

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

**GENERAL DEPARTMENT OF
AGRICULTURAL ENGINEERING AND WATER MANAGEMENT
MINISTRY OF AGRICULTURE AND HYDRAULIC RESOURCES**

**THE STUDY ON
THE RURAL WATER SUPPLY PROJECT
(PHASE II)
IN
THE REPUBLIC OF TUNISIA**

**FINAL REPORT
VOLUME II
(WATER ANALYSIS AND WATER SOURCE ASSESSMENT)**

MARCH 2006

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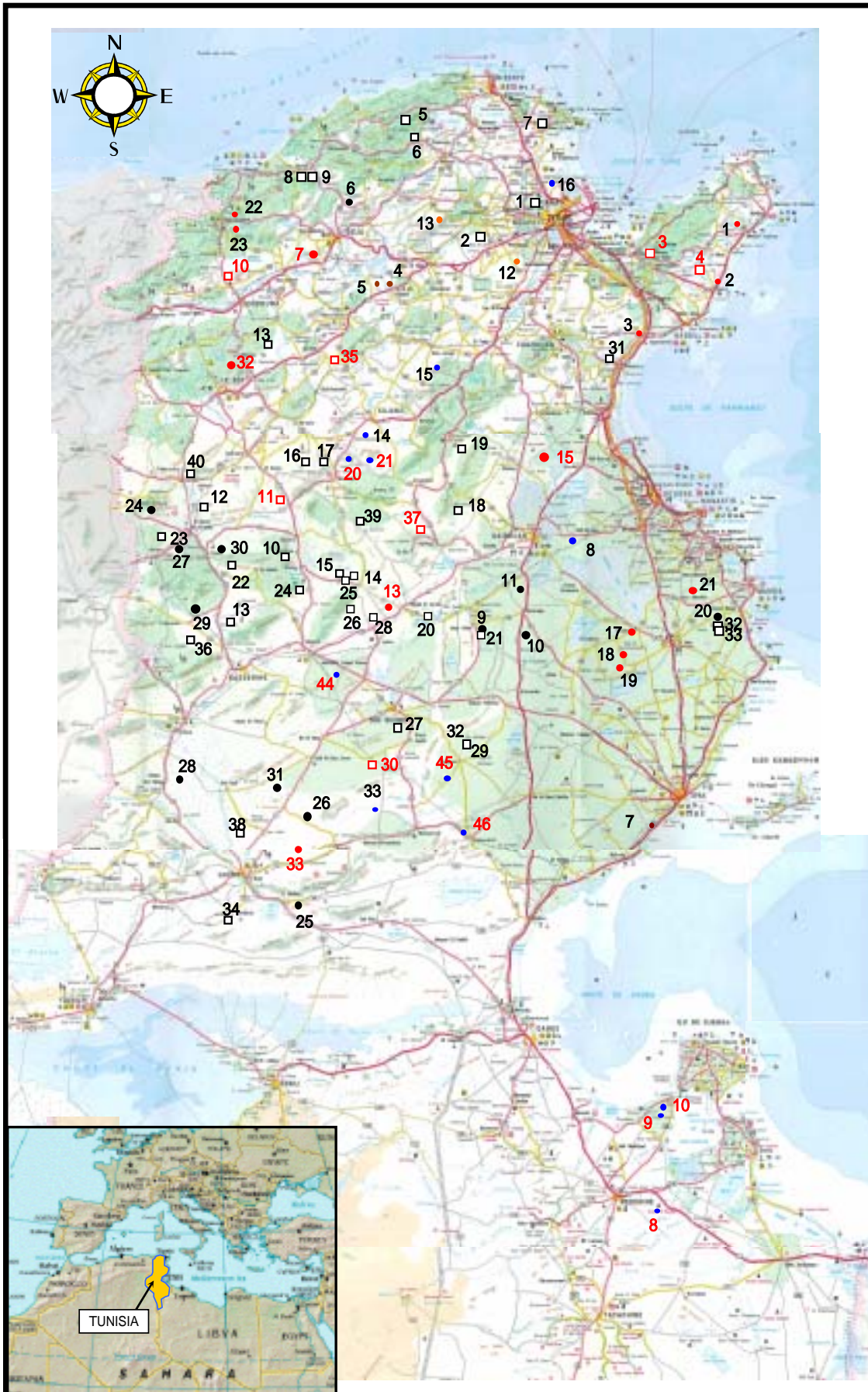
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 - 8. AIN DAM-NEFZA
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 The Study is cancelled (Subprojects for 2005)
 The Study is cancelled (Subprojects for 2006)

Abbreviations

- AGR: Regional Agricultural Engineering Direction, CRDA
(Arrondissement du Génie Rural)
- CITET: International Center of Environmental Technology in Tunis
(Centre International des Technologies de L'Environnement de Tunis)
- COFRAC: French Committee of Accreditation
(Comité Français d'accréditation)
- CRDA: Regional Directorate General for Agricultural Development
(Commissariat Régional au Développement Agricole)
- DGGREE: General Direction of Agricultural Engineering and Water Management, Ministry of
Agriculture and Hydraulic Resources
(Direction Générale du Génie Rural et de l'Exploitation des Eaux, Ministère de l'Agriculture et des
Ressources Hydrauliques)
- EPA: United States Environmental Protection Agency
- GDWQ: Guidelines for Drinking Water Quality of the World Health Organization
- GIC: Water Users Group
- GOT: Government of Tunisia
(Gouvernement Tunisien)
- GR: Agricultural Engineering Sub Division, AGR
(Génie Rural)
- ISO: International Organization for Standardization
- JICA: Japan International Cooperation Agency
(Agence Japonaise de Coopération Internationale)
- MPN: Most Probable Number
- NTU: Nephelometric Turbidity Unit
- RWS: Rural Water Supply
- SONEDE: National Corporation for Water Development and Supply
(Société Nationale d'Exploitation et de Distribution des Eaux)
- WHO: World Health Organization
(L'Organisation Mondiale de la Santé)

SUMMARY

1 INTRODUCTION

The water quality analysis and evaluation were conducted for the rural water supply project (phase II), so that appropriate water sources would be selected in terms of water quality.

The present report covers (i) examination methods, (ii) water quality of water sources, (iii) assessment of water sources and (iv) recommendations related to water sources planned for the candidate subprojects of the project for 2005 and 2006.

2 CRITERIA APPLIED TO WATER SOURCE ASSESSMENT

In this study, the water quality evaluation of the water sources was carried out based on the following criteria:

- (1) Evaluation criteria to be applied
 - *NT 09.14. 1983. Norme Tunisienne Enregistrée (Qualité des eaux de boisson)*
 - *WHO Guidelines for Drinking-water Quality the 3rd edition (2004)*
- (2) Tunisian water quality standard is applied if the above mentioned norm and guidelines provide different criteria values for the same parameter.
- (3) WHO Guidelines were applied for the parameters that are included in the WHO guideline but are not included in the Tunisian water quality standard.
- (4) There are cases that the public agencies in charge evaluate and authorize use of the water sources according to the local condition. This particular consideration of the government is taken into account in the water source assessment.

It was agreed between GOT and JICA study team to apply Table 2-1 as the basis for water evaluation of the water sources and the evaluation procedure mentioned in Clause 8.5.1 for individual assessment of the water sources.

3 WATER QUALITY ANALYSIS PARAMETERS

Fifty four (54) parameters were selected based on the requirement of NT 09.14 and GDWQ (3rd Edition). Selection of the parameters was properly made from among those; (i) that will have adverse effects on human health, (ii) that will lead to complaints of the population, (iii) that will cause damages to water supply facilities, and (iv) that will provide other basic information relative to water analysis.

4 SELECTION OF LABORATORY FOR WATER ANALYSIS IN TUNISIA

The Study Team selected four (4) laboratories in Tunisia as candidates of the contractor of the study and then compared them in terms of the technical capacity based on the following requirements:

- i) The laboratory should be located in Tunisia in order to commence the water quality analysis within at least 24 hours after sampling,
- ii) The laboratory should be able to detect the health concerning parameters to the concentration level lower than the criteria value,
- iii) The laboratory should be equipped with the facility capable of conducting the water analysis on health concerning parameters (without subcontract), and
- iv) The laboratory could undertake both sampling and analysis.

As a result, the Study Team selected CITET (Tunis International Center for Environmental Technologies) as the contractor of the Study.

5 SAMPLING

5.1 Sampling Point

The number of sampling points according to the type of water sources is given in the following Table.

Table; Number of Sampling Point

Type of Water source	Number of Sampling point			
	Original Plan		Revised	
	2005	2006	2005	2006
1 Deep well	8	13	11	16
2 Spring	1	2	1	2
3 SONEDE connection	22	11	29	15
4 Extension GR	16	8	17	12
TOTAL	81		103	

Source: Water Quality Survey of the Study

5.2 Sampling Procedures

- (1) The sample container was polyethylene or a glass bottle with a mated stopper. The sample container was washed and sterilized in the laboratory and kept clean until sampling.
- (2) In case a projected water source is a deep well, sampling was carried out directly from

the pumping facility after eight hours. In case a projected water source is an existing water supply system, sampling was carried out after about one hour of flow of water.

- (3) Sampling volume was four liters for physico-chemical analysis and two hundred milliliters for bacteriological analysis. In case the projected water source is a deep-well, two liters was supplemented after filtration and fixation on site for Fe²⁺ analysis.
- (4) The samples were transported to the laboratory within 24 hours after sampling and preserved in a refrigerator. The air temperature inside the cooler box used for transportation of the samples was kept 4-10 °C in order not to freeze samples and hence to avoid the change of the samples quality.

6 WATER ANALYSIS

6.1 Site Observation and Measurement

Measurement of EC, pH, water temperature and observation/ measurement of the taste, smell and turbidity of the samples were carried out at the time of sampling. In case the projected water source is an existing water supply system, the measurement of the residual chlorine was supplemented.

6.2 Laboratory Analysis

The analysis basically followed the French standard “Comité Française d’Accréditation (COFRAC)”, which nearly complies with ISO.

7 RESULTS OF ANALYSIS

Water quality analysis was conducted of 104 samples from 103 water sources¹ covering 89 subprojects for 2005 and 2006, including 14 backup water sources and 10 water sources for replaced subproject.

8 WATER SOURCE ASSESSMENT

8.1 Bacteriological Quality

8.1.1 Bacteriological Contamination

Total coliform bacteria, Thermotolerant coliform, *Escherichia coli* (*E-coli*) and Faecal streptococcus are considered as the indicators of bacteriological contamination. The number of the water sources, in which bacteriological parameters were detected, came up to 34. Total coliform of 42 water sources exceeded 50 MPN/100ml. Those water sources should not be

¹ Analysis was conducted twice at a spring (one water source), once in summer and another in winter.

used for drinking water. Bacteriological parameters were also detected in other 23 water sources, and faecal streptococci, thermotolerant coliform and *Escherichia coli* were present in 22 sources. The existence of those suggests fecal contamination.

8.1.2 Residual Chlorine

Residual chlorine is indispensable to protect the inhabitants from infectious diseases caused by water, however, residual chlorine was not detected at 13 water sources among 42 of project 2005 and 10 water sources among 25 of project 2006 (some samplings were conducted before the chlorination facility, and those were ejected from these counts).

8.2 Chemicals of Health Significance

The analysis revealed that concentrations of 5 chemicals of health significance, fluoride, nitrate, nitrite, boron and nickel, were higher than the criteria values in 32 water sources of the subprojects.

8.2.1 Fluoride (F)

Fifteen water sources covering 12 subprojects failed to meet the criteria value. Those are located in the middle-west semi-arid region of Tunisia.

Fluoride is known to be released in the environment from phosphate-containing rocks. The southern area of Tunisia is well known for phosphate mining and manufacturing. It is assumed that the high concentration of fluoride comes from the geology of these areas.

In the middle-west semi-arid region of Tunisia, the concentration of fluoride often exceeds the standard and it is not easy to find the water source which is suitable for drinking. Therefore, if the public agency in charge allowed use of the water sources with any risks, JICA Study Team accepted the water sources for the subproject.

8.2.2 Nitrate (NO₃) and Nitrite (NO₂)

Fifteen water sources and one (1) water source failed to meet the criteria values of nitrate and nitrite, respectively. These water sources are located in the intensive crop areas. Water sources that have vast drainage areas and have busy access of people and livestock, tend to have high concentration of nitrate and nitrite. Using inorganic fertilizers and inappropriate management of human and animal excreta are considered to be the main sources of nitrate contamination, because the given ammonia is oxidized to nitrite and nitrate in the soil.

8.2.3 Boron (B)

Seventeen water sources failed to meet the criteria for boron. Those are mainly located in the middle-west semi-arid region of Tunisia. The recommended value of WHO is a tentative one in view of the difficulty to remove boron where the substance exists with high concentration in the nature. According to the natural mineral water standard, limited value is 0.93mg/L, and Japanese standard value is 1.0mg/L. The concentrations of Boron in the four

water sources that failed to meet the GDWQ criteria were below those standards.

Regarding boron, if the public agency in charge allowed use of the water source with any risks, JICA Study Team accepted the water sources for the subproject.

8.2.4 Nickel (Ni)

One (1) water source failed to meet the criteria. The water source is the existing water supply system originating from a spring. Nickel is said to be released from taps and fittings, and concentration may rise up to 1 mg/L.

8.3 Substances and Parameters that may give rise to Consumers Complaints

The majority of water sources did not satisfy the criteria values of some of the parameters relative to public acceptance including evaporation residue, total dissolved solids, pH, phenolic compounds, hardness, calcium, magnesium, sulfate, and sodium.

8.3.1 Turbidity and Color

One water source exceeded the criteria value. The water source was eliminated since the concentration of nitrate was also exceeded the criteria value. Moreover there were water sources whose turbidity was 19.7 and 21.1 NTU. They looked brown and quite turbid. It seemed difficult for the consumers to accept the water sources. Moreover, because of the possible passing of microorganisms, it is strongly recommended that turbidity be kept as low as possible, preferably less than 1 NTU. Since 16 water sources exceeded 1 NTU, turbidity should be taken into account for the disinfection.

8.3.2 Total Dissolved Solids (TDS), Conductivity and Evaporation Residue

Sixty nine water sources failed to meet the criteria for TDS and 4 water sources failed to meet the criteria for residue on evaporation.

8.3.3 pH

Although pH usually has no direct impact on consumers, it is one of the most important operational water quality parameters. For effective disinfection with chlorine, the pH should preferably be less than 8.5. However, low pH is corrosive, and extreme low value of pH could result in accidental leakage, troubles of treatment facility, and deterioration of cement-mortar lining pipes. It is noted, however, that there exist no water sources which presented a pH value less than 6.5 in this study.

8.3.4 Phenolic Compounds

Fifteen water sources failed to meet the criteria. Since phenolic compounds can not be contained in natural water, chemical factories which use phenol and cresol as material and coal-gas plants, and rain water which flowed into asphalt paving roads, could have brought about concentration of phenolic compounds.

8.3.5 Hardness

Seven water sources in Sidi Bouzid and Siliana failed to meet the criteria value. Hardness of water is the indicator of existence of dissolved calcium and, to less extent, magnesium. Each of their ions is said to have effect on the taste.

8.3.6 Calcium

Two water sources in Kasserine and Sidi Bouzid failed to meet the criteria value. Many other inorganic salts were also detected with high values at the water source.

8.3.7 Chloride

Four water sources failed to meet the criteria. The residue on evaporation is also high at three water sources. High concentrations of chloride give a salty taste

8.3.8 Magnesium

One water source failed to meet the criteria value. It is located in Sidi Bouzid. Many other inorganic salts were also detected with high value at the water source.

8.3.9 Sulfate

Seventeen water sources failed to meet the criteria value. Many of the water sources are located in the middle west semi-arid region. The presence of sulfate in drinking water can cause noticeable taste.

8.3.10 Aluminum

Four water sources failed to meet the criteria. Aluminum exists in natural condition, but aluminum sulfate and other aluminum salts are widely used in coagulation process for drinking water treatment and this is the most common source of aluminum in drinking water.

8.3.11 Iron

At levels above 0.3 mg/L (GDWQ limit value), iron stains laundry and plumbing fixtures. In this survey, the water source in which the high concentration of ferrous iron (Fe^{2+}) was detected did not appear.

8.4 Water Quality may affect Water Supply Facilities

Possible damage to the water supply facilities includes corrosion, formation of scale and disturbance to disinfection efficacy. Generally the following parameters are considered to be connected with these possible damages:

Basic parameters	turbidity, total dissolved solid, pH, hardness, chloride, sulfate, alkalinity, erosive free carbon dioxide
Reference parameters	iron, copper, lead, zinc, nickel, ammonium, residual chlorine

In this study, there are no parameters, among the water sources assessed as acceptable,

which presented extreme values beyond the criteria value. However the effect on the well and pump piping by erosive free carbonic acid was suggested by the Tunisian expert for the rural water supply. Therefore, the value of the erosive free carbonic acid in the newly established deep wells was calculated. Moreover, the effect on the water supply system which is often expressed by the Langelier's index is also calculated.

Erosive Free Carbonic Acid

As a result, the existence of the erosive free carbonic acid was predicted in five water sources. Since measures are said to be required for erosive free carbonic acid more than 20 mg/L with less than 6.5 of pH (Japan water and food net, 2005), the values of erosive free carbonic acid are thought to be negligible.

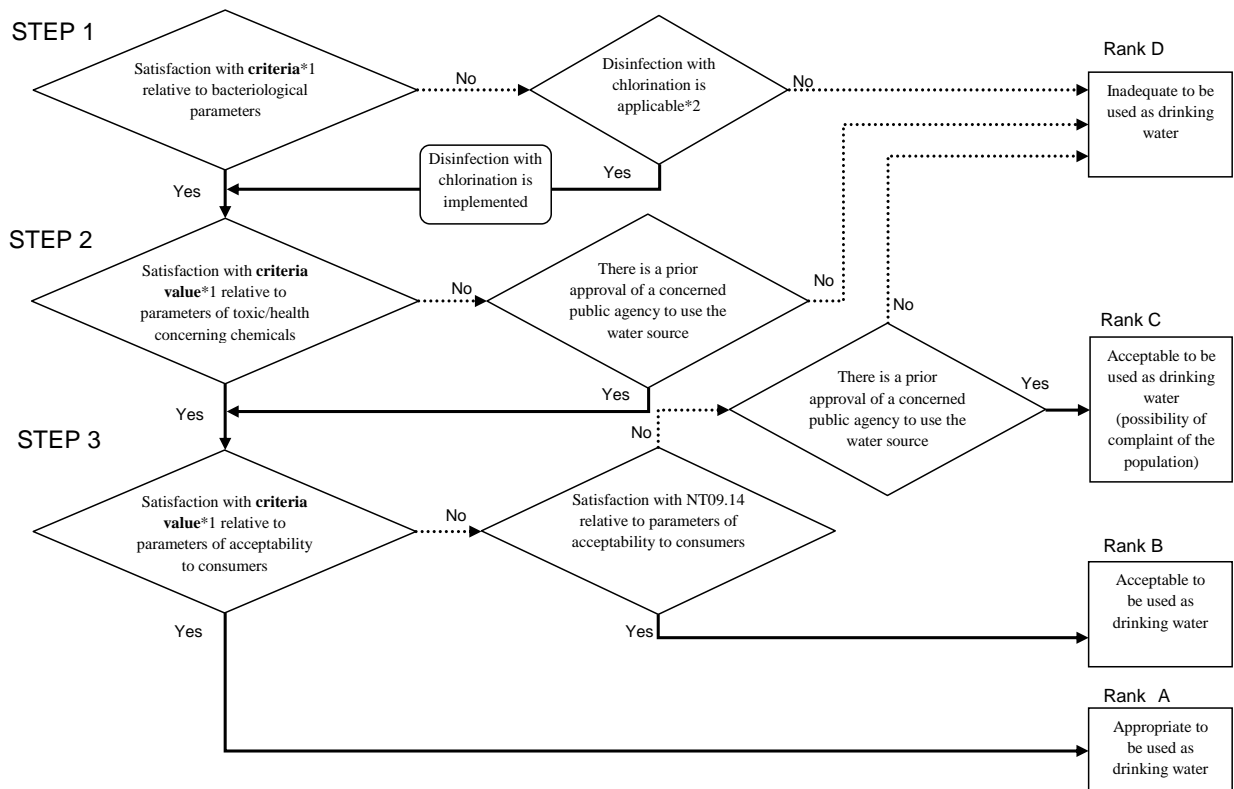
Langelier's Index

If the Langelier's index is equal or superior to zero, the water is considered to be non-corrosive. If a Langelier's index is less than -1.0, it is supposed that it acts on corrosive protection (Japan drinking water analysis method, 2001). -1.0 or less water sources were found at MZOUGHHA-ZELDOU and EL ISLAH of subprojects for 2005. Especially the Langelier's index of El ISLAH is high, and it is recommended to take some measures such as aeration or supply of alkaline agent.

8.5 Assessment of Each Water Source

8.5.1 Work flow of assessment

The work flow for assessment of the individual water source is illustrated below.



Note: Separate consideration will be made in case there is a possibility of damage to a water supply facility
*1): NT 09.14 and GDWQ are used as the criteria.
*2): Disinfection with chlorination is applied to total coliform of less than 50 MPN/100mL.

Figure 8.1 Flow of the Water Source Assessment

Each water source was assessed and classified into one of the four ranks of A, B, C and D. These ranks designate the followings:

- Rank A: Appropriate to be used as drinking water
- Rank B: Acceptable to be used as drinking water
- Rank C: Acceptable to be used as drinking water, however, there is a possibility of complaint of the population
- Rank D: Inadequate to be used as drinking water

8.5.2 Results of assessment

Fifteen water sources were assessed as rank A, 34 sources as rank B, 25 sources rank C and 31 sources as rank D. The two sub-projects of Ouled Ammar and Ouled Essâafi have the same water sources as the Rquiat sub-project, which had been studied in 2004, so these two sub-projects were not the object of the water quality analysis of water sources this year. On the basis of the results of analysis of the Rquiat sub-project, they were classified in rank B.

9 RECOMENDATIONS

9.1 Establishment of a provisional guideline of drinking water quality of water sources for RWS

There are cases in Tunisia in which public agencies make their individual judgment on utilization of water sources for RWS projects. However, prior judgment of this kind was not made available officially during the study. It is recommended to establish a tentative guideline of drinking water quality of water sources for RWS projects.

9.2 Thoroughness of Chlorination

For water supply in small communities which is operated by local people, priority should be given to minimize bacteriological contamination. It is necessary to monitor the residual chlorine periodically and supply an adequate volume of the chlorine thoroughly.

9.3 Sensitization toward Water Quality

Sensitization is indispensable for the safety of water supply and conservation of water sources. People do not have knowledge about other water quality parameters, and they are not interested in. They also have little consciousness of water source conservation and most activities for conservation are not performed. AGR and health section of concerned agencies should hold sensitization meetings to the local population.

9.4 Investigation of Rough Wells

If a rough well is polluted, pollutants from cracks pollute deep aquifer, along with a casing. Many rough wells exist all over the world, and if there are those in Tunisia, expansion of pollution might be decreased with investigation of cracks in wells including shallow wells and by repairing them.

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IN
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FINAL REPORT
VOLUME OF
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MARCH 2006**

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1 INTRODUCTION

Drinking water is an indispensable element for human's health equilibrium, because it is taken in every day, and it includes substances that directly affect people's health. As for the water which is mixed up with the pathogenic microorganisms, it is not rare to inflict damage on many people, such as diarrhea, and to lead to death within a short period. The hazardous chemicals that might be included in drinking water can be accumulated in the human s' body causing long-term effects and various health impairments; one can mention the malfunction of the peripheral nervous system caused by the accumulation of lead. Many of those damages cannot be recovered in many cases, and it is not rare that they hasten death. In addition, even if there are little of hazardous chemicals in drinking water, the presence of excessive other chemical substances degrade the drinking water taste remarkably. The taste of water taken in every day is an important problem for people, and the concentration of such chemical substances needs to be in tolerance level.

Therefore, in order to secure water sources, the water quality of the water sources should be carefully investigated, and it is necessary to check that there are no serious problems on people's health and their lives. It is required to supply people either from water sources that are evaluated as safe ones or from sources that can be easily treated.

The water quality analysis and evaluation were implemented in the rural water supply project (phase II), so that appropriate water sources would be selected in terms of water quality.

The present report covers the following points related to water points planned for the candidate subproject of the project of 2005 and 2006.

- Examination methods,
- Water quality of water sources,
- Assessment of water sources, and
- Recommendations

2 CRITERIA APPLIED TO WATER SOURCE ASSESSMENT

The national standard for drinking water quality of each country and the Guidelines for Drinking-Water Quality of the World Health Organization (WHO) (hereinafter referred to as “the GDWQ”) (see Appendix 1) are normally regarded as the bases for establishment of the each country’s criteria and can be applied to the water source assessment.

GOT has its own Tunisian standard for drinking water quality “*NT 09.14 (1983) Qualité des eaux de boisson*” (see Appendix 1) (hereinafter referred to as “NT 09.14”), which stipulates “*the criteria value of quality of water destined to human consumption*” (hereinafter referred to as “the criteria value”). Any drinking water supply projects in Tunisia are accordingly required to satisfy the criteria value.

The GDWQ has determined guideline values for various substances contained in the drinking water, etc. based on research results relative to the water pollutant.

Therefore, in this study, the water quality evaluation of the water sources was carried out based on the following criteria:

- (1) Evaluation criteria to be applied
 - *NT 09.14. 1983. Norme Tunisienne Enregistrée (Qualité des eaux de boisson)*
 - *WHO Guidelines for Drinking-water Quality the 3rd edition (2004)*
- (2) Tunisian water quality standard is applied if the above mentioned norm and guidelines provide different criteria values for the same parameter.
- (3) WHO Guidelines were applied for the parameters that are included in the WHO guideline but are not included in the Tunisian water quality standard.
- (4) Available amount of water sources in Tunisia differs from place to place and most of the rural areas are faced with shortage of safe drinking water. Under such conditions, there are cases in which the public agencies in charge authorize use of water sources according to the local conditions. This particular consideration of the government was taken into account in the water source assessment.

It was agreed between GOT and JICA study team to apply Table 2-1 as the basis for water evaluation of the water sources and the evaluation procedure mentioned in Clause 8.5.1 for individual assessment of the water sources.

3 WATER QUALITY ANALYSIS PARAMETERS

Fifty four (54) parameters were selected based on the requirement of NT09.14 and GDWQ (3rd Edition). Selection of the parameters was properly made from among those; (i) that will have adverse effects on human health, (ii) that will lead to complaints of the population, (iii) that will cause damages to water supply facilities, and (iv) that will provide other basic information relative to water analysis. Moreover, the characteristics of each type of projected water sources such as (i) deep well, (ii) spring, (iii) SONEDE Connection¹ and (iv) GR Extension² were taken into account in selection of the parameters.

The selected water quality analysis parameters are shown in the table below.

Table; Water Quality Analysis Parameters of the Project

Category		Water Quality Analysis Parameters	Type of Water Source
Direct adverse effects on public health	Bacteriologic al Parameters	<u>4 parameters:</u> 1)total coliform bacteria, 2)thermotolerant coliform, 3)faecal streptococci, 4)Escherichia coli (E.coli)	All types
	Toxic/ Health Concerning Chemicals	<u>17 parameters:</u> 1)arsenic, 2)cadmium, 3)cyanide, 4)total mercury, 5)lead, 6)selenium, 7)antimony, 8)silver, 9)barium, 10)molybdenum, 11)fluoride, 12)nitrate, 13)nitrite, 14)boron, 15)nickel, 16)chromium, 17)cobalt	All types
		<u>1 parameter:</u> 1)total chlorine	SONEDE Connection, Extension GR
Effects on drinking water characteristics	Acceptability to Consumers	<u>22 parameters:</u> 1)color, 2)odor, 3)taste, 4)turbidity, 5)residue on evaporation, 6)total dissolved solids (TDS), 7)pH, 8)anionic surface active agent, 9)mineral oils, 10)phenol compounds, 11)hardness, 12)calcium, 13)chloride, 14)copper, 15)iron, 16)magnesium, 17)manganese, 18)sulfate, 19)zinc, 20)aluminum, 21)sodium, 22)ammonia	All types
		<u>1 parameter:</u> 1)residual chlorine	SONEDE Connection, Extension GR
	Potential damage to water supply facilities	<u>5 parameters:</u> 1)total alkalinity, 2)mineral acidity, 3)total acidity, 4)iron(II), 5)iron(III)	Deep-well
Other supporting parameters		<u>4 parameters</u> 1)temperature, 2)electrical conductivity (EC), 3)potassium 4)salinity	All type

¹ SONEDE Connection is to connect the projected rural water supply system to nearby SONEDE water supply system and purchase water under its the agreement.

² GR Extension is to extend an existing rural water supply system developed by the AGR and the system is managed by GIC.

Characteristics and degree of impact on the life of the population of each category mentioned in the above table are shown in Table 3-1. The criteria value of the water quality analysis parameters are shown in Table 3-2.

4 SELECTION OF LABORATORY FOR WATER ANALYSIS IN TUNISIA

Sampling and water quality analysis was entrusted to a local laboratory, because the water quality analysis for Iron (II) and Iron (III) necessitated fixing of samples on site (fixation of samples is separately required in the laboratory), not only water quality analysis but also sampling should be commissioned to a contractor who had enough capacity and equipments.

The Study Team selected the following four (4) laboratories in Tunisia as candidates of the contractor, distributed the “specifications on sampling and water quality analysis” and asked them to submit the list of the minimum limits of detection and cost estimation. The Study Team examined the technical capacity and the offer amount submitted by each laboratory.

- A) LCAE : *Laboratoire Central d'Analyses et d'Essais*
- B) HF : *HYDROSOL FONDATIONS*
- C) SGS : *Société Générale de Surveillance*
- D) CITET : *Tunis International Centre for Environmental Technologies*

As the result, it was clarified that no laboratory is competent with all the terms of reference mentioned in the specifications. The Study Team then compared the candidate contractors in terms of the technical capacity based the following requirements

- i) The laboratory should be located in Tunisia in order to commence water quality analysis within at least 24 hours after sampling,
- ii) The laboratory should be able to detect the health concerning parameters to the concentration level lower than the criteria value,
- iii) The laboratory is equipped with the facility capable of conducting the water analysis on health concerning parameters (without subcontract), and
- iv) The laboratory could undertake both sampling and analysis.

As a result, the Study Team selected CITET (Tunis International Centre for Environmental Technologies) as the contractor of the Study for the following reasons:

- i) The laboratory could analyze all parameters included in the specifications except H₂S and chlorophenols,
- ii) The minimum limits of detection for health concerning parameters were the lowest among the candidates, and
- iii) The laboratory had enough capacity to carry out fixing of samples on site and in-situ test.

CITET is a government laboratory, under the Ministry of Agriculture, Environment and Water Resources, and provides technical services such as analysis of water quality, soil, sediment, compost, air and emission gas.

The list of the minimum limits of detection of CITET is shown in Table 4-1.

5 SAMPLING

JICA Study Team carried out one hundred four (104) sampling and water quality analysis for the project 2005 and 2006. There were one hundred three (103) water sources covering eighty nine (89) subprojects which included such cases as; (i) samplings were carried out twice in summer and winter at spring (1), (ii) the projected water sources were judged inappropriate and that the backup water sources were secured (14), and (iii) subprojects have been replaced due to local situations and water quality (10).

Table; Number of Sampling and Water Quality Analysis

Sampling Period	Sampling and Water Quality Analysis	Water Sources	Subproject
Project 2005			
January to April 2004	58	58	47
Project 2006			
June to July 2004	18	18	16
January to March 2005	28	28	27
TOTAL	104	103	89

Source: Water Quality Survey of the Study

5.1 Basic Requirements for Sampling

In order to undertake a precise/an accurate water quality analysis, the following actions are basically required.

