NIGERIAN INDUSTRIAL STANDARD

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Nigerian Standard for Drinking Water Quality

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Price group D

Approved By: SON Governing Council

STANDARDS ORGANISATION OF NIGERIA

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Foreword

Drinking water quality standard ensures the safety of the drinking water supplies and the protection of public health. The establishment of Nigerian Standard for Drinking Water Quality (NSDQW) will ensure the protection of the consumers. It is expected that the Nigerian Standard for Drinking Water Quality will speed up the process of upgrading non-protected water systems and improving the management of all drinking water systems in the country.

Consensus on the content of the Nigerian Standard for Drinking Water Quality was reached through extensive consultations with all stakeholders including development partners with responsibilities in the management of water quality. This standard is therefore based on general principles of preventive, integrated and collaborative multi-agency approach.

This standard sets parameters and maximum allowable limits in drinking water in Nigeria. It also includes normative references/laws guiding drinking water quality, definition of terminologies, institutional roles and responsibilities, monitoring, data management and compliance criteria.

In developing this Standard, references were made to the Nigerian Industrial Standards for Potable Water and Natural Mineral Water, the National Guidelines and Standards for Water Quality in Nigeria, the World Health Organisation (WHO) guidelines for drinking water quality (3rd Edition) and International Organisation of Nigeria (ISO).

1. Introduction

1.1 The Importance of Nigerian Standard for Drinking Water Quality

Nigerian Standard for Drinking Water Quality contains mandatory limits concerning constituents and contaminants of water that are known to be hazardous to health and/or give rise to complaints from consumers. The standard includes a set of procedures and good practices required to meet the mandatory limits.

1.2 Drinking Water Quality Standard Used in Nigeria

In 2005, the National Council on Water Resources (NCWR) recognized the need to urgently establish acceptable Nigerian Standard for Drinking Water Quality because it was observed that the "Nigerian Industrial Standard for Potable Water" developed by Standards Organisation of Nigeria and the "National Guidelines and Standards for Water Quality in Nigeria" developed by Federal Ministry of Environment did not receive a wide acceptance by all stakeholders in the country.

Since water quality issues are health related issues, the Federal Ministry of Health, collaborating with the Standards Organisation of Nigeria (the only body responsible for developing National Standards in Nigeria) and working through a technical committee of key stakeholders developed this Standard. The list of the members of the technical committee is presented in the Annex to this document.

1.3 Principles

The effective protection of public health against water related diseases requires a preventive integrated management approach, this includes:

a) The protection of drinking water from catchments and source to its use by consumers
b) A collaborative multi-agency approach that involve all agencies with responsibilities in the management of water quality.
c) Water quality standard that is comprehensive, realistic and implementable within the resources of the implementing agencies.
d) The development of procedures and requirements that ensure good water quality management in order to meet the maximum allowable limits. These procedures also protect the environment
e) An independent surveillance agency with strong enforcement authority and functions decentralized to local government level.

f) An effective drinking water quality data management system to enable generation of data for the development of coherent public health-centred policies and practices

1.4 Technical Approach

The selection of parameters and the determination of maximum allowable limits have been conducted taking into consideration the WHO guideline for drinking water quality.

1.5 Recommend Revision Period

The standard shall be reviewed every three years and/or as when necessary. The Technical Committee shall meet once a year to address new water quality issues and to prepare for the review of the Nigerian Standard on Drinking Water Quality.

1.6 Scope

The Nigerian Standard for Drinking Water Quality covers all drinking water except mineral water and packaged water.

The standard applies to:

Drinking water supplied by State Water Agencies,
Drinking water supplied by community managed drinking water systems
Drinking water supplied by water vendors and water tankers
Drinking water used in public or privately owned establishments
Drinking water used in food processing by manufacturers
Drinking water from privately owned drinking water system and use solely for the family residence

Mineral water and packaged water shall comply with Nigerian Industrial Standards for Natural Mineral Water (NIS 345:2003) and Potable Water (NIS 306:2004) and used for regulation and certification by the National Agency for Food and Drug administration and Control and SON respectively (It is important to mention here that the standards for mineral water and packaged water have different allowable limits for various parameters presented here).

