ANNEXURE
Water Quality Guidelines and Standards for Potable Water

Table 1: CHEMICAL AND BIOLOGICAL REQUIREMENTS

Specifications for water quality intended for human consumption from the source and piped water supply					
Status				**Ranges and upper limits**	
Interpretation				**(Ideal guideline)**	**(Acceptable Standard)**
DETERMINANTS	**Unit**	**Format**	**Concern**	**95 Percentile Requirement**	
PHYSICAL AND ORGANOLEPTIC REQUIREMENTS					
Temperature	**° C**		**E**	**Ambient temperature**	
Colour	**PTU**	**or mg/litre**	**E**	**10**	**<15**
Taste			**O,E**	**No objectionable taste**	
Odour			**O,E**	**No objectionable odour**	
Turbidity (treated surface water)	**NTU**	**or TU**	**H,I**	**< 0.3**	**< 0.5**
Turbidity (groundwater)	**NTU**	**or TU**	**H,I**	**< 0,5**	**<2**
pH @ 20 °C	**pH**		**I**	**6.0 to 8.5**	**6 to 9**
Electric Conductivity @ 25 °C	**mS/m*** **	**E.C.**	**H,I**	**< 80**	**< 300**
Total Dissolved Solids (treated surface water)	**mg/litre**		**H,I**	**< 500**	**< 2 000**
Total Dissolved Solids (groundwater)	**mg/litre**		**H,I**	**< 1000**	**< 2 000**
INORGANIC MACRO DETERMINANTS					
Ammonia	**mg/litre**	**N**	**H**	**< 0.2**	**< 0.5**
Barium	**mg/litre**	**Ba**	**H**	**0.5**	**< 2**
Calcium	**mg/litre**	**Ca**	**I**	**< 80**	**< 150**
Chloride	**mg/litre**	**Cl**	**H,I**	**< 100**	**< 300**
Fluoride	**mg/litre**	**F**	**H**	**< 0.7**	**< 1.5**
Magnesium	**mg/litre**	**Mg**	**H**	**< 30**	**< 70**
Nitrate	**mg/litre**	**N**	**H**	**< 6**	**< 11**
Nitrite	**mg/litre**	**N**	**H**	**< 0.1**	**< 0.15**
Potassium	**mg/litre**	**K**	**H**	**< 25**	**< 100**
Sodium	**mg/litre**	**Na**	**H.I**	**< 100**	**< 300**
Sulphate	**mg/litre**	**SO_4**	**H,O**	**100**	**< 300**
Asbestos (fibres longer than 10 μm)	**Fibres/litre**		**H**	**<500 000**	**< 1000 000**
INORGANIC MICRO DETERMINANTS					
Aluminium	**μg/litre**	**Al**	**H**	**< 25**	**< 100**
Antimony	**μg/litre**	**Sb**	**H**	**< 5**	**< 50**
Arsenic	**μg/litre**	**As**	**H**	**<10**	**< 50**
Beryllium	**μg/litre**	**Be**	**H**	**< 2**	**< 5**
Bismuth	**μg/litre**	**Bi**	**H**	**< 250**	**< 500**
Boron	**μg/litre**	**B**	**H**	**< 300**	**< 500**
Bromide	**μg/litre**	**Br**	**H**	**< 500**	**< 1 000**
Cadmium	**μg/litre**	**Cd**	**H**	**< 5**	**< 10**
Cerium	**μg/litre**	**Ce**	**H**	**<1 000**	**<2 000**
Cesium	**μg/litre**	**Cs**	**H**	**< 1 000**	**< 2 000**
Chromium Total	**μg/litre**	**Cr**	**H**	**< 50**	**< 100**
Cobalt	**μg/litre**	**Co**	**H**	**< 250**	**< 500**

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DETERMINANTS	**Unit**	**Format**	**Concern**	**95 Percentile Requirement**	
Copper	**µg/litre**	**Cu**	**H**	**< 500**	**< 2 000**
Radon	**Bq/L**	**Ra**		**< 200**	**< 1 000**