(1) To select the appropriate sampling points

Selection of sampling points is important in order to measure the water quality of a water source more correctly. The details of the selection method are shown in the following section.

(2) To protect from the contamination of bacteria and other chemical substances

In order to prevent contamination, it is necessary to be cautious about the following matters.

- Sterilization and washing of the flasks
- In case of the sampling from a deep well, the water outlet must be separated from the ground.
- The attachment such as nylon hose must be removed from the water tap.

(3) To avoid the impact of water supply facilities

The impact of water supply facilities such as dissolution of metals in the retaining water could be avoided by letting the water run for a while. Letting water run must be

carried out at a deep well for 8 hours and for one hour at existing water supply system of the project.

5.2 Sampling Points

The number of sampling points for the project 2005 and 2006 according to the type of water sources is given in the following table.

Table; Number of Sampling Point

Type of Water source	Number of Sampling point			
	Original Plan		Revised	
	2005	2006	2005	2006
1 Deep well	8	13	11	16
2 Spring	1	2	1	2
3 SONEDE connection	22	11	29	15
4 Extension GR	16	8	17	12
TOTAL	81		103	

Source: Water Quality Survey of the Study

The precise sampling points were selected in accordance with the under-mentioned principles for each type of the projected water sources.

5.2.1 New Water Sources

(1) Deep well

In case that the projected water source is a newly constructed deep well, the sample was directly taken by pumping from the well (see Figure 5-1).

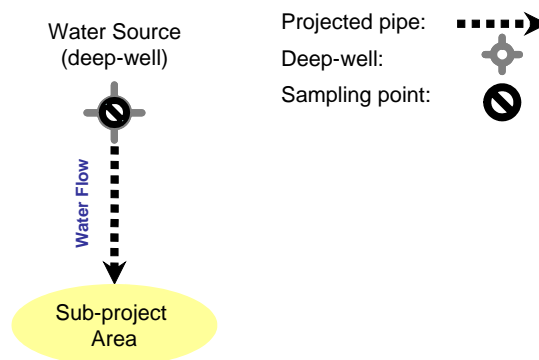


Figure 5-1 Sampling Point (Deep well)

(2) Spring

In case that the projected water source is a spring, the sample was taken in the upstream from the existing intake for the reasons that there was a possibility that the water source was contaminated with feces. However the intake was already equipped with certain structure and covered with concrete, the sample was taken at the existing intake. (see Figure 5-2).

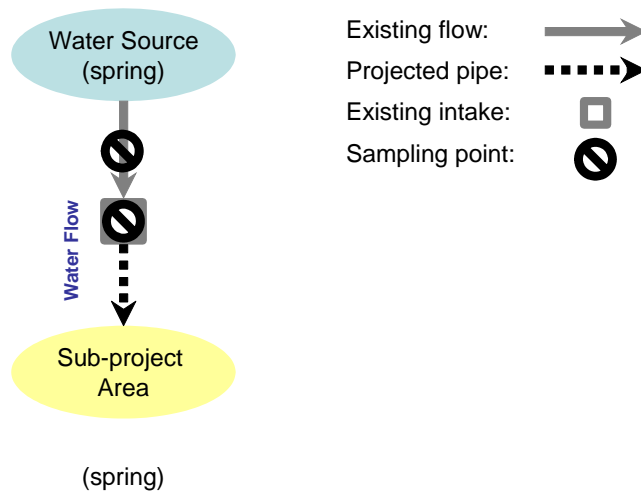


Figure 5-2 Sampling Point (Spring)

5.2.2 Existing Water Supply Facilities

In case that the projected water source is an existing water supply facility, the sample was principally taken from the nearest service facilities located in the upstream from the projected connection Point (see Figure 5-3).

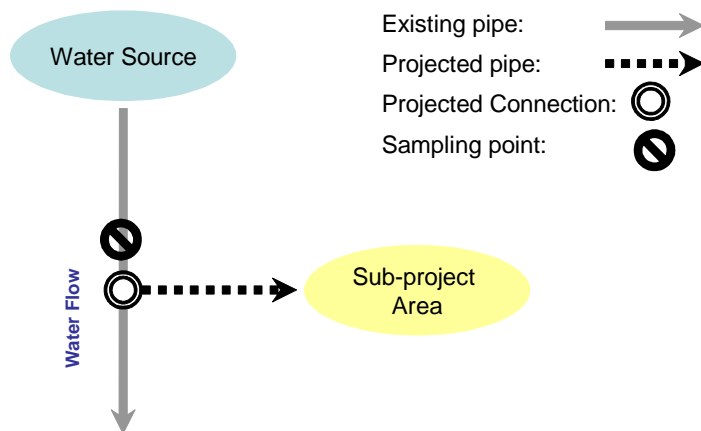


Figure 5-3 Sampling Point (Existing Water Supply System)

5.3 Sampling Procedures

Sampling was carried out based on the following standards:

The details of preparatory works and procedure for sampling are given in the “Sampling Manual” (see Appendix 2).

Table 5-3 Standard of Sampling Method

Stage	Method	Reference
sampling Planning	Water quality-Sampling Part 1 : General guide for establishment of sampling program	NF EN ISO 5667-1(1993) <K0410-3-1>
Sampling techniques	Water quality-Sampling Part 2 : General guide on sampling techniques	NF EN ISO 5667-2(1993) <K0410-3-2>
samples Preservation	Water quality-Sampling Part 3 : General guide on preservation and handling of samples	NF EN ISO 5667-3(1996) <K0410-3-3>

5.3.1 Sample container and washing

A polyethylene or a glass bottle with a mated stopper was used as the sample container. The sample container was washed and sterilized in the laboratory and kept clean until sampling. Except for the glass bottles with a mated stopper for bacteriological analysis, the sampling bottles were washed with water at a sampling site in advance of sampling.

5.3.2 General operation of sampling

In case a projected water source is a deep well, sampling was carried out directly from the pumping facility after eight (8) pumping hours.

In case a projected water source is an existing water supply system, the sample was taken from the existing public tap, house tap or existing valve located close to the projected connection point, after about one hour of water flow. The sampling for bacteriological parameters was carried out after sterilization of the outlet with flame or alcohol.

5.3.3 Pre-treatment

In case a projected water source is a deep-well, two liters (one polyethylene bottle) was supplemented after filtration and fixation on site for Fe²⁺ analysis, because Fe²⁺ might be the object of chemical reactions within few hours. Water samples were filtered on site immediately after sampling using filter devices. An adequate volume of filtrate was put into a 100ml flask. At first, the filtration of the water samples which had just been taken from the

water source was carried out on site by using filtration equipment. Then, taking a suitable amount of filtrate obtained into a 100ml volumetric flask. Five ml of 1,10-phenanthroline solution (1g/L) was added and then, a solution of ammonium acetate solution (500g/L) was added to adjust its pH to about 5.

Many other parameters also require the fixation (e.g. most of metals are fixed with nitric acid); however the chemical reaction proceeds hardly less than at 10°C, therefore, the fixation was carried out at the laboratory.

5.3.4 Analysis parameters and sample volume

In case the projected water source is a spring or an existing water supply system, the sample volume was four liters (two (2) polyethylene bottles) for physico-chemical analysis and two hundred milliliters (one (1) glass bottle) for bacteriological analysis.

5.3.5 Items to be recorded when sampling

The following items were recorded at the time of sampling:

- i) Identification number of the subproject,
- ii) Name of subproject of the sampling site,
- iii) Type of water source,
- iv) Date and time of sampling,
- v) Name of the person who carried out the sampling,
- vi) Measurement value of on site test

5.3.6 Transportation and preservation of samples

The samples were transported to the laboratory within 24 hours after sampling and preserved in a refrigerator. The air temperature inside the cooler box used for transportation of the samples was kept 4-10°C in order not to freeze samples and hence to avoid the change of the samples quality.

6 WATER ANALYSIS

6.1 Site Observation and Measurement

Measurement of EC (electrical conductivity), pH, water temperature and observation/ measurement of the taste, smell and turbidity of the samples were carried out at the time of sampling. In case the projected water source is an existing water supply system, the measurement of the residual chlorine was supplemented.

Table 6-1 gives the list of the analytical methods applied in measurement on site.

6.2 Laboratory Analysis

The analysis basically followed the French standard “Comité Française d’Accréditation (COFRAC)”, which nearly complies with ISO. Table 6-2 gives the list of the analytical method applied in the laboratory. According to the standards, the maximum preservation period (among parameters) is one month, and analysis is required to implement within the period.

7 RESULTS OF ANALYSIS

Water quality analysis was conducted 104 times for 103 water sources³ covering 89 subprojects including 14 backup water sources and 10 water sources for replaced subproject. The results of water analysis are shown in Table 7-1. Parameters which exceeded criteria values are shown in the following Table

Table 7-2 Parameters which Exceeded Criteria

Category	Parameter	Project 2005		Project 2006	
		NT0914	GDWQ	NT0914	GDWQ
Bacteriological parameters	All parameters	25	-	10	-
Health concerning chemicals	Fluoride	-	10	-	5
	Nitrate	9	-	6	-
	Nitrite	-	-	-	1
	Boron	-	13	-	4
	Nickel	-	1	-	-
Acceptability to consumers	Turbidity	1	-	-	-
	Residue on evaporation	2	-	2	-
	Total dissolved solids	-	44	-	26
	pH	6	-	1	-
	Phenolic compounds	-	-	15	-
	Hardness	4	-	3	-
	Calcium	-	-	1	-
	Chloride	3	-	1	-
	Iron	1	-	-	-
	Magnesium	-	-	1	-
	Sulfate	14	-	4	-
	Sodium	-	17	-	11
	Residual chlorine	-	4	-	-

Source: Water quality survey under the Study

Appendix 3 gives the results of water analysis for each sub-project of Project 2005 and 2006, while Appendix 4 gives characteristics of water quality analysis parameters.

³ Analysis was conducted twice at a spring (one water source), once in summer and another in winter.

8 WATER SOURCE ASSESSMENT

8.1 Bacteriological Quality

8.1.1 Bacteriological Contamination

Total coliform bacteria, Thermotolerant coliform, *Escherichia coli* (*E-coli*) and Faecal streptococcus are considered as the indicators of bacteriological contamination. The indicators must not be detected from the supplied water according to the NT 09.14 and GDWQ (3rd Edition). Meanwhile, since it is possible to make disinfection with chlorination, certain concentrations of the bacteria. Since the sources could be disinfected through chlorination, certain concentrations are accepted and the water source can be exploited. This certain level is considered as 50 MPN/100ml in this study, because Japanese standard of raw water for drinking indicates that the permissible range is 0 to 50 MPN/100ml. The condition of bacteriological contamination is shown in the following Table.

Table 8-1 Number of Water Sources with Bacteriological Contamination

Bacteriological Parameter	<2		<2 - 10		10 – 50		50 -	
	2005	2006	2005	2006	2005	2006	2005	2006
Total coliform	52	37	6	2	-	4	-	2
Thermotolerant coliform	57	42	1	1	-	1	-	1
Faecal streptococci	37	38	15	5	5	1	1	1
<i>Escherichia coli</i>	56	42	2	2	-	0	-	1
All parameters	34	35	18	4	5	4	1	2
	69		22		9		3	

Source: Water quality survey under the Study

The number of the water sources, in which bacteriological parameters were detected, came up to 34. Total coliform of two (2) water sources exceeded 50 MPN/100ml. Those water sources should not be used for drinking water. Faecal streptococci of one (1) water source was also exceeded 50 MPN/100ml. Since three other bacteriological parameters were less than 2 MPN/100ml at the water source, it was authorized to use by DGGREE⁴. Bacteriological parameters were also detected at other 23 water sources, and faecal streptococci, thermotolerant coliform and *Escherichia coli* were present in 22 sources. The existence of those suggests fecal contamination.

Bacteriological contamination by water sources are shown in the following table:

⁴ Most of those were faecal streptococci for project 2005. The movement of it is not exactly cleared, and this parameter should be considered as the reference.

Table 8-2 Number of Water Sources for every type with Bacteriological Contamination

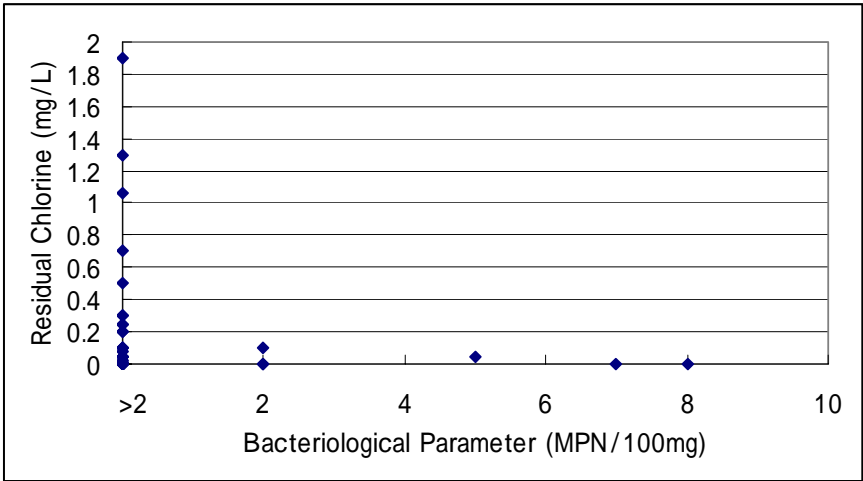
Bacteriological Parameter	<2		<2 - 10		10 – 50		50 -	
	2005	2006	2005	2006	2005	2006	2005	2006
Deep Well	4	13	3	1	3	2	0	0
Spring	0	0	1	0	0	1	0	1
Extension GR	11	9	6	2	1	0	0	1
SONEDE Connection	19	14	8	1	1	0	1	0

Source: Water quality survey under the Study
 *: Biggest concentration (MPN/100ml) among bacteriological parameters at each water source (see Table 7.1)

Springs indicated higher concentration of bacteriological parameters. Extension GR also indicated relatively high concentration. SONEDE Connection indicated low concentration with only one case indicating 144 MPN/100ml of faecal streptococci.

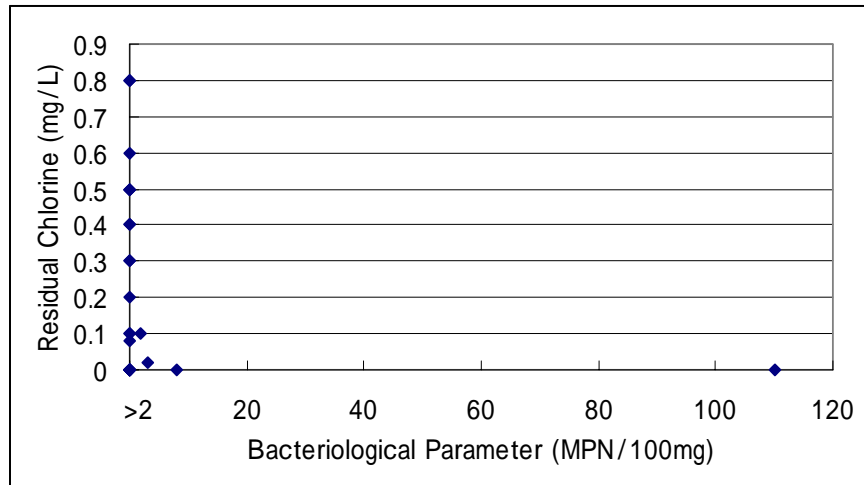
8.1.2 Residual Chlorine

It is noted that total coliform is regarded as an indicator of bacteriological contamination. The fact that total coliform was detected in the drinking water should be considered with serious concern, and it is required for GIC and SONEDE to reinforce the chlorination and monitoring of the residual chlorine in the water supply system. Residual chlorine is indispensable to protect the inhabitants from infectious diseases caused by water, however, residual chlorine was not detected at 13 water sources among 42 of project 2005 and 10 water sources among 25 of project 2006 (some samplings were conducted before the chlorination facility, and those were ejected from these counts). The following Figures shows the correspondence of the residual chlorine and bacteriological contamination⁵.



- **Figure; Residual Chlorine and Bacteriological Contamination for Project 2005**

⁵ Since many of the bacteriological parameters of Project 2005 were faecal streptococci and their movement is not clear, the results of the analysis of the parameters are removed from the Figure for project 2005.



- **Figure; Residual Chlorine and Bacteriological Contamination for Project 2006**

Source: Water quality survey under the Study

The figures show that some samples which contain less than 0.2 mg/L of residual chlorine were contaminated. It must be concluded that the water sources which residual chlorine were null were easy to be contaminated.

8.2 Chemicals of Health Significance

Regarding chemicals of health significance (toxic chemicals and health concerning chemicals, see Table 3-3), when the value was over the Tunisian standard (NT 09.14), the water source was judged to be unsuitable. However, NT 09.14 set different standard values for fluoride for various ranges of the annual average of the maximum daily temperature. Due to lack of adequate data of the air temperature in each subproject area, it was difficult to apply the Tunisian standard value as the criteria value in the water source assessment. Therefore, the guideline value of 1.5 mg/L of the GDWQ was adopted as the criteria value in principle. The parameters which are not listed in the Tunisian standard were referred to the GDWQ for the evaluation of the water sources.

The analysis revealed that concentrations of five (5) chemicals of health significance, fluoride, nitrate, nitrite, boron and nickel, were higher than the criteria values in 32 water sources of the subprojects.

Overtures of chemicals of health significance by water source are shown in the following Table.

Table 8-3 Number of Water Sources for every type with Chemicals of Health Significance

Type of Water Source	Fluoride		Nitrate		Nitrite		Boron		Nickel	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
Deep Well	1	2	3	4	-	1	3	3	-	-
Spring	-	-	1	-	-	-	-	-	-	-
Extension GR	5	-	2	1	-	-	5	1	1	-
SONEDE Connection	4	3	3	1	-	-	5	-	-	-

Source: Water quality survey under the Study

Fluoride, nitrate and boron are detected from each water sources without inclination. As for the ratio, deep well is relatively high. The number of the deep wells, in which high values of chemicals of health significance were detected, is 5 out of 10 for project 2005 and 6 of 16 for project 2006. It shows more than one third of the water sources were unsuitable for drinking. The unsuitable ratio of the water sources of Extension GR is also high. Nine water sources of 30 contain high values of chemicals of health significance. SONEDE is lowest and 11 water sources of 44 contain high values of chemicals of health significance.

Regional features are shown in the following Table.

Table 8-4 Number of Water Sources for every region with Chemicals of Health Significance

Type of Water Source	Fluoride		Nitrate		Nitrite		Boron		Nickel	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
Seacoast region	-	-	1	-	-	-	-	-	-	-
Northwest hilly region	-	-	5	3	-	-	2	-	1	-
Middle west semi-arid region	10	5	3	3	-	1	11	4	-	-

Source: Water quality survey under the Study

Note: Three regions were classified referring to the main report.

In the seacoast region, the water source containing high values of chemicals of health significance was only nitrate at one water source. These chemicals were mainly detected in the middle-west semi-arid region. In the northwest hilly region, high values of nitrate were detected.

The followings are further comments about 5 chemicals of health significance

8.2.1 Fluoride (F)

The guideline value of 1.5mg/L of GDWQ was adopted as the criteria value for fluoride.

Fifteen water sources covering 12 subprojects failed to meet the criteria value. They are located in the middle-west semi-arid region of Tunisia.

Fluoride is known to be released in the environment from phosphate-containing rocks. The southern area of Tunisia is well known for phosphate mining and manufacturing. It is assumed that the high concentration of fluoride comes from the geology of these areas.

In the middle-west semi-arid region of Tunisia, the concentration of fluoride often exceeds the standard and it is not easy to find the water source which is suitable for drinking. Therefore, if the public agency in charge allowed use of the water sources with any risks, JICA Study Team accepted the water sources for the subproject. The monitoring for the skeletal fluorosis is necessary in that case, and if the symptom appears frequently, the water source use must be stopped.

As for the water treatment, several fluoride removal techniques have been developed so far. The most frequently adopted techniques are Ion exchange and /or absorption with either charred bone-meal or activated alumina (Al_2O_3). Concentration less than 1mg/L can be achievable using activated alumina. However, adaptability of these techniques should be examined with due consideration of the local circumstances such as availability of material, financial constraints and needs for capacity development for management of the system.

8.2.2 Nitrate (NO_3) and Nitrite (NO_2)

The guideline value 45 mg/L of NT 09.14 was adopted as the criteria value for nitrate, and the guideline value 0.2 mg/L of GDWQ was adopted as the criteria value for nitrite.

Fifteen water sources and one (1) water source failed to meet the criteria values of nitrate and nitrite, respectively. These water sources tend to be located in the intensive crop areas. Water sources which have vast drainage areas and have busy access of people and livestock, tend to have high concentration of nitrate and nitrite. Using inorganic fertilizers and inappropriate management of human and animal excreta are considered to be the main sources of nitrate and nitrite contamination, because the given ammonia is oxidized to nitrite and nitrate in the soil (GDWQ 2nd edition volume 2, 1996).

Concentration of nitrate can be reduced to lower than 5mg/L using biological denitrification for surface waters and ion exchange for groundwater. However, there is no cost-effective water treatment technique that is both convenient and generally applicable for water supply in small communities for reducing nitrate and nitrite levels in water. Consideration should therefore be given to the protection of water sources, particularly in the area where the principal sources of contamination are agricultural use of fertilizers or human and animal feces discharge.

8.2.3 Boron (B)

The provisional guideline value of 0.5mg/L of GDWQ was referred to for the criteria value of boron, since NT 09.14 has no standard value of Boron.

Seventeen water sources failed to meet the criteria for boron. Those are mainly located in the middle-west semi-arid region of Tunisia.

Conventional water treatment techniques such as coagulation, sedimentation and filtration can not significantly remove boron. Special methods including ion exchange and reverse osmosis processes are required to remove boron substantially. However, they are prohibitively expensive. Mixing of waters or introduction of alternative water sources may be the only economical way to reduce boron concentration.

The recommended value of WHO is a tentative one in view of the difficulty to remove boron where the substance exists with high concentration in the nature. According to the Natural Mineral Water Standard of PNT⁶ 09.33, 2003, limited value is 0.93mg/L, and Japanese standard value is 1.0mg/L. The concentrations of Boron in the thirteen water sources which failed to meet the GDWQ criteria among seventeen were below those standards.

Regarding boron, if the public agency allowed use of the water source with any risks, JICA Study Team accepted the water source for the subproject.

8.2.4 Nickel (Ni)

The provisional guideline value of 0.02mg/L of GDWQ (the 3rd edition (Draft)) was adopted as the criteria value for nickel, since NT 09.14 has no standard value for nickel.

One (1) water source failed to meet the criteria. The water source is the existing water supply system originating from a spring. Nickel is said to be released from taps and fittings, and concentration may rise up to 1 mg/L.

The guideline value of GDWQ is considered provisional due to lack of evidence of a carcinogenic risk from oral exposure to nickel and uncertainties about the critical level for mortality during pregnancy.

A conventional technique such as coagulation is available for removal of Nickel, which however, does not exist in raw water in natural condition.

⁶ PNT : **Projet de Norme Tunisienne**

8.3 Substances and Parameters that may Give Rise to Consumers Complaints

The majority of water sources did not satisfy the criteria values of some of the parameters relative to public acceptance including evaporation residue, total dissolved solids, pH, phenolic compounds, hardness, calcium, magnesium, sulfate, aluminum, iron, and sodium.

8.3.1 Turbidity and Color

The guideline value of 25 NTU (nephelometric turbidity unit) of NT09.14 was adopted as the criteria value for turbidity.

One water source exceeded the criteria value. The water source was eliminated since the concentration of nitrate was also exceeded the criteria value. Moreover there were water sources the values were 19.7 and 21.1 NTU. Those looked brown and quite turbid. The water seemed that it was difficult to be accepted by the consumers.

Because of the possible passing of microorganisms, it is strongly recommended that turbidity be kept as low as possible, preferably less than 1 NTU at the outlet of the treatment plant. Since 16 water sources exceeded 1 NTU, turbidity should be taken into account for the disinfection (GDWQ 2nd edition volume 3, 1997).

8.3.2 Total Dissolved Solids (TDS), Conductivity and Evaporation Residue

The acceptable level (taste) to consumers of 2,500 mg/L of NT09.14 was adopted as the criteria value for residue on evaporation. GDWQ (1000 mg/L) was adopted as the criteria value for TDS.

Sixty nine water sources failed to meet the criteria for TDS and 4 water sources failed to meet the criteria for residue on evaporation.

TDS comprises inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides and sulfates) and small amounts of organic matters that are dissolved in water. Residue on evaporation is the remaining substances when the water is evaporated. The difference between them is only their detection methods but the principles are basically the same.

Conductivity and Salinity are correlative with residue on evaporation. Those parameters were measured on site, and if the value was high, the taste was carefully checked.

8.3.3 pH

The acceptable level of NT 09.14 (6.5 to 8.5) was adopted as the criteria value of pH. Seven water sources failed to meet the criteria value.

Although pH usually has no direct impact on consumers, it is one of the most important operational water quality parameters. For effective disinfection with chlorine, the pH should preferably be less than 8.5 (Disinfection of Water, Japan Water Management & Environment Center, 1997). However, low pH is corrosive, and extreme low value of pH could result in accidental leakage, troubles of treatment facility, and deterioration of cement_mortar lining pipes. It is noted, however, that there exist no water sources which presented a pH value less than 6.5 in this study.

8.3.4 Phenolic Compounds

The acceptable level for domestic use in NT 09.14 (0.002 mg/L) should have been adopted as the criteria value. However, as the limit of detection of CITET was 0.025 mg/L, therefore the value was regarded as the criteria value. 15 water sources failed to meet the criteria.

Since phenolic compounds can not be contained in natural water, chemical factories which use phenol and cresol as material and coal-gas plants, and rain water which flowed into asphalt paving roads, could serve there phenolic compounds.

The stationary pollution source such as a chemical factory does not exist near the water sources. Moreover, many water sources in which high values of phenolic compounds were detected in several governorates as well as in several types of water sources. Therefore it is assumed that phenolic compounds are distributed in the whole country. However there are obscure points, because no water source with high value of phenolic compounds was found in the survey conducted in 2004 and the cause cannot be specified. Since it is a critical matter that might cause problems such as foul smell, a note of caution should be considered and monitoring efforts should be made in order to trace the water source condition.

8.3.5 Hardness

The acceptable level for domestic use in NT 09.14 (100 F° (1,000 mg/L)) was adopted as the criteria value. Although there may be an inverse proportion between hardness of water and occurrence of cardiovascular diseases, the available data were insufficient to draw a conclusion (GDWQ 2nd edition volume 2, 1996).

Seven water sources failed to meet the criteria value. The locations were Sidi Bouzid and Siliana.

Hardness of water is the indicator of existence of dissolved calcium and, to less extent, magnesium. It is usually expressed as the equivalent quantity of calcium carbonate (CaCO₃). Each of their ions is said to have effect on the taste and cause diarrhea, though the acceptance level relative to taste differs greatly among regions.

Depending on pH and alkalinity, hardness more than 200mg/L can result in scale deposition and increase in soap consumption. Soft waters with hardness less than 100 mg/L have a low buffering capacity and may be more corrosive on water pipes (GDWQ 3rd edition, 2004).

8.3.6 Calcium

The acceptable level for domestic use in NT 09.14 (300 mg/L) was adopted as the criteria value.

Two water sources failed to meet the criteria value. Those are located in Kasserine and Sidi Bouzid. Many other inorganic salts were also detected with high values at the water sources, and with high hardness.

8.3.7 Chloride

The acceptable level for domestic use in NT 09.14 (300 mg/L) was adopted as the criteria value.

Four water sources failed to meet the criteria. The residue on evaporation is also high at three water sources. High concentrations of chloride give a salty taste to drinking water. It is necessary to carefully discuss this issue with the beneficiaries.

8.3.8 Magnesium

The acceptable level for domestic use in NT 09.14 (150 mg/L) was adopted as the criteria value.

One water source failed to meet the criteria value. It is located in Sidi Bouzid. Many other inorganic salts were also detected with high value at the water source.

8.3.9 Sulfate

The acceptable level for domestic use in NT 09.14 (600 mg/L) was adopted as the criteria value.

Seventeen water sources failed to meet the criteria value. Many of the water sources are located in the middle-west semi-arid region. The presence of sulfate in drinking water can cause noticeable taste.

8.3.10 Aluminum

The acceptable level to consumers of GDWQ (0.2 mg/L) was adopted as the criteria value. Four (4) water sources failed to meet the criteria.

Aluminum exists in natural condition, but aluminum sulfate and other aluminum salts are widely used in coagulation process for drinking water treatment and this is the most common source of aluminum in drinking water.

The presence of aluminum at concentrations in excess of 0.1 mg/L to 0.2 mg/L often leads to consumer complaints as a result of deposition of aluminum hydroxide floc in distribution systems and the exacerbation of discoloration of water by iron.

8.3.11 Iron

The acceptable level for domestic use in NT 09.14 (1 mg/L) was adopted as the criteria value, and one water source failed to meet the criteria.

At levels above 0.3 mg/L (GDWQ limit value), iron stains laundry and plumbing fixtures. Anaerobic ground water may contain ferrous iron (Fe^{2+}) at concentrations of up to several mg/L without discoloration or turbidity when directly pumped from a well. On exposure to the atmosphere, however, the ferrous iron (Fe^{2+}) oxidizes to ferric iron (Fe^{3+}), giving an objectionable reddish brown color to the water. Iron also promotes the growth of ‘iron bacteria,’ which derive their energy from the oxidation of ferrous iron (Fe^{2+}) to ferric iron (Fe^{3+}) and in the process deposit a slimy coating on the piping.

In this survey, the water source in which the high concentration of ferrous iron (Fe^{2+}) was detected did not appear, however, it is necessary to check the change of the concentration by monitoring.

In addition, it was found that the instrument for the iron removal had not been operated because of poor maintenance. The enforcement of the GIC for the operation of the equipment is required.

8.4 Water Quality may affect Water Supply Facilities

Possible damage to the water supply facilities includes corrosion, formation of scale and disturbance to disinfection efficacy. Generally the following parameters are considered to be connected with these possible damages:

Basic parameters	turbidity, total dissolved solid, pH, hardness, chloride, sulfate, alkalinity, erosive free carbon dioxide
Reference parameters	iron, copper, lead, zinc, nickel, ammonium, residual chlorine

In this study, there are no parameters, among the water sources assessed as acceptable, which presented extreme values beyond the criteria value. However a Tunisian expert for the rural water supply suggested the effect on the well and pump piping by erosive free carbonic acid. For this reason, the value of the erosive free carbonic acid in the newly established deep wells was calculated. Moreover, as the effect on the water supply system is often expressed by the Langelier’s index, it is also calculated.

8.4.1 Corrosive Free Carbonic Acid

Erosive free carbonic acid is a kind of free carbonic acid which acts in erosion, and is calculated as follows.

Erosive Free Carbonic Acid

The free carbonic acid (CO₂ mg/L) is total acidity (CaCO₃ mg/L)* multiplied by 0.88.

The combined carbonic acid (CO₂ mg/L) is total alkalinity (CaCO₃ mg/L) multiplied by 0.44.

*: Total acidity and alkalinity were detected as HCO₃ mg/L. It was converted as CaCO₃ mg/L for above calculation (1 CaCO₃ mg/L = 61/50 HCO₃ mg/L).

It asks for the sum of the free carbonic acid and the combined carbonic acid, and the approximate value is looked for from row IV of Table 8-1. The value of row III on the left-hand side of the approximate value is regarded as the subordinacy free carbonic acid. Then, this value is taken from the value of the free carbonic acid, and the left value is regarded as the erosive free carbonic acid.

(e.g. ETRAMIS-EDMIN)

$9.5 \times (50/61) \times 0.88 + 145 \times (50/61) \times 0.44 = 59.2$ The approximate value of row IV of Table 8-1 is 58.9, and the value of row III on the left-hand side is 3.9. Therefore the subordinacy free carbonic acid is thought to be approximately 4.0. The erosive free carbonic acid is $6.86 - 4.0 = 2.86$.

