterprise Joint Ventures (JV):

BEE JV partner	Black shareholding of BEE Partner (%)	Company revenue from JV	BEE revenue from JV	BEE partner workload split (%)
Total				

Does your company have a supplier development program? If YES please provide details:

CORPORATE SOCIAL INVESTMENT (CSI)

CSI is the investment in the disadvantaged sectors and or communities taking the form of HIV Aids education, black women and disabled people etc. Please calculate this as a percentage of the net profit after tax.

Investment type, i.e. Involvement in local communities, education & training, etc	**Investment in monetary value**	**Net profit after tax (%)**	**Contact details**

GENERAL

Do you intend to change your empowerment status during the current year? Yes/No
If yes in what way?
Comments:

KINDLY FORWARD THE FOLLOWING WITH YOUR QUESTIONNAIRE:

Prerequisites	**Yes/No**
Company Registration certificate	
VAT registration certificate	
Income Tax Clearance Certificate	
Full detail company profile	
Copy of a cancelled cheque/proof of account	

Please submit all statutory documents related to your industry.

CONFIRMATION

I hereby warrant that I,……. am duly authorised to submit information on my company, …… and certify to the best of my Company knowledge, that the information detailed above is correct.

Signed on behalf of the supplier at ……..……. on the …… day of ……..

Full name and surname:…….

Capacity: …….

Signature: …….

A4.11: PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2001

PURCHASES

This preference form must form part of all bids invited. It contains general information and serves as a claim form for Historically Disadvantaged Individual (HDI) preference points as well as a summary for preference points claimed for attainment of other specified goals.

NB: BEFORE COMPLETING THIS FORM, BIDDERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF EQUITY OWNERSHIP BY HISTORICALLY DISADVANTAGED INDIVIDUALS (HDIs), AS PRESCRIBED IN THE PREFERENTIAL PROCUREMENT REGULATIONS, 2001.

---

1. GENERAL CONDITIONS

1.1 The following preference point systems are applicable to all bids:

- the 80/20 system for requirements with a Rand value of up to R500 000; and
- the 90/10 system for requirements with a Rand value above R500 000.

1.2 The value of this bid is estimated to exceed/not exceed R500 000 and therefore the……system shall be applicable.

1.3 Preference points for this bid shall be awarded for:

(a) Price; and
(b) Specific contract participation goals, as specified in the attached forms.

1.3.1 The points for this bid are allocated as follows:

		POINTS
1.3.1.1	**PRICE**	**90**
1.3.1.2	**SPECIFIC CONTRACT PARTICIPATION GOALS**	
(a)	Historically Disadvantaged Individuals:	
(i)	who had no franchise in national elections before the 1983 and 1993 Constitutions	**5**
(ii)	who is a female	**4**
(iii)	who has a disability	**1**
Total points for Price & HDIs		**100**

1.4 Failure on the part of a bidder to fill in and/or to sign this form may be interpreted to mean that preference points are not claimed.

1.5. The purchaser reserves the right to require of a bidder, either before a bid is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the purchaser.

2. GENERAL DEFINITIONS

2.1 **"Acceptable bid"** means any bid which, in all respects, complies with the specifications and conditions of bid as set out in the bid document.

2.2 **"Bid"** means a written offer in a prescribed or stipulated form in response to an invitation by an organ of state for the provision of goods, works or services.

2.3 **"Comparative price"** means the price after the factors of a non-firm price and all unconditional discounts that can be utilised have been taken into consideration.

2.4 **"Consortium or joint venture"** means an association of persons for the purpose of combining their expertise, property, capital, efforts, skills and knowledge in an activity for the execution of a contract.

2.5 **"Contract"** means the agreement that results from the acceptance of a bid by an organ of state.

2.6 **"Specific contract participation goals"** means the goals as stipulated in the Preferential Procurement Regulations 2001.

2.6.1 In addition to above-mentioned goals, the Regulations [12.(1)] also make provision for organs of state to give particular consideration to procuring locally manufactured products.

2.7 **"Control"** means the possession and exercise of legal authority and power to manage the assets, goodwill and daily operations of a business and the active and continuous exercise of appropriate managerial authority and power in determining the policies and directing the operations of the business.

2.8 **"Disability"** means, in respect of a person, a permanent impairment of a physical, intellectual, or sensory function, which results in restricted, or lack of, ability to perform an activity in the manner, or within the range, considered normal for a human being.