2. Main Normative References/Laws

The following provide the regulatory framework for drinking water quality in Nigeria:

i. Consumer Protection Council Act 66 (1992)
ii. Council for Regulation of Engineering in Nigeria Act 55 (1972)
iii. Federal Environmental Protection Agency- Retained as Cap 131
iv. Food and Drug Retained as Cap 150
v. Food and Drugs (1999-No.19) Changed to NAFDAC Act 11
vi. Institute of Chartered Chemist of Nigeria Act N°91 (1993)
vii. Institute of Public Analyst of Nigeria Act N°100 (1992
viii. National Water Resources Institute Act- Retained as Cap 284
ix. Public Health Act (1958)
x. Standards Organisation of Nigeria (SON) - Retained as Cap 412
xi. Water Resources Act N° 101 (1993)
xii. International Organisation for Standardization (ISO) – Service activities relating to drinking water and wastewater – Guidelines for the management of drinking water utilities and for the assessment of drinking water services
xiii. National Guidelines and standards for Water Quality in Nigeria
xiv. Nigerian Industrial Standards for Natural Mineral Water (NIS 345: 2003) and Potable Water (NIS 306: 2004)

3. Terminology

For the purpose of this standard, the following expressions have the meaning stated below:

3.1 Community Managed Water Systems

On-site or centralized drinking water systems protected, operated and maintained (small maintenance only) by community water committee.

3.2 Contaminant

Any chemical or substance present or released or added into drinking water which is capable of being hazardous to health

3.3 Drinking Water

3.3.1 All water either in its original state or after treatment, intended for drinking, cooking, food preparation or other domestic purposes, regardless of its origin and whether it is supplied from a drinking water system, or a tanker, or taken from a private well.

3.3.2 All water used in any food production undertaking for the manufacture, processing, preservation or marketing of products or substances intended for human consumption

3.4 Drinking Water Quality Control

Water tests conducted on routine basis by the water utility to ensure that water supplied to the consumers meet the standard.

3.5 Drinking Water Quality Surveillance

Water tests, sanitary inspections and spot checks conducted by an independent agency to ensure that water utilities and others suppliers meet the Standard

3.6 Drinking Water Service Level

Measure of quality, quantity, accessibility, coverage, affordability and continuity of drinking water supplied to the population. Water service levels are defined in the National Water Supply Policy and sanitation Policy

3.7 Drinking Water Service Provider

The whole set of organization, processes, activities, means and resources necessary for abstracting, treating, distributing or supplying drinking water and for providing the associated services. Drinking water service providers are essentially states water agencies. The States Water Agencies are:

3.7.1 State Water Boards/Corporations, which mostly serve urban areas greater than 20,000 inhabitants

3.7.2 Small Water Town Agencies, which mostly serve semi-urban areas with population between 5,000 to 20,000 inhabitants

3.7.3 Rural Water Supply and Sanitation Agencies operate in rural areas and usually serve communities of 500 to 5,000 inhabitants.

3.8 Drinking Water System

Tangible assets necessary for abstracting, treating, distributing or supplying drinking water. Drinking water systems include centralized and on-site systems:

3.8.1 Protected on-site drinking water systems are:

i. Protected hand dug wells equipped with hand pump
ii. Protected spring catchments
iii. Borehole equipped with hand pump

3.8.2 Protected centralized drinking water systems are:

i. Mechanized borehole with distribution system
ii. Surface water intake, treatment and distribution system

3.9 Laboratory Quality Assurance

Minimum requirements regarding staff qualification, analytical method, sampling procedures, calibration procedures, quality control, preventive maintenance and record keeping procedures that a laboratory has to comply with to ensure reliable and accurate results

3.10 Maximum Permitted or Allowable Limits

Maximum concentration of microbiological, chemical and organic constituents / contamination allowed in drinking water. These concentrations are based on WHO guideline value for which no adverse health effect is noticed.

3.11 Mineral Water

Water packaged in suitable container that meets the Nigerian Industrial Standards for Natural Mineral Water (NIS 345: 2003).

3.12 Packaged Water

Water packaged in suitable container that meets The Nigerian Industrial Standards for Potable Water.

3.13 Point of Delivery

Physical fixed interface beyond which the water service provider is not legally responsible for the service.

3.14 Point of compliance

Points where the surveillance agency collects water samples in order to measure compliance with maximum allowable limits.

3.15 Private Drinking Water System

Drinking water systems owned by a private person(s) and use solely for the family residence.

3.16 Protection Zone

Defined area surrounding a water source where activities that may affect water quality are restricted or prohibited

3.17 Public or Privately Owned Establishment

Establishment where water is supplied to the public, such as secondary schools, university, hospitals, restaurants.

