



CONSUMER CONFIDENCE REPORT 2013

NSA II BAHRAIN

EXECUTIVE SUMMARY

This Consumer Confidence Report (CCR) for 2013 confirms water from NSAII Bahrain during the year 2013 has been considered Fit for Human Consumption for external contact purposes such as showering and hand washing only. The source of water at NSA II Bahrain is the Host Nation municipal water system. Despite presumption that the water in the Host Nation system has been treated and is potable, the water in them is by military doctrine considered nonpotable until approved for use. The Host Nation water may be contaminated after it has been treated through broken water lines or cross-connections in the storage and distribution systems that are not readily visible. Water received at NSA II from the Host Nation is further treated via a Reverse Osmosis (RO) Water Treatment process. NSA II RO product was in full compliance with Bahrain Final governing Standards water quality standards over the course of 2013. However, as a conservative measure, since the RO treatment facility was still in a start-up and testing phase, the product water has been approved for external uses only.

Annual Declaration

Product water of NSAII Bahrain Reverse Osmosis water treatment plant has been declared Fit for Human Consumption for external purposes such as hand washing and showering only.

NSA II BAHRAIN

DRINKING WATER CONSUMER CONFIDENCE REPORT 2013



Background

Every calendar year Naval Support Activity (NSA) Bahrain issues CONSUMER CONFIDENCE REPORT (CCR) to its consumers detailing the quality of drinking water that it supplies. The source of water at NSA II Bahrain is the Host Nation municipal water system. Despite the ease of access and presumption that the water in the Host Nation system has been treated and is potable, the water in them is by military doctrine considered nonpotable until approved for use. The Host Nation water may be contaminated after it has been treated through broken water lines or cross-connections in the storage and distribution systems that are not readily visible. Water received at NSA II from the Host Nation is further treated via a Reverse Osmosis (RO) Water Treatment process. NSA II RO product was in full compliance with Bahrain Final governing Standards water quality standards over the course of 2013. However, as a conservative measure, since the RO treatment facility was still in a start-up and testing phase, the product water has been determined to be fit for hand washing and showering uses only.

Location	Compliance status
NSA II	Fit for hand washing and showering uses only

Mandatory Information

- a) Applicable Water Quality Standards - Final Governing Standards (FGS);
- b) Water quality Table

NSA II water is compared with the DOD’s Final Governing Standards (FGS for Bahrain. The FGS is a compendium of the stricter of the U.S. Environmental Protection Agency (EPA) and Kingdom of Bahrain. FGS prescribes regulations that limit the amount of certain contaminants in water provided by our water systems. Tests results of the drinking water samples show that chemical parameters analyzed are below the maximum allowed contaminant levels (MCLs). A detailed list of constituents found in our drinking water is included in this report, along with a comparison to the MCLs.

GENERAL INFORMATION

NSA II, also referred to as “Mina Salman,” is a newly developed 70 acre port facility on the water front to support US and coalition ships and personnel. The NSA II Bahrain is located southeast of NSA I Bahrain.

a. Source of NSA-II water

The City water distribution system provides the water source for NSA II. This water comes from the ocean and is treated at the Al Hidd Water Plant, a multi-stage flash distillation plant. Distillation of ocean water for human consumption is a common practice worldwide.

Source water for the RO facility is stored in two cylindrical horizontal fiber reinforced plastic (FRP) tanks, 23 cubic meter capacity each, located in an underground concrete vault. The source water is transferred from the underground tanks by two 10 hp pumps to an aboveground storage tank with four compartments, two for the source water, and each with a capacity of 570 cubic meters (198,200 gallons).

Finished water is stored in the other two compartments, also with a capacity of 570 cubic meters (198,200) each Two 10 hp finished water recirculation pumps are located in the pump building. The recirculation system is equipped with a sodium hypochlorite treatment system to boost chlorine. The NSA II total available storage including source water and finished water storage is 2,326 m³ (612,000 gallons).