2.9 **"Equity Ownership"** means the percentage ownership and control, exercised by individuals within an enterprise.

2.10 **"Historically Disadvantaged Individual (HDI)"** means a South African citizen

(1) who, due to the apartheid policy that had been in place, had no franchise in national elections prior to the introduction of the Constitution of the Republic of South Africa, 1983 (Act No 110 of 1983) or the Constitution of the Republic of South Africa, 1993, (Act No 200 of 1993) ("the interim Constitution); and/or

(2) who is a female; and/or

(3) who has a disability:

provided that a person who obtained South African citizenship on or after the coming to effect of the Interim Constitution, is deemed not to be a HDI;

2.11 **"Management"** means an activity inclusive of control and performed on a daily basis, by any person who is a principal executive officer of the company, by whatever name that person may be designated, and whether or not that person is a director.

2.12 **"Owned"** means having all the customary elements of ownership, including the right of decision-making and sharing all the risks and profits commensurate with the degree of ownership interests as demonstrated by an examination of the substance, rather than the form of ownership arrangements.

2.13 **"Person"** includes reference to a juristic person.

2.14 **"Rand value"** means the total estimated value of a contract in Rand denomination that is calculated at the time of bid invitations and includes all applicable taxes and excise duties.

2.15 **"Small, Medium and Micro Enterprises (SMMEs)** bears the same meaning assigned to this expression in the National Small Business Act, 1996 (No 102 of 1996).

2.16 **"Sub-contracting"** means the primary contractor's assigning or leasing or making out work to, or employing another person to support such primary contractor in the execution of part of a project in terms of the contract.

2.17 **"Trust"** means the arrangement through which the property of one person is made over or bequeathed to a trustee to administer such property for the benefit of another person.

2.18 **"Trustee"** means any person, including the founder of a trust, to whom property is bequeathed in order for such property to be administered for the benefit of another person.

3. ESTABLISHMENT OF HDI EQUITY OWNERSHIP IN AN ENTERPRISE

3.1 Equity ownership shall be equated to the percentage of an enterprise which is owned by individuals classified as HDIs, or in the case of a company, the percentage shares that are owned by individuals classified as HDIs, who are actively involved in the management and daily business operations of the enterprise and exercise control over the enterprise, commensurate with their degree of ownership.

3.2 Where individuals are not actively involved in the management and daily business operations and do not exercise control over the enterprise commensurate with their degree of ownership, equity ownership may not be claimed.

4. ADJUDICATION USING A POINT SYSTEM

4.1 The bidder obtaining the highest number of points will be awarded the contract.

4.2 Preference points shall be calculated after prices have been brought to a comparative basis.

4.3 Points scored will be rounded off to two decimal places.

4.4 In the event of equal points scored, the bid will be awarded to the bidder scoring the highest number of points for specified goals.

5. POINTS AWARDED FOR PRICE

5.1 THE 80/20 OR 90/10 PREFERENCE POINT SYSTEMS

A maximum of 80 or 90 points is allocated for price on the following basis:

80/20 or 90/10

$$P_s = 80\left(1 - \frac{P_t - P_{min}}{P_{min}}\right) \quad \text{or} \quad P_s = 90\left(1 - \frac{P_t - P_{min}}{P_{min}}\right)$$

Where:

P_s = Points scored for price of bid under consideration

P_t = Rand value of bid under consideration

P_{min} = Rand value of lowest acceptable bid

6. Points awarded for historically disadvantaged individuals

6.1 In terms of Regulation 13 (2) preference points for HDIs are calculated on their percentage shareholding in a business, provided that they are actively involved in and exercise control over the enterprise. The following formula is prescribed in Regulation 13 (5) (c):

$$NEP = NOP \times \frac{EP}{100}$$

Where:
NEP = Points awarded for equity ownership by an HDI
NOP = The maximum number of points awarded for equity ownership by an HDI in that specific category
EP = The percentage of equity ownership by an HDI within the enterprise or business, determined in accordance with the definition of HDIs.

6.2 Equity claims for a trust will only be allowed in respect of those persons who are both trustees and beneficiaries and who are actively involved in the management of the trust.

6.3 Documentation to substantiate the validity of the credentials of the trustees contemplated above must be submitted.

6.4 Listed companies and tertiary institutions do not qualify for HDI preference points.

6.5 A consortium or joint venture may, based on the percentage of the contract value managed or executed by their HDI-members, be entitled to preference points in respect of an HDI.