3.18 Sanitary Inspections

Inspections used to evaluate the likelihood of contamination of water

3.19 Sanitary Surveys

The evaluation of the water source and intake structure, the treatment and conditioning process, the facilities and components and also an evaluation of the distribution system

3.20 Sources of Contamination

Release into the environment of man made chemical and bacteriological contaminants. Major contamination sources are animal and human wastes, industry and mining activities, agriculture and accidents and leaks such as oil spillage.

3.21 State Urban Water Supply Regulators

Independent regulatory bodies that monitor the performance of water utilities or any other water supply operators and ensure that the water supply complies with quality standard and service levels

3.22 Toxic element

Organic or inorganic constituents that may adversely affect human health when its concentration in water reaches a specific threshold.

3.23 Water Source: means either groundwater or surface water

- Surface water includes streams, rivers, lakes or reservoirs.
- Ground water includes springs, wells or boreholes

3.24 Water Safety Plan

Essential actions that are the responsibility of the drinking water provider in order to ensure that drinking water is safe. These are:

- a system assessment;
- effective operational monitoring; and
- management

3.25 Water Vendors

These are persons or organizations selling water to households or at collection points. Vendors may carry drinking water for sale directly to the consumer by tanker trucks, wheelbarrows /trolleys or donkey carts.

4. Institutional Framework: Roles, Rights and Responsibilities

Ministry of Health shall be responsible for Drinking Water Quality Surveillance in Nigeria and shall be the lead institution enforcing Nigerian Standard for Drinking Water Quality.

Ministry of Health shall strengthen the existing Division of Water Safety (or establish a new structure) solely responsible for Drinking Water Quality Surveillance and Enforcement.

At Federal level, Division of Water Safety (or new agency) shall be responsible for developing Drinking Water Quality Surveillance and enforcement strategy, developing drinking water quality surveillance and enforcement procedures, communicating drinking water quality data to stakeholders and consumers (dissemination), establishing national priorities in the sector of drinking water quality surveillance.

At state level, the Division of Water Safety (or new agency) shall be responsible for implementing strategies and procedures issued at Federal level.

The Federal Ministry of Health Division of Water Safety (or the new Agency) shall include professionals skilled in the disciplines of drinking water engineering, public health, water quality testing, drinking water quality inspection and enforcement, data management and communication.

The State Department / Division of Water Safety shall include in addition a pool of inspectors in charge of drinking water quality investigations, water sampling and sanitary inspection, control and enforcement of water safety plans and enforcement of Nigerian Standards for Drinking Water in the whole state (The local government health department and communities shall be involved).

Federal and State Departments of Water Safety shall promote NSDWQ, shall inform consumers on the health risk linked to poor water quality consumption shall publish drinking water quality results for stakeholders and make results available to consumers in an understandable way.

Federal and State Departments of Water Safety shall contract existing laboratories to perform tests for Drinking Water Quality Surveillance. Only qualified/certified laboratories and with qualified/certified personnel shall be contracted to perform water quality testing for Drinking Water Quality Surveillance

Federal Department of Water safety shall establish and manage a drinking water quality data base accessible to stakeholders and provide the data to the National Bureau of Statistics.

The Federal Ministry of Agriculture and Water Resources shall develop procedures for the sitting of new water sources for drinking water supply (good practices for water catchments).

Federal Ministry of Agriculture and Water Resources shall develop construction guidelines for water facilities and treatment requirements.

State Ministry / Agency in charge of Water Resources shall ensure that procedures developed by Federal Ministry of Agriculture and Water Resources are implemented and shall supervise the elaboration of Water Safety Plans by Water services providers (including State Water Agencies) and Water Safety Plans shall be validated by State Department of Water safety and enforced by inspectors.

The Federal Ministry in charge of Water Resources shall compile data on quality of surface and ground water and provide such data to Federal Ministry of Health and other relevant agencies.
Federal Ministry / Agency in charge of Environment (in consultation with relevant institutions**)** shall:

- be responsible for the development of procedures for the establishment of protection zone around water sources intended for human consumption.
- inform, Federal Ministry of Health (FMOH), States Ministry of Health (SMOH) and drinking water service providers in case of contaminations occurring in the protection zones.
- Protect, restore, and preserve watershed State Ministry / Agency in charge of Environment shall implement protection zone and control activities in protection zones.