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DETERMINANTS	**Unit**	**Format**	**Concern**	**95 Percentile Requirement**	
INORGANIC MICRO DETERMINANTS					
Cyanide (free)	**µg/litre**	**CN^-**	**H**	**< 20**	**< 50**
Cyanide (recoverable)	**µg/litre**	**CN^-**	**H**	**< 70**	**< 200**
Iron	**µg/litre**	**Fe**	**H,E**	**< 200**	**< 300**
Lead	**µg/litre**	**Pb**	**H**	**<10**	**< 50**
Manganese	**µg/litre**	**Mn**	**H**	**< 50**	**< 100**
Mercury	**µg/litre**	**Hg**	**H**	**< 1**	**<2**
Nickel	**µg/litre**	**Ni**	**H**	**< 50**	**< 150**
Selenium	**µg/litre**	**Se**	**H**	**< 10**	**< 50**
Thallium	**µg/litre**	**Ti**	**H**	**< 5**	**< 10**
Tin	**µg/litre**	**Sn**	**H**	**<100**	**<200**
Titanium	**µg/litre**	**Ti**	**H**	**< 100**	**< 300**
Uranium	**µg/litre**	**U**	**H**	**< 3**	**< 15**
Vanadium	**µg/litre**	**V**	**H**	**< 100**	**< 500**
Zinc	**µg/litre**	**Zn**	**H**	**< 1 000**	**< 5 000**
Organo-metallic compounds (as organo or industrial chemicals or others)	**µg/litre**	**Polymer**	**H**	**below detection limit (in accordance with WHO and EPA requirements)**	**below detection limit (in accordance with WHO and EPA requirements)**
ORGANIC DETERMINANTS					
Dissolved Organic Carbon	**mg/litre**	**DOC-C**	**H**	**< 5**	**<10**
Phenol compounds	**µg/litre**	**phenol**	**H**	**< 5**	**< 10**
DISINFECTION AND DISINFECTION BY-PRODUCTS					
Bromodichloromethane (Part of THM)	**µg/litre**		**H**	**< 20**	**< 50**
Bromoform (Part of THM)	**µg/litre**		**H**	**< 40**	**< 40**
Chloroform (Part of THM)	**µg/litre**		**H**	**< 20**	**< 100**
Dibromomonochloro-methane (Part of THM)	**µg/litre**		**H**	**< 20**	**< 100**
Trihalomethanes (Total)	**µg/litre**	**THM**	**H**	**< 100**	**< 150**
Bromate	**µg/litre**		**H**	**< 5**	**< 10**
Chloramines	**mg/litre**	**Cl_2**	**H**	**< 2**	**< 4**
Chlorine dioxide after 30 min. GENERAL	**µg/litre**		**H**	**200 - 500**	**< 800**
Chlorine dioxide after 30 min. SPECIFIC	**µg/litre**		**Turbidity > 0.3 NTU**	**200**	**200 - 400**
Chlorine dioxide after 60 min. SPECIFIC	**µg/litre**		**Turbidity > 1.0 NTU**	**< 200**	**200 - 500**
Chlorite	**µg/litre**		**H**	**< 400**	**< 800**
Chlorate	**µg/litre**		**H**	**< 200**	**< 700**
Haloacetic acids	**µg/litre**		**H**	**not detected**	**< 60**
Chlorine, free, after 30 min; GENERAL	**mg/litre**	**Cl_2**	**H,I**	**0.3 – 0.5**	**0.1 – 1.5**

Specifications for water quality intended for human consumption from the source and piped water supply					
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Interpretation				**(Ideal guideline)**	**(Acceptable Standard)**
DETERMINANTS	**Unit**	**Format**	**Concern**	**95 Percentile Requirement**	
Chlorine, free, after 30 min; SPECIFIC	**mg/litre**	**Cl_2**	**Turbidity: < 0.3 NTU**	**0.3**	**0.1 – 1.5**
Chlorine, free, after 30 min; SPECIFIC	**mg/litre**	**Cl_2**	**Turbidity: > 0.3 NTU**	**0.5**	**0.1 – 1.5**
Chlorine, free, after 60 min; SPECIFIC	**mg/litre**	**Cl_2**	**Turbidity: >1.0 NTU**	**1.0**	**0.1 – 1.5**

