Water Quality Management Program

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1.0 INTRODUCTION

This document outlines the standards for potable water quality, the actions required on non-conformance with regulatory compliance and a summary of recommendations to minimize risk of potable water contamination and referred to “OMS Group Element 3.4 - Health and Industrial Hygiene”.

In BP Az SPU facilities, potable water can either be provided

- In bottles from an approved bottled water supplier
- As above but via bottled water-dispensers
- Via a desalination and purification plant (e.g. on an offshore drilling platform)
- Water treatment system (e.g. site facilities along pipelines, offices, etc.)
- Through a reliable mains water supply

BP Az SPU has adopted the World Health Organization (WHO) and European Union (EU) Recommended Drinking Water Guidelines values as the basis for the drinking water standards. The drinking water standards are meant to ensure the safety of drinking water supplies through the elimination, or reduction to a minimum concentration, of those constituents of water that are known to be hazardous to health. It also sets standards for the aesthetic acceptability of drinking water by reducing or eliminating those water constituents which, although of no direct consequence to health at the concentrations at which they normally occur in water, may nevertheless be objectionable to consumers for various reasons.

This standard is designed to help you meet your responsibilities and understand the purpose of monitoring and control methods.

- Advice can also be sought through the Az SPU Health Team / Environmental Health Specialist.
- You can request water sampling any time you are in doubt as to the quality of drinking water – for advice contact Az SPU Health Team / Environmental Health Specialist.
- It is likely that there will be a water quality testing program in place, but if in doubt asks the Health Team / Environmental Health Specialist.
- Help with other aspects of water safety such as design of filtration or specific issues can also be sought from Health Team / Environmental Health Specialist.

More detailed information about drinking water can be found in the Guidelines for Drinking Water Quality published by the World Health Organisation (2004)

http://www.who.int/water_sanitation_health/dwq/gdwq3/en/

2.0 DEFINITIONS

Potable Water

Potable water or drinking water refers to water which is safe to consume. Potable water must meet the minimum standards in this document. Potable water must also be used in the preparation of food, teeth cleaning, hand-washing, dishwashing and showering. (Non-potable water may not be used for any of the above activities)

Non-Potable Water

This is water which is not fit for human consumption but can be used for industrial applications, irrigation or toilet flushing. Non-potable water is any water which does not meet drinking water standards due to pollution, lack of proper treatment, or exposure to environmental contamination or is simply not intended for drinking purposes.

Bacteria

These are one-celled living microorganisms, some of which can have adverse health effects. The presence of these can be identified in water. Control of microorganisms in potable water is the most important water quality protection that a water supplier can perform. Microbiological quality in drinking water distribution systems is measured by the presence or absence of various bacteria measured in terms of Total Viable Count (TVC) of general bacteria, Coliforms and Escherichia coli present in a sample. See Appendix B for more information on water testing.

Biofilm

A slime layer of bacteria and other microorganisms, which naturally develop when bacteria attach and grow on an internal surface of water mains. Once they are established they can be difficult to remove. Preventative measures to reduce the risk of growth are necessary to ensure that biofilms do not develop to the extent that this can have an adverse impact on health.

Coliform Bacteria

Coliforms are a type of bacteria, which occur widely in the environment including surface water, soil, and decaying organic matter. This group of bacteria includes the faecal coliform group, which grows in the intestines of warm-blooded animals. While this group of coliform bacteria are generally not harmful in themselves, they have long been used as an indication of water quality and should not be present in potable water. One of the members of the coliform group is Escherichia coli, the presence of which is used to indicate faecal contamination of the water.

Chemical Oxygen Demand (COD)

Chemical Oxygen Demand or COD is a measure of the oxygen required to oxidize all compositions, both organic and inorganic, in water and commonly used to indirectly measure

the amount of compounds. Most applications of COD determine the amount of organic pollutants found in water, making COD a useful measure of water quality. It is expressed in mg/l, which indicates the mass of oxygen consumed per litre of solution.

Chlorine

Chlorine is the most widely used drinking water disinfectant in the world. Adding a small amount of chlorine to drinking water destroys bacteria and other microorganisms. Chlorine is added to drinking water as either a gas or after having already been dissolved in water. Chlorine could be measured in the field using portable analytical instrumentation and should be at a minimum level of 0.2 parts per million (ppm or mg/l) at the point of use. When the level of chlorine at the point of consumption exceeds 0.5 parts per million, many people can smell or taste chlorine in the water.