Standard Organisation of Nigeria shall:

- establish standards for quality of materials, equipment and treatment chemicals used for drinking water supply.
- enforce laboratory quality assurance and conduct system certification.
- Assess conformity to standards

National Water Resources Institute shall conduct training and re-training of drinking water utilities personnel on development and implementation of Water Safety Plan.

Drinking water supplied by State Water Agencies, other water service providers and bodies listed in section 1 shall comply with Nigerian Standards for Drinking Water Quality. These “bodies” shall:

- Request an authorization from the Ministry of Health for the use of water for human consumption or for food processing. The authorization shall be issued when the following requirements are meet:
    - Water quality comply with allowable limits
    - Construction requirements and water treatments are met
    - Minimum safe distance is observed around water points.

Operate and maintain water facilities in order to provide drinking water complying with standards. An internal routine water quality control shall be conducted and water providers shall be equipped with minimum laboratory facilities to carry out routine water quality control. Results of internal routine water quality control shall be made available to Ministry of Water Resources and to Drinking Water Quality Surveillance inspectors.

- Establish and implement a Water Safety Plan that includes all measures undertaken to achieve NSDWQ
- Facilitate the access of all water facilities to Drinking Water Quality Surveillance inspectors.
- Inform Public Health State Authorities in case of failure of water treatment process.
- Provide regular update on water facilities characteristics and status to Ministry of Water Resources and Ministry of Health.

National Agency for Food and Drug administration and Control (NAFDAC) shall:

- enforce packaged water quality standards,
- regulate the use of water treatment chemicals

Consumer Protection Council (CPC) shall:

- receive complaints and or observed lapses and use appropriate Institutional Framework to ensure adequate correction.
- seek redress and compensation for aggrieved consumer or community as provided in the CPC Act.
- undertake awareness campaigns to enlighten consumers on their rights to safe and wholesome drinking water as generally provided for in the CPC Act.

5. Requirements

5.1 Drinking Water Quality

In preparing the following table of parameters and maximum permitted limits, care has been taken to ensure that flexibility is carefully managed and balanced taking into consideration water system economic viability without unduly compromising the health of the consumers.

The substances in Nigerian Standard for Drinking Water Quality are simply divided into physical / organoleptic, chemical organic and inorganic constituents, disinfectants and disinfectants by-products, radionuclides and microbiological parameters.

All drinking water shall at any time meet the minimum requirements set out in Table1, Table 2, Table 3, Table 4, Table 5, Table 6 and Table 7.

All water sources intended for human consumption shall comply with Nigerian Standards for Drinking Water Quality and shall receive authorization from Ministry of Health before being supplied to the population.

5.1.1 Parameters and Maximum Allowable Limits

Table 1 - Physical / Organoleptic Parameters

Parameter	Unit	Maximum Permitted Levels	Health Impact	Note
Colour	TCU	15	None	
Odour	-	Unobjectionable	None	
Taste	-	Unobjectionable	None	
Temperature	^{0} Celsius	Ambient	None	
Turbidity	NTU	5	None	

5.1.2 Chemical Parameters

Table 2 - Inorganic Constituents

Parameter	Unit	Maximum Permitted	Health Impact	Notes
Aluminum (Al)	mg/L	0.2	Potential Neuro-degenerative disorders	Note 1
Arsenic (As)	mg/L	0.01	Cancer,	
Barium	mg/L	0.7	Hypertension	
Cadmium (Cd)	mg/L	0.003	Toxic to the kidney	
Chloride (Cl)	mg/L	250	None	
Chromium (Cr^{6+})	mg/L	0.05	Cancer	
Conductivity	µS/cm	1000	None	
Copper (Cu^{+2})	mg/L	1	Gastrointestinal disorder,	
Cyanide (CN^{-})	mg/L	0.01	Very toxic to the thyroid and the nervous system	
Fluoride (F^{-})	mg/L	1.5	Fluorosis, Skeletal tissue (bones and teeth) morbidity	
Hardness (as $CaCO_3$)	mg/L	150	None	
Hydrogen Sulphide (H_2S)	mg/L	0.05	None	
Iron (Fe^{+2})	mg/L	0.3	None	
Lead (Pb)	mg/L	0.01	Cancer, interference with Vitamin D metabolism, affect mental development in infants, toxic to the central and peripheral nervous systems	
Magnesium (Mg^{+2})	mg/L	0.20	Consumer acceptability	
Manganese (Mn^{+2})	mg/L	0.2	Neurological disorder	

Table 2 - Inorganic Constituents (Contd)