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Interpretation				**(Ideal guideline)**	**(Acceptable Standard)**
DETERMINANTS	**Unit**	**Format**	**Concern**	**95 Percentile Requirement**	
BIOLOGICAL REQUIREMENTS					
Algae					
Chlorophyll α	**µg/litre**		**E,O**	**< 1**	**< 2**
Total algae cell count		**/ml**	**H,O**	**< 200**	**<5 000**
Blue-green algae	**cells**	**/ml**	**H,O**	**< 200**	**<2 000**
Mycrocystin	**µg/litre**		**H**	**< 0.1**	**< 1**
Geosmin	**ηg/litre**		**E, H**	**< 15**	**< 30**
2-Methyl Iso Borneal (2 MIB)	**ηg/litre**		**E, H**	**< 15**	**< 30**
OTHER DETERMINANTS					
Agricultural chemical compounds			**H**	**Any organic compound recognized as an agro-chemical shall be in accordance with the WHO and EPA requirements.**	
Industrial chemical compounds			**H**	**Any organic compound recognized as an industrial chemical shall be in accordance with the WHO and EPA requirements.**	
Endocrine disruptive chemicals			**H**	**Any chemical compound that is suspected of having endocrine disruptive effects shall be in accordance with the WHO and EPA requirements.**	
RADIOACTIVITY				**95 Percentile Requirement**	
Gross alpha activity	**Bq/litre**		**H**	**< 0.2**	**< 0.5**
Gross beta activity	**Bq/litre**		**H**	**< 0.4**	**< 1.0**
If Gross alpha and beta is above specification calculate Dose based on individual radionuclide concentrations	**mSv/a**		**H**	**≤ 0.04**	**≤ 0.1**

"Concern" refers to impact if the limit is transgressed: H = health concern; O = organoleptic effect;
I = effect on infrastructure, structural; E = aesthetic effect
* Based on a viral cell culture-dependent method and not on cell culture-independent methods (e.g. PCR)
** Indicative of faecal pollution having occurred, even when the residual disinfectant levels are safe.
*** Comply with SANAS Guidelines

Table 2: Standards for Microbiological and Biological Requirements

MICROBIOLOGICAL REQUIREMENTS APPLICABLE TO ALL POTABLE WATER					
Microbiology	**cfu**			**95 percentile**	**1 of samples maximum**
Heterotrophic bacteria HPC or TCC	counts	/ml		100	1 000
Total Coliform	counts	/100 ml	H	0	5
E.Coli	counts	/100 ml	H	0	1
Entrerococci	counts	/100 ml	H	0	1
Somatic Coliphage	counts	/100 ml	H	0	1
Clostridium perfrigens inclusive spores	counts	/100 ml	H	0	1
Enteric viruses	viral count*	/10 L	H	0	1
Parasites (Protozoa) applicable to all potable water				**95 percentile**	**99 percentile**
Giardia lamblia	cysts	/100 litre	H	0	1
Cryptosporidium	oocysts	/100 litre	H	0	1
Giardia lamblia and Giardia lamblia (Grab sample)	cysts or oocysts	/10 L	H	0	0

Table 3: Special Requirements for the Protection of Infrastructure

Specifications for water quality intended for human consumption from the source and piped water supply for the protection of infrastructure against corrosion					
Status				**Ranges and upper limits**	
Interpretation				**(Ideal guideline)**	**(Acceptable Standard)**
DETERMINANTS	**Unit**	**Format**	**Concern**	**95 Percentile requirement**	
CORROSIVE AND SCALING PROPERTIES (treated surface water)					
Calcium Carbonate Precipitation Potential	mg/litre	CCPP	I	4 - 5	1 - 6
Alkalinity/Sulphate/ Chloride Ratio	Equi-valents	Corrosivet y Ratio	I	With SO_4 and Cl above 50 mg/litre Ratio=(Alk/50)/(SO_4/48+Cl/35.5) > 5.0 Water is Stable Ratio= (SO_4/48+Cl/35.5)/(Alk/50) > 0.2 Water is Corrosive	
Total Hardness (Ca & Mg)	mg/litre	$CaCO_3$	I	<200	< 400
CORROSIVE AND SCALING PROPERTIES (ground water)					
Calcium Carbonate Precipitation Potential	mg/litre	CCPP	I	4 - 5	3 - 15
Alkalinity/Sulphate/ Chloride Ratio	Equi-valents	Corrosivet y Ratio	I	With SO_4 and Cl above 50 mg/litre Ratio=(Alk/50) /(SO_4/48+Cl/35 .5) > 5.0 Water is Stable Ratio= (SO_4/48+Cl/35. 5)/(Alk/50) > 0.2 Water is Corrosive	
Total Hardness (Ca & Mg)	mg/litre	$CaCO_3$	I	<400	< 1000