Chloramine

Chloramine is a combination of chlorine and ammonia, is widely used as a drinking water disinfectant as an alternative to chlorine because it is longer lasting and has less of an odour than chlorine. Adding a small amount of chloramine to drinking water protects the water from bacteria and other microorganisms. In order to meet microbiological drinking water regulations, it is recommended to add at least 0.2 parts per million of chloramine where water enters the distribution system and be able to detect chloramine in 95 percent of the samples taken from the water distribution system.

Conductivity

Conductivity is a measure of the ability of water to conduct electric current and is directly related to the Total Dissolved Solids (ions) in water.

Corrosion

Corrosion occurs when metal is exposed to conditions, which cause the breakdown of the metal through an exchange of ions. In water systems, this term generally refers to the rusting of metallic pipelines. Over time, corrosion will weaken the structure of the metallic pipes, resulting in leaks or breaks. Corrosion also can build up on the inside surface of the pipes, reducing water flow and contributing to water taste, odour, colour problems and biofilm growth.

Distribution Systems

There are various methods of transporting water including groundwater from wells to homes and businesses through an interconnected grid of water mains, valves, storage reservoirs, and pressure boosting or reducing facilities. This is generally referred to as the water distribution system.

Hardness

Hardness measures the ease with which soap can be lathered. It is easier to produce a lather using soft water. Water hardness is generally divided into the following categories.

Soft	0 to 75 parts per million
Moderately Hard	75 to 150 parts per million
Hard	150 to 300 parts per million
Very Hard	more than 300 parts per million

The level of hardness can be in direct proportion to naturally occurring minerals such as calcium and over time is visible as a scale build e.g. on heating elements

Nitrates and Nitrites

Nitrates are compounds that can occur in both groundwater and surface water. Nitrates are used mainly in inorganic fertilizers or can originate from animal waste. Over time, rainfall can cause nitrates to percolate down through the ground and eventually reach the groundwater. The formation of nitrites is a consequence of microbiological activity on nitrates.

Parts per million (ppm)

Parts per million or ppm are the quantity of one substance contained in one million units of another substance and equivalent to milligram per litre (mg/l). This unit of measurement commonly used to express a contamination ratio, as in establishing the maximum permissible amount of a contaminant in water, land, air or other substances.

pH

pH is a measure of the activity of hydrogen ions (H+) in a solution and, therefore, it is an indicator of acidity or alkalinity and is measured on a scale of 0 to 14. When the pH is below 7, the solution is acidic, and when it is above 7, the solution is alkaline and a pH of 7 is neutral. PH values are calculated in powers of 10. The acidity of a solution with a pH of 1.0 is 10 times greater than a solution with a pH of 2.0.

Total Dissolved Solids (TDS)

The Total Dissolved Solids or TDS is a measure of all the solids dissolved in the water. TDS is an indicator of the mineral content of the water and can include calcium, magnesium, potassium, sodium, chlorides, sulphates, carbonates and bicarbonates. The higher the TDS the harder it is for the chlorine to carry out its work.

Trihalomethanes (THMs)

Trihalomethanes or THMs are several synthetic organic compounds formed when chlorine or bromine combine with organic materials in water. Trihalomethanes are produced when water is disinfected with chlorine and the chlorine reacts with naturally occurring organic matter found in all waters. Dependant on geography, various levels of natural organic matter will emanate into a water distribution system.

Turbidity

Turbidity is a measure of the cloudiness of water, including clay, silt, organic and inorganic

matter, algae, and microorganisms. High turbidity can cause disinfectants to become ineffective.

3.0 SCOPE

This standard is aimed at both onshore and offshore installations including:

- Offshore drilling platforms and supply vessels
- Terminals and pump stations
- Catering facilities
- Offices
- Camps and guesthouses
- BP provided accommodations

This standard related to water used for the following purposes:

- Potable water used for cooking and food preparation
- Potable drinking water
- Water used for cleaning and dishwashing in food preparation areas
- Water used for personal washing and showering

The standards provided in this document are based on information available from sources such as the World Health Organisation and EU Drinking Water Guidelines (see references) and are not intended to replace or duplicate such guidelines rather to summarise and present an example of best practice.