Parameter	Unit	Maximum Permitted	Health Impact	Notes
Mercury (Hg)	mg/L	0.001	Affects the kidney and central nervous system	
Nickel (Ni)	mg/L	0.02	Possible carcinogenic	
Nitrate (NO_3)	mg/L	50	Cyanosis, and asphyxia (‘blue-baby syndrome”) in infants under 3 months syndrome”) in infants under 3 months	
Nitrite (NO_2)	mg/L	0.2	Cyanosis, and asphyxia (‘blue-baby syndrome”) in infants under 3 months	
pH	-	6.5-8.5	None	
Sodium (Na)	mg/L	200	None	
Sulphate (SO_4)	mg/L	100	None	
Total Dissolved Solids	mg/L	500	None	
Zinc (Zn)	mg/L	3	None	

Note 1: Parameter to be monitored only if aluminum chemicals are used for water

5.1.3 Chemical Parameters

Table 3 - Organic Constituents

Parameter	Unit	Maximum Permitted Levels	Health Impact	Note
Detergents	mg/L	0.01	Possibly carcinogenic	
Mineral oil	mg/L	0.003	Possibly carcinogenic	
Pesticides	mg/L	0.01	Possibly carcinogenic	
Phenols	mg/L	0.001	Possibly carcinogenic	
Poly Aromatic Hydrocarbons	mg/L	0.007	Possibly carcinogenic	
Total Organic Carbon or Oxidisability	mg/L	5	Cancer	

5.1.4 Disinfectants and their By-products

Table 4 - Disinfectants and their by-products

Parameter	Unit	Maximum Permitted Levels	Health Impact	Note
Free residual chlorine	mg/L	0.2 - 0.25	None	Note 2
Trihalomethanes Total	mg/L	0.001	Cancer	Note 2
2,4,6-trichlorophenol	mg/L	0.02	Cancer	Note 2

Note 2: For chlorinated water only

Drinking water providers shall increase the amount of residual chlorine during epidemics or special cases according to instructions of Ministry of Health.

5.1.5 Radioactive constituents

The presence of the following contaminants shall not exceed limits specified in Table 5.

Table 5 - Radioactive Limits

Parameter	Unit	Maximum Permitted Levels	Health Impact	Notes
Radionuclides	Bq/L	0.1	Cancer	

5.1.6 Microbiological Requirements

Table 6 - Microbiological Limits

Parameter	Unit	Maximum Permitted Levels	Health Impact	Notes
Total Coliform count	cfu/mL	10	Indication of faecal contamination	
Thermo tolerant Coliform or *E.coli*	cfu/100mL	0	Urinary track infections, bacteraemia, meningitis, diarrhea, (one of the main cause of morbidity and mortality among children), acute renal failure and haemolytic anaemia	
Faecal streptococcus	cfu/100mL	0	Indication of recent faecal contamination	
Clostridium perfringens spore	cfu/100mL	0	Index of intermittent faecal contamination	

5.2 Routine Monitoring

Inspectors in charge of Drinking Water Quality Surveillance shall conduct regular verification water quality tests and sanitary inspections to determine whether water utilities, community water committees, food processing industries, private or public establishment and private water system owners meet standard for drinking water quality.

5.2.1 Minimum Parameters for Monitoring

The following set of simple parameters indicators of quality of drinking water shall be controlled on regular basis:

Table 7 - Routine Monitoring Parameters

Parameters	**Notes**
Taste	
Odour	
Colour	
Turbidity	
pH	
Conductivity	
Iron	
Nitrates	
Aluminum	Note 1
Residual chlorine	Note 2
E. coli	Note 3
Fluoride	

Note 1: Parameters subject to monitoring water treated using aluminum compound

Note 2: Parameters subject to monitoring water treated using chlorine compound

Note 3: 95% compliance over a one-year period

5.2.2 Sampling Frequency

Inspectors in charge of Drinking Water Quality Surveillance shall conduct water quality tests and sanitary inspections according to the minimum frequency defined below:

(a) On-site drinking water systems shall be checked at least once every 3 years

Drinking Water Quality Surveillance agency shall increase the frequency of sampling for drinking water facilities meeting the following criteria:

- areas located in high risk for faecal contamination or chemical contamination
- highly populated areas,
- areas prone to floods.