As a result, the existence of the erosive free carbonic acid was predicted in five water sources, as shown in the following Table. Since it is said that measures are required in the case erosive free carbonic acid is more than 20 mg/L with less than 6.5 of pH (Japan water and food net, 2005), the values of erosive free carbonic acid are thought to be negligible.

8.4.2 Langelier's Index

Langelier's index which indicate the activity of erosion is calculated as follows.

Langelier's Index

The Langelier's index was calculated by the following formula.

Langelire's index = pH - pH_s

$pH_s = 8.313 - \log(Ca^{2+} \text{ meq/L}) - \log(\text{Total Alkalinity CaCO}_3 \text{ meq/L}) + S$

$S: 2\sqrt{\mu}/(1+\sqrt{\mu})$ $\mu: 2.5 \times 10^{-5} sd$ sd : Total Dissolved Solid (mg/L)

(e.g. ETRAMIS-EDMIN)

$pH_s = 8.313 - \log(63/40.1/2) - \log(145/61) + 2\sqrt{0.000025 \times 1900}/(1+\sqrt{0.000025 \times 1900}) = 7.80$

Langelire's index is $6.90 - 7.80 = -0.90$

The Langelier's index is generally used as a corrosive standard of water. If the Langelier's index is equal or superior to zero, the water is considered to be non-corrosive. If a Langelier's index is more than -1.0, it is supposed that it acts on corrosive protection (Japan drinking water analysis method, 2001). -1.0 or less water sources were found at MZOUGHHA-ZELDOU and EL ISLAH of subprojects for 2005. Especially the Langelier's index of EL ISLAH is high, and it is recommended to measures such as aeration of supply of alkaline agent. As for eight other water sources, in which Langelier's index were minus, pH and alkalinity tend to be low. Total alkalinity should be measured for the water sources of low pH level. Then, if Langelier's index is lower than -1.0, it is desirable to implement measures to prevent corrosion.

Table 8-6 Water Sources with Erosive Free Carbonic Acid and Langelire's Index (less than 0)

Year	Water Source	Erosive free carbonic acid	Langelire's index
2005	MZOUGHHA-ZELDOU (1st & 2nd)	-	-1.13
	KEF DAAROUGUI-SFAYA	-	-0.03
	CEBELAT AAMMAR	1.52	-
	SOUALHIA	-	-0.79
	EL ISLAH	-	-1.50
2006	SIDI ACHOUR	-	-0.67
	GHANGUET ZGALASS	-	-0.03
	BNANA ET OULED BENAJEH	0.48	-
	AIN JAFFEL	1.47	-
	GARD HADID	-	-0.17
	ETRAMIS-EDMIN	2.86	-0.90
	SLATNIA	4.47	-
	SMAIDIA	-	-0.02
ESBIAAT, EL ARGOUB ET SOUALHIA	0.99	-0.05	

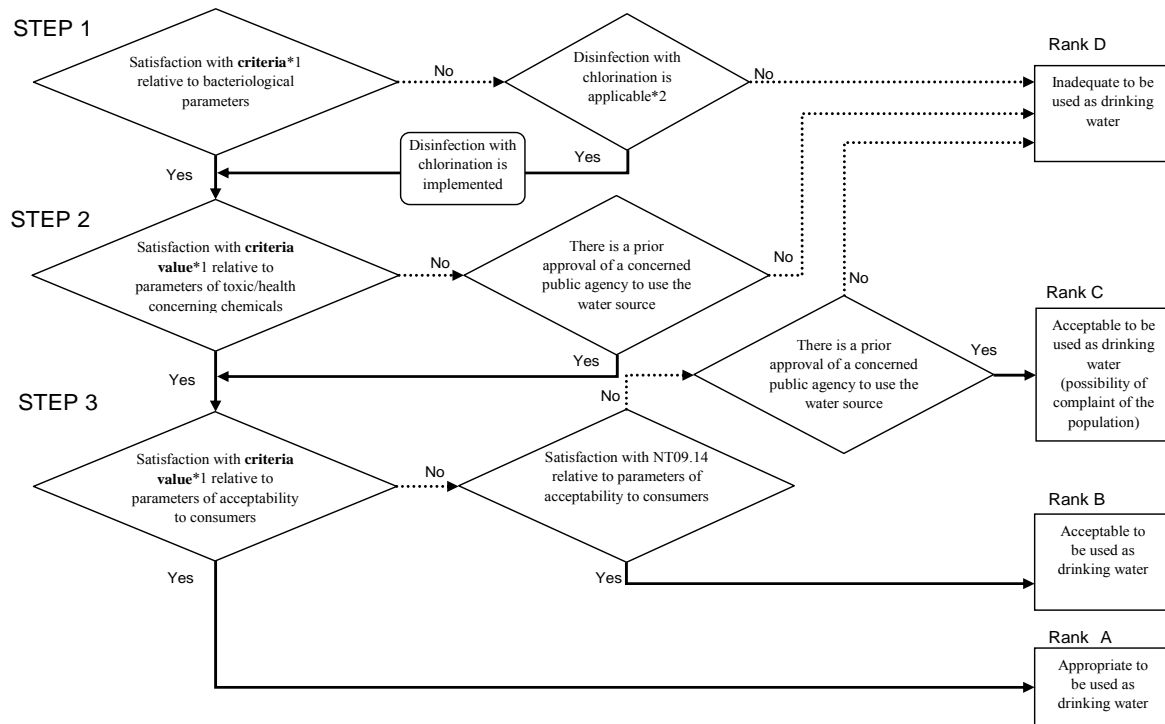
Source: Water quality survey under the Study

8.5 Assessment of Each Water Source

Water source assessment was carried out in order to clarify the acceptability of each water source, and also in order to clarify the recommendation of the utilization at the subproject when the water source was judged as acceptable.

8.5.1 Work flow of assessment

The work flow for assessment of the individual water source is illustrated below.



Note: Separate consideration will be made in case there is a possibility of damage to a water supply facility

*1): NT09.14 and GDWQ are used as the criteria.

*2): Disinfection with chlorination is applied to total coliform of less than 50 MPN/100mL.

Figure 8.1 The Flow of the Water Source Assessment

The major check items provided in the work flow are based on the following considerations:

(a) Feasibility of application of water treatment technologies

For planning of water supply projects in small community, it is necessary to assess the water sources to be used as drinking water taking into consideration not only the direct impacts of the water quality on the population, but also the technical and economical feasibility of application of water treatment technologies to remove concerned substances, so that operation and maintenance by the population can be assured. Ordinary technologies such as sedimentation and filtration or the advanced technologies including ion exchange, reverse osmosis membrane, etc. will be costly and necessitate employment of experts for operation. Introduction of these technologies will be therefore not realistic. Accordingly, only disinfection by chlorination with simple method of operation and maintenance was considered as a realistic way for improvement of the water quality.

(b) Approval of public agency on utilization of water sources

Water resources differ from one place to another in Tunisia. There are differences in utilization of water and dependence of the population on the water supply projects between the south and the north. Under such conditions, there are cases in which regional agencies

allows to use water sources according to the local conditions. This particular consideration of the GOT was taken into account in the water source assessment.

The regional governmental agencies in charge of the public health reportedly judge the adequacy of water sources quality for rural water supply in Tunisia. There are some cases in which utilization of water source is accepted even though the water quality does not meet the NT09.14. This situation is explained as such: the agency which is familiar with the conditions of “water and health” of the concerned area judges the risk to use the water source. Taking it for granted that this kind of decision should be respected the accepted value in the vicinity of the project area by public agencies were considered as the basis for water source assessment of the Study.

However, since no such values have been informed by the Implementing Agency of Tunisia, there are no cases in which water source assessments were made on such basis for subprojects 2005.

(c) Tunisian standard for acceptability of population

The Tunisian standard generally gives milder criteria value than those recommended by GDWQ for the water analysis parameters relative to public acceptability. It was judged that this difference was the results of consideration of the local condition, and accordingly adopted as an indicator of the level of the public acceptability, based on which the concerned water sources are assessed as rank B or rank C.

Each water source was assessed and classified into one of the four ranks of A, B, C and D. These ranks designate the followings:

- Rank A: Appropriate to be used as drinking water
- Rank B: Acceptable to be used as drinking water
- Rank C: Acceptable to be used as drinking water, however, there is a possibility of complaint of the population
- Rank D: Inadequate to be used as drinking water

The water source was assessed as rank “D” in cases that all answers in STEP 1 or 2 were “NO”. Even if the answer was “YES” in STEP 1 and 2, the water source was assessed again, and assessed from rank “A” to “D” depending on the answer in STEP 3.

In normal work flow, the water source can be judged to have no problem in terms of water quality if it is finally assessed as rank A. However, if the final assessment was the result of “YES” to the item < Public agencies approved to use the water source>, there is a possibility that the water quality does not meet the criteria value for the parameters categorized as <possible damage to water supply facilities> mentioned in Table 3-1. In this case, separate

consideration should be made depending on the actual situation. However, such a case was not observed in this Study.

8.5.2 Results of assessment

The results of water source assessment are shown in Table 8-2.

As shown in the Table, 15 water sources were assessed as rank A, 34 sources as rank B, 25 sources rank C and 31 sources as rank D. In two water sources, Ammar and Essaafi in Mahdia for project 2006, which are assessed as rank B, the water quality was not analyzed, because the water sources are the same as the water source, Rquiat, which was assessed as rank B in 2004.

The water analysis of the projected water source for the OULED LAHTAB subproject in the governorate of KASSERINE shows the 1.6mg/L of fluoride concentration which does not meet the criterion value. However, the Study Team decided to make use of the water source considering the facts that the Ministry of Public Health judged the said value to be lower than the specified value in “NT 09.14”, and the difficult conditions described below to secure domestic water in the subproject area:

- 1) It is quite difficult to develop other water sources because CRDA KASSERINE had constructed three deep wells in and around the subproject area, however, two of them were not suitable as a drinking water supply source. The projected water source is the remaining one, which is a deep well.
- 2) Population buys water from water vendors with 10DT/m³
- 3) Population is also making use of rain water; however, there are not any appropriate facilities to harvest the rain water.
- 4) Water vendors take water from shallow wells constructed on the terrace of neighboring wadi. Flogs and maybe other creatures live in the shallow wells and some of them are accidentally brought to the water tank of houses by water vendors. These shallow wells dry up in summer and water vendors have to go to other shallow wells around 12km away.
- 5) A woman in the area told that young as well as often suffered from diarrhea which was supposedly brought by insufficient and unsanitary water.

For the above reasons, OULED LAHTAB was categorized as Rank C.

The regional result of categorization is shown in the following Table.

Table 8-8 Regional Result of Categorization

Region	Rank A		Rank B		Rank C		Rank D	
	2005	2006	2005	2006	2005	2006	2005	2006
Seacoast region	1	2	10	6	3	2	1	1
Northwest hilly region	2	4	4	3	3	3	6	4
Middle west semi-arid region	1	5	9	2	6	8	12	7
Total	4	11	23	11	12	13	19	12

Source: Water quality survey under the Study

The results of water analysis for water sources are shown in Table 7-1. The condition and recommended actions of each water sources, which shall be used for the subproject 2006, are shown in Table 8-3.

9 RECOMENDATIONS

9.1 Establishment of a provisional guideline of drinking water quality of water sources for RWS

There are cases in Tunisia in which public agencies make their individual judgment on utilization of water sources for RWS projects. Therefore, public agencies, which are more familiar with local characteristics relative to RWS, should be considered as the most competent to make the most appropriate judgment. However, prior judgment of this kind was not made available officially during the study, although it was intended to incorporate the said judgment as a basis for the water source assessment. Taking into consideration the importance of securing water sources for future development of RWS projects, it is recommended to establish a tentative guideline of drinking water quality of water sources for RWS projects.

9.2 Thoroughness of Chlorination

DGGREE requires that minimum 0.1 mg/L of residual free chlorine should be detected at the farthest distribution point to ensure effective disinfection by chlorine. The results of water analysis of 12 water sources out of 25 did not meet the requirement of DGGREE. It is noted that no residual free chlorine was detected at 10 water sources.

For water supply in small communities which is operated by local people, priority should be given to minimize bacteriological contamination which may have vital effect on human health. In this respect, it is necessary to maintain 0.1 mg/L as the minimum value for residual free chlorine to be detected at the farthest distribution point.

JICA Study Team observed the condition of chlorination and monitoring of GIC and SONEDE. Chlorination in both GIC and SONEDE are implemented with automated system, however it was not clear that they always provide chlorine (sodium hypochlorite, NaOCl). SONEDE monitors the residual chlorine once a week and confirm whether 0.3 mg/L of residual chlorine is maintained at the farthest distribution point. It also provides a preparatory chlorination system at a pumping station and they prevent lack of chlorination. On the other hand, many of GICs are not conducting the monitoring, and according to the monitoring results of health section, the concentration of residual chlorine is often null especially at the farthest distribution point. The concentration of residual chlorine may be changed by other parameters in water. It means the adequate volume of chlorine is different depending on the water quality. Therefore it is necessary to monitor the residual chlorine periodically and supply an adequate volume of the chlorine thoroughly.

9.3 Sensitization toward Water Quality

Sensitization is indispensable for the safety of water supply and conservation of water sources. According to the interview to an AGR, local people may complain about turbidity and taste of water, however people do not have knowledge about other water quality parameters, and they are not interested in. They also have little consciousness of water source conservation and most activities for conservation are not performed.

For this reason, as for safety water supply, AGR and health section should compile a water quality survey result, summarize influences on health of each parameter, and hold sensitization meetings to the local population. It is recommended to make infants drink bottled water (mineral water). This would reduce the illnesses that might be caused by drinking water quality.

Regarding the conservation of water sources, it is thought to be possible to secure the water and reduce the concentration of nitrate, if catchment areas are cleared, forest area is maintained or increased, chemical fertilizer use is reduced in the catchment area.

9.4 Investigation of Rough Wells

If a rough well is polluted, pollutants from cracks pollute deep aquifer, along with a casing. Many rough wells exist all over the world, and if there are those in Tunisia, expansion of pollution might be decreased with investigation of cracks in wells including shallow wells and by repairing them, especially in areas where concentrations of nitrate tend to be high (such as LE KEF) and the area where those of fluoride and boron tend also to be high (such as MEDENINE). As the concentrations of pollutants of aquifers would fall in the long run consequently, it is thought that appropriate water sources shall increase in future.

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Table 3-2 Characteristics of Category of Water Analysis Parameters

Category of parameters		Characteristics
Potential hazard to public health	Bacteriological parameters	Direct or indirect contamination of drinking water with human and animal excreta may frequently cause waterborne diseases. Because the bacteriological contamination may expand over a wide range and rapidly.
	Toxic chemicals	Waterborn diseases due to strong toxic chemicals will cause acute health problems and also carcinogenic and other chronic influences.
	Health concerning chemicals	Some chemical constituents such as heavy metals and substances that are carcinogenic have cumulative toxic properties. Long-term exposure may cause chronic
Effects on drinking water characteristics	Acceptability to consumers	Water which is poor in appearance, odour or taste will itself have no direct consequences to the public health but will lead to complaints of consumers, who may eventually use water sources which are less safe.
	Possible damage to the water supply facilities	Corrosion, formation of scale and/or low efficacy of disinfection will take place. It is necessary to take into account the initial investment and O/M cost in the feasibility of the project.

Table 3-3 Criteria Value of Water Quality Analysis Parameters

Category	Constituents (English)	abb.	Unit	NT 09.14 (1983)			WHO Guideline (2004)		
				Criteria of Drinking-Water (*1)	Criteria for Health Concerning (*2)	Criteria of Acceptability for domestic use (*3)	Criteria of Health Concerning (*4)	Criteria of Acceptability to Consumers (*5)	
Potential Hazard to Public Health	1 Bacteriological Parameters	1 Total coliform bacteria	CT	MPN/100ml	-	0	-	0	-
		2 Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-
		3 Faecal streptococci	ST	MPN/100ml	-	-	-	-	-
		4 <i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-
	2 Toxic Chemicals	1 arsenic	As	µg/l	50	-	-	10(P)	-
		2 cadmium	Cd	mg/l	0.005	-	-	0.003	-
		3 cyanide	Cn	mg/l	0.05	-	-	0.07	-
		4 total mercury	Hg	µg/l	1	-	-	1	-
		5 lead	Pb	µg/l	50	-	-	10	-
		6 selenium	Se	µg/l	10	-	-	10	-
		7 antimony	Sb	µg/l	20	-	-	18	-
		8 silver	Ag	mg/l	0.02	-	-	-	-
		9 barium	Ba	mg/l	- (*6)	-	-	0.7	-
		10 molybdenum	Mo	mg/l	- (*6)	-	-	0.07	-
	3 Health Concerning Chemicals	11 fluoride	F	mg/l	-	-	-	1.5	-
		12 nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50(*7)	-
		13 nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3(*8) / 0.2(P)(*9)	-
14 boron		B	mg/l	-	-	-	0.5(T)	-	
15 nickel		Ni	mg/l	-	-	-	0.02(P)	-	
16 chromium		Cr	mg/l	-	-	-	0,05(P)	-	
17 cobalt		Co	mg/l	- (*6)	-	-	-	-	
No Direct Consequence to Health	4 Acceptability to Consumers	1 total chlorine	Cl ⁻	mg/l	-	-	-	5	-
		1 color (*10)	-	TCU	-	-	50 TCU	-	15 TCU
		2 odour	-	dilution(*11)	-	-	acceptable	-	-
		3 taste	-	dilution(*11)	-	-	acceptable	-	-
		4 turbidity	-	NTU	-	-	25 NTU	-	5 NTU
		5 residue on evaporation	-	mg/l	-	-	2,500	-	-
		6 total dissolved solids	TDS	mg/l	-	-	-	-	1,000
		7 pH	pH	-	-	-	6.5 - 8.5	-	-
		8 Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-
		9 mineral oils (*12)	-	mg/l	-	-	0.3	-	-
		10 phenolic compounds	-	mg/l	-	-	0.002	-	-
		11 hardness (CaCO ₃)	-	mg/l	-	-	1000	-	-
		12 calcium	Ca	mg/l	-	-	300	-	-
		13 chloride	Cl	mg/l	-	-	600	-	250
		14 copper	Cu	mg/l	-	-	1	2(P)	1
		15 iron	Fe	mg/l	-	-	1	-	0.3
		16 magnesium	Mg	mg/l	-	-	150	-	-
		17 manganese	Mn	mg/l	-	-	0.5	0.4	0.1
		18 sulfate	SO ₄	mg/l	-	-	600.0	-	250
		19 zinc	Zn	mg/l	-	-	5	-	3
		20 aluminum	Al	mg/l	-	-	-	-	0.2
		21 sodium	Na	mg/l	-	-	-	-	200
22 ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5		
5 Potentially Affecting Water Supply Facilities	1 residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	
	1 Total alkalinity (HCO ₃)	-	mg/l	-	-	-	-	-	
	2 Mineral acidity (HCO ₃)	-	mg/l	-	-	-	-	-	
	3 Total acidity (HCO ₃)	-	mg/l	-	-	-	-	-	
	4 iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	
5 iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-		
Other Supporting Parameters	1 Temperature	T	°C	-	-	-	-	-	
	2 Electrical Conductivity	EC	mS/m	-	-	-	-	-	
	3 Potassium	K	mg/l	-	-	-	-	-	
	4 salinity	-	‰	-	-	-	-	-	

Note

- (*1) : substances listed in " Table 1 of NT 09.14(1983) 3.1 Concentrations limites provisoires pour les substances toxiques présentes dans l'eau de boisson'
- (*2) : substances listed in "Table 2 of NT 09.14(1983) 3.2 Substances chimiques susceptibles de constituer un risque pour la santé" and "4 Examen bactériologique'
- (*3) : substances listed in « NT 09.14(1983) 3.4"Substances et propriétés chimiques qui influent sur l'acceptabilité de l'eau'
- (*4) : Guideline Value in "WHO Guidelines for Drinking-Water Quality -DRAFT-,17 February 2003~ 11, March 2003"
- (P) Significant scientific uncertainties regarding derivation of health based level:
- (T) Calculated GLV is below the level that can be achieved through practical treatment method:
- (*5) : Acceptable level in "WHO Guidelines for Drinking-Water Quality -DRAFT-,17 February 2003~ 11, March 2003"
- (*6) : substances listed as « la présence dans leau de boisson devrait être contrôlée mais les données actuelles ne permettent pas de leur assigner des limites provisoires in " NT 09.14(1983) 3.1 Concentrations limites provisoires pour les substances toxiques présentes dans l'eau de boisson"
- (*7) : guideline value for short-term exposure in bottled-fed infants
- (*8) : guideline value for short-term exposure in infants
- (*9) : Provisional guideline value for long-term exposure
- (*10) : measured value in ISO7887(1994)
- (*11) : number of necessary dilution until taste or odor disappear
- (*12) : measured value as huiles et graisses in gravimetric analysis method

Table 4-1 Minimum Limit of Determination of CITET

Water Quality Test Parameters		Unit	NT09.14 (1983)	WHO Guideline for drinking water (3rd edition)		CITET	
			Standard value	Guideline value	Acceptable level to Consumer	Satisfaction of criteria value*	Minimum limits of determination
1	Total coliform bacteria	MPN/100ml	0 in 100ml sample	0 in 100ml sample	-		1
2	Thermotolerant coliform						1
3	E-coli						1
4	Facal streptococci						1
5	arsenic (As)	mg/L	0.05	0.01	-		0.001
6	cadmium (Cd)	mg/L	0.005	0.003	-		0.003
7	cyanide (CN)	mg/L	0.05	0.07	-		0.01
8	total mercury (Hg)	mg/L	0.001	0.001	-		0.001
9	lead (Pb)	mg/L	0.05	0.01	-		0.0017
10	selenium (Se)	mg/L	0.01	0.01	-		0.001
11	antimony (Sb)	mg/L	0.02	0.02	-		0.001
12	silver (Ag)	mg/L	0.02	-	-		0.007
13	barium (Ba)	mg/L	-	0.7	-		0.003
14	molybdenum (Mo)	mg/L	-	0.07	-		0.012
15	Cobalt (Co)	mg/L	-	-	-		0.004
15	fluoride (F)	mg/L	0.8-1.7	1.5	-		0.10
16	nitrate (NO3-)	mg/L	45	50	-		0.5
17	nitrite (NO2-)	mg/L	-	3/0.2	-		0.011
18	boron (B)	mg/L	-	0.5	-		0.0057
19	nickel (Ni)	mg/L	-	0.02	-		0.005
20	chromium (Cr)	mg/L	-	0.05	-		0.005
21	color	mg/L	50 TCU ^{b)}	-	15 TCU ^{b)}		0.02
22	odour	mg/L	acceptable	-	-	-	
23	taste	mg/L	acceptable	-	-	-	
24	turbidity	mg/L	25 NTU ^{c)}	-	5 NTU ^{c)}		0.01
25	total dissolved solids (TDS)	mg/L	2,500	-	1,000	-	40
26	pH		6.5 - 8.5	-	-		3.00
27	Anionic surface active agent	mg/L	0.5	-	-		0.1
28	mineral oils	mg/L	0.3	-	-	×	10.0
29	phenolic compounds	mg/L	0.002	-	-	×	0.025
30	hardness	mg/L	1,000	-	-		2
31	calcium	mg/L	300	-	-		2.0
32	chloride (Cl)	mg/L	600	-	250		0.34
33	copper (Cu)	mg/L	1	2	1		0.011
34	iron (Fe)	mg/L	1	-	0.3		0.057
35	magnesium	mg/L	150	-	-		2.0
36	manganese (Mn)	mg/L	1	0.4	0.1		0.080
37	sulfate (SO4)	mg/L	600	-	250		0.32
38	zinc (Zn)	mg/L	5	-	3		0.068
39	aluminum (Al)	mg/L	-	-	0.2		0.050
40	sodium (Na)	mg/L	-	-	200		0.27
41	ammonia (NH4)	mg/L	-	-	1.5		0.06
42	residual chlorine	mg/L	0.3	5	0.6-1		0.001
43	Total alkalinity	mg/L	-	-	-		2
44	Mineral acidity	mg/L	-	-	-		2
45	Total acidity	mg/L	-	-	-		2
46	iron bivalent (Fe2+)	mg/L	-	-	-		0.010
47	iron trivalent (Fe3+)	mg/L	-	-	-		0.010
48	Temperature	mg/L					(0.1)
49	Electrical Conductivity	µS/cm					0.8

× : The minimum limit of determination is not satisfied with criteria value
 - : not available to analysis in CITET

Table 6-1 List of Analysis Method applied on Site Test

Parameter	Method of Detection	Reference
Temperature	Sonde PT 100 avec affichage electronique	
p H	Electrochemical method	NF T 90-008 (2001)
EC	Electrochemical method	NF EN 27 - 888 (1994)
Colour	Visual examination	ISO 7887 (1994)
Odour, Taste	Dilution method	NF EN 1622 (1997)
Residual Chlorine	Colorimetry Test	-

Table 6-2 List of Analysis Method applied for Laboratory Analysis

Parameters	Method	Reference
Sulfate, Chlorine	Ion chromatography	NF EN ISO 10304-2 (1996)
Hardness	Titration method	NF T 90-003 (1984)
Magnesium	Calculaiton by Hardness and Calcium	-
Calcium	Titration method	NF T 90-016 (1984)
Potassium	Emission analysis with flame	NF T 90-019 (1984)
Sodium	Emission analysis with flame	NF T 90-019 (1984)
Carbonate-Bicarbonate	Titration method	NF EN ISO 9963 - 1(1996)
Residue on evaporation	Gravimetric Analysis	NF T 90 - 029 (2002)
TDS	Electrochemical method	-
Anionic surface active	Colorimetric method	NF EN 903(1994)
Nitrate, Fluoride	Ion chromatography	NF EN ISO 10304-2 (1996)
Ammonia	Colorimetric method	NF T 90-015-2 (2000)
Cyanide	Colorimetric method	DIN 38405 D13/ISO 6703
Phenolic componds	Colorimetric method	XP T 90 - 109
Mineral Oil	Gravimetric Analysis	Rodier 8th edition(1996)
Nitrite	Colorimetric method	NF EN 26777 - ISO 6777
Ba, B, Cr, Mn, Mo, Ag, Al, Fe, Zn, Cu, Pb, Ni, Cd, Co	ICP Atomic Emission method	NF EN ISO 11885 (1998)
Turbidity	Colorimetric method	Process described in the turbidimeter WTW Turb 550 guide book. This method respects the standard recommendations of US EPA
As, Se, Sb	Atomic absorption (with Hydride generation	-
Mercury	Atomic absorption (with Hydride generation	NF EN 1483 (1997)
Total coliform bacteria	Liquid culture medium method	NF 90 - 413 (1985)
Thermotolerant coliform	Liquid culture medium method	NF 90 - 413 (1985)
Fecal streptocossi	Liquid culture medium method	NF 90 - 411 (1989)
<i>Escherichia coli</i>	Liquid culture medium method	NF 90 - 413 (1985)

Table 7-1(B) (1) Results of Water Quality Analysis for Project 2006

Governorate	Subproject	Category	Water source	1. Bacteriological parameters										2. Toxic Hazard to Public Health														
				Total coliform (am coliform)	Fecal coliform (mpn/100ml)	E. coli	Asenic	Cadmium	Cyanide	Total mercury	Lead	Selenium	Antimony	Silver	Barium	Molybdenum	Cobalt	Fluoride	Nitrate	Nitrite	Boro							
				CF	ST	E. Coli	As	Cu	Cn	Hg	Pb	Se	Sh	Ag	Ba	Mo	Co	F	NO ₃	NO ₂	B							
				MPN/100ml	MPN/100ml	MPN/100ml	µg/l	mg/l	mg/l	µg/l	µg/l	µg/l	µg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg NO ₃ -l	mg NO ₂ -l	mg/l							
NT (09.14.1983)	Limit for Drinking Water (*1) Health Concerning Limit(*2) Acceptable Level for domestic use(*3)	(Unit)	Water source	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
				0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WHO Guideline	Guideline Value (*4)	Acceptable Level to Consumers (*5)	Evaluation	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
				0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Governorate	Subproject	Category	Water source	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2							
				1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2					
				1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2				
				1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2				
				1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2				

LEGEND
 Bold : Exceed criteria value
 A : Acceptable
 B : Satisfactory
 C : Acceptable with complaints
 D : Inadequate

(*1): substances listed in "Table 1 of NT (09.14.1983) 3.1. Concentrations limites provisoires pour les substances toxiques présentes dans l'eau de boisson"
 (*2): substances listed in "Table 2 of NT (09.14.1983) 3.2. Substances chimiques susceptibles de constituer un risque pour la santé" and "4. Examen bactériologique"
 (*3): Guideline Value in WHO Guidelines for Drinking Water Quality, September 2004.
 (*4): Guideline Value in WHO Guidelines for Drinking Water Quality, September 2004.
 (*5): Significant scientific uncertainties (regarding derivation of health based levels)
 Calculated Q.V. is below the level that can be achieved through practical treatment methods

(*6): Acceptable level in WHO Guidelines for Drinking Water Quality, September 2004.
 (*7): substances listed as "la présence dans l'eau de boisson devrait être contrôlée mais les données actuelles ne permettent pas de leur assigner des limites provisoires"
 in "NT (09.14.1983) 3.1. Concentrations limites provisoires pour les substances toxiques présentes dans l'eau de boisson"
 (*8): Guideline value for short-term exposure in bottled drinking water. (*9): Guideline value for long-term exposure in bottled drinking water.
 (*10): Turbidity Unit (*11): Turbidity Unit (*12): number of necessary dilution until taste or odor disappears
 (*13): Nephelometric Turbidity Unit. (*14): necessary value as hardes et graisses in gravimetric analysis method
 (*15): *1 = CaCO₃mg/L>0.1 (*16): *1 = HCO₃mg/L>0.82

Table 7-1(B) (2) Results of Water Quality Analysis for Project 2006

Governorate	Subproject	Category	Potential Hazard to Public Health		No Direct Consequences to Health																																																																																				
			Toxic/Inert Concerning Chemicals		3 Acceptability to Consumers			Phenolic compound (mg/l)					Hardness			Calcium		Chloride		Copper		Iron																																																																			
Nickel Chromium	Copper	Chloride	Total chrome	Colour (°10)	Odour	Taste	Turbidity (NTU)	Residue on evaporation (mg/l)	Total dissolved solids (mg/l)	pH	mg ABSI	mg/l	mg/L	mg/l	Ca	mg/l	Ca	mg/l	Cu	mg/l	Fe	mg/l																																																																			
																							mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l																																																							
NT (9/14/1983)		Water source		5	Uncolored	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																																																																			
																							0.02(P)	2500*	0.3	0.002	100	1000	300	600	1	I	-	-	-	-	-	-	-	-	-	-	-	-																																													
																																													Acceptable Level for domestic use(*)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																							
																																																																			Guideline Value (*)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
																																																																																									Acceptable Level for Consumers (*5)
Water source	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																																																																			

LEGEND
 Bold : Exceed criteria value
 * : Acceptable
 B : Inadequate
 C : Acceptable with complaints
 D : Inadequate