4.0 RESPONSIBILITIES

4.1 Health Manager or Designee

It is the responsibility of Az SPU to ensure that potable water supplies do not pose any health hazard to employees by:

- Ensuring policies and procedures are in place to prevent contamination of drinking-water supplies.
- Ensuring procedures are in place for the proper treatment and distribution of drinking water.
- Regularly monitoring drinking-water qualities of health and aesthetic significance following prescribed monitoring methods and schedule as stipulated in this standard.
- Investigating and taking remedial actions when any of the parameters are exceeded.
- Reviewing the parameters for testing water and the frequency of testing to ensure it is relevant to the needs of the business in controlling the risk and providing suitable surveillance.

4.2 Site Management

Site / Unit Management shall be responsible for:

- Ensuring that adequate provisions are made for the supply of potable and non-potable water.
- Ensuring that a suitable and sufficient water quality risk assessment has been carried out with regard to the hazard from contamination (including risk from E. coli, Legionella, chemical factors, etc.).
- Appoint a person from within their organisation to be responsible for maintenance of water treatment plant, non-potable water distribution and potable water supply systems and logs.
- Ensuring that water testing program has been carried out in line with this Program and complied with the results of water quality risk assessment.
- Notify central HSE of potable and non-potable water sources and storage facilities (capacity, material etc.), extraction and treatment methods.
- Ensuring that non-potable water supplies are clearly labeled as not suitable for drinking.
- Ensuring that workers are educated on water disinfection as appropriate (boiling, chemicals, etc.)
- Ensuring an adequate supply of bottled / potable water is available at sites where the site fixed supply is of non-potable quality only.
- Notifying any changes in water supply such as in-line filters being installed.

4.3 Supply Chain Management

- Ensuring that all contracts clearly state areas of responsibility for the supply of bunkered, tankered or bottled water and that all such provisions comply with this guide and any legislative requirements.
- Arrangement of audits of potable and non-potable water production and management arrangements.

4.4 Supply Service Providers

Supply Service Providers shall be responsible for:

- Compliance with contractual conditions.
- Ensuring that suitable procedures are in place for the provision potable water delivery to BP Az SPU installations whenever this service is provided.

4.5 Environmental Health Specialist, AzSPU

Environmental Health Specialist shall be responsible for:

- Carry out or where it is appropriate support Operations Health Advisor in suitable and sufficient water quality risk assessment with regard to the risk from contamination (including risk from E. coli, Legionella, chemical factors, etc.).
- Identify, assess and select water-testing laboratories. Ensuring that water-testing laboratories' quality control and quality assurance systems are complied with international and company requirements.
- Ensuring routine monitoring of water quality in the facilities under responsibility of Health Team is undertaken in line with legislative and company requirements.
- Collating and reviewing all potable and non-potable water examination results.
- Providing advice and assistance as and when water fails to meet required standard.
- Providing information and advice on new / forthcoming legislation or measures to improve water quality.
- Review and maintain this Program.
- Ensuring lessons learned and best practices are communicated between operational sites.
- Review and audit potable water supplies to ensure acceptable standards are being applied.

4.6 Health Advisors, Operations

Operations Health Advisors shall be responsible for:

- Carry out suitable and sufficient water quality risk assessment with regard to the risk from contamination (including risk from E. coli, Legionella, chemical factors, etc.).
- Ensuring Operations routine monitoring of water quality is undertaken in line with legislative and company requirements through determination of sampling points and frequency for different water tests.
- Review water testing results and communicate recommendations as appropriate.
- Track water quality improvement actions.
- Report imminent risk associated with water quality to site management and recommend solutions.
- Ensuring lessons learned and best practices are communicated to operational sites.
- Co-ordinate Operations water quality management with Environmental Health Specialist.

5.0 QUALITY CRITERIA

Water can transmit infectious diseases as well as chemical contamination. The major infectious diseases in this category include: Hepatitis A, Polio, Cholera, Typhoid, Amoebiasis, Giardiasis, Cryptosporidiosis and Legionellosis. Water borne infectious diseases are mostly due to the fecal contamination of drinking water due to the following factors: poor sanitation and lack of sewage systems; lack of running water and water distribution system malfunction; improper or inadequate water treatment systems; poor hygiene practices. This contamination can be indicated by the presence of Coliforms or such bacteria as Escherichia coli.