(b) Centralized drinking water system

Table 8 - Schedule for Sampling Frequency for Centralized System

Population Served	Number of Monthly Samples	Remarks
<5000	1 per 2000 population	1 at the outlet of the treatment plant and the rest in the distribution system
5000-100,000	1 per 5000 population	1 at the outlet of the treatment plant and the rest in the distribution system
>100,000	1 per 10000 population, plus 10 additional samples	1 at the outlet of the treatment plant and the rest in the distribution system

5.2.3 Sanitary Inspections

Inspectors for Drinking Water Quality shall conduct sanitary inspection each time a water sample is collected in accordance with the procedures developed by the Federal Ministry of Health.

5.3 Sampling and Analytical Methods

Sampling and testing shall meet the following minimum requirements:

5.3.1 Point of compliance

Sample shall be taken from locations that are representative of the water source, treatment plant, storage facilities, and distribution network, points at which water is delivered to consumers.

(i) For centralized drinking water system, sample shall be taken in the distribution system

(ii) In case of water supplied from an on-site water system, sample shall be taken at the hand pump outlet or from the bucket used to fetch water; and in household water storage

(iii) In case of water supplied from a tanker, sample shall be taken at the point at which it emerges from the tankers,

(iv) In the case of water used in a food-production undertaking, sample shall be taken at the point where the water is used in the undertaking

5.3.2 Sampling Method

All precautions shall be taken to prevent contamination of the sample and to ensure the concentration of the substance being determined do not change between sampling and analysis.

Samples shall be collected by trained personnel (inspectors for drinking water quality surveillance).

Sampling methods shall comply with ISO or WHO guideline.

5.3.3 Analytical Method

Analytical methods shall comply with ISO or WHO guideline.

Field test kits may be used by the surveillance agency to conduct routine tests.

5.4 Laboratory Quality Assurance

Laboratories contracted by the Drinking Water Quality Surveillance agency to conduct water testing shall comply with NIS ISO 17025: 2005

5.5 Water Safety Plans

5.5.1 All water service providers (including State Water Agencies) and community water committees shall develop a Water Safety Plan that ensures the minimization of contamination of source waters, the reduction or removal of contamination through treatment processes and the prevention of contamination during storage, distribution and handling of drinking water.

5.5.2 If the system is unlikely to be capable of meeting the standards for drinking water quality, a programme of upgrading (which may include capital investment or training) shall be initiated to ensure that the drinking-water supply meets the targets.

5.5.3 State Ministry of Water Resources shall support water services providers (including State Water Agencies) in establishing and implementing Water Safety Plans.

5.5.4 Water Safety Plans shall be validated by the Drinking Water Quality Surveillance agency /department and enforced by inspector for Drinking Water Quality Surveillance.

5.5.5 For Community water committees managing on site drinking water facilities, the development of Water Safety Plans shall be done in collaboration with Local Government Authorities (LGAs) and committees shall conduct regular sanitary inspections of the water facilities.

5.6 Protection Zones

5.6.1 Water sources shall be protected from potential source of contamination.

5.6.2 For on-site drinking water system, a minimum distance of 15 meters shall be kept between the water system and potential source of contamination. Communities shall keep clean the protected area surrounding on-site drinking water systems

5.6.3 The Federal Ministry of Environment in consultation with the States shall declare special protection zones for Chemical Elements Sensitive Areas (such as Nitrates, heavy metals), wetlands based on such local peculiarities.

5.6.4 For mechanized centralized drinking water systems (high yield), broader protection zones shall be established and enforced by Ministry of Environment.

5.7 Construction Requirements and Best Practices

5.7.1 All drinking water systems shall comply with construction specifications as stipulated by Federal Ministry of Water Resources.

5.7.2 All materials and equipment in contact with drinking water shall comply with relevant Nigerian Industrial Standard (NIS) (such as casing, drilling additive, hand pumps, fitting, distribution pipe, and reservoir paint).

5.7.2 There shall be effective corrosion control of the materials constituting the treatment and supply systems, tanks, pipes, pumps and valves.

5.7.4 Water containers shall be stored away from poisonous materials and contamination sources.

6. Data Management (Information, Record Keeping and Reporting)

6.1 State water agencies shall compile and forward annual water quality reports to relevant Federal surveillance agency.

6.2 All drinking water quality test and sanitary inspections results conducted by the drinking water quality surveillance body shall be processed and forwarded to the data bank of the FMOH with the National Bureau of Statistics.