6.6 A person awarded a contract as a result of preference for contracting with, or providing equity ownership to an HDI, may not subcontract more than 25% of the value of the contract to a person who is not an HDI or does not qualify for the same number or more preference for equity ownership.

7. BID DECLARATION

7.1 Bidders who claim points in respect of equity ownership must complete the Bid Declaration at the end of this form.

8. EQUITY OWNERSHIP CLAIMED IN TERMS OF PARAGRAPH 2.10 ABOVE. POINTS TO BE CALCULATED FROM INFORMATION FURNISHED IN PARAGRAPH 9.8.

	Ownership	Percentage owned	Points claimed
8.1	Equity ownership **by persons who** had no franchise in the national elections	%	
8.2	Equity ownership **by women**	%	
8.3	Equity ownership **by disabled persons***	%	

* If points are claimed for disabled persons, indicate nature of impairment (see paragraph 2.8 above)

……

9. DECLARATION WITH REGARD TO EQUITY

9.1 Name of firm: …….

9.2 VAT registration number: …….

9.3 Company registration number: …….

9.4 TYPE OF FIRM

[TICK APPLICABLE BOX]

- ▫ Partnership
- ▫ One person business/sole trader
- ▫ Close corporation
- ▫ Company
- ▫ (Pty) Limited

9.5 DESCRIBE PRINCIPAL BUSINESS ACTIVITIES

9.6 COMPANY CLASSIFICATION

[TICK APPLICABLE BOX]

- ▫ Manufacturer
- ▫ Supplier
- ▫ Professional service provider
- ▫ Other service providers, e.g. transporter, etc.

9.7 TOTAL NUMBER OF YEARS THE FIRM HAS BEEN IN BUSINESS ……

9.8 List all Shareholders by Name, Position, Identity Number, Citizenship, HDI status and ownership, as relevant. Information to be used to calculate the points claimed in paragraph 8.

Name	Date/Position occupied in enterprise	ID number	Date RSA citizenship obtained	* HDI Status			% of business/enterprise owned
				No franchise prior to elections	Women	Disabled	

*Indicate YES or NO

9.9 Consortium/Joint Venture

9.9.1 In the event that preference points are claimed for HDI members by consortia/joint ventures, the following information must be furnished in order to be entitled to the points claimed in respect of the HDI member:

Name of HDI member (to be consistent with paragraph 9.8)	**Percentage (%) of the contract value managed or executed by the HDI member**

9.10 I/We, the undersigned, who warrant(s) that he/she is/they are duly authorised to do so on behalf of the firm certify that points claimed, based on the equity ownership, indicated in paragraph 8 of the foregoing certificate, qualifies the firm for the preference(s) shown and I/we acknowledge that:

a) The information furnished is true and correct.

b) The Equity ownership claimed is in accordance with the General Conditions as indicated in paragraph 1 of this form.

c) In the event of a contract being awarded as a result of points claimed as shown in paragraph 8, the contractor may be required to furnish documentary proof to the satisfaction of the purchaser that the claims are correct.

d) If the claims are found to be incorrect, the purchaser may, in addition to any other remedy it may have -

i. recover costs, losses or damages it has incurred or suffered as a result of that person's conduct;

ii. cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation;

iii. impose a financial penalty more severe than the theoretical financial preference associated with the claim which was made in the bid.

WITNESSES:

1. ----------

2. ----------

SIGNATURE(S)OF BIDDER(S)

Date ----------

Address ----------

CHECK LIST

	YES	NO
Did you sign the authority to sign a bid?		
Did you attach company registration certificate?		
Did you read and sign the condition of bid?		
Did you sign a declaration of interest?		
Did you make any amendments?		
Did you submit an alternative Bid?		
Did you offer discount?		
Did you sign declaration of bidder's past supply chain management practices?		
Did you complete record of addenda to bid?		
Did you attach tax clearance certificate?		
Did you submit tax clearance certificate?		
Did you submit full details company profile?		
Did you submit a cross cancelled cheque?		
Did you complete and submit previous/current contract of bidder table?		
Did you submit assurance plan & control procedure?		
Did you submit Financial Statements of you company?		
Did you submit a letter/an agreement of assurance of supply from your supplier?		
Did you submit OHS Certificate?		
Did you submit an environmental plan?		
Did you submit a managerial capacity and experience?		
Did you complete and submit supplier evaluation questionnaire?		
Did you complete preference points claim form in terms of the preferential procurement?		
Did you complete requirement and price schedule?		
Did you complete cost analysis sheet?		
Did you complete general information questionnaire?		
Did you complete form of offer and acceptance?		