Sometimes chemical (e.g. heavy metals, pesticides, fertilizers, hydrocarbons, etc.) or radioactive contamination of water can be responsible for adverse health effects. This may be more likely if there are current or past industrial processes near the water source.

Therefore, the objective of any water quality monitoring and management program is to ensure that water is potable i.e. water is safe for human consumption, contact with the skin or to prevent any possible adverse health effects as a result of the inhalation of associated aerosols.

The standards adopted for potable water (Drinking Water Standards) are laid down by the World Health Organisation and EU Council Directive 98/83/EC (see section 7).

Water supplies shall be tested for potability only by a competent / trained person at intervals outlined further below in this document. All results from potable water tests are notified in accordance with the procedures laid down in this standard.

As an additional means of confirming the efficacy of precautionary measures taken against contamination of water systems with the Legionella bacterium, hot water systems shall be sampled on an annual basis.

Procedures for the collection of water samples are set out in Appendix A.

5.1 Bacteriological Quality

Analysis should be carried out by an independent and preferably externally certificated laboratory.

Bacteriological samples shall initially be taken monthly from drinking water supplies. This may be changed to quarterly for drinking water supplies if six successive samples are satisfactory unless otherwise agreed (e.g. frequency of bacteriological tests can be modified as per risk assessment outcomes).

If bottled water is used for drinking or food preparation it is important to ensure that the supplier produces all relevant and valid national / international quality certificates and licenses before signing the contract. It is further recommended to subject this water to bacteriological testing by an independent laboratory for quality assurance at least twice a year. Note, that all such samples shall bear no labels; shall be assigned special codes and properly registered before they are sent to the testing laboratories (see Appendix A).

Unsatisfactory laboratory results shall be notified as soon as reasonable possible to the Environmental Health Specialist immediately. The Environmental Health Specialist will then advise on suitable remedial action to ensure potable water is available.

For more information on bacteriological parameters please see Appendix B.

Table 1

The following is given as general guidance only and more detailed advice will be given by the Environmental Health Specialist on receipt of any unsatisfactory results.

Standard	Maximum	Action on Criteria Exceeded
Total Viable Count (Bacterial) TVC at 22ºC TVC at 37ºC	 100 counts per ml 10 counts per ml	1. Repeat sample(s) 2. Check residual Cl / ClO_2 at point of use (min 0.2 ppm) 3. Further failure - increase Cl / ClO_2 to 0.5 ppm and maintain until satisfactory results are obtained. 4. If improvements are not evident, seek advice from Environmental Health Specialist.
E. coli / Total Coliforms	0 per 100 ml	1. Do not drink or use with ready-to-eat foods (i.e. use boiled / bottled water. Water can be used for cooking providing the temperature of the water exceeds 75°C during the cooking process). 2. Super-chlorination of whole system including hoses ASAP as per UKOOA EH Guidelines (see Appendix C). 3. Repeat sampling until satisfactory results are obtained. 4. If improvements are not evident, seek advice from Environmental Health Specialist.

Action levels following Legionella monitoring

Aerobic Count cfu/ml at 30°C (minimum 48 hours incubation)	Legionella bacteria cfu/l	Action Required
10 000 or less	100 or less	**System under control**
More than 10 000 and up to 100 000	More than 100 and up to 1000	**Review programme operation** – A review of the control measures and risk assessment should be carried out to identify any remedial actions and the count should be confirmed by immediate re-sampling.
More than 100 000	More than 1000	**Implement corrective action** – The system should immediately be re-sampled. It should then be 'shot dosed' with an appropriate biocide, as a precaution. The risk assessment and control measures should be reviewed to identify remedial actions.

(Source: Legionnaires disease: The control of legionella bacteria in water systems. Approved Code of Practice and Guidance. Health and Safety Executive, L8, 2000. HSE Books, ISBN 0 7176 1772 6)

5.2 Chemical Quality

Routine chemical examination shall be carried out by an independent and preferably externally certificated laboratory. Chemical and physical parameters shall be determined and compared to the water quality standards defined within this document.

Where any of the maximum acceptable levels are exceeded then advice will be given to the user of this document by the designated member of the Health Team (Environmental Health Specialist) on the suitability of the water for use or consumption and any remedial action required. All water sources shall be subjected to a chemical analysis before use and annually thereafter.