6.3 Drinking water quality surveillance body shall provide quarterly status report to the different stakeholders at a forum

6.4 Water quality results shall be accessible to the general public.

7. Cost of Drinking Water Quality Surveillance

The owner of the system shall pay the cost of testing new water sources. The normal budgetary provisions of the State and Federal Ministries of Health shall cover the cost of routine drinking water quality surveillance and research.

8. Criteria for Compliance and Enforcement

8.1 The drinking water quality surveillance body shall enforce Nigerian Standard for Drinking Water Quality.

8.2 In case of non-compliance, the drinking water quality surveillance body shall:

(i) inform the water utility not more than 7 days after the date the sample was collected and 3 days in case of disease outbreak.
(ii) recommend remedial measures and set dead line for the implementation of the measures.

8.3 The quality of all drinking water produced in Nigeria shall comply with provision of this standard; any offence shall be liable on conviction to both fine and imprisonment as stipulated in Standards Organisation of Nigeria (SON) Act- Retained as Cap 412.

Annex: 1 - The List of the members of the Technical Committee

S/No.	Names	Organization Represented
1	Mrs. V. N. Ogbechie (Chairman)	Federal Ministry of Health, Abuja
2	Mr. C. Ikelionwu	Federal Ministry of Water Resources, Abuja
3	Mr. E. O. Awe	Federal Ministry of Water Resources, Abuja
4	Mr. M. A. Adeyinka	Federal Ministry of Environment, Lagos
5	Mr. G. B. Jegede	Federal Ministry of Environment, Abuja
6	Mr. L. O. Njoku	Standards Organisation of Nigeria
7	Engr. M. H. Iliyas	UNICEF (Consultant)
8	Mr. D. A. Akoh	Institute of Public Analyst of Nigeria, Lagos
9	Mr. O. O. O. Oni	National Water Resources Institute, Kaduna
10	Mrs. M. Leo	Kaduna State Water Board, Kaduna
11	Mr. F. P. Atolagbe	Nigerian Association of Hydro Geologist
12	Dr. E. O. Longe	University of Lagos, Akoka, Lagos
13	Mr. A. Moses	Federal Ministry of Health-Public Health
14	Engr. Prof. J. C. Agunwamba	Nigeria Society of Engineers

S/No.	Names	Organization Represented
15	Mr. A. O. Babarinde	National Agency for food and Drug Administration and Control (NAFDAC)
16	Dr. O. J. Oluwatola	Consumer Protection Council (CPC)
17	Mr. M. Ocholi	Water Aid, Makurdi
18	Ms. J. Purdue	European Union
19	Mrs. V. Ezediaro	Institute of Chartered Chemist of Nigeria
20	Mrs. G. E. Eke	Institute of Chartered Chemist of Nigeria
21	Mr. Z. Ishaku	Plateau RUWASSA, Jos
22	Engr. S. Holloway	Lagos State Water Corporation
23	Engr. O. Adanyih	Benue RUWASSA, Makurdi
24	Dr. A. Ismail	Ahmadu Bello University, Zaria
25	Alh. A. Danjebu	State Ministry of Health, Bauchi
26	Dr. T. Oyelade	WHO
27	Mr. R. C. Okoro	ADB, Abuja
28	Mr. E. I. Oye	Ministry of Environment Rivers State
29	Dr. (Mrs.) S. Balogun	Lagos State Water Corporation
31	Mrs. E. I. Ofili (Tech. Secretary)	Standards Organisation of Nigeria

Annex 2 - Other Consultants and Peer Review Experts

S/No	Name of Expert	Position and Address	Role in the Preparation of Standard
1	Marie Claire Durand	International Consultant on WASH	UNICEF Consultant (International)
2	Prof. Philip Rushbrook	Visiting Professor, The University of Northampton, UK	International Peer Review expert
3	Dr. Oladepo Adenle	A Consultant / water resources specialist. Ibadan.	Local / National Peer Review Expert
4	Dr. Samuel E. Kakulu	Associate Professor, Department of Chemistry University of Abuja, Nigeria	Local / National Peer Review Expert