PART B: CONTRACT DATA

B1: TECHNICAL SPECIFICATION

B2: REQUIREMENTS AND PRICE SCHEDULE

B3: COST ANALYSIS SHEET

B4: SPECIAL CONDITIONS OF CONTRACT

B5: FORM OF OFFER AND ACCEPTANCE

B6: GENERAL INFORMATION QUESTIONNAIRE

B7: GENERAL CONDITIONS OF CONTRACT (ANNEXURE)

B1: TECHNICAL SPECIFICATION

Hydrated Lime

1. Quality Control

The hydrated lime shall be air separated slaked (hydrated) as specified in SABS 459-1955.

The chemical composition shall meet the following specifications

Silica and insoluble mineral matter:	Maximum 2.0% (m/m)
Available calcium oxide:	Minimum 68% (m/m)
Magnesium oxide:	Maximum 2.0% (m/m)
Carbon dioxide:	Maximum 3.0% (m/m)
Residue retained on 150 µm sieve:	Maximum 5.0% (m/m)

2. Physical Requirements

Lime supplied shall be dry, finely powered and free from any foreign material that might interfere with the operation of dry-feed equipment. As the lime might be handled pneumatically and stored in a silo, a further requirement is that the lime is non-bridging. Uniformity of size is desirable.

3. Approval for use in Potable Water

Approval for use of a Successful Supplier's hydrated lime will be considered only if documentation is produced stating that the lime supplied is suitable for use in the treatment of potable water.

B2: REQUIREMENTS AND PRICE SCHEDULE

CONTRACT No.: 2007/006

Area	Estimated qty over 36 months/kg	Packaging	% Foreign content	ROE	Price/kg	Transport Cost/kg	Cost off-loading and stacking (if any)	Total price per kg	Total
XYl	1344 Tonnes	Bulk Tanker							
XY	300 Tonnes	25 kg Bags							
XY	3000 Tonnes	Bulk Tanker							
XX	120 Tonnes	500 kg Maxi Bags							
XX	100 Tonnes	500 kg Maxi Bag							
XY	1230 Tonnes	500 kg Maxi Bags							
XY	450 Tonnes	25 kg Bags							
XX	220 Tonnes	25 kg Bag							
xx	315 Tonnes	25 kg Bag							
XX	150 Tonnes	25 kg Bag							
XX	25 Tonnes	25 kg Bag							
XX	25 Tonnes	25 kg Bag							
TOTAL									

Briefing description: supply, delivery and off loading of lime

All prices MUST BE VAT EXCLUSIVE

Settlement discount offered for payment within 30 days:_____% Authorised signatory: _____

Designation/position in the company:_____ Name: _____

Brand offered: _____ Minimum quantity per delivery if any: _____

Packaging offered: _____ Date: _____

B3: COST ANALYSIS SHEET
CONTRACT No.: 2007/006

Please provide a breakdown of price quoted as follows:

COST ELEMENTS	
1. DIRECT COSTS:	
a) MATERIALS	
(i) Imported	%
(ii) Local	%
b) LABOUR:	%
2. MANUFACTURING OVERHEADS	
a) FIXED	%
b) VARIABLE	%
3. GENERAL AND ADMINISTRATION OVERHEADS	
a) FIXED PORTION	%
b) VARIABLE PORTION	%
c) TRANSPORTATION	%
4. TOTAL	**100%**

B4: SPECIAL CONDITIONS OF CONTRACT

1. CONTRACT DURATION

For an initial period of one year commencing_____. Thereafter with an option to extend the contract for a further period of two years with the option being exercised on completion of each year contractual. This contract will be reviewed on performance and any other identified aspects, bi-annually.

2. DELIVERY POINTS

a) **Region**

Address of delivery

b) **Region**

Address

(See attached Map)

3. DELIVERY

3.1 Lead Time
The delivery lead-time from the date of receipt of the order shall be no more than five working days.

3.2 Time of Delivery
Deliveries to reach sites during normal working hours between the hours of 08H00 and 16H30, unless otherwise agreed by the Superintendent of the Works.