The full analysis below (see Table 2) shall be carried out for the first test on a new water source. Thereafter the list of parameters shall be carried out on all samples at the frequencies outlined further below in this document.

Chemical samples shall initially be taken quarterly from drinking water supplies. This may be changed to 2 samples per year for drinking waters if six successive samples are satisfactory. However, at times of high rainfall or other exceptional circumstances this policy may change by notification from the Environmental Health Specialist. Frequency and scope of chemical tests can be modified as per risk assessment outcomes.

It is advised that if bottled water is used for drinking / food preparation, ensure that the supplier produces all relevant and valid national / international quality certificates and licences before signing any contract. It is also recommended to subject this water to chemical analysis once before use and thereafter.

Table 2

Standard (Quarterly Test)	Provisional/Current Guidance Value	Significant Medical Risk (Limit of Acceptability**)
pH	5.5 – 9.5	-
Colour	< 20 mg/l (Pt/Co Scale)	-
Odour	3 dilution no at 25ºC	
Conductivity	< 1500 µS/cm	N/A
Turbidity	< 5.0 FTU	-
Total Alkalinity*	-	-
Total Hardness*	-	-
Chlorine (residual)	< 0.5 mg/l	
Chloride (Cl-)	< 250.0 mg/l	500.0 mg/l
Nitrate (NO_3)	< 50.0 mg/l	100.0 mg/l
Nitrite (NO_2)	< 0.5 mg/l	3.0 mg/l
Sulphate (SO_4) and	< 250.0 mg/l	400 mg/l
Ammonium (NH_3 and NH_4)	< 0.5 mg/l	

Chemical Oxygen Demand (COD)	< 5.0 mg/l	N/A
Copper (Cu)	< 2.0 mg/l	
Magnesium (Mg)	< 50 mg/l	700 mg/l
Iron (Fe)	< 0.2 mg/l	4.0 g/l
Manganese (Mn)	< 0.05 mg/l	2.0 mg/l
Calcium (Ca)	< 100 mg/l	500 mg/l
Lead (Pb)	< 0.01 mg/l	
Sodium or Natrium (Na)	< 200 mg/l	
Zinc (Zn)	< 3.0 mg/l	
Organo-chlorine pesticides	< 0.5 μg/l total < 0.1 μg/l individual	
Organo-phosphorus pesticides	<0.5 μg/l total < 0.1 μg/l individual	
Hydrocarbons; mineral oil	< 0.3 mg/l	
Triazine herbicides	< 0.1 μg/l individual and total	
Total Dissolved Solids	< 1000.0 mg/l	
Cyanide (CN)	< 0.05 mg/l	
Fluorides (F)	< 1.5 mg/l	
Aluminium (Al)	< 0.2 mg/l	
Arsenic (As)	< 0.01 mg/l	
Barium (Ba)	< 0.3 mg/l	
Cadmium (Cd)	< 0.003 mg/l	
Chromium (Cr)	< 0.05 mg/l	
Mercury (Hg)	< 0.001 mg/l	
Potassium (K)	< 12.0 mg/l	
Selenium (Se)	< 0.01 mg/l	
Silver (Ag)	< 0.01 mg/l	
Nickel (Ni)	< 0.02 mg/l	
Boron (B)	< 0.3 mg/l	
Bromate (Br)	< 0.01 mg/l	
Trihalomethanes	< 0.1 mg/l	
Trichloroethene	< 0.01 mg/l	
Tetrachloroethene	< 0.01 mg/l	
Acrylamide	< 0.0001 mg/l	

* For water that has been softened or desalinated
** The upper notification value should be regarded as an intervention value.

Where no WHO Guideline exists the European Union maximum admissible concentration has been used.

Incidents resulting from accidental contamination of potable water (e.g. hydrocarbon tainting) should be immediately reported to Health Team / Environmental Health Specialist so that a coordinated response can be initiated. This will include arranging for appropriate water analysis and treatment advice to remove contaminant.

5.3 Legionella Prevention

Legionella pneumophila is the bacteria that can cause the condition Legionellosis or Legionnaires' Disease, a severe form of pneumonia. Infection is attributed to inhaling aerosols of Legionella contaminated water. Infection by drinking or person-to-person spread has not been documented. Risks of developing the disease are believed to be low due to the many vagaries of the organism, its need for aerosols, suitable infective doses and susceptible individuals (smokers, the old and those in poor health).