Table 8-5 Subordinacy Free Carbonic Acid

Total Alkalinity (CaCO ₃ mg/L)	Combined carbonic acid (=1×0.44) (CO ₂ mg/L)	Subordinacy free carbonic acid (CO ₂ mg/L)	Total carbonic acid = + (CO ₂ mg/L)	Total Alkalinity (CaCO ₃ mg/L)	Combined carbonic acid (=1×0.44) (CO ₂ mg/L)	Subordinacy free carbonic acid (CO ₂ mg/L)	Total carbonic acid = + (CO ₂ mg/L)
5.7	2.5	0.0	2.5	159.1	70.0	7.5	77.5
11.4	5.0	0.0	5.0	164.8	72.5	8.3	80.8
17.0	7.5	0.1	7.5	170.5	75.0	9.3	84.2
22.7	10.0	0.1	10.1	176.1	77.5	10.4	87.9
28.4	12.5	0.2	12.7	181.8	80.0	11.5	91.5
34.1	15.0	0.3	15.3	187.5	82.5	12.8	95.3
39.8	17.5	0.4	17.9	193.2	85.0	14.1	99.1
45.5	20.0	0.5	20.5	198.9	87.5	15.6	103.1
51.1	22.5	0.6	23.1	204.5	90.0	17.2	107.2
56.8	25.0	0.8	25.8	210.2	92.5	19.0	111.5
62.5	27.5	0.9	28.4	215.7	95.0	20.8	115.8
68.2	30.0	1.0	31.0	221.6	97.5	22.8	120.8
73.9	32.5	1.2	33.7	227.3	100.0	25.0	125.0
79.5	35.0	1.4	36.4	233.0	102.5	27.3	129.8
85.2	37.5	1.6	39.1	238.6	105.0	29.5	134.5
90.9	40.0	1.8	41.8	244.3	107.5	32.3	139.8
96.6	42.5	2.1	44.6	250.0	110.0	35.0	145.0
102.3	45.0	2.4	47.4	255.7	112.5	37.8	150.3
108.0	47.5	2.7	50.2	261.4	115.0	40.8	155.8
113.7	50.0	3.0	53.0	267.1	117.5	43.8	161.3
119.3	52.5	3.3	56.0	272.2	120.0	47.0	167.0
125.0	55.0	3.6	58.9	278.4	122.5	50.2	172.7
130.7	57.5	3.9	61.8	284.1	125.0	54.0	179.0
136.4	60.0	4.2	64.8	289.8	127.5	57.4	184.9
142.0	62.5	4.5	67.8	295.5	130.0	61.0	191.0
147.7	65.0	4.8	71.0	301.1	132.5	64.7	197.2
153.4	67.5	5.1	74.2	306.8	135.0	68.5	203.5

Source: Japan hygienic analysis methods 2000 (Japan medical society, 2000)

Table 8-7(A) Summary of Water Source Assessment for Project 2005

ID No.	Governorate	Sub-project	Type of Water Source	Rank	Number of water analysis parameters of each category which exceeded the criteria value*			
					I	II	III-1	III-2
1	NABEUL	RMIL ET FARJOUN	SONEDE Connection	C	-	-	1	4
101	NABEUL	BASATINE	SONEDE Connection	B	-	-	-	4
2	NABEUL	BEN THAMEUR ET BKIR	SONEDE Connection	B	-	-	-	2
3	NABEUL	BIR BEN ZAHRA	SONEDE Connection	B	-	-	-	2
4	BEJA	MZOUGHHA-ZELDOU (1ST)	SONEDE Connection	C	-	-	1	1
5	BEJA	MZOUGHHA-ZELDOU (1st&2nd)	SONEDE Connection	A	-	-	-	-
6-1	BEJA	KEF DAROUGUI-SFAYA	Spring	D	-	1	-	-
6-2			Extension GR	A	-	-	-	-
7	BEJA	GASR HDID A BEJA SUD	Deep well	D	-	1	-	-
8	MEDENINE	CITE KRICHID	SONEDE Connection	D	-	2	4	3
9	MEDENINE	CITE KRID	SONEDE Connection	D	-	2	-	3
10	MEDENINE	CITE MARS	SONEDE Connection	D	-	2	-	3
11	SFAX	GARGOUR-BRAHMA FKAHIA	SONEDE Connection	B	-	-	-	3
12	SOUSSE	OULED FALEH	SONEDE Connection	B	-	-	-	1
13	KAIROUAN	GRAIRIA	Extension GR	B	-	-	-	3
14	KAIROUAN	DOUAR EL BELDI	Extension GR	B	-	-	-	1
15-1	KAIROUAN	ROUAOUNA	Deep well	D	-	1	4	3
15-2			SONEDE Connection	B	-	-	-	3
16	KAIROUAN	OULED ABBES	SONEDE Connection	B	-	-	-	4
17	KAIROUAN	OULED BOUDABOUS	Extension GR	C	-	1	1	3
18	MANOUBA	EL MAAFRINE	SONEDE Connection	B	-	-	-	1
19-1	MANOUBA	TIRASSET	SONEDE Connection	D	-	1	-	-
19-2			SONEDE Connection	C	-	-	1	-
20	SILIANA	BIR EZZOUZ	SONEDE Connection	D	-	1	-	1
21	SILIANA	SFINA	Deep well	D	-	1	3	4
22	SILIANA	FEJ-ASAKRA	Extension GR (Deep well)	B	-	-	-	2
23	SILIANA	KSAR-OULED BOUHANI	SONEDE Connection	C	-	-	1	-
24	ARIANA	CEBELAT A AMMAR	SONEDE Connection	A	-	-	-	-
25	MAHDIA	SLAIMIA	SONEDE Connection	B	-	-	-	2
26	MAHDIA	SKHAIBIA	Extension GR	B	-	-	-	1
27	MAHDIA	KHOUR	SONEDE Connection	B	-	-	-	2
28	MAHDIA	RMADHNA	SONEDE Connection	B	-	-	-	2
29	JENDOUBA	SOUALHIA	SONEDE Connection	B	-	-	-	1
30	JENDOUBA	EL ISLAH	SONEDE Connection	B	-	-	-	2
31-1	LE KEF	EZZAGAYA	SONEDE Connection	B	-	-	-	2
31-2			SONEDE Connection	C	-	-	1	4
32-1	LE KEF	OULED GANA	Extension GR (Spring)	D	-	2	-	1
32-2			SONNEDE Connection	D	-	2	-	4
33-1	GAFSA	HENCHIR BONCHMEL	Extension GR	D	-	3	2	1
33-2			Deep well for irrigation	D	-	3	3	3
33-3			Extension GR	D	-	1	1	1
34	GAFSA	EL AHCHACHNA	Extension GR	C	-	-	3	1
35	GAFSA	OUED ZITOUN	Extension GR	B	-	-	-	2
36	KASSERINE	AIN DEFLA	Deep well	C	-	-	1	2
37-1	KASSERINE	FAKET EL KHADEM	Deep well	B	-	-	-	2
37-2			Deep well 2	B	-	-	-	2
38-1	KASSERINE	OULED BARKA	Deep well	D	-	1	-	2
38-2			Deep well (Bouganem)	C	-	-	3	1
38-3			Extension GR (ZID)	B	-	-	-	1
39	KASSERINE	SIDI SHIL	Deep well	A	-	-	-	-
40	SIDI BOUZID	MBARKIA (SIDI ALIBEN AOUN)	Extension GR	C	-	-	2	3
41	SIDI BOUZID	OULED NAOUI	Extension GR	B	-	-	-	1
42	SIDI BOUZID	OULED YOUSSEF GALLEL	Extension GR	C	-	-	1	3
43	MAHDIA	RQUIAT	SONNEDE Connection	C	-	-	-	3
44-1	SIDI BOUZID	OUAMRIA-ABABSIA	Extension GR	D	-	2	1	3
44-2			Extension GR	D	-	2	1	3
45	SIDI BOUZID	GOULEB	Extension GR	D	-	2	1	3
46	SIDI BOUZID	GHRIST EST	SONEDE Connection	D	-	2	2	2

* Categorization of key constituents

Category	Classification
I	Total coliform bacteria, thermotolerant coliform and E. Coli exceed 25 MPN/100mL
II	Toxic/Health concerning chemicals exceed criteria value
III-1	Parameters of no direct consequences to health exceed the standard value of NT 09.14
III-2	Parameters of no direct consequences to health exceed acceptable level of the GDWQ, although meet the standard value of NT 09.14.

Evaluation
A: Adequate
B: Acceptable with small Complaints
C: Acceptable with large complaints
D: Inadequate

Table 8-7 (B) Summary of Water Source Assessment for Project 2006

ID No.	Pjt No.	Governorate	Sub-project	Type of Water Source	Rank	Number of water analysis parameters of each category which exceeded the criteria value*			
						I	II	III-1	III-2
1	1	ARIANA	EL ACHICHI	SONEDE Connection	B	-	-	-	2
2	2	MANOUBA	SIDI ACHOUR	SONEDE Connection	A	-	-	-	-
3	-	NABEUL	BOULAHOUADH	SONEDE Connection	B	-	-	-	3
4-1	-	NABEUL	TASSELMINE ET SOUASSI	EXTENSION GR	D	1	-	-	5
4-2	-	NABEUL	TASSELMINE ET SOUASSI	SONEDE Connection	B	-	-	-	2
5	7	BEJA	AIN DAM-NEFZA	SONEDE Connection	A	-	-	-	-
6	-	BEJA	AIN SOLTANE	DEEP WELL	D	2	-	-	1
10	-	LE KEF	EL ARGOUB-ERRHAMNA	DEEP WELL	D	-	1	-	1
11-1	11	SILIANA	AGBA	SPRING	A	-	-	-	-
11-1	11	SILIANA	AGBA	SPRING	A	-	-	-	-
11-2	-	SILIANA	AGBA	SONEDE Connection	B	-	-	-	1
12	9	SILIANA	Ghanguest Zgalass	EXTENSION GR	B	-	-	-	3
13	12	SILIANA	NSIRAT	SONEDE Connection	A	-	-	-	-
14	10	SILIANA	SIDI DAHER	EXTENSION GR	C	-	-	2	2
15	14	KAIROUAN	Ghanzour	DEEP WELL	C	-	-	1	3
16-1	-	KAIROUAN	Gouaad	DEEP WELL	D	-	2	2	2
16-2	15	KAIROUAN	Gouaad	EXTENSION GR	A	-	-	-	-
19	23	KASSERINE	BNANA / Ouled BenaJeh	DEEP WELL	A	-	-	-	-
20	24**	KASSERINE	Mkimen	DEEP WELL	D	-	4	-	3
21	28	SIDI BOUZID	Ain Jaffel	DEEP WELL	A	-	-	-	-
26	-	SIDI BOUZID	Souassia	DEEP WELL	D	-	2	5	4
27	29	SIDI BOUZID	Gard Hadid	DEEP WELL	C	-	-	1	-
28	18	SOUSSE	Chraifia	EXTENSION GR	B	-	-	-	3
29	19	MAHDIA	Ammar	SONEDE Connection	B	Same water source with Rquiat of project 2005			
30	20	MAHDIA	Essaafi	SONEDE Connection	B	Same water source with Rquiat of project 2005			
31	32	GAFSA	Enjamia	SONEDE Connection	C	-	-	1	2
32	-	MEDENINE	Cite Chaabat El Maarek	SONEDE Connection	D	-	1	-	2
33	-	MEDENINE	Hlalma et Oudhanachaaibia	SONEDE Connection	D	-	1	-	3
34	-	MEDENINE	Togui et Rahhalchaaibia	SONEDE Connection	D	-	1	-	3
35	25	KASSERINE	Chaaibia	DEEP WELL	A	-	-	-	-
36	26	KASSERINE	Oued Lahtab	DEEP WELL	C	-	1	-	-
37	-	JENDOUBA	El Frachich	DEEP WELL	D	-	2	-	2
38	8	BEJA	Gmara	SONEDE Connection	C	-	-	1	-
39	21	LE KEF	Forna	SONEDE Connection	C	-	-	1	-
40	22	LE KEF	El Ouena	EXTENTION GR	A	-	-	-	-
41	3	BIZERTE	Etramis-Edmin	DEEP WELL	C	-	-	1	2
42	4	BIZERTE	El Kalboussi	DEEP WELL	A	-	-	-	-
43	5	BIZERTE	Sidi Hassen	SONEDE Connection	C	-	-	1	1
44	16	KAIROUAN	Khoualdia	EXTENSION GR	B	-	-	-	4
45	17	KAIROUAN	Hsainia	EXTENSION GR	C	-	-	1	1
46	31	SIDI BOUZID	Slatnia	EXTENSION GR	C	-	-	4	2
47	30	SIDI BOUZID	Ouled Moussa	EXTENSION GR	C	-	-	1	-
48	-	SILIANA	Nfouta	SONEDE Connection	D	-	1	-	1
49	27	KASSERINE	Ouled Massoud Rizg	DEEP WELL	B	-	-	-	3
50	-	KAIROUAN	Frathia	EXTENSION GR	D	-	1	-	-
51	33	GAFSA	Smaidia	DEEP WELL	C	-	-	1	2
52	6	KAIROUAN	Maamria	EXTENSION GR	A	-	-	-	-
53	13	LE KEF	ESBIAAT, EL ARGOUB ET SOUALHIA	DEEP WELL	B	-	-	-	1

* Categorization of key constituents

** The water source was changed the water source of Ain defla which water quality was evaluated as acceptable for project 2005

Category	Classification	Evaluation
I	Total coliform bacteria, thermotolerant coliform and E. Coli exceed 50 MPN/100mL	A: Adequate
II	Toxic/Health concerning chemicals exceed criteria value	B: Acceptable
III-1	Parameters of no direct consequences to health exceed the standard value of NT 09.14	C: Acceptable with complaints
III-2	Parameters of no direct consequences to health exceed acceptable level of the GDWQ, although meet the standard value of NT 09.14.	D: Inadequate

Note: There are 35 water sources which are categorized from Rank A to C, because one replaced subproject 'BOULAHOUADH' is included.

Table 8-9 (1) Evaluation of Projected Water Sources 2006

Project 1

Governorate	Subproject	Water Source	Rank
ARIANA	EL ACHICH	SONEDE Connection	B
Noticable Parameters			
TDS: 1500 mg/L, Sulfate:287 mg/L			
Evaluation and Recommendation			
Acceptable The taste was a bit salty. TDS and sulfate were above the GDWQ Acceptable level to consumers. However the concentrations were not so high relatively to Tunisia, therefore complaint is not predicted.			

Project 2

Governorate	Subproject	Water Source	Rank
MANOUBA	SIDI ACHOUR	SONEDE Connection	A
Noticable Parameters			
Residual Chlorine: 0.08 mg/L, Langelier's index: -0.67			
Evaluation and Recommendation			
Adequate The concentration of residual chlorine is low. It should be chlorinated for the new water supply system. Langelier's index is relatively low. It has not reached the corrosive level, however, pH should be monitored.			

Project 3

Governorate	Subproject	Water Source	Rank
BIZERTE	ETRAMIS-EDMAIN	Deep Well	C
Noticable Parameters			
Faecal streptococci: 7 MPN/100ml, TDS: 1900 mg/L, Phenolic compounds: 0.04 mg/L, Chloride: 588 mg/L, Ammonia: 302 mg/L			
Evaluation and Recommendation			
Acceptable with complaint The existence of faecal streptococci suggests the faecal contamination. The source of contamination should be found to prevent the infection. TDS and chloride were above the GDWQ Acceptable level to consumers. Phenolic compounds was higher than the Tunisian standard. It might make foul smell. Langelier's index is relatively low and erosive free carbonic acid was detected. It has not been the corrosive level, however, pH			

Project 4

Governorate	Subproject	Water Source	Rank
BIZERTE	EL KALBOUSSI	Deep Well	B
Noticable Parameters			
Total coliform 35 MPN/100ml, Turbidity: 11.6 NTU			
Evaluation and Recommendation			
Acceptable The MPN of total coliform is high. Furthermore turbidity which weaken the effect of disinfection is also high. The chlorination must be strictly implemented to maintain the residual chlorine at the farthest distribution point. If the residual chlorine will be null at the furthest distribution point, other water			

Project 5

Governorate	Subproject	Water Source	Rank
BIZERTE	SIDI HASSEN	SONEDE Connection	C
Noticable Parameters			
TDS: 1400 mg/L, Phenolic compounds: 0.046 mg/L, Chloride: 288 mg/L, Residual chlorine: 0.02 mg/L			
Evaluation and Recommendation			
Acceptable with complaint The concentration of residual chlorine is low. It should be chlorinated for the new water supply system. Phenolic compounds was higher than the Tunisian standard. It might make foul smell.			

Table 8-9 (2) Evaluation of Projected Water Sources 2006

Project 6

Governorate	Subproject	Water Source	Rank
KAIROUAN	MAAMRIA	Extension GR	A
Noticable Parameters			
NO ³ : 33.4 mg/L			
Evaluation and Recommendation			
Adequate The concentration of nitrate is relatively high though it is less than the standard value. The fertilizer use in the catchment area should be careful.			

Project 7

Governorate	Subproject	Water Source	Rank
BEJA	AIN DAM-NEFZA	SONEDE Connection	A
Noticable Parameters			
No anxious parameter			
Evaluation and Recommendation			
Adequate Monitoring should be exactly implemented according to the instruction of health section.			

Project 8

Governorate	Subproject	Water Source	Rank
BEJA	GMARA	SONEDE Connection	C
Noticable Parameters			
Phenolic compounds: 0.047 mg/L			
Evaluation and Recommendation			
Acceptable with complaint Phenolic compounds was higher than the Tunisian standard. It might make foul smell.			

Project 9

Governorate	Subproject	Water Source	Rank
SILIANA	GHANGEUET ZGALASS	Extension GR	B
Noticable Parameters			
TDS: 1960 mg/L, Sulfate: 542 mg/L, Sodium: 320 mg/L, Residual chlorine: 0 mg			
Evaluation and Recommendation			
Acceptable The concentration of residual chlorine is null. It should be chlorinated for the new water supply system. TDS and chloride were above the GDWQ Acceptable level to consumers.			

Project 10

Governorate	Subproject	Water Source	Rank
SILIANA	SIDI DAHER	Extension GR	C
Noticable Parameters			
Faecal streptococci: 4 MPN/100ml, Residue on Evaporation: 2320 mg/L, Hardness: 1270 mg/L, Sulfate: 1150 mg/L, Residual chlorine: 0 mg/L			
Evaluation and Recommendation			
Acceptable with complaint The existence of faecal streptococci suggests the faecal contamination. The source of contamination should be found to prevent the infection. The concentration of residual chlorine was null. It should be chlorinated for the new water supply system. Hardness and sulfate were above the Tunisian standard. These might lead to complaints, therefore the agreement with users is necessary.			

Table 8-9 (3) Evaluation of Projected Water Sources 2006

Project 11

Governorate	Subproject	Water Source	Rank
SILIANA	AGBA	SPRING	A
Noticable Parameters			
Thermotolerant coliform: 17 MPN/100ml			
Evaluation and Recommendation			
Adequate The existence of thermotolerant coliform suggests the faecal contamination. The source of contamination should be found to prevent the infection.			

Project 12

Governorate	Subproject	Water Source	Rank
SILIANA	NSIRAT	SONEDE Connection	A
Noticable Parameters			
NO ³⁻ : 33.4 mg/L			
Evaluation and Recommendation			
Adequate The concentration of nitrate is relatively high though it is less than the standard value. The fertilizer use in the catchment area should be careful.			

Project 13

Governorate	Subproject	Water Source	Rank
LE KEF	ESBIAAT, EL ARGOUB ET SOUALHIA	Deep Well	C
Noticable Parameters			
Phenolic compounds: 0.047 mg/L			
Evaluation and Recommendation			
Acceptable with complaint Phenolic compounds was higher than the Tunisian standard. It might make foul smell.			

Project 14

Governorate	Subproject	Water Source	Rank
KAIROUAN	GHAZOUR	Deep Well	C
Noticable Parameters			
Thermotolerant coliform: 5 MPN/100ml, Turbidity: 19.7 NTU, Phenolic compounds: 0.216 mg/L			
Evaluation and Recommendation			
Acceptable with complaint The existence of thermotolerant coliform suggests the faecal contamination. The source of contamination should be found to prevent the infection. Furthermore turbidity which weaken the effect of disinfection is also high. The chlorination must be strictly implemented to maintain the residual chlorine at the farthest distribution point. Phenolic compounds was higher than the Tunisian standard. It might make foul smell.			

Project 15

Governorate	Subproject	Water Source	Rank
KAIROUAN	GOUAAD	Extension GR	A
Noticable Parameters			
Residual chlorine: 0 mg/L			
Evaluation and Recommendation			
Adequate The concentration of residual chlorine is null. It should be chlorinated for the new water supply system.			

Table 8-9 (4) Evaluation of Projected Water Sources 2006

Project 16

Governorate	Subproject	Water Source	Rank
KAIROUAN	KHOUALDIA	Extension GR	B
Noticable Parameters			
Faecal streptococci: 3 MPN/100ml, TDS: 1830 mg/L, Chloride: 337 mg/L, Sulfate: 393 mg/L, Residual			
Evaluation and Recommendation			
Acceptable The existence of faecal streptococci suggests the faecal contamination. The source of contamination should be found to prevent the infection. The concentration of residual chlorine was null. It should be chlorinated for the new water supply system. TDS, chloride and sulfate were above the GDWQ Acceptable level to consumers. However the concentrations were not so high relatively in Tunisia, therefore complaint is not			

Project 17

Governorate	Subproject	Water Source	Rank
KAIROUAN	HSAINIA	Extension GR	C
Noticable Parameters			
Phenolic compounds: 0.078 mg/L, Residual chlorine: 0 mg/L			
Evaluation and Recommendation			
Acceptable with complaint Phenolic compounds was higher than the Tunisian standard. It might make foul smell. The concentration of residual chlorine was null. It should be chlorinated for the new water supply system.			

Project 18

Governorate	Subproject	Water Source	Rank
SOUSSE	CHRAIFIA	Extension GR	B
Noticable Parameters			
Boron: 0.493 mg/L, TDS: 2000 mg/L, Chloride: 424 mg/L, Sodium: 343 mg/L			
Evaluation and Recommendation			
Acceptable TDS, chloride and sodium were above the GDWQ Acceptable level to consumers. The concentration of boron is relatively high. These should be monitored.			

Project 19

Governorate	Subproject	Water Source	Rank
MAHDIA	AMMAR	SONEDE Connection	B
Noticable Parameters			
TDS: 1460 mg/L, Sulfate:363 mg/L			
Evaluation and Recommendation			
Acceptable (Same water source with Rquiat of project 2005) The taste was a bit salty. TDS and sulfate were above the GDWQ Acceptable level to consumers. However the concentrations were not so high relatively in Tunisia, therefore complaint is not predicted.			

Project 20

Governorate	Subproject	Water Source	Rank
MAHDIA	ESSAAFI	SONEDE Connection	B
Noticable Parameters			
TDS: 1460 mg/L, Sulfate:363 mg/L			
Evaluation and Recommendation			
Acceptable (Same water source with Rquiat of project 2005) TDS and sulfate were above the GDWQ Acceptable level to consumers. However the concentrations were not so high relatively in Tunisia, therefore complaint is not predicted.			

Table 8-9 (5) Evaluation of Projected Water Sources 2006

Project 21

Governorate	Subproject	Water Source	Rank
LE KEF	FORNA	SONEDE Connection	C
Noticable Parameters			
NO3-: 33.4 mg/L, Phenolic compounds: 0.047 mg/L			
Evaluation and Recommendation			
Acceptable with complaint Phenolic compounds was higher than the Tunisian standard. It might make foul smell.			

Project 22

Governorate	Subproject	Water Source	Rank
LE KEF	EL OUENA	Extension GR	A
Noticable Parameters			
No anxious parameter			
Evaluation and Recommendation			
Adequate Monitoring should be exactly implemented according to the instruction of health section.			

Project 23

Governorate	Subproject	Water Source	Rank
KASSERINE	BNANA ET OULED BENAJEH	Deep Well	A
Noticable Parameters			
No anxious parameter			
Evaluation and Recommendation			
Adequate Monitoring should be exactly implemented according to the instruction of health section.			

Project 24

Governorate	Subproject	Water Source	Rank
KASSERINE	MKIMEN	Deep Well	C
Noticable Parameters			
TDS: 1520 mg/L, Sulfate:328 mg/L, pH: 8.6			
Evaluation and Recommendation			
Acceptable with complaint (Same water source with Ain defla of project 2005) pH was above the Tunisian standard. It might prevent the disinfection.			

Project 25

Governorate	Subproject	Water Source	Rank
KASSERINE	CHAAIBIA	Deep Well	A
Noticable Parameters			
Fluoride: 1.38 mg/L			
Evaluation and Recommendation			
Adequate The concentration of fluoride was relatively high. Monitoring should be exactly implemented.			

Table 8-9 (6) Evaluation of Projected Water Sources 2006

Project 26

Governorate	Subproject	Water Source	Rank
KASSERINE	OUED LAHTAB	Deep Well	C
Noticable Parameters			
Fluoride: 1.6 mg/L			
Evaluation and Recommendation			
Acceptable with complaint The concentration of fluoride was above the GDWQ guideline level and the information disclosure to the users is recommended. Monitoring should be exactly implemented according to the instruction of health			

Project 27

Governorate	Subproject	Water Source	Rank
KASSERINE	OULED MASSAOUD RIZG	Deep Well	B
Noticable Parameters			
TDS: 1550 mg/L, Sulfate:505 mg/L			
Evaluation and Recommendation			
Acceptable (Same water source with Rquiat of project 2005) TDS and sulfate were above the GDWQ Acceptable level to consumers. However the concentrations were not so high relatively in Tunisia, therefore complaint is not predicted.			

Project 28

Governorate	Subproject	Water Source	Rank
SIDI BOUZID	AIN JAFFEL	Deep Well	A
Noticable Parameters			
No anxious parameter			
Evaluation and Recommendation			
Adequate Monitoring should be exactly implemented according to the instruction of health section.			

Project 29

Governorate	Subproject	Water Source	Rank
SIDI BOUZID	GARD HADID	Deep Well	C
Noticable Parameters			
Phenolic compounds: 0.027 mg/L			
Evaluation and Recommendation			
Acceptable with complaint Phenolic compounds was higher than the Tunisian standard. It might make foul smell.			

Project 30

Governorate	Subproject	Water Source	Rank
SIDI BOUZID	OULED MOUSSA	Extension GR	C
Noticable Parameters			
Phenolic compounds: 0.042 mg/L			
Evaluation and Recommendation			
Acceptable with complaint Phenolic compounds was higher than the Tunisian standard. It might make foul smell.			

Table 8-9 (7) Evaluation of Projected Water Sources 2006

Project 31

Governorate	Subproject	Water Source	Rank
SIDI BOUZID	SLATNIA	Extension GR	C
Noticable Parameters			
Boron: 0.533 mg/L, Residue on Evaporation: 2250 mg/L, TDS: 2000 mg/L, Phenolic compounds: 0.067 mg/L, Hardness: 1900 mg/L, Chloride: 749 mg/L, Sulfate: 642 mg/L			
Evaluation and Recommendation			
Acceptable with complaint The concentration of boron is above the GDWQ guideline level. Phenolic compounds was higher than the Tunisian standard. It might make foul smell. Hardness was quite above the Tunisian standard. It is predicted to lead to complaints about taste, therefore the agreement with users is necessary.			

Project 32

Governorate	Subproject	Water Source	Rank
GAFSA	ENJAIMIA	SONEDE Conection	C
Noticable Parameters			
Residue on Evaporation: 2800 mg/L, TDS: 2000 mg/L, Hardness: 984 mg/L, Chloride: 301 mg/L, Sulfate: 845 mg/L			
Evaluation and Recommendation			
Acceptable with complaint Residue on Evaporation and sulfate were above the Tunisian standard. It is predicted to lead to complaints about taste, therefore the agreement with users is necessary.			

Project 33

Governorate	Subproject	Water Source	Rank
GAFSA	SMAIDIA	Deep Well	C
Noticable Parameters			
TDS: 1400 mg/L, Phenolic compounds: 0.042 mg/L, Sulfate: 406 mg/L			
Evaluation and Recommendation			
Acceptable with complaint Phenolic compounds was higher than the Tunisian standard. It might make foul smell.			

Appendices

Appendix 1	Standard / Guideline of Water Quality	A-1
Appendix 2	Sampling manual	A-2
Appendix 3	The results of water analysis for each sub-project of project 2005/2006	A-5
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Appendix 1: Organizations relative to Standard/Guideline of Water Quality

- (1) World Health Organization (WHO), Guidelines for Drinking-water Quality: The WHO published the first edition of Guidelines for drinking-water quality in three volumes in place of the International standard for drinking-water (1972). The main reason for not promoting the adoption of International standards for drinking-water quality is to avoid that the adoption of drinking-water standards, that are too stringent, could limit the availability of water supplies that meet those standards - a significant consideration in regions of water shortage. That is, the WHO emphasizes the guideline values recommended are not mandatory limits. In order to define such limits, it is necessary to consider the guideline values in the context of local or national environmental, social, economic, and cultural conditions for which national standards will be developed. Moreover, it is planned to establish a counting process of revision of the Guideline for drinking-water quality with a number of substances of agents subject to evaluation each year. Where appropriate, addenda will be issued, containing evaluations of new substances already evaluated for which new scientific information has become available.
- (2) NT 09.14. 1983, *Norme Tunisienne Enregistrée (Qualité des eaux de boisson), Deuxieme édition juin 1997*, l'institut national de la normalisation et de la propriété industrielle (INORPI): NT09.14 was established in 1983. It referred to *the International Standards for drinking-water quality (WHO, 1972)*, *the European Standards relative to drinking-water (JOCE No L 229/11, 1980)* and *the Lebanese Standards No.75 (1970)*. The revision to 2nd edition was registered in 1997. Only references and analysis methods for some parameters were revised. However, there were no supplement of new substances and re-evaluation of the standard values.
- (3) WHO Guidelines for Drinking Water Quality 3rd Edition (2004): WHO published Guidelines for Drinking Water Quality 3rd Edition in September 2004 as the final version of the 3rd edition.

Appendix 2 Sampling Manual

1. Preparation and planning for sampling

1.1 Basic consideration for preparation of schedule

- a) It is necessary that personnel of CRDA guide the survey team to the point of sampling. Accordingly the survey team is required to visit the CRDA office and have a preliminary meeting before going to the site.
- b) The sampling schedule should be prepared taking into account the distances between CRDA offices and sampling points and the routes.
- c) To consider the office hour of CRDA: 8 :30 - 12 :30 and 15 :00 - 17 :30

1.2 Data/information

- a) To send fax to CRDA with the information of site visit for sampling and confirm the followings :
 - i) Meeting place
 - ii) Time of meeting
 - iii) Name of persons to be accompanied
 - iv) Number of mobile phone of the person to be accompanied
- b) To ask preparation of the following data and to collect them on the day of sampling:
 - i) Detail map (scale : 1 / 2 500 ~ 50 000) which shows :
 - project site and point of water source ;
 - existing pipeline route in case the water source is SONEDE connection or GR extension
 - ii) Fiche de *forage*
 - iii) Existing results of water quality analysis

2. Sampling on site

2.1 Meeting with CRDA

- a) Explain the objective of sampling and confirm the point of sampling on the map. Sampling should be made principally in the upstream from the connection point in cases of existing water supply system.
- b) The team should be punctual in meeting. In case of delay, it is necessary to inform CRDA on the telephone.
- c) The Engineer of CRDA who will guide the team to the sampling point is deeply involved with the study of our project. You are requested not to be late so as to disturb the work schedule of the Engineer.
- d) There is a possibility that a substitute who is not so familiar with the sampling point

may attend the team to the sampling point. Accordingly you are requested to confirm the point on the map while you are in the CRDA office.