Annex 3 - Normative References/Laws

(i) Water Resources Act No 101 (1993)
(ii) Standards Organisation of Nigeria (SON) Act- Retained as Cap412
(iii) Public Health Act (1958)
(iv) Federal Environmental Protection Agency- Retained as Cap 131
(v) Federal Environmental Protection Agency (Amendment) Act (1992-No. 59)
(vi) Federal Environmental Protection Agency (Amendment) Act (1992-No. 14)
(vii) Environmental Health Officers (Registration etc) Act 11 (2002)
(viii) Food and Drugs (1999-No.19) Changed to NAFDAC Act 11
(ix) Food and Drug- Retained as Cap 150
(x) National Electric Power Authority Act-Currently retained as Cap 256
(xi) National Electric Power Authority (Amendment) Act
(xii) Land Use Act- Retained as Cap 202
(xiii) Land Use Act (Validation of Certain Edits)- Retained as Cap 203
(xiv) National Water Resources Institute Act- Retained as Cap 284
(xv) River Basin Development Authorities Act- Retained as Cap 396
(xvi) Navigable Waterways (Declaration) Act- Retained as Cap 287
(xvii) Factory Act (1959)
(xviii) Council Of Mining Engineers and Geoscientist Act No 40 (1990)
(xix) National Inland Waterways Authority
(xx) State Water Supply Edicts/Laws
(xxi) Local Government Water and Sanitation Byelaws
(xxii) National Water Supply and Sanitation Policy. Federal Ministry of Water Resources (2000)
(xxiii) International Organisation for Standardization (ISO) – Service activities relating to drinking water and wastewater – Guidelines for the management of drinking water utilities and for the assessment of drinking water services
(xxiv) World Health Organisation – Guideline for Drinking Water Quality, 3rd Edition, 2004
(xxv) Institute of Public Analyst of Nigeria Act No 100 (1992
(xxvi) Institute of Chartered Chemist of Nigeria Act No 91 (1993)
(xxvii) Council for Regulation of Engineering in Nigeria Act 55 (1972)
(xxviii) Council of Regulation of Engineering in Nigeria Act (Amendment) No 27 (1992)
(xxix) Consumer Protection Council Act 66 (1992)
(xxx) National Guidelines and Standards for Water Quality in Nigeria
(xxxi) Nigerian Industrial Standards for Potable Water and Natural Mineral Water (1992)

Annex 4 - Background of the Standard.

Initiation

The National Council of Water Resources, during its 16th annual meeting, directed, while deliberating on the results of the Rapid Drinking Water Quality Survey it conducts with the support of UNICEF and WHO, that a Nigerian Standard for Drinking Water Quality be produced through wide consultation with various stakeholders due to the following reasons:

- Lack of uniform drinking water quality standards (as it was observed that various stakeholders make use of three different standards and guidelines viz: Nigerian Industrial Standard for Potable Water; Drinking Water Standard/Guideline form Federal Ministry of Environment and WHO guideline for drinking water).
- Absence of nationally acceptable and enforceable regulations for safe drinking water.
- General poor state of drinking water quality in the country
- Weak and uncoordinated national water monitoring programme
- Inadequate water quality data and weak collaboration amongst the key Agencies.

Several meetings were held between the Federal Ministry of Water Resources, Federal Ministry of Health and UNICEF at the end of which UNICEF agreed to provide financial and technical support for the development of the Standard.

Core Group

A core group was formed to initiate the process and collect relevant references (which included normative references / laws, related past efforts to produce water standard). The core group met and selected a 26 member Technical Committee (TC) representing all the key stakeholders and some other professionals to draft the standard with the Secretariat in Standards Organisation of Nigeria while Federal Ministry of Health chairs the Technical Committee. UNICEF provided two short time consultants (one international and one local) to support the core group and the TC.

Technical Committee

The Honourable Minister of Health inaugurated The Technical Committee on July 17th 2006, and it proceeded immediately with a 2 days workshop to deliberate on the Standard. Another workshop held on August 1-2, 2006 culminated in the drafting of the first draft of the standard. Subsequently, the first draft standard was subjected to the following processes:

- Distribution to all the TC members and asking them to consult with their respective chief executive for final comments.
- Peer reviews by one international and two local experts.
- Deliberation at **national stakeholder workshop** on January 17 -18 2007 in Abuja which was attended by the Chief Executives of all the states and FCT water boards / corporation, all the Project Managers of states and FCT Rural Water Supply agencies, all the officers in charge of water quality in all the states Ministries of Health and all the TC members.
- The TC then held another workshop in Lagos on 14-15 February 2007 to consider all comments and suggestions made during the above exercises and prepared the final draft.

In all these processes, the Standard Organisation of Nigeria (SON) supported by the Federal Ministry of Health in provided the secretariat.

The final draft was submitted to SON Governing Council on April 16, 2007 and was accordingly approved.