Aboveground Source/Finished Water Tank at NSA II Facility

b. About Treatment Process

The source water from two of the compartments of the above ground storage tank is treated by a single RO treatment skid located in the water treatment building. The pre-treatment system consists of a multimedia filter followed by a 5 µm cartridge filter. The filtered water is pumped into the RO brackish water treatment system with a high pressure pump. The RO skid is a single train consisting of two stages. Treatment chemicals include sodium hypochlorite for pre-chlorination (before multimedia filter), sodium metabisulfite to remove chlorine, antiscalant to control membrane fouling, sulfuric acid (before RO), and sodium hydroxide for pH adjustment. Chemical treatment is provided at the RO skid and chemicals are stored in the water treatment building chemical storage room. RO plant reject water and multimedia filter backwash water discharges to the City wastewater collection and treatment system.

The NSA II water distribution pumps are located in a separate pump building. There are five centrifugal variable speed pumps, two 15 hp and three 40 hp, that distribute finished water from the storage facility to the distribution system in the NSA II facilities.

NSA II supplies clean and safe non-potable water to the consumers at the NSA II Base. The RO plants at NSA II are operated by Public Works Department (PWD) contractor G4S.



NSA II RO plant



Treatment Chemicals at NSA II RO plant

The Naval Facilities Engineering Command conducted a comprehensive sanitary survey of the NSA Bahrain drinking water system in September 2013. This survey, which will be updated in August 2016, provided an evaluation of the adequacy of the drinking water source, facilities, equipment, operation and maintenance for producing and distributing water.

Currently NSA II water is fit for hand washing and showering only. Consumers at NSA II purchase bottled water from local water bottling companies that have been certified by the US Army Veterinarian to meet US guidelines.

Nature of Pollutants and their possible sources

Water should be adequately treated to remove harmful chemicals, heavy metals and pathogenic bacteria. These contaminants when present at or above acceptance levels may be harmful to humans. Additionally, water may contain certain additives and essential mineral which are added during treatment to provide taste, growth and development of the human body

Bahrain's water source is distilled; however, distillation is not 100% effective in removing all contaminants because:

- 1) Droplets of un-vaporized liquid can be carried with the steam prior to distillation, and
- 2) Some contaminants have boiling points similar to water and will be vaporized and condensed with the distilled water. Due to this, some substances may be present in source drinking water, such as:

Nature of contaminant	Sources
Microbial contaminants	Bacteria, viruses, parasite and other microorganisms are at times found in water causing illness These illnesses are caused by bacteria, viruses and protozoa that make their way into the water supply. However, even well operated water utilities cannot ensure drinking water is entirely free of microbial pathogens. Runoff, or water flowing over the land surface, may pick up these pollutants from wildlife and soils. This often occurs after flooding. Some of these organisms can cause a variety of illnesses. Symptoms include nausea and diarrhea. These can occur shortly after drinking contaminated water. The effects could be short term yet severe or might recur frequently or develop slowly over a long time
Inorganic contaminants	naturally occurring such as salts and metals, which can be naturally occurring or result from urban storm water runoff, industrial, or domestic wastewater discharges, oil and gas production, mining, or farming;
Pesticides and Herbicides	Fertilizers and pesticides are regularly used to promote growth and reduce insect damage. The chemicals in these products may end up in ground water. Many fertilizers contain forms of nitrogen that can break down into harmful nitrates. Some underground agricultural drainage systems collect fertilizers and pesticides. This polluted water can pose problems to ground water and local streams and rivers. In addition, chemicals used to treat buildings and homes for termites or other pests may pose a threat
Organic chemical contaminants	Most of these contaminants are from industrial, chemical, petroleum and waste generating facilities. The chemicals compounds may be low boiling Organic chemical, high boiling point organic, cosmetic industry by-products
Radioactive contaminants	Certain radionuclide (example Barium and Strontium) are naturally occurring and form a part of the earth crust. Others radionuclide may be present as contaminants due to their use as tracers in the oil fields

Treated water supplied by city of Manama to NSA II through their distribution network is treated, dosed with disinfectants and processed at NSA II Bahrain facility to eliminate harmful pollutants using Reverse Osmosis (RO) units.