2.2 Confirmation of the sampling point and preparatory works

- a) The public taps or *potences* are often locked and accordingly required to be opened by the keepers. In such cases, you are requested to pay for the services.
- b) If the intake facility (public tap, potence, home tap, etc.) has not been used for long to supply water, there is a risk of detection of a large number of coliform or other indicators of bacteriological contamination. In this case, it is necessary to confirm the frequency of utilization of the facility and prolong as required the duration of flow before sampling.
- c) Normally sampling should be conducted after:
 - 1 hour of flow for SONEDE connection and GR extension
 - 8 hours of pumping for deep well
- d) Conditions of pumping facility and water tank should be checked. Frequency and condition of utilization should be checked. (to provide a space in the logbook for this purpose)
- e) You are requested to pay for the amount of water for sampling in case the water source is an existing system. Water is very precious in the service area.
- f) If you do not pay for the consumption, population will not allow enough flow of water before sampling.
- g) If nylon hose is connected to the taps ::
 - i) Principally sampling should be conducted directly from the tap after detaching the hose because there is a risk of bacteriological contamination.
 - ii) After sampling, do not forget to connect the hose again.
- h) In case of sampling from house taps:
 - i) Identify the most frequently utilized tap and take sample from the tap:
 - iii) There is a risk of contamination due to sediments if sampling is made from less frequently utilized taps.

2.3 Sampling work

- Polyethylene flask for sampling heavy metals:

- a) The flask should be washed in the laboratory. However, it is necessary to wash the flask on site with the water of sampling.
- b) To avoid oxidation of sample, put the stopper after filling up the flask with the sample.

- c) A seal should be stuck on the flask with indication of date of sampling and ID number of the sampling place.

- Sampling for bacteriological analysis :

- a) Sterilize metal tap by flame before sampling for bacteriological analysis
- b) Person in charge of sampling should wash hands with running water.
- c) The flask should be opened in the running water just before sampling and capped soon after sampling

2.4 Test on site

The on-site test results should be recorded in the recording sheet.

<Measurement of pH/EC>

- a) The test should be conducted after washing the sensor of the portable measurement instrument with the sample water.

<Measurement of residual chlorine>

- b) The test should be conducted after washing the colorimeter.

<Taste, smell>

- c) Do not take foods of strong taste.
- d) Do not take food or drinks offered by the population until the test on site has been finished.
- e) Carefully rinse the testing cups.

<Turbidity>

- a) Carefully distinguish the suspended particles of the sample from air bubbles in the cup.

2.5 Filtration and fixation of sample

Filtration and fixation of samples should be conducted on site in the following procedure for the purpose of analysis of Fe^{2+} and Fe^{3+} of samples taken from deep wells:

- a) Sample water should be filtered immediately after sampling from the deep wells.
- b) An adequate volume of filtrate should be put into a 100 ml flask.
- c) A volume of 5 ml of 1, 10-phenanthroline solution (1 g/L) should be added to adjust the pH to about 5.

In cases the power source for filtration device is not made available on sampling site, best effort should be given to secure the power supply from the neighboring public facilities or the population.

Appendix 3-1(1) Results of Water Analysis For Sub-projects 2005

ID Number				1						
Governorate				NABEUL						
Delegation				MENZEL TEMIME						
subproject				RMIL ET FARJOUN						
				NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	1	
Potential Hazard to Public Health	Bacterologica Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	2
		E-coli	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	0.013
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	<0.5
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.339
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	2.2	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	5
		taste	-	dilution	-	-	acceptable	-	-	5
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.12
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	1,940
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>>1999</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	77.6
		calcium	Ca	mg/l	-	-	300	-	-	177
		chloride	Cl	mg/l	-	-	600	-	250	625
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
	magnesium	Mg	mg/l	-	-	150	-	-	87.5	
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>505</u>	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
sodium	Na	mg/l	-	-	-	-	200	<u>384</u>		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	<u>1.9</u>		
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.30	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	317	
			°f	-	-	-	-	-	26	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supportin g Parameter s	Temperature	T	°C	-	-	-	-	-	13.7	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	311	
	Potassium	K	mg/l	-	-	-	-	-	7.4	
	salinity	-	‰	-	-	-	-	-	1.3	

LEGENDE
10 (Bold+Underline)
10 (underline)

Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(2) Results of Water Analysis For Sub-projects 2005

ID Number				101						
Governorate				NABEUL						
Delegation				MENZEL TEMIME						
subproject				BASATINE						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.025
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	16.4
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.240
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.3	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	3
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.24
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	1,390
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	>1999
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	57.6
		calcium	Ca	mg/l	-	-	300	-	-	172
		chloride	Cl	mg/l	-	-	600	-	250	470
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
	magnesium	Mg	mg/l	-	-	150	-	-	36	
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	406	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	0.067	
sodium	Na	mg/l	-	-	-	-	200	270		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.3		
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.05	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	171	
			°f	-	-	-	-	-	14	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	15.3	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	225	
	Potassium	K	mg/l	-	-	-	-	-	5.6	
	salinity	-	‰	-	-	-	-	-	1	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(3) Results of Water Analysis For Sub-projects 2005

ID Number				2						
Governorate				NABEUL						
Delegation				KORBA						
subproject				BEN THAMEUR ET BKIR						
				NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	2	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	11.2
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.144
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	1.17	
No Direct Consequence to Health	Acceptability to Consumers		color	-	TCU	-	-	50 TCU	-	15 TCU
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	2
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.21
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	712
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,110</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	33.6
		calcium	Ca	mg/l	-	-	300	-	-	97.8
		chloride	Cl	mg/l	-	-	600	-	250	149
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	22.4
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	225	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
sodium	Na	mg/l	-	-	-	-	200	102		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	<u>1,12</u>		
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.45	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	123	
			°f	-	-	-	-	-	10.1	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	11.1	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	112	
	Potassium	K	mg/l	-	-	-	-	-	3.8	
	salinity	-	‰	-	-	-	-	-	0.3	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(4) Results of Water Analysis For Sub-projects 2005

ID Number				3						
Governorate				NABEUL						
Delegation				HAMMAMET						
subproject				BIR BEN ZAHRA						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		3	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.53
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	10.5
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.131
nickel		Ni	mg/l	-	-	-	0.02	-	<0.005	
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.98	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	2
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.12
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	702
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,120</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	33
		calcium	Ca	mg/l	-	-	300	-	-	97.6
		chloride	Cl	mg/l	-	-	600	-	250	152
		copper	Cu	mg/l	-	-	1	2	1	0.013
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	22.8
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	226	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	102	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.95	
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.25	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	116	
			°f	-	-	-	-	-	9.5	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	14.2	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	112.1	
	Potassium	K	mg/l	-	-	-	-	-	3.8	
	salinity	-	‰	-	-	-	-	-	0.3	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(5) Results of Water Analysis For Sub-projects 2005

ID Number				4						
Governorate				BEJA						
Delegation				TESTOUR						
subproject				MZOUGHA-ZELDOU (1ST)						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		4	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<u>2</u>
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	2.09
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.021
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.1	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	1.84
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	171
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	259
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	8.2
		calcium	Ca	mg/l	-	-	300	-	-	29.2
		chloride	Cl	mg/l	-	-	600	-	250	22
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	2.24
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	60	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	0.26	
	sodium	Na	mg/l	-	-	-	-	200	13.0	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.05	
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	<u>9.95</u>	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	6	
			°f	-	-	-	-	-	0.5	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	31	
			°f	-	-	-	-	-	2.5	
	Mineral acidity		°f	-	-	-	-	-	0	
	Total acidity		°f	-	-	-	-	-	0	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	15	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	26.6	
	Potassium	K	mg/l	-	-	-	-	-	3.3	
	salinity	-	‰	-	-	-	-	-	0	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(6) Results of Water Analysis For Sub-projects 2005

ID Number				5						
Governorate				BEJA						
Delegation				TESTOUR						
subproject				MZOUGHA-ZELDOU (1st&2nd)						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<u>2</u>
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.013
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	2.15
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.013
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.025	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.94
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	126
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	217
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	8.6
		calcium	Ca	mg/l	-	-	300	-	-	27.3
		chloride	Cl	mg/l	-	-	600	-	250	20
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	4.37
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	53	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	0.077	
	sodium	Na	mg/l	-	-	-	-	200	11	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0	
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	7.60	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	23.4	
			°f	-	-	-	-	-	1.92	
	Mineral acidity		°f	-	-	-	-	-	0	
	Total acidity		°f	-	-	-	-	-	0	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	11.6	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	22.6	
	Potassium	K	mg/l	-	-	-	-	-	1.6	
	salinity	-	‰	-	-	-	-	-	0	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(7) Results of Water Analysis For Sub-projects 2005

ID Number				6-1	6-2						
Governorate				BEJA							
Delegation				BEJA NORD							
subproject				KEF DAROUGUI-SFAYA							
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		Spring	Extension GR	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	6-1	6-2	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<u>2</u>	<u>2</u>
		E-coli	E. Coli	MPN/100ml	-	0	-	-	-	<2	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7	1.8
		selenium	Se	µg/l	10	-	-	10	-	<1.095	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.059	0.033
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004	<0.004
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.56	0.78
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	<u>54.6</u>	3.51
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.026	0.027
nickel		Ni	mg/l	-	-	-	0.02	-	<0.005	<0.005	
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	<0.01	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1	1
		taste	-	dilution	-	-	acceptable	-	-	1	3
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.08	0.05
			-		-	-	25 NTU	-	5 NTU		
		residue on evaporation	-	mg/l	-	-	2,500	-	-	425	318
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	700	557
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	32.6	26.4
		calcium	Ca	mg/l	-	-	300	-	-	108	84.2
		chloride	Cl	mg/l	-	-	600	-	250	52	24.8
		copper	Cu	mg/l	-	-	1	2	1	<0.011	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	13.6	13.1
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	27	30.5
		zinc	Zn	mg/l	-	-	5	-	3	<0.068	0.068
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	0.1	
	sodium	Na	mg/l	-	-	-	-	200	23	17.4	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	-	
	Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	7.25	7.15
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0	0
				°f	-	-	-	-	-	0	0
		Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	277	240
			°f	-	-	-	-	-	22.7	19.7	
Mineral acidity			°f	-	-	-	-	-	0	-	
Total acidity			°f	-	-	-	-	-	0	-	
iron bivalent		Fe ²⁺	mg/l	-	-	-	-	-	-	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	19	19.9	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	73.4	55.1	
	Potassium	K	mg/l	-	-	-	-	-	0.7	0.407	
	salinity	-	‰	-	-	-	-	-	0.1	-	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(8) Results of Water Analysis For Sub-projects 2005

ID Number				7						
Governorate				BEJA						
Delegation				BEJA SUD						
subproject				GASR HDID A BEJA SUD						
				NT 09.14 (1983)			OMS Guideline (2004)		7	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	7	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	14
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.005
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	45.8
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	0.011
	boron		B	mg/l	-	-	-	0.5	-	0.041
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	2.77
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	441
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	728
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	27.8
		calcium	Ca	mg/l	-	-	300	-	-	91.4
		chloride	Cl	mg/l	-	-	600	-	250	80
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	12.3
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	52
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	43	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	
	Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	7.30
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	222	
			°f	-	-	-	-	-	18.2	
Mineral acidity			°f	-	-	-	-	-	0	
Total acidity			°f	-	-	-	-	-	0	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	<0.010		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	<0.057		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	21.7	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	75.1	
	Potassium	K	mg/l	-	-	-	-	-	1.3	
	salinity	-	‰	-	-	-	-	-	0.1	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(9) Results of Water Analysis For Sub-projects 2005

ID Number				8						
Governorate				MEDENINE						
Delegation				MEDENINE SUD						
subproject				CITE KRICHID						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	2
		E-coli	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	1.72
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.012
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	15.1
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.628
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.6	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	6
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.21
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	2,890
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	>1999
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	120
		calcium	Ca	mg/l	-	-	300	-	-	287
		chloride	Cl	mg/l	-	-	600	-	250	893
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	118
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	935	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	520	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.6	
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	7.70	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	193	
			°f	-	-	-	-	-	15.8	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	19.2	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	423	
	Potassium	K	mg/l	-	-	-	-	-	9.2	
	salinity	-	‰	-	-	-	-	-	-	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(10) Results of Water Analysis For Sub-projects 2005

ID Number				9						
Governorate				MEDENINE						
Delegation				SIDI MAKHLOUF						
subproject				CITE KRID						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.008
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	<u>2.06</u>
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	13.3
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	<u>0.525</u>
		nickel	Ni	mg/l	-	-	-	0.02	-	0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.05	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	3
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.12
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	1,240
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,810</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	53.6
		calcium	Ca	mg/l	-	-	300	-	-	107
		chloride	Cl	mg/l	-	-	600	-	250	221
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	65.1
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>504</u>	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	<u>220</u>	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.05	
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	7.90	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	171	
			°f	-	-	-	-	-	14	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	16.4	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	186	
	Potassium	K	mg/l	-	-	-	-	-	8.6	
	salinity	-	‰	-	-	-	-	-	-	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(11) Results of Water Analysis For Sub-projects 2005

ID Number				10						
Governorate				MEDENINE						
Delegation				SIDI MAKHLOUF						
subproject				CITE MARS						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	13
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	2.32
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.009
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	14.1
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	<u>0.521</u>
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.6	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	3
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.52
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	1,240
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,800</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	53.6
		calcium	Ca	mg/l	-	-	300	-	-	103
		chloride	Cl	mg/l	-	-	600	-	250	205
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	68
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>515</u>	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	<u>205</u>	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.5	
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	7.80	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	171	
			°f	-	-	-	-	-	14	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	16.2	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	184	
	Potassium	K	mg/l	-	-	-	-	-	9	
	salinity	-	‰	-	-	-	-	-	-	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(12) Results of Water Analysis For Sub-projects 2005

ID Number				11						
Governorate				SFAX						
Delegation				AGAREB						
subproject				GARGOUR-BRAHMA FKAHIA						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.014
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	13.3
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.223
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.4	
color	-		TCU	-	-	50 TCU	-	15 TCU	uncolored	
odour	-	dilution	-	-	acceptable	-	-	1		
taste	-	dilution	-	-	acceptable	-	-	3		
turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.21		
	-	-	-	-	25 NTU	-	5 NTU	-		
residue on evaporation	-	mg/l	-	-	2,500	-	-	1,180		
total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,730</u>		
Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10		
mineral oils	-	mg/l	-	-	0.3	-	-	<10		
phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025		
hardness	(CaCO ₃)	°f	-	-	100	-	-	57.2		
calcium	Ca	mg/l	-	-	300	-	-	128		
chloride	Cl	mg/l	-	-	600	-	250	<u>279</u>		
copper	Cu	mg/l	-	-	1	2	1	<0.011		
iron	Fe	mg/l	-	-	1	-	0.3	<0.057		
magnesium	Mg	mg/l	-	-	150	-	-	61.2		
manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080		
sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>367</u>		
zinc	Zn	mg/l	-	-	5	-	3	<0.068		
aluminum	Al	mg/l	-	-	-	-	0.2	<0.05		
sodium	Na	mg/l	-	-	-	-	200	190		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.3		
No Direct Consequence to Health	Acceptability to Consumers	pH	-	-	-	6.5-8.5	-	-	8.00	
		Carbonate	CO ₃	mg/l	-	-	-	-	0	
				°f	-	-	-	-	0	
		Total alkalinity	HCO ₃	mg/l	-	-	-	-	250	
				°f	-	-	-	-	20.5	
		Mineral acidity		°f	-	-	-	-	-	
		Total acidity		°f	-	-	-	-	-	
		iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supportin g Parameters	Temperature	T	°C	-	-	-	-	-	16.2	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	181	
	Potassium	K	mg/l	-	-	-	-	-	6.6	
	salinity	-	‰	-	-	-	-	-	-	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(13) Results of Water Analysis For Sub-projects 2005

ID Number				12						
Governorate				SOUSSE						
Delegation				SIDI EL HANI						
subproject				OULED FALEH						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	14.1
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.132
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.1	
No Direct Consequence to Health	Acceptability to Consumers		color	-	TCU	-	-	50 TCU	-	15 TCU
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.25
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	647
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,020</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	41.6
		calcium	Ca	mg/l	-	-	300	-	-	107
		chloride	Cl	mg/l	-	-	600	-	250	100
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	36
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	224	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
sodium	Na	mg/l	-	-	-	-	200	63		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	0.07		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0		
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.45	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	232	
			°f	-	-	-	-	-	19	
	Mineral acidity		°f	-	-	-	-	-	0	
	Total acidity		°f	-	-	-	-	-	0	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	12.5	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	103	
	Potassium	K	mg/l	-	-	-	-	-	3.6	
	salinity	-	‰	-	-	-	-	-	0.3	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(14) Results of Water Analysis For Sub-projects 2005

ID Number				13						
Governorate				KAIROUAN						
Delegation				HAJEB EL AYOUN						
subproject				GRAIRIA						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		Extension GR	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	<0.5
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.173
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.1	
No Direct Consequence to Health	Acceptability to Consumers		color	-	TCU	-	-	50 TCU	-	15 TCU
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	<u>5.92</u>
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	727
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1.130</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	39.6
		calcium	Ca	mg/l	-	-	300	-	-	79.4
		chloride	Cl	mg/l	-	-	600	-	250	119
		copper	Cu	mg/l	-	-	1	2	1	<0.011
	iron	Fe	mg/l	-	-	1	-	0.3	<u>0.38</u>	
	magnesium	Mg	mg/l	-	-	150	-	-	48.1	
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	226	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
sodium	Na	mg/l	-	-	-	-	200	97		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0		
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	7.85	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	256	
			°f	-	-	-	-	-	21	
	Mineral acidity		°f	-	-	-	-	-	0	
	Total acidity		°f	-	-	-	-	-	0	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	17	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	113	
	Potassium	K	mg/l	-	-	-	-	-	5.1	
	salinity	-	‰	-	-	-	-	-	0.3	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(15) Results of Water Analysis For Sub-projects 2005

ID Number				14						
Governorate				KAIROUAN						
Delegation				NASR ALLAH						
subproject				DOUAR EL BELDI						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		Extension GR	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	8.1
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	2.83
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.253
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.2	
No Direct Consequence to Health	Acceptability to Consumers		color	-	TCU	-	-	50 TCU	-	15 TCU
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.18
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	677
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,110</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	40.2
		calcium	Ca	mg/l	-	-	300	-	-	85
		chloride	Cl	mg/l	-	-	600	-	250	124
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	46.2
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	169	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
sodium	Na	mg/l	-	-	-	-	200	84		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0		
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.00	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	292	
			°f	-	-	-	-	-	23.9	
	Mineral acidity		°f	-	-	-	-	-	0	
	Total acidity		°f	-	-	-	-	-	0	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	17	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	111	
	Potassium	K	mg/l	-	-	-	-	-	5.3	
	salinity	-	‰	-	-	-	-	-	0.3	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(16) Results of Water Analysis For Sub-projects 2005

ID Number				15-1	15-2						
Governorate				KAIROUAN							
Delegation				SHBIKHA							
subproject				ROUAOUNA							
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		Deep well	SONEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	15-1	15-2	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2	140
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	0.005	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.53	0.93
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	17.5	18.5
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/0.2	-	0.04	<0.011
		boron	B	mg/l	-	-	-	0.5	-	<u>1.020</u>	0.269
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	<0.050	
No Direct Consequence to Health	Acceptability to Consumers	total chlorine	Cl ⁻	mg/l	-	-	-	5	-	-	0.25
		color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1	1
		taste	-	dilution	-	-	acceptable	-	-	4	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	2.21	0.08
			-		-	-	25 NTU	-	5 NTU		
		residue on evaporation	-	mg/l	-	-	2,500	-	-	4.050	1.170
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>>1999</u>	<u>1.600</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	<u>108</u>	53
		calcium	Ca	mg/l	-	-	300	-	-	208	98.6
		chloride	Cl	mg/l	-	-	600	-	250	1,570	<u>250</u>
	copper	Cu	mg/l	-	-	1	2	1	<0.011	<0.011	
	iron	Fe	mg/l	-	-	1	-	0.3	0.204	<0.057	
	magnesium	Mg	mg/l	-	-	150	-	-	137	69.0	
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<u>0.127</u>	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	829	<u>275</u>	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	<0.068	
aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	<0.05		
sodium	Na	mg/l	-	-	-	-	200	<u>1,040</u>	176		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	0.25		
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	7.90	7.50	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	0	
			°f	-	-	-	-	-	0	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	284	321	
			°f	-	-	-	-	-	23.3	26.3	
	Mineral acidity		°f	-	-	-	-	-	0	-	
	Total acidity		°f	-	-	-	-	-	0	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	0.046	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	0.158	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	23.4	16.3	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	649	169	
	Potassium	K	mg/l	-	-	-	-	-	11.4	3.70	
	salinity	-	‰	-	-	-	-	-	3.5	-	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(17) Results of Water Analysis For Sub-projects 2005

ID Number				16						
Governorate				KAIROUAN						
Delegation				BOUHAJLA						
subproject				OULED ABBES						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.019
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	9.48
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.199
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0	
No Direct Consequence to Health	Acceptability to Consumers		color	-	TCU	-	-	50 TCU	-	15 TCU
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	2
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.13
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	1,190
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,840</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	56.4
		calcium	Ca	mg/l	-	-	300	-	-	115
		chloride	Cl	mg/l	-	-	600	-	250	<u>332</u>
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	67.1
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>327</u>	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
sodium	Na	mg/l	-	-	-	-	200	<u>220</u>		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0		
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.00	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	256	
			°f	-	-	-	-	-	21	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	15	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	192	
	Potassium	K	mg/l	-	-	-	-	-	8.6	
	salinity	-	‰	-	-	-	-	-	-	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(18) Results of Water Analysis For Sub-projects 2005

ID Number				17						
Governorate				KAIROUAN						
Delegation				BOUHAJLA						
subproject				OULED BOUDABOUS						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		Extension GR	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	2.4
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	24.6
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	<u>0.522</u>
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.01	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	3
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.49
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	1,680
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>>1999</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	68.2
		calcium	Ca	mg/l	-	-	300	-	-	131
		chloride	Cl	mg/l	-	-	600	-	250	<u>422</u>
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	86.5
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>761</u>	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	<u>374</u>	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.01	
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	7.65	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	207	
			°f	-	-	-	-	-	17	
	Mineral acidity		°f	-	-	-	-	-	0	
	Total acidity		°f	-	-	-	-	-	0	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	14.5	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	284	
	Potassium	K	mg/l	-	-	-	-	-	14.8	
	salinity	-	‰	-	-	-	-	-	1.3	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(19) Results of Water Analysis For Sub-projects 2005

ID Number				18						
Governorate				MANOUBA						
Delegation				MORNAGUIA						
subproject				EL MAAFRINE						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	4.1
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	8.27
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.112
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	1.132	
color	-		TCU	-	-	50 TCU	-	15 TCU	uncolored	
odour	-	dilution	-	-	acceptable	-	-	1		
taste	-	dilution	-	-	acceptable	-	-	2		
turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.11		
	-	-	-	-	25 NTU	-	5 NTU	-		
residue on evaporation	-	mg/l	-	-	2,500	-	-	535		
total dissolved solids	TDS	mg/l	-	-	-	-	1,000	826		
Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10		
mineral oils	-	mg/l	-	-	0.3	-	-	<10		
phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025		
hardness	(CaCO ₃)	°f	-	-	100	-	-	36.4		
calcium	Ca	mg/l	-	-	300	-	-	109		
chloride	Cl	mg/l	-	-	600	-	250	58		
copper	Cu	mg/l	-	-	1	2	1	<0.011		
iron	Fe	mg/l	-	-	1	-	0.3	<0.057		
magnesium	Mg	mg/l	-	-	150	-	-	22.4		
manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080		
sulfate	SO ₄	mg/l	-	-	600.0	-	250	190		
zinc	Zn	mg/l	-	-	5	-	3	<0.068		
aluminum	Al	mg/l	-	-	-	-	0.2	<0.05		
sodium	Na	mg/l	-	-	-	-	200	33		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	<u>1.061</u>		
No Direct Consequence to Health	Acceptability to Consumers	pH	-	-	-	6.5-8.5	-	-	8.00	
		Carbonate	CO ₃	mg/l	-	-	-	-	0	
				°f	-	-	-	-	0	
		Total alkalinity	HCO ₃	mg/l	-	-	-	-	192	
				°f	-	-	-	-	15.7	
		Mineral acidity		°f	-	-	-	-	0	
		Total acidity		°f	-	-	-	-	0	
		iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-
iron trivalent		Fe ³⁺	mg/l	-	-	-	-	-	-	
Other Supporting Parameters		Temperature	T	°C	-	-	-	-	-	14.1
		Electrical Conductivity	EC	mS/m	-	-	-	-	-	83.3
		Potassium	K	mg/l	-	-	-	-	-	1.4
	salinity	-	‰	-	-	-	-	-	0.2	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(20) Results of Water Analysis For Sub-projects 2005

20/47

ID Number				19-1	19-2						
Governorate				MANOUBA							
Delegation				TEBOURBA							
subproject				TIRASSET							
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	SONEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	19-1	19-2	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7	2.0
		selenium	Se	µg/l	10	-	-	10	-	<1.095	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.026	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012	0.063
		cobalt	Co	mg/l	-	-	-	-	-	<0.004	<0.004
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.44	0.24
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	<u>73.7</u>	4.31
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	0.012	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.085	0.031
nickel		Ni	mg/l	-	-	-	0.02	-	<0.005	<0.005	
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	<0.01	0.3	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1	1
		taste	-	dilution	-	-	acceptable	-	-	2	3
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.10	-
			-		-	-	25 NTU	-	5 NTU		
		residue on evaporation	-	mg/l	-	-	2,500	-	-	548	206
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	712	349
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	33.9	12.4
		calcium	Ca	mg/l	-	-	300	-	-	110	41.5
		chloride	Cl	mg/l	-	-	600	-	250	162	20
		copper	Cu	mg/l	-	-	1	2	1	<0.011	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	15.6	4.96
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	54	46
		zinc	Zn	mg/l	-	-	5	-	3	<0.068	<0.068
	aluminum	Al	mg/l	-	-	-	-	0.2	0.061	0.114	
	sodium	Na	mg/l	-	-	-	-	200	81	19	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	0.25	
	Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	7.65	<u>9.00</u>
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0	2.64
				°f	-	-	-	-	-	0	0
		Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	236	100
			°f	-	-	-	-	-	19.4	8.2	
Mineral acidity			°f	-	-	-	-	-	0	-	
Total acidity			°f	-	-	-	-	-	0	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	15.5	16.8	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	108	34	
	Potassium	K	mg/l	-	-	-	-	-	1.6	1.81	
	salinity	-	‰	-	-	-	-	-	0.3	0.0	

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Exceed criteria values of NT 09.14

Exceed criteria values of WHO

Appendix 3-1(21) Results of Water Analysis For Sub-projects 2005

ID Number				20						
Governorate				SILIANA						
Delegation				MAKTHAR						
subproject				BIR EZZOZ						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	4
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	68.6
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.047
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.85	
No Direct Consequence to Health	Acceptability to Consumers		color	-	TCU	-	-	50 TCU	-	15 TCU
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	3
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	1.80
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	426
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	757
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	30.8
		calcium	Ca	mg/l	-	-	300	-	-	117
		chloride	Cl	mg/l	-	-	600	-	250	49
		copper	Cu	mg/l	-	-	1	2	1	0.014
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	3.89
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	46	
	zinc	Zn	mg/l	-	-	5	-	3	0.079	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
sodium	Na	mg/l	-	-	-	-	200	28		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.7		
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.45	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	262	
			°f	-	-	-	-	-	21.5	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	10.9	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	77.7	
	Potassium	K	mg/l	-	-	-	-	-	10.2	
	salinity	-	‰	-	-	-	-	-	0.1	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(22) Results of Water Analysis For Sub-projects 2005

22/47

ID Number				21						
Governorate				SILIANA						
Delegation				SILIANA SUD						
subproject				SFINA						
				NT 09.14 (1983)			OMS Guideline (2004)		Deep well	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	21	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	0.021
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	1.06
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	1.8
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	-
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	Colored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	5
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	93.50
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	869
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,420</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	20
		calcium	Ca	mg/l	-	-	300	-	-	43.3
		chloride	Cl	mg/l	-	-	600	-	250	176
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	1.28
		magnesium	Mg	mg/l	-	-	150	-	-	22.4
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	217	
	zinc	Zn	mg/l	-	-	5	-	3	0.146	
	aluminum	Al	mg/l	-	-	-	-	0.2	<u>1.42</u>	
	sodium	Na	mg/l	-	-	-	-	200	<u>240</u>	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	0.57	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	<u>8.65</u>	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	311	
			°f	-	-	-	-	-	25.5	
	Mineral acidity		°f	-	-	-	-	-	0	
	Total acidity		°f	-	-	-	-	-	0	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	0.22	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	1.06		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	20.7	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	142	
	Potassium	K	mg/l	-	-	-	-	-	4	
	salinity	-	‰	-	-	-	-	-	0.5	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

ID Number				22						
Governorate				SILIANA						
Delegation				SILIANA SUD-SILIANA NORD						
subproject				FEJ-ASAKRA						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		Extension GR (Deep well)*	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacterologica l Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<u>5</u>
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.077
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	14.7
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	0.028
	boron		B	mg/l	-	-	-	0.5	-	0.048
	nickel		Ni	mg/l	-	-	-	0.02	-	0.006
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers		color	-	TCU	-	-	50 TCU	-	15 TCU
		odour	-	dilution	-	-	acceptable	-	-	2
		taste	-	dilution	-	-	acceptable	-	-	2
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	<u>16.30</u>
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	467
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,520</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	35
		calcium	Ca	mg/l	-	-	300	-	-	107
		chloride	Cl	mg/l	-	-	600	-	250	29
		copper	Cu	mg/l	-	-	1	2	1	<0.011
	iron	Fe	mg/l	-	-	1	-	0.3	0.184	
	magnesium	Mg	mg/l	-	-	150	-	-	20.5	
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	101	
	zinc	Zn	mg/l	-	-	5	-	3	0.148	
	aluminum	Al	mg/l	-	-	-	-	0.2	0.081	
sodium	Na	mg/l	-	-	-	-	200	20		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-		
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	7.50	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	275	
			°f	-	-	-	-	-	22.5	
	Mineral acidity		°f	-	-	-	-	-	0	
	Total acidity		°f	-	-	-	-	-	0	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	<0.01	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	0.121		
Other Supportin g Parameters	Temperature	T	°C	-	-	-	-	-	18.8	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	72.6	
	Potassium	K	mg/l	-	-	-	-	-	2.2	
	salinity	-	‰	-	-	-	-	-	-	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(24) Results of Water Analysis For Sub-projects 2005

ID Number				23						
Governorate				SILIANA						
Delegation				BOU ARADA						
subproject				KSAR-OULED BOUHANI						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		23	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	0.05
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.32
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	9.16
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/0.2	-	<0.011
boron		B	mg/l	-	-	-	0.5	-	0.088	
nickel		Ni	mg/l	-	-	-	0.02	-	<0.005	
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.45	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	4
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	1.20
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	314
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	619
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	20.4
		calcium	Ca	mg/l	-	-	300	-	-	52.9
		chloride	Cl	mg/l	-	-	600	-	250	74
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	17.5
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	93	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	0.068	
	sodium	Na	mg/l	-	-	-	-	200	53	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.05	
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.95	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	134	
			°f	-	-	-	-	-	11	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	12.3	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	60.9	
	Potassium	K	mg/l	-	-	-	-	-	2.7	
	salinity	-	‰	-	-	-	-	-	<0.1	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(25) Results of Water Analysis For Sub-projects 2005