Legionella organisms can colonise non-potable hot and cold water systems, particularly humidifiers, calorifiers and shower heads where they can multiply under certain conditions (e.g. temperatures between 20 - 40°C, stagnant water and presence of biofilm / scale).

A risk assessment should be carried out by a suitably trained persons and appropriate controls implemented to prevent any harm to health. Legionella tests should be carried out by an independent and preferably externally certificated laboratory. For detailed guidance, on how to assess the risks and on control options which are available, see references 7.0.

Briefly, to reduce the risk of Legionellosis, the main objective is to design, maintain and operate water services under controlled conditions, which prevent or minimise the proliferation of Legionella:

Design

- Protect systems against external contamination
- Avoid water stagnation by careful sizing of system capacity
- Eliminate 'dead legs' (static sections of a water distribution system)
- Provide efficient heating for hot water systems & adequate insulation for all pipes/fittings
- Tanks, calorifiers etc. should be readily accessible for cleaning and disinfection

Operation

- Establish effective control levels for temperature, biocide etc.
- Ensure delivery of effective control levels by measurement
- Maintain records of the procedures / precautions

Maintenance

- Potable water system components require regular and routine cleaning, disinfection and maintenance
- Examples of a suitable proactive cleaning, disinfection and maintenance programs strategy are outlined in Table 3.
- Annual screening for Legionella to confirm efficiency of controls

See also: "Az SPU Legionella Control Management Program"
http://www.hse.gov.uk/lau/lacs/46-2.htm

6.0 WATER QUALITY MANAGEMENT

Although the quality of generated (i.e. from reverse osmosis or distillation plant) or bunkered water may generally be considered high it is unlikely to be entirely free of suspended solids and micro-organisms and, as a result, storage and distribution systems are ultimately affected by the accumulation of sediments and deleterious biofilms. When conditions are favourable, harmful organisms that have colonised the system will multiply and seriously contaminated water may be released to the workplace.

6.1 Maintenance and Monitoring

An appropriate planned preventive maintenance (PPM) regime is essential in preventing any deterioration in water quality. Table 3 summarises the main contamination areas and the basic steps to be taken to avoid or minimise bacteriological proliferation.

To ensure that a suitable system of preventative maintenance is put in place, management shall identify a person from within their organisation to be responsible for producing and co-ordinating a Potable Water System Maintenance Log. In addition to the information given in Table 3 more detailed information may be required in the log depending on the type and complexity of the system.

For most of our systems a relatively simple record should suffice which should include:

- Identification of those responsible
- System operating procedures and schematic/plan
- Legionella risk assessment
- Preventative maintenance & monitoring procedure (Including testing schedule and record keeping)
- Log of monitoring data (see Table 3 - Planned Preventative Maintenance Program).

Such a log should be regularly reviewed and updated as necessary to reflect changes and a means of verification put in place that all planned preventative measures are being fully and effectively implemented.

Table 3 - Planned Preventative Maintenance Programme

Contamination Source	Action	Frequency	Monitor / Log
Bunkered / tankered supply (supply route source)	Flush loading line	Each bunkering	Visual check
			Test water every 6 months for: appearance, taste, pH, odour, conductivity and residual chlorine.
Desalination / water purification systems (low temp / filters etc.)	As per manufacturer's advice	As per manufacturer's maintenance schedule	Compliance with manufacturer's maintenance schedule.
			Test water every 6 months