3.3 Penalty on late delivery
In the event of cost being incurred due to late delivery, this will be on supplier's account.

3.4 Certificate of Analysis
A certificate of analysis must accompany each delivery, failing which, the delivery will not be accepted. This is to include the requirement as given in the "Technical Specification" Clause 1.

4. METHOD OF CHEMICAL ANALYSIS AND PENALTIES

4.1 Analysis of samples
The analysis of samples will be based on accepted standard methods and the analyses performed on each chemical will be those listed below unless additional tests are specifically requested.

4.2 Hydrated lime
The lime shall be slaked as specified in SABS 459-1955 and the chemical composition shall meet the following:

Silica and insoluble mineral matter:	Maximum 2.0% (m/m)
Available calcium oxide:	Minimum 68% (m/m)

Manganese oxide:	Maximum 2.0% (m/m)
Carbon dioxide:	Maximum 3.0% (m/m)
Residue retained on 150 µm sieve:	Maximum 5.0% (m/m)

Silica and insoluble matter is determined using the procedure described in section 7.3 of SABS 459-1955.

Available calcium oxide is determined using a titration procedure described in section 5.3.1 of WRC Report No. 1184/1/04.

Magnesium oxide is determined using the procedure described in section 7.6 of SABS 459-1955.

Carbon dioxide is determined using the procedure described in section 7.11 of SABS 459-1955

Residue contained on 150 µm sieve is determined using the procedure described in section 6.1 of SABS 459-1955.

5. REJECTION

Lime purchased under this contract will be rejected if the grit or insoluble material (residue retained on 150 µm sieve) is found to exceed the 5% maximum specification as detailed in the technical specification.

In the event of the lime not meeting the CaO specification, the price will be adjusted on a pro rata basis based on the available CaO instead of the specified 68%, e.g. for 65% available CaO the factor used for price adjustment would be 65/68. Company reserves the right to reject any delivery of lime that does not meet the specification.

6. NON-CONFORMANCE

It must be clearly understood that should, in the opinion of Company, the lime being supplied be found at any stage of the duration of contract to be ineffective in treating the water to the standard specified herein or where the Successful Supplier fails to meet the supply in terms of the contract, Company reserves the right to buy in any other chemicals necessary to ensure the satisfactory operation of the water treatment process. Any increase in price as a result of such change will be for the Successful Supplier account. Following such a non-conformance, the onus will be on the Successful Supplier to demonstrate to Company that the non-conformance has been rectified. The Successful Supplier must supply the contact details of the person responsible to deal with quality/non-conformance product/supply.

7. CONTAINER EQUIPMENT

Any receptacles and/or vessels for containing chemicals supplied such as tankers, cylinders or drums:

7.1 Must be leak proof/undamaged
7.2 Any leaking/damaged containers to be immediately removed and replaced after notification to the Contractor by Company.
7.3 All costs incurred resulting from leaking containers will be for the Contractor’s account

8. HANDLING OF HAZARDOUS CHEMICAL SUBSTANCES

8.1 Compliance with legislation

The Contractor must be strictly in compliance with the Occupational Health and Safety Act 85 of 1993 and specifically with Regulation 7 of the General Administrative Regulations of the Occupational Health and Safety Act 85 of 1993.

Subject to provisions of Section 10 (3) and (4) of the Act, every person/supplier who manufactures, imports, sells or supplies any hazardous chemical substance for use at work shall as far as reasonably practicable provide the party receiving such substance, free of charge with a material safety data sheet containing all the information as contemplated in either ISO11014 or ANSIZ400.1. 1993 with regard to:

a) Product and company identification;
b) Composition/information or ingredient;
c) Hazards identification;
d) First-aid measures;
e) Fire-fighting measures
f) Accidental release measures
g) Handling and storage
h) Exposure control/personal protection
i) Physical and chemical properties
j) Stability and reactivity
k) Toxicological information
l) Ecological information
m) Disposal consideration
n) Transport information
o) Regulatory information; and
p) Other information.

8.2 Provided it is not reasonably practical to provide a material safety data sheet, the manufacturer, importer, seller or supplier shall supply the receiver of any hazardous chemical substance with sufficient information to enable the user to take the necessary measures with regard to health and safety measures.