ID Number				24						
Governorate				ARIANA						
Delegation				SIDI THABET						
subproject				CEBELAT A AMMAR						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	7.46
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.115
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	1.068	
color	-		TCU	-	-	50 TCU	-	15 TCU	uncolored	
odour	-	dilution	-	-	acceptable	-	-	1		
taste	-	dilution	-	-	acceptable	-	-	3		
turbidity	-	NTU	-	-	25 NTU	-	5 NTU	1.38		
	-	-	-	-	25 NTU	-	5 NTU	-		
residue on evaporation	-	mg/l	-	-	2,500	-	-	585		
total dissolved solids	TDS	mg/l	-	-	-	-	1,000	949		
Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10		
mineral oils	-	mg/l	-	-	0.3	-	-	<10		
phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025		
hardness	(CaCO ₃)	°f	-	-	100	-	-	26.7		
calcium	Ca	mg/l	-	-	300	-	-	75.8		
chloride	Cl	mg/l	-	-	600	-	250	129		
copper	Cu	mg/l	-	-	1	2	1	<0.011		
iron	Fe	mg/l	-	-	1	-	0.3	<0.057		
magnesium	Mg	mg/l	-	-	150	-	-	19		
manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080		
sulfate	SO ₄	mg/l	-	-	600.0	-	250	178		
zinc	Zn	mg/l	-	-	5	-	3	<0.068		
aluminum	Al	mg/l	-	-	-	-	0.2	0.117		
sodium	Na	mg/l	-	-	-	-	200	85		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	0.12		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-		
No Direct Consequence to Health	Acceptability to Consumers	pH	-	-	-	6.5-8.5	-	-	7.80	
		Carbonate	CO ₃	mg/l	-	-	-	-	0	
				°f	-	-	-	-	0	
		Total alkalinity	HCO ₃	mg/l	-	-	-	-	110	
				°f	-	-	-	-	9	
		Mineral acidity		°f	-	-	-	-	0	
		Total acidity		°f	-	-	-	-	0	
		iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	13.5	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	94.7	
	Potassium	K	mg/l	-	-	-	-	-	3.3	
	salinity	-	‰	-	-	-	-	-	0.2	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(26) Results of Water Analysis For Sub-projects 2005

ID Number				25						
Governorate				MAHDIA						
Delegation				ESSOUASSI						
subproject				SLAIMIA						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.04
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	12
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.179
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.3	
No Direct Consequence to Health	Acceptability to Consumers		color	-	TCU	-	-	50 TCU	-	15 TCU
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	4
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.42
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	968
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,460</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	42.8
		calcium	Ca	mg/l	-	-	300	-	-	114
		chloride	Cl	mg/l	-	-	600	-	250	241
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	35
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>329</u>	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
sodium	Na	mg/l	-	-	-	-	200	154		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.3		
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.20	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	139	
			°f	-	-	-	-	-	11.4	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	15	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	155	
	Potassium	K	mg/l	-	-	-	-	-	4.5	
	salinity	-	‰	-	-	-	-	-	-	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(27) Results of Water Analysis For Sub-projects 2005

ID Number				26						
Governorate				MAHDIA						
Delegation				ESSOUASSI						
subproject				SKHAIBIA						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		Extension GR	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.034
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	11.6
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.131
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.1	
No Direct Consequence to Health	Acceptability to Consumers		color	-	TCU	-	-	50 TCU	-	15 TCU
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	2
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.18
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	714
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,130</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	34.8
		calcium	Ca	mg/l	-	-	300	-	-	99.4
		chloride	Cl	mg/l	-	-	600	-	250	177
		copper	Cu	mg/l	-	-	1	2	1	<0.011
	iron	Fe	mg/l	-	-	1	-	0.3	<0.057	
	magnesium	Mg	mg/l	-	-	150	-	-	24.3	
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	248	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
sodium	Na	mg/l	-	-	-	-	200	106		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.1		
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.35	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	122	
			°f	-	-	-	-	-	10	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	14.3	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	118	
	Potassium	K	mg/l	-	-	-	-	-	6	
	salinity	-	‰	-	-	-	-	-	-	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(28) Results of Water Analysis For Sub-projects 2005

ID Number				27						
Governorate				MAHDIA						
Delegation				SIDI ALOUANE						
subproject				KHIOUR						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.031
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	14.1
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.131
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.05	
No Direct Consequence to Health	Acceptability to Consumers		color	-	TCU	-	-	50 TCU	-	15 TCU
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	4
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.10
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	732
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,130</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	35.6
		calcium	Ca	mg/l	-	-	300	-	-	101
		chloride	Cl	mg/l	-	-	600	-	250	<u>272</u>
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	25.3
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	183	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
sodium	Na	mg/l	-	-	-	-	200	144		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0		
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.20	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	137	
			°f	-	-	-	-	-	11.2	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	15.6	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	114	
	Potassium salinity	K	mg/l	-	-	-	-	-	4.1	
		-	‰	-	-	-	-	-	-	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(29) Results of Water Analysis For Sub-projects 2005

ID Number				28						
Governorate				MAHDIA						
Delegation				BOU MERDES						
subproject				RMADHNIA						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<u>5</u>
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.033
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	11.1
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.153
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0	
No Direct Consequence to Health	Acceptability to Consumers		color	-	TCU	-	-	50 TCU	-	15 TCU
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	2
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	1.31
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	832
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,290</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	39.6
		calcium	Ca	mg/l	-	-	300	-	-	104
		chloride	Cl	mg/l	-	-	600	-	250	192
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	33.1
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>281</u>	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
sodium	Na	mg/l	-	-	-	-	200	136		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0		
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.00	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	137	
			°f	-	-	-	-	-	11.2	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	13	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	134	
	Potassium	K	mg/l	-	-	-	-	-	4.5	
	salinity	-	‰	-	-	-	-	-	-	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(30) Results of Water Analysis For Sub-projects 2005

ID Number				29						
Governorate				JENDOUBA						
Delegation				AIN DRAHAM						
subproject				SOUALHIA						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		29	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.014
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.10
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	2.13
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.025
nickel		Ni	mg/l	-	-	-	0.02	-	<0.005	
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.25	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	2
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	4.66
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	180
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	244
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	7.8
		calcium	Ca	mg/l	-	-	300	-	-	28.9
		chloride	Cl	mg/l	-	-	600	-	250	22
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	0.102
		magnesium	Mg	mg/l	-	-	150	-	-	<2
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	70	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<u>0.851</u>	
	sodium	Na	mg/l	-	-	-	-	200	14	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.2	
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.45	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	7	
			°f	-	-	-	-	-	0.6	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	12.8	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	24.9	
	Potassium	K	mg/l	-	-	-	-	-	1.7	
	salinity	-	‰	-	-	-	-	-	<0.1	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(31) Results of Water Analysis For Sub-projects 2005

ID Number				30						
Governorate				JENDOUBA						
Delegation				AIN DRAHAM						
subproject				EL ISLAH						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<u>2</u>
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<u>2</u>
		E-coli	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.013
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	2.17
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.031
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.1	
No Direct Consequence to Health	Acceptability to Consumers		color	-	TCU	-	-	50 TCU	-	15 TCU
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	2
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	<u>5.02</u>
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	168
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	229
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	7.8
		calcium	Ca	mg/l	-	-	300	-	-	24.8
		chloride	Cl	mg/l	-	-	600	-	250	23
		copper	Cu	mg/l	-	-	1	2	1	<0.011
	iron	Fe	mg/l	-	-	1	-	0.3	<0.057	
	magnesium	Mg	mg/l	-	-	150	-	-	3.89	
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	66	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<u>0.935</u>	
sodium	Na	mg/l	-	-	-	-	200	13		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.08		
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	7.80	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	7.1	
			°f	-	-	-	-	-	0.58	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	12.2	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	23.4	
	Potassium	K	mg/l	-	-	-	-	-	1.6	
	salinity	-	‰	-	-	-	-	-	<0.1	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(32) Results of Water Analysis For Sub-projects 2005

ID Number				31-1	31-2						
Governorate				LE KEF							
Delegation				KALAAT							
subproject				EZZAGAYA							
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	SONEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	31-1	31-2	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	2	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2	5
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.85
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	42.3	44.7
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.206	0.434
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.1	0.15	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1	1
		taste	-	dilution	-	-	acceptable	-	-	1	4
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.80	0.21
			-		-	-	25 NTU	-	5 NTU		
		residue on evaporation	-	mg/l	-	-	2,500	-	-	1,110	1,680
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,690</u>	<u>>1999</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	60.4	73.2
		calcium	Ca	mg/l	-	-	300	-	-	184	167
		chloride	Cl	mg/l	-	-	600	-	250	207	<u>342</u>
		copper	Cu	mg/l	-	-	1	2	1	<0.011	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	35	76.8
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>311</u>	<u>562</u>	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	140	<u>275</u>	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0	0.1	
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	7.70	8.90	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	0	
			°f	-	-	-	-	-	0	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	323	303	
			°f	-	-	-	-	-	26.5	24.8	
	Mineral acidity		°f	-	-	-	-	-	0	0	
	Total acidity		°f	-	-	-	-	-	0	0	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	14.2	11.3	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	173	249	
	Potassium	K	mg/l	-	-	-	-	-	2.5	6	
	salinity	-	‰	-	-	-	-	-	0.7	1.1	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(33) Results of Water Analysis For Sub-projects 2005

ID Number				32-1	32-2						
Governorate				LE KEF							
Delegation				NEBEUR							
subproject				OULED GANA							
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		Extension GR (Spring)	SONNEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	32-1	32-2	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	7	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	2	2
		E-coli	E. Coli	MPN/100ml	-	0	-	-	-	<2	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91	<0.91
		lead	Pb	µg/l	50	-	-	10	-	4.9	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012	0.014
		cobalt	Co	mg/l	-	-	-	-	-	0.005	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.36
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	153	108
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.069	0.632
	nickel		Ni	mg/l	-	-	-	0.02	-	0.022	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0	0.2	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1	1
		taste	-	dilution	-	-	acceptable	-	-	3	3
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.20	0.38
			-		-	-	25 NTU	-	5 NTU		
		residue on evaporation	-	mg/l	-	-	2,500	-	-	719	1,610
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	1,220	≥1999
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	45.2	69
		calcium	Ca	mg/l	-	-	300	-	-	143	134
		chloride	Cl	mg/l	-	-	600	-	250	170	353
		copper	Cu	mg/l	-	-	1	2	1	<0.011	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	23.3	86.5
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	56	390
		zinc	Zn	mg/l	-	-	5	-	3	0.147	0.176
	aluminum	Al	mg/l	-	-	-	-	0.2	0.1	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	80	285	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0	0.2	
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.25	7.45	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	0	
			°f	-	-	-	-	-	0	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	220	341	
			°f	-	-	-	-	-	18	27.9	
	Mineral acidity		°f	-	-	-	-	-	0	-	
	Total acidity		°f	-	-	-	-	-	0	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	12.1	14	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	123	230	
	Potassium	K	mg/l	-	-	-	-	-	2.7	3.2	
	salinity	-	‰	-	-	-	-	-	0.4	-	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(34) Results of Water Analysis For Sub-projects 2005

ID Number				33-1	33-2	33-3						
Governorate				GAFSA								
Delegation				SNED								
subproject				HENCHIR BONCHMEL								
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		Extension GR <small>(Deep well for irrigation)</small>			
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	33-1	33-2	33-3	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2	<2	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2	<2	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2	49	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2	<2	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00	<1.00	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003	<0.003	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010	<0.010	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91	<0.91	<0.91
		lead	Pb	µg/l	50	-	-	10	-	4.4	<1.7	2.10
		selenium	Se	µg/l	10	-	-	10	-	<1.095	<1.095	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08	<1.08	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007	<0.007	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.008	<0.0023	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012	<0.012	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	<0.004	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	<u>2.68</u>	<u>2.55</u>	<u>1.82</u>
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	71.4	48	35.7
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/0.2	-	<0.011	0.172	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.588	0.733	0.418
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005	<0.005	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	<0.050	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.1	-	0.10	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored	uncolored	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1	1	1
		taste	-	dilution	-	-	acceptable	-	-	3	3	3
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.81	0.09	0.81
			-		-	-	25 NTU	-	5 NTU			
		residue on evaporation	-	mg/l	-	-	2,500	-	-	1,780	1,670	1,550
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,020</u>	≥1999	≥1999
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10	<0.10	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10	<10	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025	<0.025	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	88.4	136	82
		calcium	Ca	mg/l	-	-	300	-	-	168	256	172
		chloride	Cl	mg/l	-	-	600	-	250	129	444	207
		copper	Cu	mg/l	-	-	1	2	1	<0.011	<0.011	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	0.065	<0.057	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	113	<u>176</u>	94.8
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	<0.080	<0.080
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	881	1,280	609	
	zinc	Zn	mg/l	-	-	5	-	3	0.175	<0.068	0.194	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	<0.05	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	184	340	171	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	<0.05	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.005	-	0.02	
	Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.60	7.45	7.20
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0	0	0
				°f	-	-	-	-	-	0	0	0
		Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	146	170	197
			°f	-	-	-	-	-	12	14	16.2	
Mineral acidity			°f	-	-	-	-	-	-	0	-	
Total acidity			°f	-	-	-	-	-	-	0	-	
iron bivalent		Fe ²⁺	mg/l	-	-	-	-	-	-	<0.01	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-	<0.057	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	15.7	18.1	20.0	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	224	223	220	
	Potassium	K	mg/l	-	-	-	-	-	4.4	4.8	4.35	
	salinity	-	‰	-	-	-	-	-	1	1	1	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(35) Results of Water Analysis For Sub-projects 2005

ID Number				34						
Governorate				GAFSA						
Delegation				EL GUETAR						
subproject				EL AHCHACHNA						
				NT 09.14 (1983)			OMS Guideline (2004)		Extension GR	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	34	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<u>2</u>
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<u>2</u>
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.009
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	29.1
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.330
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.08	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	3
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.38
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	2,400
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	>1999
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	<u>138</u>
		calcium	Ca	mg/l	-	-	300	-	-	268
		chloride	Cl	mg/l	-	-	600	-	250	177
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	<u>173</u>
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>1,340</u>	
	zinc	Zn	mg/l	-	-	5	-	3	0.505	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	172	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.05	
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.10	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	153	
			°f	-	-	-	-	-	12.5	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	14.1	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	284	
	Potassium	K	mg/l	-	-	-	-	-	7.5	
	salinity	-	‰	-	-	-	-	-	1.3	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

ID Number				35						
Governorate				GAFSA						
Delegation				SNED						
subproject				OUED ZITOUN						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		Extension GR	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.012
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	11.7
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.239
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0	
No Direct Consequence to Health	Acceptability to Consumers		color	-	TCU	-	-	50 TCU	-	15 TCU
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	2
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.29
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	931
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,370</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	54.4
		calcium	Ca	mg/l	-	-	300	-	-	112
		chloride	Cl	mg/l	-	-	600	-	250	136
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	64.2
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>382</u>
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	116	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0	
	Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.35
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
		Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	216
				°f	-	-	-	-	-	17.7
Mineral acidity			°f	-	-	-	-	-	-	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent		Fe ²⁺	mg/l	-	-	-	-	-	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	14.9	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	143	
	Potassium	K	mg/l	-	-	-	-	-	4	
	salinity	-	‰	-	-	-	-	-	0.5	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(37) Results of Water Analysis For Sub-projects 2005

ID Number				36						
Governorate				KASSERINE						
Delegation				HAIDRA						
subproject				AIN DEFLA						
				NT 09.14 (1983)			OMS Guideline (2004)		36	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.033
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	36.3
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.225
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers		color	-	TCU	-	-	50 TCU	-	15 TCU
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	2.98
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	1,040
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,520</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	59.2
		calcium	Ca	mg/l	-	-	300	-	-	156
		chloride	Cl	mg/l	-	-	600	-	250	170
		copper	Cu	mg/l	-	-	1	2	1	0.033
		iron	Fe	mg/l	-	-	1	-	0.3	0.131
		magnesium	Mg	mg/l	-	-	150	-	-	49.6
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>328</u>	
	zinc	Zn	mg/l	-	-	5	-	3	0.077	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
sodium	Na	mg/l	-	-	-	-	200	112		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-		
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	<u>8.60</u>	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	303	
			°f	-	-	-	-	-	24.8	
	Mineral acidity		°f	-	-	-	-	-	0	
	Total acidity		°f	-	-	-	-	-	0	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	<0.01	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	<0.057		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	19.7	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	156	
	Potassium	K	mg/l	-	-	-	-	-	3.5	
	salinity	-	‰	-	-	-	-	-	0.6	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(38) Results of Water Analysis For Sub-projects 2005

ID Number				37-1		37-2					
Governorate				KASSERINE							
Delegation				MAJEL BEL ABBES							
subproject				FAKET EL KHADEM							
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		Deep well	Deep well 2	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	37-1	37-2	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<u>5</u>	<u>13</u>
		E-coli	E. Coli	MPN/100ml	-	0	-	-	-	<2	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.02	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.84
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	12.3	18.2
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	0.02	0.032
	boron		B	mg/l	-	-	-	0.5	-	0.220	0.220
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0	-	
No Direct Consequence to Health	Acceptability to Consumers		color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1	1
		taste	-	dilution	-	-	acceptable	-	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.50	0.30
			-		-	-	25 NTU	-	5 NTU		
		residue on evaporation	-	mg/l	-	-	2,500	-	-	696	759
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,030</u>	<u>1,120</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	35.6	35.4
		calcium	Ca	mg/l	-	-	300	-	-	82.6	85
		chloride	Cl	mg/l	-	-	600	-	250	71	47.7
		copper	Cu	mg/l	-	-	1	2	1	<0.011	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	36.5	34.5
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>233</u>	<u>322</u>
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	<0.05	
sodium	Na	mg/l	-	-	-	-	200	94	134		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0	-		
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	7.65	7.45	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	0	
			°f	-	-	-	-	-	0	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	244	264	
			°f	-	-	-	-	-	20	21.6	
	Mineral acidity		°f	-	-	-	-	-	0	0	
	Total acidity		°f	-	-	-	-	-	0	0	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	0.014	<0.01	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	<0.043	<0.057		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	20.8	21.1	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	106	104	
	Potassium	K	mg/l	-	-	-	-	-	2.5	2.6	
	salinity	-	‰	-	-	-	-	-	0.3	0.3	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(39) Results of Water Analysis For Sub-projects 2005

ID Number				38-1	38-2	38-3						
Governorate				KASSERINE								
Delegation				FOUSSANA								
subproject				OULED BARKA								
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		Deep well	Deep well (Baqarn)	Extension GR (ZID)	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	38-1	38-2	38-3	
Potential Hazard to Public Health	Bacterologica Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2	<u>5</u>	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2	<u>5</u>	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2	<2	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2	<u>5</u>	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00	<1.00	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003	<0.003	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010	<0.010	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91	<0.91	<0.91
		lead	Pb	µg/l	50	-	-	10	-	4.7	2.0	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095	<1.095	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08	<1.08	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007	<0.007	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023	<0.0023	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012	<0.012	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	<0.004	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.88	1.48	0.79
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	<u>50.6</u>	7.19	21.8
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011	<0.011	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.241	0.253	0.193
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005	<0.005	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	<0.050	<0.050	
No Direct Consequence to Health	Acceptability to Consumers	total chlorine	Cl ⁻	mg/l	-	-	-	5	-	-	0.08	0.15
		color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored	colored	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1	1	1
		taste	-	dilution	-	-	acceptable	-	-	1	5	4
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.83	<u>21.10</u>	0.75
			-		-	-	25 NTU	-	5 NTU			
		residue on evaporation	-	mg/l	-	-	2,500	-	-	1,240	2,340	869
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,760</u>	<u>≥1999</u>	<u>1240</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10	<0.10	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10	<10	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025	<0.025	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	66.4	139	49.6
		calcium	Ca	mg/l	-	-	300	-	-	136	388	111
		chloride	Cl	mg/l	-	-	600	-	250	161	127	70.6
	copper	Cu	mg/l	-	-	1	2	1	<0.011	<0.011	<0.011	
	iron	Fe	mg/l	-	-	1	-	0.3	0.17	<0.057	<0.057	
	magnesium	Mg	mg/l	-	-	150	-	-	78.7	102	53.0	
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	<0.080	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>529</u>	<u>1,230</u>	-	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	0.269	<0.068	
aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	<0.05	<0.05		
sodium	Na	mg/l	-	-	-	-	200	144	151	83.2		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	<0.05	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	0.05	0.1		
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.25	7.80	7.45	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	0	0	
			°f	-	-	-	-	-	0	0	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	209	149	256	
			°f	-	-	-	-	-	17.1	12.2	21	
	Mineral acidity		°f	-	-	-	-	-	0	0	-	
	Total acidity		°f	-	-	-	-	-	0	0	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	0.071	0.017	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	0.094	<0.040	-		
Other Supportin g Parameter s	Temperature	T	°C	-	-	-	-	-	19.2	16.3	19.2	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	178	276	125	
	Potassium	K	mg/l	-	-	-	-	-	4.5	11.0	3.80	
	salinity	-	‰	-	-	-	-	-	0.7	1.3	0.4	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(40) Results of Water Analysis For Sub-projects 2005

ID Number				39						
Governorate				KASSERINE						
Delegation				THALA						
subproject				SIDI SHIL						
				NT 09.14 (1983)			OMS Guideline (2004)		39	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<u>5</u>
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.024
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	27.2
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.103
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.15
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	579
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	921
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	39.6
		calcium	Ca	mg/l	-	-	300	-	-	93.8
		chloride	Cl	mg/l	-	-	600	-	250	90
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	39.4
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	117	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	48	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.20	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	276	
			°f	-	-	-	-	-	22.6	
	Mineral acidity		°f	-	-	-	-	-	0	
	Total acidity		°f	-	-	-	-	-	0	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	<0.01	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	<0.057		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	18.5	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	94.2	
	Potassium	K	mg/l	-	-	-	-	-	6	
	salinity	-	‰	-	-	-	-	-	0.2	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(41) Results of Water Analysis For Sub-projects 2005

ID Number				40						
Governorate				SIDI BOUZID						
Delegation				SIDI ALI BEN AOUN						
subproject				MBARKIA (SIDI ALIBEN AOUN)						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		Extension GR	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.016
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	27.3
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.281
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.05	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	3
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.22
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	2,000
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	>1999
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	100
		calcium	Ca	mg/l	-	-	300	-	-	184
		chloride	Cl	mg/l	-	-	600	-	250	400
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	132
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	651	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	225	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0	
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.45	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	195	
			°f	-	-	-	-	-	16	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	12.1	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	258	
	Potassium	K	mg/l	-	-	-	-	-	6.1	
	salinity	-	‰	-	-	-	-	-	1.2	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(42) Results of Water Analysis For Sub-projects 2005

ID Number				41						
Governorate				SIDI BOUZID						
Delegation				OULED HAFFOUZ						
subproject				OULED NAOUI						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		Extension GR	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	8
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	22
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.047
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	33.1
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.384
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	2
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.49
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	733
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1200</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	29.2
		calcium	Ca	mg/l	-	-	300	-	-	56.1
		chloride	Cl	mg/l	-	-	600	-	250	184
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	36.9
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	124	
	zinc	Zn	mg/l	-	-	5	-	3	0.079	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	156	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0	
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.00	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	269	
			°f	-	-	-	-	-	22	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	21.2	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	124	
	Potassium	K	mg/l	-	-	-	-	-	4	
	salinity	-	‰	-	-	-	-	-	-	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

ID Number				42						
Governorate				SIDI BOUZID						
Delegation				MENZEL BOUZAIENE						
subproject				OULED YOUSSEF GALLEL						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		Extension GR	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.006
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	17
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.487
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.15	
No Direct Consequence to Health	Acceptability to Consumers		color	-	TCU	-	-	50 TCU	-	15 TCU
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	5
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.52
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	2,180
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	>1999
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	96.8
		calcium	Ca	mg/l	-	-	300	-	-	183
		chloride	Cl	mg/l	-	-	600	-	250	447
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	124
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	924	
	zinc	Zn	mg/l	-	-	5	-	3	0.154	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
sodium	Na	mg/l	-	-	-	-	200	340		
ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05		
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.1		
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.45	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	201	
			°f	-	-	-	-	-	16.5	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	14.4	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	315	
	Potassium	K	mg/l	-	-	-	-	-	8.4	
	salinity	-	‰	-	-	-	-	-	1.5	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(44) Results of Water Analysis For Sub-projects 2005

ID Number				43						
Governorate				MAHDIA						
Delegation				SIDI ALOUANE						
subproject				RQUIAT						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		SONNEDE Connection	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.008
		molybdenum	Mo	mg/l	-	-	-	0.07	-	0.030
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	16.1
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	0.212
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	1.4	
color	-		TCU	-	-	50 TCU	-	15 TCU	uncolored	
No Direct Consequence to Health	Acceptability to Consumers	odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	2
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.22
		residue on evaporation	-	mg/l	-	-	2,500	-	-	855
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1460</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	55
		calcium	Ca	mg/l	-	-	300	-	-	129
		chloride	Cl	mg/l	-	-	600	-	250	215
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	55.4
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>363</u>
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	136	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	1.3		
Potentially Affecting Water Supply Facilities	pH	-	-	-	-	6.5-8.5	-	-	8.20	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	°f	-	-	-	-	-	0	
			mg/l	-	-	-	-	-	201	
	Mineral acidity	-	°f	-	-	-	-	-	16.5	
	Total acidity	-	°f	-	-	-	-	-	-	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	
	iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-	
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	15.9	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	153	
	Potassium	K	mg/l	-	-	-	-	-	5.20	
	salinity	-	‰	-	-	-	-	-	1.2	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(45) Results of Water Analysis For Sub-projects 2005

ID Number				44-1		44-2					
Governorate				SIDI BOUZID							
Delegation				CEBELET OULED ASKAR							
subproject				OUAMRIA-ABABSIA							
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		Extension GR	Extension GR	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	44-1	44-2	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<u>5</u>	<2
		E-coli	E. Coli	MPN/100ml	-	0	-	-	-	<2	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.005	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	<u>2.37</u>	<u>2.25</u>
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	19.4	17.2
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011	<0.011
		boron	B	mg/l	-	-	-	0.5	-	<u>1.015</u>	<u>1.020</u>
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.08	0.1	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1	1
		taste	-	dilution	-	-	acceptable	-	-	3	5
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.34	0.30
			-		-	-	25 NTU	-	5 NTU		
		residue on evaporation	-	mg/l	-	-	2,500	-	-	2,290	2,020
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	>1999	>1999
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	90.2	91.4
		calcium	Ca	mg/l	-	-	300	-	-	160	169
		chloride	Cl	mg/l	-	-	600	-	250	<u>269</u>	<u>283</u>
		copper	Cu	mg/l	-	-	1	2	1	<0.011	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	122	120
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>911</u>	<u>993</u>	
	zinc	Zn	mg/l	-	-	5	-	3	0.121	0.089	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	<u>290</u>	<u>321</u>	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.05	0.05	
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	7.70	7.60	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	0	
			°f	-	-	-	-	-	0	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	226	221	
			°f	-	-	-	-	-	18.5	18.1	
	Mineral acidity		°f	-	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	15	18.5	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	266	279	
	Potassium	K	mg/l	-	-	-	-	-	5.3	5.03	
	salinity	-	‰	-	-	-	-	-	1.2	1.3	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(46) Results of Water Analysis For Sub-projects 2005

ID Number				45						
Governorate				SIDI BOUZID						
Delegation				REGUEB						
subproject				GOULEB						
Category	Parameters	abb.	Unit	NT 09.14 (1983)			OMS Guideline (2004)		Extension GR	
				Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	4
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.008
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	25.7
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	<u>1.015</u>
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.05	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	4
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.14
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	1,880
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>>1999</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	75.6
		calcium	Ca	mg/l	-	-	300	-	-	131
		chloride	Cl	mg/l	-	-	600	-	250	<u>382</u>
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	104
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	753	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	<u>335</u>	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0	
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.05	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	226	
			°f	-	-	-	-	-	18.5	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
	iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	15.7	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	274	
	Potassium	K	mg/l	-	-	-	-	-	5.1	
	salinity	-	‰	-	-	-	-	-	1.3	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-1(47) Results of Water Analysis For Sub-projects 2005

ID Number				46						
Governorate				SIDI BOUZID						
Delegation				MEZZOUNA						
subproject				GHRIST EST						
				NT 09.14 (1983)			OMS Guideline (2004)		SONEDE Connection	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	46	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.00
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.008
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
		Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-
	nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	35.2
	nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	0.2	-	<0.011
	boron		B	mg/l	-	-	-	0.5	-	<u>0.543</u>
	nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium	Cr		mg/l	-	-	-	0.05	-	<0.050	
total chlorine	Cl ⁻		mg/l	-	-	-	5	-	0.25	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	3
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.14
			-		-	-	25 NTU	-	5 NTU	
		residue on evaporation	-	mg/l	-	-	2,500	-	-	1,870
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>>1999</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	104
		calcium	Ca	mg/l	-	-	300	-	-	205
		chloride	Cl	mg/l	-	-	600	-	250	<u>336</u>
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	127
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	797	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	186	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.2	
Potentially Affecting Water Supply Facilities	pH			-	-	6.5-8.5	-	-	8.20	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	183	
			°f	-	-	-	-	-	15	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	15.0	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	258	
	Potassium	K	mg/l	-	-	-	-	-	5.8	
	salinity	-	‰	-	-	-	-	-	1.2	

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Exceed criteria values of NT 09.14
 Exceed criteria values of WHO

Appendix 3-2 (1) Results of Water Analysis for Sub-projects 2006

1/47

ID Number				1						
Governorate				ARIANA						
Delegation				EL MNIHLA						
subproject				EL ACHICH						
Date				07/07/2004						
				NT 09.14 (1983)			OMS Guideline (2004)		SONEDE CONNECTION	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	1	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.53
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	12.4
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.057
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.05	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.7	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	2
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.65
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 913
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	1,500
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	39.8
		calcium	Ca	mg/l	-	-	300	-	-	131
		chloride	Cl	mg/l	-	-	600	-	250	215
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	31.0
	manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080	
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	287	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	0.076	
	sodium	Na	mg/l	-	-	-	-	200	168	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.6	
Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.90	
	Carbonate	CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
	Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	133	
			°f	-	-	-	-	-	10.9	
	Mineral acidity		°f	-	-	-	-	-	-	
	Total acidity		°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	25.0	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	145	
	Potassium	K	mg/l	-	-	-	-	-	3.91	
	salinity	-	‰	-	-	-	-	-	0.5	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (2) Results of Water Analysis for Sub-projects 2006

ID Number				2						
Governorate				MANOUBA						
Delegation				MORNAGUIA						
subproject				SIDI ACHOUR						
Date				06/07/2004						
				NT 09.14 (1983)						
				OMS Guideline (2004)						
				SONEDE CONNECTION						
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	2	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<u>33</u>
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<u>2</u>
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<u>2</u>
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.23
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	4.36
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	<0.002
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
		chromium	Cr	mg/l	-	-	-	0.05	-	<0.05
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.15	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	1.89
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	185
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	328
		mineral oils	-	mg/l	-	-	0.3	-	-	<0.10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<10
		hardness (CaCO ₃)	°f	-	-	-	100	-	-	<0.025
		calcium	Ca	mg/l	-	-	300	-	-	11.6
		chloride	Cl	mg/l	-	-	600	-	250	41.5
		copper	Cu	mg/l	-	-	1	2	1	24.2
		iron	Fe	mg/l	-	-	1	-	0.3	0.016
		magnesium	Mg	mg/l	-	-	150	-	-	<0.057
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	6.19
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	<0.080
		zinc	Zn	mg/l	-	-	5	-	3	43.2
		aluminum	Al	mg/l	-	-	-	-	0.2	<0.068
		sodium	Na	mg/l	-	-	-	-	200	0.113
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	17.1	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	<0.05	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	0.08
		Carbonate	CO ₃	mg/l	-	-	-	-	-	7.35
				°f	-	-	-	-	-	0
		Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	85
Mineral acidity			°f	-	-	-	-	-	6.9	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	21.6	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	20	
	Potassium	K	mg/l	-	-	-	-	-	1.79	
	salinity	-	‰	-	-	-	-	-	<0.1	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (3) Results of Water Analysis for Sub-projects 2006