			for: appearance, taste, pH odour, conductivity, residual chlorine.
Bunkering hose (lining / stagnant water)	Ensure only designated food grade hoses are used	Continuous	Visual checks to ensure correct hoses are used.
	Cap and stow empty hose in designated area.	After every use	Visual checks to ensure hoses are capped and stowed in designated area.
	Super-chlorination of hoses as per UKOOA EH Guidelines (see Appendix).	Every 3 months	Review maintenance log.
Supplies from Wells	Keep area around well clean. Cut back vegetation. Exclude animals and non essential personnel Check water run off is away from well Keep well cover shut	Daily Weekly At all times Monthly At all time, except when maintaining equipment.	Sampling (high bacteria counts - if surface water has entered the well). Visual check Visual check Visual check Visual check Visual check
Public supplies: Contamination of water in storage tanks	See below	See below	See below
Public supplies: Contaminated at point of supply, storage tanks, vessels (coatings / bio-	Treat incoming water with Sodium Hypochlorite or Chlorine dioxide (min. 0.2 ppm)	Continuously	Check chlorine or equivalent residual at least weekly.
	Use bottled water for drinking and food preparation	Until water meets minimum microbiological standards	Sampling (high bacteria counts - if the public treatment system has failed or from contamination during distribution).
	Treat incoming water with Sodium Hypochlorite or Chlorine dioxide (min. 0.2 ppm)	Continuously	Check chlorine or equivalent residual at least weekly
			Visual inspection of coating

fouling)	Visual inspection	Annual	condition, sediment and presence of biofilm build-up Maintain records of checks and any action taken. Entry permission is required.
	Entry inspection: repair, recoat, clean, disinfect as required and then follow super-chlorination.	5 yearly	Visual inspection of structure, corrosion and condition of coating. Maintain a record of checks and any action taken.
Calorifiers / Hot Water Heaters / Storage Tanks (stratification / sludge)	T°C check (> 60°C)	Monthly	Temperature log.
	Blow down where specified by manufacturer	As per manufacturer instruction	Review maintenance log.
On-line treatment (reduced efficiency)	Auto-chlorination	Weekly	Residual chlorine (0.2 ppm)
	UV-units checks and maintenance	As per manufacturer instructions	Trip / alarm device.
Filters / Ion Exchange Resins / Humidifiers / Boilers (scale build up / bio-fouling)	Inspect, clean, change, back-flush, etc.	As advised by manufacturer	Maintain a record of checks and any action taken.
Pipe work / Dead legs / Outlets (scale / bio-fouling)	Water quality monitoring	Quarterly sampling	Review lab results
	De-scale and disinfect shower heads	Monthly	Maintain a record of checks and any action taken.
	Temperature check	Monthly	Maintain a record of checks and any action taken. Hot (furthest from calorifier) minimum temperature of >60°C after 1 min that taps has been running. Cold (furthest from tanks) <20°C.

7.0 REFERENCES

- World Health Organisation International Standards Guidelines for Drinking Water 3rd Edition 2004
- EU Legislation – Council Directive 98/83/EC on the quality of water intended for human consumption.
- OMS Group Element 3.4 – Health and Industrial Hygiene.

- Occupational Safety and Health Administration (OSHA) – Sanitation Standard 1910.141 (a), (b).
- Guidelines for Environmental Health for Offshore Installations (UKOOA), January 1996 (under revision).
- The Control of Legionella Bacteria in Water Systems – Approved Code of Practice and Guidance, HSE 2000.
- The Control of Legionella in hot and cold water systems, HSE MISC150, 1998.
- "BP Az SPU Legionella Control Management Program"
- Guidance on the design, supply, storage, treatment, distribution and BP Group Engineering Recommended Practice RP 60 - 5 'Potable Water Systems'.

Revision/Review Log

Revision Date	Approval Authority	Custodian	Revision Details
01/04/2005	AzSPU HSSE VP	AzSPU Health Manager	Initial issue
01/11/2007	AzSPU Health Manager Almaz Agazade	Occupational Health and Food Safety Advisor Eldar Yarmamedov	Periodic review
20/05/2009	AzSPU Health Manager Almaz Agazade	Food Safety and Hygiene Advisor Eldar Yarmamedov	Changed Action levels following Legionella monitoring in section 5.1. Added new Table 1 B.
20/06/2010	AzSPU Health Manager Almaz Agazade	AzSPU Environmental Health Specialist Eldar Yarmamedov	See below

Front Page: Custodian title; Revision date and Next revision date are changed.

1.0 Introduction: Added reference to OMS Group Element 3.4 – Health and Industrial Hygiene.
PU Health Advisors changed to Operations Health Advisoers

4.5 Responsibilities: Central Health Department changed to Health Team.
PU Health Advisors changed to Operations Health Advisors.
4.6 Responsibilities: PU Health Advisors changed to Operations Health Advisors.

PU changed to Operations.

7.0 References: Added reference to OMS Group Element 3.4 – Health and Industrial Hygiene