8.3 Subject to the provisions of Section 10 (a)(b)(c) of the Hazardous Chemical Substances Regulations of the Occupational Health & Safety Act 85 of 1993, all contractors will ensure that the exposure of an employee is adequately controlled.

9. TRANSPORTATION OF BULK CHEMICALS FOR DELIVERIES

a) The vehicle driver must be a Certified Hazchem Driver
b) The vehicle used for delivery of chemicals must be adequately equipped to off-load chemicals at the delivery point.
c) The vehicle must also be in a sound operational condition to ensure no leakage of chemical, oils and other undesirable substances when delivering or transporting chemicals to site.
d) The vehicle is to be clearly marked and carry all necessary safety equipment to ensure that off-loading can be conducted in a manner that will not endanger the environment or personnel.
e) Non-compliance with the above will render the supplier in breach of contract and any remedial work arising from such a situation will be for the supplier's account.
f) The Contractor must provide emergency contact details of a responsible person who can deal with any situation arising from a delivery or any other problem directly linked to the use of the chemical supplied.

g) Non-compliance with 8 (c) shall render the vehicle unfit to enter the premises. The contractor however will still be responsible to ensure that the product is delivered.

10. STRATEGIC STOCKHOLDING REQUIREMENTS

The Contractor is required to hold stock of raw material equivalent to a single month supply based on average usage of product by the sites at his premises and costs. Company reserves the right to audit the stock holding at the Contractor's premises, at any time during the contractual period. Should this ever drop to a level below one month of stock, Company is to be immediately notified.

11. DETERMINATION OF MASS DELIVERED

a) The Contractor at an assized Weighbridge must determine the mass of each delivery. The method of weighing should accurately reflect the mass of chemical delivered. A weighbridge at the point of supply is acceptable if it is assized and the method of weighing provided by the Contractor satisfies Company that the mass of chemical delivered is accurate. If no assized weighbridge is available at the point of supply the Contractor is to indicate which weighbridge is to be used. The Contractor to indicate the distance (in km) from the weighbridge to the delivery point and the method of weighing used to satisfy Company that the mass of the chemical delivered is accurately determined.
b) Calibration of the Weighbridge used must be certified assized for any current year by the Government assizer and bear the Official Assize Stamp.
c) The weighbridge certificate of mass determination must be supplied within 24 hours of delivery.
d) The use of any weighbridge other than that identified above without prior notification of Company would constitute a breach of contract. Such notification would require confirmation by the Contractor by Telefax. If the use of an alternative weighbridge is accepted by Company the alternative must meet all the requirements as indicated in 10 a) b) and c) above.

12. SITES VISITS OF COMPANY

The Contractor must visit Company Works on the following frequencies:

The purpose of the site visit is to review the supplier's performance in terms of the contract and to evaluate chemical usage and make recommendations.

13. QUANTITIES

The given quantities are the best estimate, but must not be considered as binding. Company reserves the right to either increase or decrease the quantities actually ordered.

14. RATES

The rates or prices quoted shall be all inclusive of profit, materials, labour and plant or other equipment required in the execution of the contract. At least the minimum **wages** applicable under the Basic Conditions of Employment Act, 1997, must be paid to all labourers. Company reserves the right to inspect wage records of the contractor throughout the duration of the contract. Prices must be fixed for one year. The formula to be used will be created prior to commencement date of the contract; cost analysis sheet will be used to create indices for the price adjustments. Price will be fixed for duration of twelve months after the commencement date of the contract. The contractor should give Company at least 30 days notice prior to the effective date of the new price and Company should accept the adjustment in writing.

15. METHOD OF "CALL-OFF" AGAINST CONTRACT

The Contractor understands that Company is entitled to "call-off" on an "as and when required basis" during the contractual period. Actual quantities will then be ordered by means of the following "call-off" procedure. Whenever a product is required a "call-off" number will be quoted by the Employer's Technical Representative and a copy of the "call-off" document forwarded to the Contractor. Should the Contractor on inspection ascertain that a product is required the Contractor must obtain a "call-off" number from the Employer's Technical Representative, prior to commencing the work. The contact person for any query concerning the "call-off" procedure is the Employer's Representative (Commercial Aspects).

16. DETAILS THAT MUST BE STATED ON THE DELIVERY NOTE, INVOICE AND OTHER RELATED DOCUMENTS

The contract number and the "Call Off" number (complete with its suffix) together with the Employer's reference and item code number must be stated on all documentation.