ID Number				3						
Governorate				NABEUL						
Delegation				MENZEL BOUZELFA						
subproject				BOULAHOUADH						
Date				25/06/2004						
				NT 09.14 (1983)			OMS Guideline (2004)		SONEDE CONNECTION	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	3	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.025
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.57
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	17.0
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.058
nickel		Ni	mg/l	-	-	-	0.02	-	0.005	
chromium		Cr	mg/l	-	-	-	0.05	-	<0.05	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.6	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	3.42
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 1,040
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,650</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	45.2
		calcium	Ca	mg/l	-	-	300	-	-	136
		chloride	Cl	mg/l	-	-	600	-	250	<u>268</u>
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	0.066
		magnesium	Mg	mg/l	-	-	150	-	-	34.1
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>305</u>
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
	aluminum	Al	mg/l	-	-	-	-	0.2	0.138	
	sodium	Na	mg/l	-	-	-	-	200	186	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.5	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.80
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	135	
			°f	-	-	-	-	-	11.1	
Mineral acidity			°f	-	-	-	-	-	-	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	26.7	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	15	
	Potassium	K	mg/l	-	-	-	-	-	4.51	
	salinity	-	‰	-	-	-	-	-	-	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (4) Results of Water Analysis for Sub-projects 2006

4/47

ID Number				4-1						
Governorate				NABEUL						
Delegation				KORBA						
subproject				TASSELMINE ET SOUA						
Date				25/06/2004						
				NT 09.14 (1983)			OMS Guideline (2004)		EXTENSION GR	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	4-1	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	110
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	4
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.93
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	<0.5
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.106
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.05	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
			-	-	-	-	-	-	-	salée
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	4.88
			-	-	-	-	-	-	-	turbide
		residue on evaporation	-	mg/l	-	-	2,500	-	-	1,320
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	>2000
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	65.0
		calcium	Ca	mg/l	-	-	300	-	-	178
		chloride	Cl	mg/l	-	-	600	-	250	371
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	0.371
		magnesium	Mg	mg/l	-	-	150	-	-	61.6
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	266	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	229	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	0.12	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.20
Carbonate		CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	378	
			°f	-	-	-	-	-	31.0	
Mineral acidity			°f	-	-	-	-	-	-	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	25.6	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	213	
	Potassium	K	mg/l	-	-	-	-	-	5.76	
	salinity	-	‰	-	-	-	-	-	-	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (5) Results of Water Analysis for Sub-projects 2006

5/47

ID Number				4-2						
Governorate				NABEUL						
Delegation				KORBA						
subproject				TASSELMINE ET SOUA						
Date				15/09/2004						
				NT 09.14 (1983)			OMS Guideline (2004)		SONEDE CONNECTION	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	4-2	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.048
		molybdenum	Mo	mg/l	-	-	-	0.07	-	0.013
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.52
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	12
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.044
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.05	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.5	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	3
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.32
			-	-	-	-	-	-	-	non turbide
		residue on evaporation	-	mg/l	-	-	2,500	-	-	889
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,360</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	39.8
		calcium	Ca	mg/l	-	-	300	-	-	111
		chloride	Cl	mg/l	-	-	600	-	250	220
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	27.5
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>276</u>
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	139	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.3	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	8.00
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	124	
			°f	-	-	-	-	-	10.2	
Mineral acidity			°f	-	-	-	-	-	-	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	30.7	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	141	
	Potassium	K	mg/l	-	-	-	-	-	3.99	
	salinity	-	‰	-	-	-	-	-	0.5	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (6) Results of Water Analysis for Sub-projects 2006

6/47

ID Number				5						
Governorate				BEJA						
Delegation				NEFZA						
subproject				AIN DAM-NEFZA						
Date				23/06/2004						
				NT 09.14 (1983)			OMS Guideline (2004)		SONEDE CONNECTION	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	5	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	1.9
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.107
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.32
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	5.07
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	<0.002
nickel		Ni	mg/l	-	-	-	0.02	-	<0.005	
chromium		Cr	mg/l	-	-	-	0.05	-	<0.05	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.5	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	3
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.29
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 492
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	858
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	28.0
		calcium	Ca	mg/l	-	-	300	-	-	102
		chloride	Cl	mg/l	-	-	600	-	250	149
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	9.53
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	45.4
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
		aluminum	Al	mg/l	-	-	-	-	0.2	<0.05
	sodium	Na	mg/l	-	-	-	-	200	69.5	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	0.08	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.5	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.55
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
		Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	124
				°f	-	-	-	-	-	10.2
Mineral acidity			°f	-	-	-	-	-	-	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	30.7	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	141	
	Potassium	K	mg/l	-	-	-	-	-	3.99	
	salinity	-	‰	-	-	-	-	-	0.5	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (7) Results of Water Analysis for Sub-projects 2006

7/47

				ID Number		6				
				Governorate		BEJA				
				Delegation		BEJA NORD				
				subproject		AIN SOLTANE				
				Date		23/06/2004				
				NT 09.14 (1983)			OMS Guideline (2004)		SPRING	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	6	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<u>130</u>
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	130
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	110
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<u>130</u>
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.05
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.19
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	16.5
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	<0.002
nickel		Ni	mg/l	-	-	-	0.02	-	0.006	
chromium		Cr	mg/l	-	-	-	0.05	-	<0.05	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.35
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 305
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	532
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<u>0.031</u>
		hardness	(CaCO ₃)	°f	-	-	100	-	-	24.6
		calcium	Ca	mg/l	-	-	300	-	-	95.4
		chloride	Cl	mg/l	-	-	600	-	250	27.8
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	5.11
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	14.1
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	15.1	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.35
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	241	
			°f	-	-	-	-	-	19.8	
Mineral acidity			°f	-	-	-	-	-	-	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	18.8	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	53	
	Potassium	K	mg/l	-	-	-	-	-	1.08	
	salinity	-	‰	-	-	-	-	-	<0.1	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (8) Results of Water Analysis for Sub-projects 2006

8/47

ID Number				10						
Governorate				LE KEF						
Delegation				EL KSOUR						
subproject				EL ARGOUB-ERRHAMNA						
Date				26/01/2005						
				NT 09.14 (1983)			OMS Guideline (2004)		DEEP WELL	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	10	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<1
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<1
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.042
		molybdenum	Mo	mg/l	-	-	-	0.07	-	0.053
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.43
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	<u>64.5</u>
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.159
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.05	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	-
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	1.64
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,160</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	41.4
		calcium	Ca	mg/l	-	-	300	-	-	116
		chloride	Cl	mg/l	-	-	600	-	250	151
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	22.1
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	170
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	77	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	0.07	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.40
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	248	
			°f	-	-	-	-	-	20.3	
Mineral acidity		-	°f	-	-	-	-	-	0	
Total acidity		-	°f	-	-	-	-	-	0.78	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	<0.01		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	<0.057		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	15.4	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	113	
	Potassium	K	mg/l	-	-	-	-	-	0.4	
	salinity	-	‰	-	-	-	-	-	0.3	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (9) Results of Water Analysis for Sub-projects 2006

ID Number				11-1						
Governorate				SILIANA						
Delegation				MAKTHAR						
subproject				AGBA						
Date				24/06/2004						
				NT 09.14 (1983)			OMS Guideline (2004)		Spring	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	11-1	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<u>22</u>
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<u>17</u>
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<u>11</u>
		E-coli	E. Coli	MPN/100ml	-	0	-	-	-	<u>4</u>
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.14
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	16.6
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	<0.002
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.05
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 365
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	591
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	27.1
		calcium	Ca	mg/l	-	-	300	-	-	108
		chloride	Cl	mg/l	-	-	600	-	250	28.2
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	5.03
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	30.9
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
		aluminum	Al	mg/l	-	-	-	-	0.2	<0.05
		sodium	Na	mg/l	-	-	-	-	200	14.4
		ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05
		residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.50
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	250	
			°f	-	-	-	-	-	20.5	
Mineral acidity		-	°f	-	-	-	-	-	-	
Total acidity		-	°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	16.0	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	58.4	
	Potassium	K	mg/l	-	-	-	-	-	0.7	
	salinity	-	‰	-	-	-	-	-	-	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (10) Results of Water Analysis for Sub-projects 2006

ID Number				11-1						
Governorate				SIRIANA						
Delegation				MAKTHAR						
subproject				AGBA						
Date				24/02/2005						
				NT 09.14 (1983)			OMS Guideline (2004)		SPRING	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	11-1	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<u>1</u>
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<u>1</u>
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<1
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<u>1</u>
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.014
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.4
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	24.8
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.012
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.05	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	-
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.54
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	367
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	581
		mineral oils	-	mg/l	-	-	0.3	-	-	<0.10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	29
		calcium	Ca	mg/l	-	-	300	-	-	106
		chloride	Cl	mg/l	-	-	600	-	250	33.7
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	4.95
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	36.7
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	15.5	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.06	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.55
Carbonate		CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	271	
			°f	-	-	-	-	-	22.2	
Mineral acidity		-	°f	-	-	-	-	-	0	
Total acidity		-	°f	-	-	-	-	-	0.4	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	<0.01		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	<0.057		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	14.6	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	58	
	Potassium	K	mg/l	-	-	-	-	-	0.14	
	salinity	-	‰	-	-	-	-	-	0	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (11) Results of Water Analysis for Sub-projects 2006

ID Number				11-2						
Governorate				SILIANA						
Delegation				MAKTHAR						
subproject				AGBA						
Date				24/06/2004						
				NT 09.14 (1983)			OMS Guideline (2004)		SONEDE CONNECTION	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	11-2	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.30
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	43.4
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	<0.002
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.3	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	3
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.33
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 531
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	879
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	34.2
		calcium	Ca	mg/l	-	-	300	-	-	122
		chloride	Cl	mg/l	-	-	600	-	250	72.2
		copper	Cu	mg/l	-	-	1	2	1	0.019
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	13.7
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	79.2
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
		aluminum	Al	mg/l	-	-	-	-	0.2	<0.05
		sodium	Na	mg/l	-	-	-	-	200	43.7
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	<u>0.3</u>	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.60
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
		Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	262
				°f	-	-	-	-	-	21.5
Mineral acidity			°f	-	-	-	-	-	-	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	19.3	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	87.2	
	Potassium	K	mg/l	-	-	-	-	-	7.49	
	salinity	-	‰	-	-	-	-	-	-	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (12) Results of Water Analysis for Sub-projects 2006

				ID Number		12						
				Governorate		SILIANA						
				Delegation		ER-ROUHIA						
				subproject		GHANGUET ZGALASS						
				Date		08/07/2004						
				NT 09.14 (1983)			OMS Guideline (2004)		EXTENSION GR			
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	12			
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria		CT	MPN/100ml	-	<2	-	0	-	<2	
		Thermotolerant coliform		CF	MPN/100ml	-	-	-	-	-	<2	
		Facal streptococci		ST	MPN/100ml	-	-	-	-	-	<2	
		<i>E-coli</i>		E. Coli	MPN/100ml	-	0	-	-	-	<2	
	Toxic Chemicals	arsenic		As	µg/l	50	-	-	10	-	<1.0	
		cadmium		Cd	mg/l	0.005	-	-	0.003	-	<0.003	
		cyanide		Cn	mg/l	0.05	-	-	0.07	-	<0.010	
		total mercury		Hg	µg/l	1	-	-	1	-	<0.915	
		lead		Pb	µg/l	50	-	-	10	-	<1.7	
		selenium		Se	µg/l	10	-	-	10	-	<1.095	
		antimony		Sb	µg/l	20	-	-	18	-	<1.08	
		silver		Ag	mg/l	0.02	-	-	-	-	<0.007	
		barium		Ba	mg/l	-	-	-	0.7	-	<0.0023	
		molybdenum		Mo	mg/l	-	-	-	0.07	-	<0.012	
		cobalt		Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride		F	mg/l	-	-	-	1.5	-	1.27	
		nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	<0.50	
		nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011	
		boron		B	mg/l	-	-	-	0.5	-	0.168	
nickel		Ni	mg/l	-	-	-	0.02	-	<0.005			
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050			
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0			
No Direct Consequence to Health	Acceptability to Consumers	color		-	TCU	-	-	50 TCU	-	15 TCU	uncolored	
		odour		-	dilution	-	-	acceptable	-	-	-	1
		taste		-	dilution	-	-	acceptable	-	-	-	3
		turbidity		-	NTU	-	-	25 NTU	-	5 NTU	-	0.46
		residue on evaporation		-	mg/l	-	-	2,500	-	-	-	non turbide 1,290
		total dissolved solids		TDS	mg/l	-	-	-	-	1,000	<u>1,960</u>	
		Anionic surface active agent		-	mg ABS/l	-	-	0.5	-	-	-	<0.10
		mineral oils		-	mg/l	-	-	0.3	-	-	-	<10
		phenolic compounds		-	mg/l	-	-	0.002	-	-	-	<0.025
		hardness		(CaCO ₃)	°f	-	-	100	-	-	-	37.0
		calcium		Ca	mg/l	-	-	300	-	-	-	85.0
		chloride		Cl	mg/l	-	-	600	-	250	-	184
		copper		Cu	mg/l	-	-	1	2	1	-	<0.011
		iron		Fe	mg/l	-	-	1	-	0.3	-	<0.057
		magnesium		Mg	mg/l	-	-	150	-	-	-	34.4
		manganese		Mn	mg/l	-	-	0.5	0.4	0.1	-	<0.080
		sulfate		SO ₄	mg/l	-	-	600.0	-	250	-	<u>542</u>
		zinc		Zn	mg/l	-	-	5	-	3	-	0.194
		aluminum		Al	mg/l	-	-	-	-	0.2	-	<0.05
	sodium		Na	mg/l	-	-	-	-	200	-	<u>320</u>	
	ammonia		NH ₄	mg NH ₄ /l	-	-	-	-	1.5	-	<0.05	
	residual chlorine		Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	0	
	Potentially Affecting Water Supply Facilities	pH		pH	-	-	-	6.5 - 8.5	-	-	-	7.45
		Carbonate		CO ₃	mg/l	-	-	-	-	-	-	0
					°f	-	-	-	-	-	-	0
		Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	-	227
					°f	-	-	-	-	-	-	18.6
Mineral acidity			°f	-	-	-	-	-	-	-		
Total acidity			°f	-	-	-	-	-	-	-		
iron bivalent		Fe ²⁺	mg/l	-	-	-	-	-	-	-		
iron trivalent		Fe ³⁺	mg/l	-	-	-	-	-	-	-		
Other Supporting Parameters	Temperature		T	°C	-	-	-	-	-	-	18.8	
	Electrical Conductivity		EC	mS/m	-	-	-	-	-	-	197	
	Potassium		K	mg/l	-	-	-	-	-	-	9.96	
	salinity		-	‰	-	-	-	-	-	-	0.8	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (13) Results of Water Analysis for Sub-projects 2006

				ID Number	13					
				Governorate	SILIANA					
				Delegation	MAKTHAR					
				subproject	NSIRAT					
				Date	08/07/2004					
				NT 09.14 (1983)			OMS Guideline (2004)		SONEDE CONNECTION	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	13	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.41
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	34.2
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
boron		B	mg/l	-	-	-	0.5	-	<0.002	
nickel		Ni	mg/l	-	-	-	0.02	-	<0.005	
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.5	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	3
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.44
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	859
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	34.0
		calcium	Ca	mg/l	-	-	300	-	-	126
		chloride	Cl	mg/l	-	-	600	-	250	69.8
		copper	Cu	mg/l	-	-	1	2	1	0.024
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	13.5
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	84.6
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	41.8	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.4	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.75
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	251	
			°f	-	-	-	-	-	20.6	
Mineral acidity			°f	-	-	-	-	-	-	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	24.6	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	85.4	
	Potassium	K	mg/l	-	-	-	-	-	5.37	
	salinity	-	‰	-	-	-	-	-	0.2	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (14) Results of Water Analysis for Sub-projects 2006

14/47

ID Number				14						
Governorate				SILIANA						
Delegation				ER-ROUHIA						
subproject				SIDI DAHER						
Date				02/07/2004						
				NT 09.14 (1983)		OMS Guideline (2004)		EXTENSION GR		
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	14	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<u>8</u>
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<u>4</u>
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	1.14
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	10.2
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.299
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	2
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.30
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 2,320
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	>2000
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	<u>127</u>
		calcium	Ca	mg/l	-	-	300	-	-	238
		chloride	Cl	mg/l	-	-	600	-	250	208
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	139
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>1,150</u>
	zinc	Zn	mg/l	-	-	5	-	3	0.145	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	<u>222</u>	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.45
Carbonate		CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	269	
			°f	-	-	-	-	-	22.0	
Mineral acidity			°f	-	-	-	-	-	-	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	24.9	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	286	
	Potassium	K	mg/l	-	-	-	-	-	3.38	
	salinity	-	‰	-	-	-	-	-	1.4	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (15) Results of Water Analysis for Sub-projects 2006

ID Number				15						
Governorate				KAIROUAN						
Delegation				EL OUESLATIA						
subproject				GHANZOUR						
Date				08/03/2005						
				NT 09.14 (1983)			OMS Guideline (2004)		DEEP WELL	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	15	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<u>13</u>
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<u>5</u>
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<u>1</u>
		E-coli	E. Coli	MPN/100ml	-	0	-	-	-	<u>5</u>
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.016
		molybdenum	Mo	mg/l	-	-	-	0.07	-	0.039
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.84
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	4.27
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	0.016
		boron	B	mg/l	-	-	-	0.5	-	0.114
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.05	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	Colored
		odour	-	dilution	-	-	acceptable	-	-	-
		taste	-	dilution	-	-	acceptable	-	-	-
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	<u>19.70</u>
		residue on evaporation	-	mg/l	-	-	2,500	-	-	turbide 706
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1.050</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	0.11
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<u>0.216</u>
		hardness	(CaCO ₃)	°f	-	-	100	-	-	37.0
		calcium	Ca	mg/l	-	-	300	-	-	154
		chloride	Cl	mg/l	-	-	600	-	250	92
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	23
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>295.0</u>
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
		aluminum	Al	mg/l	-	-	-	-	0.2	<0.05
		sodium	Na	mg/l	-	-	-	-	200	82.0
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.06	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.35
Carbonate		CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	234	
			°f	-	-	-	-	-	19.2	
Mineral acidity			°f	-	-	-	-	-	0	
Total acidity			°f	-	-	-	-	-	0.9	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	<0.01		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	<0.057		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	20	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	100	
	Potassium	K	mg/l	-	-	-	-	-	2.68	
	salinity	-	‰	-	-	-	-	-	0.3	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (16) Results of Water Analysis for Sub-projects 2006

ID Number				16-1						
Governorate				KAIROUAN						
Delegation				EL OUESLATIA						
subproject				GOUAAD						
Date				22/02/2005						
				NT 09.14 (1983)			OMS Guideline (2004)		DEEP WELL	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	16-1	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<1
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<1
		E-coli	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.043
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.75
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	<u>52.2</u>
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	<u>0.537</u>
		nickel	Ni	mg/l	-	-	-	0.02	-	0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.05	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	-
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	<u>5.05</u>
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbbide 1,320
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,730</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<u>0.054</u>
		hardness	(CaCO ₃)	°f	-	-	100	-	-	62
		calcium	Ca	mg/l	-	-	300	-	-	169
		chloride	Cl	mg/l	-	-	600	-	250	111.0
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	0.279
		magnesium	Mg	mg/l	-	-	150	-	-	47
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	235.0
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	169.0	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	0.29	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	<u>9</u>
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	394	
			°f	-	-	-	-	-	32.3	
Mineral acidity			°f	-	-	-	-	-	0	
Total acidity			°f	-	-	-	-	-	0.88	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	0.015		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	0.108		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	20.3	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	181	
	Potassium	K	mg/l	-	-	-	-	-	2.03	
	salinity	-	‰	-	-	-	-	-	0.7	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (17) Results of Water Analysis for Sub-projects 2006

ID Number				16-2						
Governorate				KAIROUAN						
Delegation				EL OUESLATIA						
subproject				GOUAAD						
Date				08/03/2005						
				NT 09.14 (1983)			OMS Guideline (2004)		EXTENSION GR	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	16-2	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<u>1</u>
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<1
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.02
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.33
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	6.04
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.019
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	2
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.16
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 326
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	582
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	32.0
		calcium	Ca	mg/l	-	-	300	-	-	106.0
		chloride	Cl	mg/l	-	-	600	-	250	37
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	5.72
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	27
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
		aluminum	Al	mg/l	-	-	-	-	0.2	<0.05
		sodium	Na	mg/l	-	-	-	-	200	18
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.06	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.5
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
		Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	286
				°f	-	-	-	-	-	23.4
Mineral acidity			°f	-	-	-	-	-	-	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	12.2	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	55	
	Potassium	K	mg/l	-	-	-	-	-	0.94	
	salinity	-	‰	-	-	-	-	-	0	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (18) Results of Water Analysis for Sub-projects 2006

				ID Number						19
				Governorate						KASSERINE
				Delegation						FOUSSANA
				subproject						BNANA / OULED BENAJEH
				Date						01/07/2004
				NT 09.14 (1983)			OMS Guideline (2004)		DEEP WELL	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	19	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.31
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	12.7
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	<0.002
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.44
		residue on evaporation	-	mg/l	-	-	2,500	-	-	turbide
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	335
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	569
		mineral oils	-	mg/l	-	-	0.3	-	-	<0.10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<10
		hardness (CaCO ₃)	°f	-	-	-	100	-	-	<0.025
		calcium	Ca	mg/l	-	-	300	-	-	22.8
		chloride	Cl	mg/l	-	-	600	-	250	79.3
		copper	Cu	mg/l	-	-	1	2	1	40.1
		iron	Fe	mg/l	-	-	1	-	0.3	<0.011
		magnesium	Mg	mg/l	-	-	150	-	-	<0.057
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	12.9
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	<0.080
	zinc	Zn	mg/l	-	-	5	-	3	44.0	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.068	
	sodium	Na	mg/l	-	-	-	-	200	<0.05	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	26.7	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	<0.05	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.65
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	206	
			°f	-	-	-	-	-	16.9	
Mineral acidity			°f	-	-	-	-	-	0	
Total acidity			°f	-	-	-	-	-	1.10	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	<0.010		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	<0.057		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	18.8	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	56.8	
	Potassium	K	mg/l	-	-	-	-	-	1.88	
	salinity	-	‰	-	-	-	-	-	<0.1	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (19) Results of Water Analysis for Sub-projects 2006

				ID Number						20
				Governorate						KASSERINE
				Delegation						HADRA
				subproject						MKIMEN
				Date						06/04/2005
				NT 09.14 (1983)			OMS Guideline (2004)		DEEP WELL	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	20	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	24
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<1
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.024
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	1.2
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	86.7
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	0.397
		boron	B	mg/l	-	-	-	0.5	-	0.563
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
		chromium	Cr	mg/l	-	-	-	0.05	-	<0.05
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	-
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	3.72
		residue on evaporation	-	mg/l	-	-	2,500	-	-	turbide
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	1,680
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	954
		mineral oils	-	mg/l	-	-	0.3	-	-	<0.10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness (CaCO ₃)	°f	-	-	100	-	-	-	64.5
		calcium	Ca	mg/l	-	-	300	-	-	151
		chloride	Cl	mg/l	-	-	600	-	250	374.0
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	66.2
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	289.0
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	231.0	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	0.56	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.25
Carbonate		CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	293	
			°f	-	-	-	-	-	24	
Mineral acidity			°f	-	-	-	-	-	0	
Total acidity			°f	-	-	-	-	-	0.98	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	<0.010		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	<0.057		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	21.2	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	220	
	Potassium	K	mg/l	-	-	-	-	-	6.27	
	salinity	-	‰	-	-	-	-	-	1	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (20) Results of Water Analysis for Sub-projects 2006

				ID Number		21				
				Governorate		SIDI BOUZID				
				Delegation		JELMA				
				subproject		AIN JAFFEL				
				Date		07/02/2005				
				NT 09.14 (1983)			OMS Guideline (2004)			
						DEEP WELL				
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	21	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.003
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.94
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	<0.5
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.178
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.05	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	-
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	1.46
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	628
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	979
		mineral oils	-	mg/l	-	-	0.3	-	-	<0.10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	30
		calcium	Ca	mg/l	-	-	300	-	-	61
		chloride	Cl	mg/l	-	-	600	-	250	111.0
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	0.122
		magnesium	Mg	mg/l	-	-	150	-	-	23.2
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	233.0
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	130.0	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	0.22	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.75
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
		Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	191
			°f	-	-	-	-	-	15.7	
Mineral acidity			°f	-	-	-	-	-	0	
Total acidity			°f	-	-	-	-	-	1.02	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	<0.010		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	0.06		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	23.4	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	96	
	Potassium	K	mg/l	-	-	-	-	-	3.97	
	salinity	-	‰	-	-	-	-	-	0.2	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (21) Results of Water Analysis for Sub-projects 2006

21/47

ID Number				26						
Governorate				SIDI BOUZID						
Delegation				BIR EL HAFEY						
subproject				SOUASSIA						
Date				02/02/2005						
				NT 09.14 (1983)			OMS Guideline (2004)		DEEP WELL	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	26	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<u>1</u>
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<u>1</u>
		E-coli	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.003
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	<u>1.6</u>
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	9.7
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	<u>0.775</u>
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.05	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	-
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	4.88
		residue on evaporation	-	mg/l	-	-	2,500	-	-	turbide
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>3.600</u> <u>>2000</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<u>0.029</u>
		hardness	(CaCO ₃)	°f	-	-	100	-	-	<u>182</u>
		calcium	Ca	mg/l	-	-	300	-	-	<u>498</u>
		chloride	Cl	mg/l	-	-	600	-	250	<u>544</u>
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	0.132
		magnesium	Mg	mg/l	-	-	150	-	-	<u>210</u>
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>2.020</u>	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	<u>410</u>	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.06	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.05
Carbonate		CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	272	
			°f	-	-	-	-	-	22.3	
Mineral acidity			°f	-	-	-	-	-	0	
Total acidity			°f	-	-	-	-	-	0.98	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	<0.010		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	<0.057		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	22.2	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	416	
	Potassium	K	mg/l	-	-	-	-	-	9.99	
	salinity	-	‰	-	-	-	-	-	2.1	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (22) Results of Water Analysis for Sub-projects 2006

22/47

ID Number				27						
Governorate				SIDI BOUZID						
Delegation				SIDI BOUZID EST						
subproject				GARD HADID						
Date				07/02/2005						
				NT 09.14 (1983)			OMS Guideline (2004)		DEEP WELL	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	27	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.003
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.62
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	6.62
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.194
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.05	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	-
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.29
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	723
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<u>1.110</u>
		mineral oils	-	mg/l	-	-	0.3	-	-	<0.10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<10
		hardness	(CaCO ₃)	°f	-	-	100	-	-	<u>0.027</u>
		calcium	Ca	mg/l	-	-	300	-	-	39.0
		chloride	Cl	mg/l	-	-	600	-	250	87
		copper	Cu	mg/l	-	-	1	2	1	150
		iron	Fe	mg/l	-	-	1	-	0.3	<0.011
		magnesium	Mg	mg/l	-	-	150	-	-	<0.057
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	46.4
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	<0.080
	zinc	Zn	mg/l	-	-	5	-	3	236	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.068	
	sodium	Na	mg/l	-	-	-	-	200	<0.05	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	84	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	<0.06	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.20
Carbonate		CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	237	
			°f	-	-	-	-	-	19.4	
Mineral acidity			°f	-	-	-	-	-	0	
Total acidity			°f	-	-	-	-	-	0.98	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	<0.010		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	<0.057		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	22.6	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	108	
	Potassium	K	mg/l	-	-	-	-	-	9.82	
	salinity	-	‰	-	-	-	-	-	0.3	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (23) Results of Water Analysis for Sub-projects 2006

23/47

ID Number				28						
Governorate				SOUSSE						
Delegation				BOUFICHA						
subproject				CHRAIFIA						
Date				05/07/2004						
				NT 09.14 (1983)			OMS Guideline (2004)		EXTENSION GR	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	28	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	1.14
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	28.5
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.493
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.8	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	5
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.15
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 1,240
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	>2000
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness (CaCO ₃)	°f	-	-	-	100	-	-	40.4
		calcium	Ca	mg/l	-	-	300	-	-	93.1
		chloride	Cl	mg/l	-	-	600	-	250	<u>424</u>
		copper	Cu	mg/l	-	-	1	2	1	0.013
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	47.8
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	132
		zinc	Zn	mg/l	-	-	5	-	3	0.171
		aluminum	Al	mg/l	-	-	-	-	0.2	<0.05
		sodium	Na	mg/l	-	-	-	-	200	<u>343</u>
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.8	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.45
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	381	
			°f	-	-	-	-	-	31.2	
Mineral acidity			°f	-	-	-	-	-	-	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	26.9	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	220	
	Potassium	K	mg/l	-	-	-	-	-	5.85	
	salinity	-	‰	-	-	-	-	-	1	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (24) Results of Water Analysis for Sub-projects 2006

24/47

ID Number				31						
Governorate				GAFSA						
Delegation				MDHILA						
subproject				ENJAIMIA						
Date				01/07/2004						
				NT 09.14 (1983)			OMS Guideline (2004)		SONEDE CONNECTION	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	31	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	1.11
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	3.00
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.234
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	1.1	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	2
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.12
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turide 1,800
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	>2000
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	98.4
		calcium	Ca	mg/l	-	-	300	-	-	254
		chloride	Cl	mg/l	-	-	600	-	250	301
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	116
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	845
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
		aluminum	Al	mg/l	-	-	-	-	0.2	<0.05
		sodium	Na	mg/l	-	-	-	-	200	174
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.8	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.80
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
		Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	203
				°f	-	-	-	-	-	16.6
Mineral acidity			°f	-	-	-	-	-	-	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	27.8	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	243	
	Potassium	K	mg/l	-	-	-	-	-	10.3	
	salinity	-	‰	-	-	-	-	-	1.1	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (25) Results of Water Analysis for Sub-projects 2006

25/47

ID Number				32						
Governorate				MEDENINE						
Delegation				BENI KHEDECHE						
subproject				CITE CHAABAT EL MA						
Date				29/06/2004						
				NT 09.14 (1983)			OMS Guideline (2004)		SONEDE CONNECTION	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	32	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<u>7</u>
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		E-coli	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	<u>2.32</u>
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	22.2
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.396
		nickel	Ni	mg/l	-	-	-	0.02	-	0.006
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.1	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	2
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.45
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 799
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,280</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	36.0
		calcium	Ca	mg/l	-	-	300	-	-	73.5
		chloride	Cl	mg/l	-	-	600	-	250	101
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	45.6
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>313</u>
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	156	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.1	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.85
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	206	
			°f	-	-	-	-	-	16.9	
Mineral acidity			°f	-	-	-	-	-	-	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	33.6	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	128	
	Potassium	K	mg/l	-	-	-	-	-	8.12	
	salinity	-	‰	-	-	-	-	-	0.4	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (26) Results of Water Analysis for Sub-projects 2006

26/47

ID Number				33						
Governorate				MEDENINE						
Delegation				SIDI MAKHLOUF						
subproject				HLALMA ET OUDHANA						
Date				29/06/2004						
				NT 09.14 (1983)			OMS Guideline (2004)		SONEDE CONNECTION	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	33	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	0.004
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	<u>1.93</u>
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	9.59
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	0.135
		boron	B	mg/l	-	-	-	0.5	-	0.430
nickel		Ni	mg/l	-	-	-	0.02	-	<0.005	
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.1	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	2
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.24
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 1,220
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,850</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	49.4
		calcium	Ca	mg/l	-	-	300	-	-	105
		chloride	Cl	mg/l	-	-	600	-	250	195
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	0.063
		magnesium	Mg	mg/l	-	-	150	-	-	59.6
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>516</u>
	zinc	Zn	mg/l	-	-	5	-	3	0.607	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	<u>242</u>	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.1	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.80
Carbonate		CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	201	
			°f	-	-	-	-	-	16.5	
Mineral acidity			°f	-	-	-	-	-	-	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	28.3	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	186	
	Potassium	K	mg/l	-	-	-	-	-	8.14	
	salinity	-	‰	-	-	-	-	-	0.8	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (27) Results of Water Analysis for Sub-projects 2006