The presence of the above contaminants does not necessarily indicate that water poses a health risk. In order to ensure that tap water is safe to drink, regulations limit the amount of certain contaminants in water provided by public water systems. You can learn more about contaminants and any potential health effects by visiting the EPA's Drinking Water Standards web site:

<http://permanent.access.gpo.gov/lps21800/www.epa.gov/safewater/standards.html> or by calling their Safe Drinking Water Hotline: 1-800-426-4791.

1. MANDATORY INFORMATION

a. Applicable Water Quality Standards.

Drinking water is deemed to be Fit for human consumption if the levels of pollutants are below the **Maximum Contaminant Levels (MCL)**. Drinking water systems distributed on the base must meet the requirement of the **Final Governing Standards (FGS)**. FGS documents are developed after a comprehensive review and comparison of U.S. EPA's Safe Drinking Water Act (SDWA) and Kingdom of Bahrain drinking water standards. When Bahraini and U.S. standards differ, the *most protective* requirement is adopted and incorporated into the FGS.

NSA II Bahrain's water is monitored frequently for various parameters by an independent laboratory to ensure consumer's health and safety. Regular sampling is conducted to detect:

- Bacteriological
- Inorganic and Organic Compounds
- Pesticides and PCBs
- Total Trihalomethanes (disinfection by-products)
- Radionuclide

Some people must use special precautions – There are people who may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons, such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the EPA's Safe Drinking Water Hotline: 800-426-4791.

This report is produced in accordance with the requirements of COMNAVREGEURINST 11330.1, Drinking Water Management, CNIC Instructions, OPNAV Instructions 5090.1D.

b. Water Quality Data Table

The table below lists water contaminants and relevant data collected during 2013 sampling. The presence of contaminants in the water does not necessarily indicate that the water poses a health risk. All substances detected in NSA II Bahrain's drinking water are below allowed Maximum Contaminant Levels (MCL) and are in full compliance with Bahrain FGS requirements.

Water produced at NSA II Bahrain after the RO process is tested daily for pH, chlorine, conductivity and total dissolved solids (TDS) and turbidity. During the year 2013 samples of water were tested quarterly for

physical, inorganic and organic chemicals. Additionally, numerous samples were analyzed semi-annually for lead and copper. Water samples from taps collected at NSAII Bahrain were analyzed monthly for Coliform Bacteria.

NSA II Bahrain Water Treatment Facility				
Contaminant	Unit	MCLG From FGS	Annual Average Results (2013)	Possible Source
Copper	mg/L	1.3	0.013	Corrosion or erosion of copper plumbing, faucets, taps and natural deposits

Contaminants and their Possible Sources

In the table below various contaminants and their possible sources are identified. These components are health hazards when they exceed certain levels.

Contaminant	Possible Sources
Inorganic contaminants	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits Infiltration through soil, sediment and rock that form earth crust. Water travelling over the earth surface dissolves salts and minerals. Direct flow through improperly built wells that become conduits for contamination. Cross contamination below the ground surface from other aquifers through the casings of improperly built wells.
Organic contaminants	Most of these contaminants are from industrial, chemical, petroleum and waste generating facilities. The chemicals compounds may be low boiling Organic chemical, high boiling point organic, cosmetic industry by -products
Pesticides and herbicides	Pesticides are carried in rainwater runoff from farm fields, suburban lawns, or roadside embankments into the nearest creeks and streams. Occasionally they are even intentionally sprayed into waterways as part of a pest-control effort also enter environment as herbicides, insecticides, fungicides, rodenticides, and algicides.
Volatile organic compounds	Enter environment when used to make plastics, dyes, rubbers, polishes, solvents, crude oil, insecticides, inks, varnishes, paints, disinfectants, gasoline products, pharmaceuticals, preservatives, spot removers, paint removers, degreasers, and many more.
Microbial contaminants	Even though most viruses and bacteria are extremely sensitive to temperature and pressure, there are a few that are immune. Occur naturally in the environment from soils and plants and in the intestines of humans and other warm-blooded animals.
Radionuclide	Certain radionuclide (example Barium and Strontium) are naturally occurring and form a part of the earth crust. Others radionuclide may be present as contaminants due to their use as tracers in the oil fields