17. TERMS OF PAYMENT

17.1 Payment of invoices for local contractors will be effected 30 (thirty) days from the date of the receipt of the correct statement. Invoices/statements should be submitted after Company has, in writing, acknowledged receipt of the products supplied. A correct and original monthly statement reflecting the above invoices must be submitted to Company.

17.2 Payment will be effected directly to the foreign contractor subject to SA Reserve Bank approval. Payment to the foreign contractor will be effected in the relevant foreign currency by means of telegraphic transfer, 30 (thirty) days after receipt of a correct and original monthly statement, or where statements are not submitted, 45 (forty five) days from receipt of a correct and original invoice. Where statements are not submitted, a certificate should be issued to Company reconciling the amount outstanding for the month.

17.3 All payments will be made by Company to the foreign contractors account. The following particulars of the foreign contractors banking details must be furnished:

a) account name;
b) account number;
c) routing number; and
d) bank name and country.

17.4 The monthly statements, invoices and all supporting documentation must be received before payment can be effected. If the contractors documentation is incomplete or incorrect, payment of these documents will only be effected the month following the month during which the correct documents were received and in the case of foreign contractors, payment will be effected 30 (thirty) days from receipt of a correct statement or 45 (forty five) days from receipt of a correct invoice.

17.5 For VAT registered contractors, all invoices on the contractor's statement must comply with the VAT Act, No. 89 of 1991, or any Act replacing it, before payment can be effected.

17.6 Settlement discounts, if any, agreed upon will be deducted from payments.

17.7 Company may set-off any amounts owed by the contractor from any amount due.

17.8 Payment will be effected by bank transfer or by cheque. Company's' liability towards the contractor will be deemed to be met when the cheque is posted or with Bank Transfer being made. The contractor assumes the entire risk for cheques from the moment of posting, or with Bank Transfer, upon transfer being made. The contractor will ensure that

Company at all times has the correct banking information of the contractor in order to make a bank transfer.

17.9 If the cheque is to be collected, it will be at the contractor's sole risk and risk will pass to the contractor upon handing over of the cheque to the proposed contractor's representative

17.10 All original invoices must be forwarded to Company on a continuous basis throughout the month to the address stated below:

COMPANY
The Creditors Department
PO Box 1000000
Pit Sonder Water

17.11 All payments are provisional and are subject to audit by Company. The contractor will preserve its records for such a period as the South African Revenue Services may require, or 5 (five) years from date of payment by Company, whichever is the longer.

17.12 All correspondence (relating to matters other than invoices) must reflect the relevant Contract Number and be addressed to the Senior Buyer and sent to
PO Box 10000
Pit Sonder Water
9000.

18. PURCHASES BY COMPANY PERSONNEL

Prices contained in any resulting contract are to be extended to all Company personnel, in their personal capacity, on condition that a Company identity card or an Company cash order is produced. Payment must be obtained from the individual at the time the services are provided. Company will not hold itself responsible for any payment due from personnel for services provided to such personnel, in their personal capacity.

19. OCCUPATIONAL HEALTH AND SAFETY ACT (ACT NO 85 OF 1993)

The Contractor must comply with the provisions of this Act. Attention is drawn to the General Safety Regulations, The Driven Machinery Regulations and their specific codes of practice. All equipment and protective clothing must be supplied strictly in accordance with the provisions of the Occupational Health and Safety Act and site specific requirements. All equipment must be available for inspection on request.

Compensation for Occupational Injuries and Disease (Act 130 of 1993) The contractor must comply with the provisions of this Act. A valid registration certificate must be forwarded to the Employers Safety Officer prior to commencement of work.

B5: GENERAL INFORMATION QUESTIONNAIRE

Name of the supplier's representative:	
Telephone no.:	
Emergency no.:	
Name of a person responsible for quality issues:	
Telephone no.:	
Emergency no.:	
Physical address where the company will be operating:	

Are you fully aware of the conditions and undertakings by the bidder in respect of this bid, Special Conditions of Contract, technical specification and supplier evaluation questionnaire which will be applicable to any consulting contract?

YES	NO

Are you fully familiar with the situation surrounding the water works and coagulants for which supply being called for?

YES	NO

Do you have a quality system in place?