Table 4: Frequency of Microbiological Monitoring (including Turbidity values) for Water Supply and Distribution

Size of population served	Turbidity 95%**	Frequency of sampling
> 250 000	< 0,5 NTU	**Thrice weekly *****

100 001 – 250 000	< 1,0 NTU	**Twice weekly**
50 001 – 100 000	< 1,0 NTU	**Once weekly**
10 001 – 50 000	< 1,0 NTU	**Three times every month**
< 10 000 reticulated	< 1,0 NTU	**Once every 1 month***
< 10 000 non-reticulated	**1 – 2 NTU**	**Once every 1 month***

* Upon complaints by the consumers or of medical practitioners and after incidents such as pipe breaks, the frequency should be increased until the situation has returned to original counts and been declared safe;

** Average or 95 percentile turbidity of the water supplied

*** The frequency should be stepped up by one extra sampling per week for every 100 000 residents (including the estimated number of visitors residing within the area at any time) in the area served, over and above 250 000.

General Information

1. The area being monitored shall be defined by the Minister in consultation with the Minister responsible for health and, where applicable, relevant officials from the Regional and Local Authorities;
2. At the time of sampling the operator shall also take a “free chlorine” reading of the same water under examination but prior to sampling for microbiological sampling, whilst using a portable device designed for that purpose and accepted by the Minister; this ‘reading’ is to be recorded and reported together with the results from the microbiological analyses;
3. As for field ‘screening’ of water supplies for microbiological contamination there exist portable devices designed for that purpose and accepted by the Minister; these ‘readings’ are to be recorded and reported together with the results from the microbiological analyses;
4. The results of the microbiological monitoring together with the free chlorine readings is to be reported as per mutual agreement to the ultimate supplier (bulk water supplier, Local Authority, or any other supplier) for remedial action where required, and to the Minister for record and monitoring purposes and follow up actions;
5. The costs of routine monitoring shall be borne by the authority commissioning the monitoring;
6. The US-EPA 2012 (update) Drinking Water Standards and Health Advisories shall be used to prescribe the maximum disinfection dosages when deemed necessary by the Minister.
7. Biological monitoring of invertebrates shall be conducted using the NASS method as prescribed in the guidelines by the Minister.

Methodology for Sampling and Analyses

The methodologies followed for sampling and during transit and storage of samples prior to analysis shall be as prescribed.

1. Preferably samples are to be taken in borosilicate glass bottles with a glass or polypropylene screw-cap lid;
2. Where this is not feasible or practical polyethylene bottles with internal seal and with screw-lid can be used;
3. Samples shall, as far as practical, be analysed within 24 hours of sampling;
4. Where there are special requirements for the period between sampling and analysis to be less than 24 hours, such requirement should be attended to as far as is practical;
5. Samples are to be kept and stored, even during transit, at as low a temperature as is practically manageable, whilst preventing the risk of the sample freezing;
6. The sample shall be kept away from light and shielded from sunlight, to reduce chances of micro-/biological growth to a minimum;
7. The use of preservation chemicals should be considered, planned and executed with extreme care;
8. Where sample preservation is appropriate or required an extra smaller volume sample should be taken so as to not upset any other analyses that are affected by the preservation chemical(s);
9. Certain determinants may be monitored ‘in the field’ at the time of sampling; such field-data are to be measured in a receptacle or container different from the sample container; data so obtained shall be recorded as “field measurement” and cannot replace laboratory analysis for the parameters concerned;
10. The methodologies followed for physical, chemical and microbiological analysis shall be in agreement with the specifications listed in the latest edition of the SANS 241, Drinking Water Standards, published by the SABS.
11. The cost of routine, regulatory inspections and monitoring, for the purpose of fulfilling the provisions of this regulation shall borne by the service provider.