Additional information on Lead:

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. PWD is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for thirty seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, please contact Environmental Office at 973-1785-4603 / DSN:318-439-4603. Information on lead in drinking water and the steps you can take to minimize exposure is available from the USEPA Safe Drinking Water website, www.epa.gov/safewater/lead.

Unit Descriptions	
Term	Definition
ppm	Parts Per Million, or milligrams per liter (mg/L)
ppb	Parts Per Billion, or micrograms per liter (µg/L)
pCi/L	Pico-curies per liter (a measure of radioactivity)
NA	Not Applicable
ND	Not Detected
NR	Monitoring Not Required, but recommended.

Important Drinking Water Definitions	
Term	Definition
MCLG	Maximum Contaminant Level Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
MCL	Maximum Contaminant Level: The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
TT	Treatment Technique: A required process intended to reduce the level of a contaminant in drinking water.
AL	Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements. which a water system must follow.
Variances and Exemptions	State or EPA permission not to meet an MCL or a treatment technique under certain conditions.
MRDLG	Maximum residual disinfection level goal. The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
MRDL	Maximum residual disinfectant level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
MNR	Monitored Not Regulated
MPL	State Assigned Maximum Permissible Level

What Commands and Departments are involved in the Installation Water Quality Board to provide safe drinking water? What are their responsibilities?	
NAVFAC Bahrain Public Works Department (PWD) – Utilities	<ul style="list-style-type: none"> • Operation and maintenance of drinking water treatment and distribution systems including cleaning of tanks, system disinfection, flushing, and backflow prevention. Note: PWD contracts with G4S to operate and maintain the reverse osmosis treatment system. • Coordinate with Environmental Division to update the master plans.
NAVFAC SWA Environmental Program	<ul style="list-style-type: none"> • Overall compliance with FGS (includes EPA and Bahraini Drinking Water Standards). • Coordination of drinking water sampling and laboratory analysis. • Recordkeeping. • Source water surveys, master plans, sanitary surveys, and laboratory contract services
US Naval Branch Health Clinic Bahrain (Cognizant Medical Authority)	<ul style="list-style-type: none"> • Certification of base drinking water systems as potable. • Bacteriological monitoring. • Health effects advice and implementation of protective measures associated with any instances of non-compliance.
Naval Facilities Engineering Command	<ul style="list-style-type: none"> • Treatment plant construction/upgrades
NSA Bahrain Public Affairs Office	<ul style="list-style-type: none"> • Public notification of any non-compliance issues associated with on-base drinking water systems. Public notification covers potential adverse health effects/risks, corrective actions, alternative water supplies and protective measures. • Public notification of any non-compliance issues associated with off-base systems in the surrounding community which may affect station personnel. • Issuance of CCR's. • Community Outreach.
NSA Bahrain Housing Office	<ul style="list-style-type: none"> • Coordination of drinking water issues relating to base housing

If you have any questions regarding this report or about the drinking water processes, please contact Awni M. Almasri Regional Environmental Director/IWQB Coordinator, Commercial Phone +973-1785-4603, DSN:439-4603.

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REFERENCE DOCUMENTS:

- Final Governing Standards (FGS)
- COMNAVREGEUR Instruction 11330.1
- CNIC Instructions
- OPNAV Instructions 5090.1D