YES	NO

If "yes" briefly detail your quality system

If 'no' are you working towards achieving a quality system? if 'yes' please provide details

Guaranteed delivery lead time_____ days

Detail method of delivery

Container equipment: detail how leakages and damages will be handled

Lead time for the removal of damaged equipment is _____hours

Are you aware that any leakages and damages will be for your ACCOUNT?

YES	NO

If ‘no’, comment if any

HAZARDOUS CHEMICALS

CONTAMINATION

Describe in full your contingency plans and actions for handling such an eventuality (please include lead time, containing of risk and the responsibility for cost element, including any special insurances.

Strategic stock holding:

Are you prepared to hold at your own expense product levels covering three (3) months average consumption, at all times?

YES	NO

MASS DETERMINATION

Give details of the nearest weighbridge you will use as well as the distance between the weighbridge and the delivery point and the method you will use to ensure accurate mass of chemical delivered:

Details of calibration e.g. testing, frequency and authority of current assizing:

Detail your maximum capacity at any point in time:

Authorised signatory:

Name:

Designation/position in the company:

Date:

B6: FORM OF OFFER AND ACCEPTANCE

A: OFFER

Company identified in the Acceptance signature block, has solicited offers to enter into a contract in respect of the product specified in Technical Specification and Requirements and Price Schedule attached to the Contract Data.
Contract No: ..... for .....

....
The bidder identified in the Offer signature block below, has examined the documents listed in the Tender Data and addenda thereto as listed in the Returnable Schedules, and by submitting this Offer has accepted the Conditions of Tender.

By the representative of the Bidder, deemed to be duly authorised, signing this part of this Form of Offer and Acceptance, the Bidder offers to perform all of the obligations and liabilities of the Supplier under the Contract including compliance with all its terms and conditions according to their true intent and meaning for an amount to be determined in accordance with the Conditions of Contract identified in the Contract Data.

The offered total of the prices inclusive of Value Added Tax is set out in the Requirements and Price Schedule which attached to the Contract Data .

This Offer may be accepted by Company by signing the Acceptance part of this Form of Offer and Acceptance and returning one copy of this document to the Bidder before the end of the period of validity stated in the Tender Data, whereupon the Bidder becomes the party named as the Supplier in the Conditions of Contract identified in the Contract Data.

Signature: *(of person authorized to sign the tender)*:.....

Name: (*of signatory in capitals)*:.....

Capacity: (*of Signatory*): .....

Name of Bidder: (*organisation*): .....

Address:.....Tel. number: .....Fax number: .....

Witness:

Signature: .....

Name: *(in capitals)*:.....

Date: .....

[Failure of a bidder to sign this part of the Form of Offer and Acceptance will invalidate the tender].

B: ACCEPTANCE

By signing this part of the Form of Offer and Acceptance, Company identified below accepts the Bidder's Offer. In consideration thereof, Company shall pay the Supplier the amount due in accordance with the Conditions of Contract as set out in this Agreement and the Contract Data. Acceptance of the Bidder's Offer shall form an agreement between Company and the Bidder upon the terms and conditions contained in this Agreement and in the Contract Data documents that are the subject of this Agreement.

The terms of the contract are contained in this Agreement and Contract Data and the schedules, forms, drawings and documents or parts thereof, which may be incorporated by reference in this agreement or in the Contract Data.

Deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Tender Schedules as well as any changes to the terms of the Offer agreed by the Bidder and Company during this process of offer and acceptance, are contained in the Schedule of Deviations attached to and forming part of this Agreement. No amendments to or deviations from said documents are valid unless contained in this Schedule.

The Bidder shall within two weeks after receiving a completed copy of this Agreement, including the Schedule of Deviations (if any), contact the Employer's agent (whose details are given in the Contract Data) to arrange the delivery of any other bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the Conditions of Contract identified in the Contract Data. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this Agreement.

Notwithstanding anything contained herein, this Agreement comes into effect on the date when the Bidder receives one fully completed original copy of this document, including the Schedule of Deviations (if any). Unless the Bidder (now Supplier) within five days of the date of such receipt notifies Company in writing of any reason why he cannot accept the contents of this Agreement, this Agreement shall constitute a binding contract between the parties.

Signature: .....

Name: .....

Capacity: .....

Name of organisation: .....

Address: .....
.....
.....
.....
.....

Witness

Signature: .....

Name: .....

Date: .....