27/47

ID Number				34						
Governorate				MEDENINE						
Delegation				SIDI MAKHLOUF						
subproject				TOGUI ET RAHHAL						
Date				29/06/2004						
				NT 09.14 (1983)			OMS Guideline (2004)		SONEDE CONNECTION	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	34	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<u>7</u>
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		E-coli	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	1.04
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.08
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.0023
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	<u>1.91</u>
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	12.2
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.413
nickel		Ni	mg/l	-	-	-	0.02	-	<0.005	
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.4	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	3
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.26
		residue on evaporation	-	mg/l	-	-	2,500	-	-	peu turbide 1,320
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,980</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	56.8
		calcium	Ca	mg/l	-	-	300	-	-	136
		chloride	Cl	mg/l	-	-	600	-	250	226
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	64.7
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>535</u>
	zinc	Zn	mg/l	-	-	5	-	3	0.086	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	<u>240</u>	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.05	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.4	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.70
Carbonate		CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	214	
			°f	-	-	-	-	-	17.5	
Mineral acidity			°f	-	-	-	-	-	-	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	30.6	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	198	
	Potassium	K	mg/l	-	-	-	-	-	8.58	
	salinity	-	‰	-	-	-	-	-	0.9	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (28) Results of Water Analysis for Sub-projects 2006

				ID Number		35				
				Governorate		KASSERINE				
				Delegation		SBIBA				
				subproject		CHAAIBIA				
				Date		28/01/2005				
				NT 09.14 (1983)			OMS Guideline (2004)			
							DEEP WELL			
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	35	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<1
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<1
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.047
		molybdenum	Mo	mg/l	-	-	-	0.07	-	0.039
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	1.38
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	20.6
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	0.011
		boron	B	mg/l	-	-	-	0.5	-	0.333
nickel		Ni	mg/l	-	-	-	0.02	-	<0.005	
chromium		Cr	mg/l	-	-	-	0.05	-	<0.05	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	-
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.60
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	487
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	779
		mineral oils	-	mg/l	-	-	0.3	-	-	<0.10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	26.6
		calcium	Ca	mg/l	-	-	300	-	-	67
		chloride	Cl	mg/l	-	-	600	-	250	83
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	33.6
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	93.1
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	59.6	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.06	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.55
Carbonate		CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	233	
			°f	-	-	-	-	-	19.1	
Mineral acidity			°f	-	-	-	-	-	0	
Total acidity			°f	-	-	-	-	-	0.79	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	<0.010		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	<0.057		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	18.1	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	78.4	
	Potassium	K	mg/l	-	-	-	-	-	2.59	
	salinity	-	‰	-	-	-	-	-	0.1	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (29) Results of Water Analysis for Sub-projects 2006

29/47

ID Number				36						
Governorate				KASSERINE						
Delegation				SBIBA						
subproject				OUED LAHTAB						
Date				31/01/2005						
				NT 09.14 (1983)		OMS Guideline (2004)		DEEP WELL		
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	36	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<1
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<1
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.003
		molybdenum	Mo	mg/l	-	-	-	0.07	-	0.015
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	<u>1.6</u>
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	7.97
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.161
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	-
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	1.29
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 688
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,150</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<u>0.03</u>
		hardness	(CaCO ₃)	°f	-	-	100	-	-	34
		calcium	Ca	mg/l	-	-	300	-	-	58.5
		chloride	Cl	mg/l	-	-	600	-	250	143.0
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	0.06
		magnesium	Mg	mg/l	-	-	150	-	-	53
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	202.0
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
		aluminum	Al	mg/l	-	-	-	-	0.2	<0.05
		sodium	Na	mg/l	-	-	-	-	200	144.0
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.06	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.55
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
		Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	297
				°f	-	-	-	-	-	24.3
Mineral acidity			°f	-	-	-	-	-	0	
Total acidity			°f	-	-	-	-	-	1.22	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	<0.010		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	<0.057		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	19.9	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	113	
	Potassium	K	mg/l	-	-	-	-	-	3.15	
	salinity	-	‰	-	-	-	-	-	0.3	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (30) Results of Water Analysis for Sub-projects 2006

ID Number								37		
Governorate								JENDOUBA		
Delegation								JENDOUBA NORD		
subproject								EL FRACHICH		
Date								24/01/2005		
				NT 09.14 (1983)			OMS Guideline (2004)		DEEP WELL	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	37	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<u>1</u>
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<1
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<u>28.7</u>
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.082
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.16
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	<u>70.6</u>
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.051
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	-
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	4.29
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 952
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1.440</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	0.1
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	47
		calcium	Ca	mg/l	-	-	300	-	-	152
		chloride	Cl	mg/l	-	-	600	-	250	<u>284.0</u>
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	25.6
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	71.7
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	110.0	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.06	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.10
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	304	
			°f	-	-	-	-	-	24.9	
Mineral acidity			°f	-	-	-	-	-	0	
Total acidity			°f	-	-	-	-	-	1.42	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	<0.010		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	<0.057		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	21.5	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	144	
	Potassium	K	mg/l	-	-	-	-	-	1.37	
	salinity	-	‰	-	-	-	-	-	0.5	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (31) Results of Water Analysis for Sub-projects 2006

ID Number				38						
Governorate				BEJA						
Delegation				NEFZA						
subproject				GMARA						
Date				17/01/2005						
				NT 09.14 (1983)			OMS Guideline (2004)		SONEDO CONNECTION	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	38	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<1
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<1
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.119
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.38
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	4.38
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.068
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.5	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.62
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 567
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	902
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	0.047
		hardness	(CaCO ₃)	°f	-	-	100	-	-	31.2
		calcium	Ca	mg/l	-	-	300	-	-	132
		chloride	Cl	mg/l	-	-	600	-	250	121.0
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	9.93
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	48.9
		zinc	Zn	mg/l	-	-	5	-	3	0.089
		aluminum	Al	mg/l	-	-	-	-	0.2	<0.05
		sodium	Na	mg/l	-	-	-	-	200	59.6
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.06	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.5	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.20
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	314	
			°f	-	-	-	-	-	25.7	
Mineral acidity		-	°f	-	-	-	-	-	-	
Total acidity		-	°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	8.3	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	88.9	
	Potassium	K	mg/l	-	-	-	-	-	1.15	
	salinity	-	‰	-	-	-	-	-	0	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (32) Results of Water Analysis for Sub-projects 2006

32/47

ID Number				39						
Governorate				LE KEF						
Delegation				KALAAT KHSBA						
subproject				FORNA						
Date				26/01/2005						
				NT 09.14 (1983)			OMS Guideline (2004)		SONEDE CONNECTION	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	39	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<1
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<1
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.022
		molybdenum	Mo	mg/l	-	-	-	0.07	-	0.039
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.48
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	32.1
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.129
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	1.50
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	623
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	1,000
		mineral oils	-	mg/l	-	-	0.3	-	-	<0.1
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<10
		hardness	(CaCO ₃)	°f	-	-	100	-	-	0.033
		calcium	Ca	mg/l	-	-	300	-	-	41.4
		chloride	Cl	mg/l	-	-	600	-	250	80.8
		copper	Cu	mg/l	-	-	1	2	1	95.0
		iron	Fe	mg/l	-	-	1	-	0.3	<0.011
		magnesium	Mg	mg/l	-	-	150	-	-	0.073
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	36.8
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	<0.080
	zinc	Zn	mg/l	-	-	5	-	3	161.0	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.068	
	sodium	Na	mg/l	-	-	-	-	200	<0.05	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	48.0	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	<0.06	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	0
Carbonate		CO ₃	mg/l	-	-	-	-	-	7.75	
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	262	
Mineral acidity			°f	-	-	-	-	-	21.5	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	6.9	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	97.1	
	Potassium	K	mg/l	-	-	-	-	-	0.81	
	salinity	-	‰	-	-	-	-	-	0.2	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (33) Results of Water Analysis for Sub-projects 2006

ID Number				40						
Governorate				LE KEF						
Delegation				NEBEUR						
subproject				EL OUENA						
Date				24/01/2005						
				NT 09.14 (1983)			OMS Guideline (2004)		EXTENSION GR	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	40	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<1
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<1
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.066
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.21
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	25
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.091
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.4	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	2.47
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 479
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	837
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	0.1
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	28.8
		calcium	Ca	mg/l	-	-	300	-	-	91.3
		chloride	Cl	mg/l	-	-	600	-	250	128
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	11.5
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	75
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	55	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.06	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.2	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.9
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	204	
			°f	-	-	-	-	-	16.7	
Mineral acidity			°f	-	-	-	-	-	-	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	12.3	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	83.5	
	Potassium	K	mg/l	-	-	-	-	-	2.66	
	salinity	-	‰	-	-	-	-	-	0.2	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (34) Results of Water Analysis for Sub-projects 2006

ID Number				41						
Governorate				BIZERTE						
Delegation				BIZERTE SUD						
subproject				ETRAMIS-EDMIN						
Date				18/01/2005						
				NT 09.14 (1983)			OMS Guideline (2004)		DEEP WELL	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	41	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<u>1</u>
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<u>2</u>
		E-coli	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.072
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.28
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	6.34
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.131
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health		Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU
	odour		-	dilution	-	-	acceptable	-	-	1
	taste		-	dilution	-	-	acceptable	-	-	-
	turbidity		-	NTU	-	-	25 NTU	-	5 NTU	0.70
	residue on evaporation		-	mg/l	-	-	2,500	-	-	non turbide 1,090
	total dissolved solids		TDS	mg/l	-	-	-	-	1,000	<u>1,900</u>
	Anionic surface active agent		-	mg ABS/l	-	-	0.5	-	-	0.1
	mineral oils		-	mg/l	-	-	0.3	-	-	<10
	phenolic compounds		-	mg/l	-	-	0.002	-	-	<u>0.04</u>
	hardness		(CaCO ₃)	°f	-	-	100	-	-	54.0
	calcium		Ca	mg/l	-	-	300	-	-	63.6
	chloride		Cl	mg/l	-	-	600	-	250	<u>588.0</u>
	copper		Cu	mg/l	-	-	1	2	1	<0.011
	iron		Fe	mg/l	-	-	1	-	0.3	<0.057
	magnesium		Mg	mg/l	-	-	150	-	-	25
	manganese		Mn	mg/l	-	-	0.5	0.4	0.1	0.081
	sulfate		SO ₄	mg/l	-	-	600.0	-	250	51.0
	zinc		Zn	mg/l	-	-	5	-	3	<0.068
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	<u>302.0</u>	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	0.07	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	6.9
Carbonate		CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	145	
			°f	-	-	-	-	-	11.9	
Mineral acidity		-	°f	-	-	-	-	-	0	
Total acidity		-	°f	-	-	-	-	-	0.78	
iron bivalent		Fe ²⁺	mg/l	-	-	-	-	-	<0.010	
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	<0.057		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	19	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	186	
	Potassium	K	mg/l	-	-	-	-	-	3.97	
	salinity	-	‰	-	-	-	-	-	0.8	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (35) Results of Water Analysis for Sub-projects 2006

35/47

				ID Number	42					
				Governorate	BIZERTE					
				Delegation	GHAZALA					
				subproject	EL KALBOUSSI					
				Date	19/01/2005					
				NT 09.14 (1983)			OMS Guideline (2004)		DEEP WELL	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	42	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	35
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<1
		E-coli	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.041
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.36
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	27.3
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.039
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	-
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	<u>11.60</u>
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 364
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	675
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	31.2
		calcium	Ca	mg/l	-	-	300	-	-	94.7
		chloride	Cl	mg/l	-	-	600	-	250	75
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	4.67
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
	sulfate	SO ₄	mg/l	-	-	600.0	-	250	27	
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	32	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.06	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.3
Carbonate		CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	245	
			°f	-	-	-	-	-	20.1	
Mineral acidity			°f	-	-	-	-	-	0	
Total acidity			°f	-	-	-	-	-	0.92	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	<0.010		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	<0.057		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	16.2	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	67.5	
	Potassium	K	mg/l	-	-	-	-	-	0.43	
	salinity	-	‰	-	-	-	-	-	0.1	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (36) Results of Water Analysis for Sub-projects 2006

				ID Number		43					
				Governorate		BIZERTE					
				Delegation		GHAR EL MELEH					
				subproject		SIDI HASSEN					
				Date		19/01/2005					
				NT 09.14 (1983)			OMS Guideline (2004)		SONEDE CONNECTION		
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	43		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria		CT	MPN/100ml	-	<2	-	0	-	1
		Thermotolerant coliform		CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci		ST	MPN/100ml	-	-	-	-	-	<1
		<i>E-coli</i>		E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic		As	µg/l	50	-	-	10	-	<1.0
		cadmium		Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide		Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury		Hg	µg/l	1	-	-	1	-	<0.915
		lead		Pb	µg/l	50	-	-	10	-	<1.7
		selenium		Se	µg/l	10	-	-	10	-	<1.095
		antimony		Sb	µg/l	20	-	-	18	-	<1.00
		silver		Ag	mg/l	0.02	-	-	-	-	<0.007
		barium		Ba	mg/l	-	-	-	0.7	-	0.059
		molybdenum		Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt		Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride		F	mg/l	-	-	-	1.5	-	0.4
		nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	20.2
		nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron		B	mg/l	-	-	-	0.5	-	0.227
		nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050		
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.04		
No Direct Consequence to Health	Acceptability to Consumers	color		-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour		-	dilution	-	-	acceptable	-	-	1
		taste		-	dilution	-	-	acceptable	-	-	2
		turbidity		-	NTU	-	-	25 NTU	-	5 NTU	0.94
		residue on evaporation		-	mg/l	-	-	2,500	-	-	non turbide 924
		total dissolved solids		TDS	mg/l	-	-	-	-	1,000	<u>1.400</u>
		Anionic surface active agent		-	mg ABS/l	-	-	0.5	-	-	0.1
		mineral oils		-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds		-	mg/l	-	-	0.002	-	-	0.046
		hardness		(CaCO ₃)	°f	-	-	100	-	-	38
		calcium		Ca	mg/l	-	-	300	-	-	124
		chloride		Cl	mg/l	-	-	600	-	250	<u>288.0</u>
		copper		Cu	mg/l	-	-	1	2	1	<0.011
		iron		Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium		Mg	mg/l	-	-	150	-	-	22.8
		manganese		Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate		SO ₄	mg/l	-	-	600.0	-	250	157.0
		zinc		Zn	mg/l	-	-	5	-	3	<0.068
		aluminum		Al	mg/l	-	-	-	-	0.2	<0.05
		sodium		Na	mg/l	-	-	-	-	200	130.0
	ammonia		NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.06	
	residual chlorine		Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.02	
	Potentially Affecting Water Supply Facilities	pH		pH	-	-	-	6.5 - 8.5	-	-	7.9
		Carbonate		CO ₃	mg/l	-	-	-	-	-	0
					°f	-	-	-	-	-	0
		Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	220
					°f	-	-	-	-	-	18
Mineral acidity			°f	-	-	-	-	-	-		
Total acidity			°f	-	-	-	-	-	-		
Other Supporting Parameters	Temperature		T	°C	-	-	-	-	-	15.4	
	Electrical Conductivity		EC	mS/m	-	-	-	-	-	141	
	Potassium		K	mg/l	-	-	-	-	-	3.96	
	salinity		-	‰	-	-	-	-	-	0.5	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (37) Results of Water Analysis for Sub-projects 2006

37/47

ID Number				44						
Governorate				KAIROUAN						
Delegation				HADJEB						
subproject				KHOUALDIA						
Date				13/02/2005						
				NT 09.14 (1983)		OMS Guideline (2004)		EXTENSION GR		
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	44	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<1
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<u>3</u>
		E-coli	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.003
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.7
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	<0.5
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.202
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.29
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,830</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	0.11
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness (CaCO ₃)	°f	°f	-	-	100	-	-	50.7
		calcium	Ca	mg/l	-	-	300	-	-	121
		chloride	Cl	mg/l	-	-	600	-	250	<u>337</u>
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	64.6
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>393</u>
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	<u>216</u>	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.06	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.5
Carbonate		CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	250	
			°f	-	-	-	-	-	20.5	
Mineral acidity			°f	-	-	-	-	-	-	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	12.1	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	187	
	Potassium	K	mg/l	-	-	-	-	-	9.08	
	salinity	-	‰	-	-	-	-	-	0.8	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (38) Results of Water Analysis for Sub-projects 2006

				ID Number		45					
				Governorate		KAIROUAN					
				Delegation		NASRALLAH					
				subproject		HSAINIA					
				Date		09/02/2005					
				NT 09.14 (1983)			OMS Guideline (2004)		EXTENSION GR		
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	45		
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria		CT	MPN/100ml	-	<2	-	0	-	1
		Thermotolerant coliform		CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci		ST	MPN/100ml	-	-	-	-	-	<1
		<i>E-coli</i>		E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic		As	µg/l	50	-	-	10	-	<1.0
		cadmium		Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide		Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury		Hg	µg/l	1	-	-	1	-	<0.915
		lead		Pb	µg/l	50	-	-	10	-	<1.7
		selenium		Se	µg/l	10	-	-	10	-	<1.095
		antimony		Sb	µg/l	20	-	-	18	-	<1.00
		silver		Ag	mg/l	0.02	-	-	-	-	<0.007
		barium		Ba	mg/l	-	-	-	0.7	-	<0.003
		molybdenum		Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt		Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride		F	mg/l	-	-	-	1.5	-	0.68
		nitrate		NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	1.19
		nitrite		NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron		B	mg/l	-	-	-	0.5	-	0.244
		nickel		Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050		
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0		
No Direct Consequence to Health	Acceptability to Consumers	color		-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour		-	dilution	-	-	acceptable	-	-	1
		taste		-	dilution	-	-	acceptable	-	-	1
		turbidity		-	NTU	-	-	25 NTU	-	5 NTU	0.61
		residue on evaporation		-	mg/l	-	-	2,500	-	-	non turide
		total dissolved solids		TDS	mg/l	-	-	-	-	1,000	723
		Anionic surface active agent		-	mg ABS/l	-	-	0.5	-	-	<u>1.090</u>
		mineral oils		-	mg/l	-	-	0.3	-	-	0.12
		phenolic compounds		-	mg/l	-	-	0.002	-	-	<10
		hardness		(CaCO ₃)	°f	-	-	100	-	-	0.078
		calcium		Ca	mg/l	-	-	300	-	-	60
		chloride		Cl	mg/l	-	-	600	-	250	89.2
		copper		Cu	mg/l	-	-	1	2	1	143
		iron		Fe	mg/l	-	-	1	-	0.3	<0.011
		magnesium		Mg	mg/l	-	-	150	-	-	<0.057
		manganese		Mn	mg/l	-	-	0.5	0.4	0.1	49.4
		sulfate		SO ₄	mg/l	-	-	600.0	-	250	<0.080
		zinc		Zn	mg/l	-	-	5	-	3	206
		aluminum		Al	mg/l	-	-	-	-	0.2	<0.068
		sodium		Na	mg/l	-	-	-	-	200	<0.05
	ammonia		NH ₄	mg NH ₄ /l	-	-	-	-	1.5	98	
	residual chlorine		Cl ⁻	mg/l	-	-	-	-	0.6-1.0	<0.06	
	Potentially Affecting Water Supply Facilities	pH		pH	-	-	-	6.5 - 8.5	-	-	7.80
		Carbonate		CO ₃	mg/l	-	-	-	-	-	0
					°f	-	-	-	-	-	0
		Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	221
					°f	-	-	-	-	-	18.1
		Mineral acidity			°f	-	-	-	-	-	-
		Total acidity			°f	-	-	-	-	-	-
		iron bivalent		Fe ²⁺	mg/l	-	-	-	-	-	-
iron trivalent		Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature		T	°C	-	-	-	-	-	15.8	
	Electrical Conductivity		EC	mS/m	-	-	-	-	-	105	
	Potassium		K	mg/l	-	-	-	-	-	4.67	
	salinity		-	‰	-	-	-	-	-	0.3	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (39) Results of Water Analysis for Sub-projects 2006

39/47

				ID Number		46				
				Governorate		SIDI BOUZID				
				Delegation		REGUEB				
				subproject		SLATNIA				
				Date		07/02/2005				
				NT 09.14 (1983)			OMS Guideline (2004)		EXTENSION GR	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	46	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<2
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<2
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<2
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<2
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.003
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.65
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	26.9
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	<u>0.533</u>
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	1.02
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 2,250
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>>2000</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<u>0.067</u>
		hardness	(CaCO ₃)	°f	-	-	100	-	-	<u>190.0</u>
		calcium	Ca	mg/l	-	-	300	-	-	192
		chloride	Cl	mg/l	-	-	600	-	250	<u>749</u>
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	0.084
		magnesium	Mg	mg/l	-	-	150	-	-	140
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>642</u>
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	<u>287</u>	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.06	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.75
Carbonate		CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	148	
			°f	-	-	-	-	-	12.1	
Mineral acidity			°f	-	-	-	-	-	0	
Total acidity			°f	-	-	-	-	-	1.02	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	10.4	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	295	
	Potassium	K	mg/l	-	-	-	-	-	8.69	
	salinity	-	‰	-	-	-	-	-	1.4	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

					ID Number		47			
					Governorate		SIDI BOUZID			
					Delegation		JELMA			
					subproject		OULED MOUSSA			
					Date		02/02/2005			
					NT 09.14 (1983)			OMS Guideline (2004)		EXTENSION GR
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	47	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<1
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<1
		E-coli	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.003
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
		cobalt	Co	mg/l	-	-	-	-	-	<0.004
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.55
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	<0.5
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.115
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
		chromium	Cr	mg/l	-	-	-	0.05	-	<0.050
		total chlorine	Cl ⁻	mg/l	-	-	-	5	-	-
No Direct Consequence to Health		Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU
	odour		-	dilution	-	-	acceptable	-	-	1
	taste		-	dilution	-	-	acceptable	-	-	-
	turbidity		-	NTU	-	-	25 NTU	-	5 NTU	0.70
	residue on evaporation		-	mg/l	-	-	2,500	-	-	non turbide
	total dissolved solids		TDS	mg/l	-	-	-	-	1,000	484
	Anionic surface active agent		-	mg ABS/l	-	-	0.5	-	-	810
	mineral oils		-	mg/l	-	-	0.3	-	-	<0.10
	phenolic compounds		-	mg/l	-	-	0.002	-	-	<10
	hardness		(CaCO ₃)	°f	-	-	100	-	-	0.042
	calcium		Ca	mg/l	-	-	300	-	-	29.8
	chloride		Cl	mg/l	-	-	600	-	250	67.4
	copper		Cu	mg/l	-	-	1	2	1	82
	iron		Fe	mg/l	-	-	1	-	0.3	<0.011
	magnesium		Mg	mg/l	-	-	150	-	-	0.078
	manganese		Mn	mg/l	-	-	0.5	0.4	0.1	25.2
	sulfate		SO ₄	mg/l	-	-	600.0	-	250	<0.080
	zinc		Zn	mg/l	-	-	5	-	3	168
	aluminum		Al	mg/l	-	-	-	-	0.2	<0.068
	sodium		Na	mg/l	-	-	-	-	200	<0.05
	ammonia		NH ₄	mg NH ₄ /l	-	-	-	-	1.5	89
	residual chlorine		Cl ⁻	mg/l	-	-	-	-	0.6-1.0	<0.06
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.65
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
		Total alkalinity	HCO ₃	mg/l	-	-	-	-	-	226
				°f	-	-	-	-	-	18.5
		Mineral acidity		°f	-	-	-	-	-	-
		Total acidity		°f	-	-	-	-	-	-
		iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-
	iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-	
	Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	26.7
		Electrical Conductivity	EC	mS/m	-	-	-	-	-	79
Potassium		K	mg/l	-	-	-	-	-	3.52	
salinity		-	‰	-	-	-	-	-	0.2	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (41) Results of Water Analysis for Sub-projects 2006

41/47

ID Number				48						
Governorate				SILIANA						
Delegation				SIDIBOUROUIS						
subproject				NFOUTA						
Date				24/02/2005						
				NT 09.14 (1983)			OMS Guideline (2004)		SONEDE CONNECTION	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	48	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<1
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<1
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	2.5
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.059
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.41
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	<u>127</u>
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.157
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	3
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.72
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 894
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,380</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	47.5
		calcium	Ca	mg/l	-	-	300	-	-	155
		chloride	Cl	mg/l	-	-	600	-	250	173
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	23.7
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	90
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	126	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.06	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.30
Carbonate		CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	403	
			°f	-	-	-	-	-	33.1	
Mineral acidity			°f	-	-	-	-	-	0	
Total acidity			°f	-	-	-	-	-	3.6	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	16.2	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	142	
	Potassium	K	mg/l	-	-	-	-	-	2.83	
	salinity	-	‰	-	-	-	-	-	0.5	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (42) Results of Water Analysis for Sub-projects 2006

ID Number				49						
Governorate				KASSERINE						
Delegation				FOUSSANA						
subproject				OULED MASSAOUD RIZK						
Date				23/02/2005						
				NT 09.14 (1983)			OMS Guideline (2004)		DEEP WELL	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	49	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<1
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<1
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	1.9
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.012
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.65
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	8.15
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.197
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	-
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	<u>5.83</u>
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 1,230
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	<u>1,550</u>
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	68
		calcium	Ca	mg/l	-	-	300	-	-	155
		chloride	Cl	mg/l	-	-	600	-	250	114
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	0.247
		magnesium	Mg	mg/l	-	-	150	-	-	76.4
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	<u>505</u>
	zinc	Zn	mg/l	-	-	5	-	3	<0.068	
	aluminum	Al	mg/l	-	-	-	-	0.2	0.164	
	sodium	Na	mg/l	-	-	-	-	200	72	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.06	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	-	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.29
Carbonate		CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	296	
			°f	-	-	-	-	-	24.3	
Mineral acidity			°f	-	-	-	-	-	0	
Total acidity			°f	-	-	-	-	-	2.5	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	<10		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	0.247		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	19.2	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	155	
	Potassium	K	mg/l	-	-	-	-	-	4.06	
	salinity	-	‰	-	-	-	-	-	0.6	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (43) Results of Water Analysis for Sub-projects 2006

ID Number				50						
Governorate				KAIROUAN						
Delegation				HAFFOUZZ						
subproject				FRATHIA						
Date				25/02/2005						
				NT 09.14 (1983)			OMS Guideline (2004)		EXTENSION GR	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	50	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<1
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<1
		E-coli	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.91
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	0.125
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.86
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	<u>76.6</u>
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.222
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.050	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0.2	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	4
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.12
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	880
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	31.5
		calcium	Ca	mg/l	-	-	300	-	-	49.5
		chloride	Cl	mg/l	-	-	600	-	250	121
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	27.4
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	43
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	82	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.06	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0.1	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.65
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	248	
			°f	-	-	-	-	-	20.3	
Mineral acidity		-	°f	-	-	-	-	-	-	
Total acidity		-	°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	20.6	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	88	
	Potassium	K	mg/l	-	-	-	-	-	1.54	
	salinity	-	‰	-	-	-	-	-	0.2	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (44) Results of Water Analysis for Sub-projects 2006

ID Number				51						
Governorate				GAFSA						
Delegation				GAFSA NORD						
subproject				SMAIDIA						
Date				09/03/2005						
				NT 09.14 (1983)			OMS Guideline (2004)		DEEP WELL	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	51	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<1
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<1
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.003
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	1.07
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	12.19
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.253
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.05	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	-
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.83
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	954
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<u>1.400</u>
		mineral oils	-	mg/l	-	-	0.3	-	-	<0.10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<10
		hardness	(CaCO ₃)	°f	-	-	100	-	-	0.042
		calcium	Ca	mg/l	-	-	300	-	-	40.4
		chloride	Cl	mg/l	-	-	600	-	250	100
		copper	Cu	mg/l	-	-	1	2	1	138
		iron	Fe	mg/l	-	-	1	-	0.3	<0.011
		magnesium	Mg	mg/l	-	-	150	-	-	0.085
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	45.1
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	<0.080
	zinc	Zn	mg/l	-	-	5	-	3	<u>406.0</u>	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.068	
	sodium	Na	mg/l	-	-	-	-	200	<0.05	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	143.0	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	<0.06	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.3
Carbonate		CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	249	
			°f	-	-	-	-	-	20.4	
Mineral acidity			°f	-	-	-	-	-	0	
Total acidity			°f	-	-	-	-	-	1.4	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	<0.01		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	0.085		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	21.4	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	138	
	Potassium	K	mg/l	-	-	-	-	-	2.25	
	salinity	-	‰	-	-	-	-	-	0.5	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (45) Results of Water Analysis for Sub-projects 2006

ID Number				52						
Governorate				KAIROUAN						
Delegation				EL ALAA						
subproject				MAAMRIA						
Date				08/03/2005						
				NT 09.14 (1983)			OMS Guideline (2004)		EXTENSION GR	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	52	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	<1
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<1
		<i>E-coli</i>	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.003
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.93
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	33.4
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.015
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.05	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	0	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	1
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.31
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide 507
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	868
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	<0.10
		mineral oils	-	mg/l	-	-	0.3	-	-	<10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<0.025
		hardness	(CaCO ₃)	°f	-	-	100	-	-	35.4
		calcium	Ca	mg/l	-	-	300	-	-	83.3
		chloride	Cl	mg/l	-	-	600	-	250	125
		copper	Cu	mg/l	-	-	1	2	1	<0.011
		iron	Fe	mg/l	-	-	1	-	0.3	<0.057
		magnesium	Mg	mg/l	-	-	150	-	-	23.3
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	<0.080
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	123.0
		zinc	Zn	mg/l	-	-	5	-	3	<0.068
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.05	
	sodium	Na	mg/l	-	-	-	-	200	63.0	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	<0.06	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	0	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.9
		Carbonate	CO ₃	mg/l	-	-	-	-	-	0
				°f	-	-	-	-	-	0
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	199	
			°f	-	-	-	-	-	16.3	
Mineral acidity			°f	-	-	-	-	-	-	
Total acidity			°f	-	-	-	-	-	-	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	-		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	-		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	9.7	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	83	
	Potassium	K	mg/l	-	-	-	-	-	3.05	
	salinity	-	‰	-	-	-	-	-	0.2	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 3-2 (46) Results of Water Analysis for Sub-projects 2006

46/47

ID Number				53						
Governorate				LE KEF						
Delegation				JRISSA ET KHEOBA						
subproject				ESBIAAT, EL ARGOUB ET SOUALHIA						
Date				10/03/2005						
				NT 09.14 (1983)			OMS Guideline (2004)		DEEP WELL	
Category	Parameters	abb.	Unit	Criteria of Drinking-Water	Criteria for Health Concerning	Criteria of Acceptability for domestic use	Criteria of Health Concerning	Criteria of Acceptability to Consumers	53	
Potential Hazard to Public Health	Bacteriological Parameters	Total coliform bacteria	CT	MPN/100ml	-	<2	-	0	-	1
		Thermotolerant coliform	CF	MPN/100ml	-	-	-	-	-	<1
		Facal streptococci	ST	MPN/100ml	-	-	-	-	-	<1
		E-coli	E. Coli	MPN/100ml	-	0	-	-	-	<1
	Toxic Chemicals	arsenic	As	µg/l	50	-	-	10	-	<1.0
		cadmium	Cd	mg/l	0.005	-	-	0.003	-	<0.003
		cyanide	Cn	mg/l	0.05	-	-	0.07	-	<0.010
		total mercury	Hg	µg/l	1	-	-	1	-	<0.915
		lead	Pb	µg/l	50	-	-	10	-	<1.7
		selenium	Se	µg/l	10	-	-	10	-	<1.095
		antimony	Sb	µg/l	20	-	-	18	-	<1.00
		silver	Ag	mg/l	0.02	-	-	-	-	<0.007
		barium	Ba	mg/l	-	-	-	0.7	-	<0.003
		molybdenum	Mo	mg/l	-	-	-	0.07	-	<0.012
	cobalt	Co	mg/l	-	-	-	-	-	<0.004	
	Health Concerning Chemicals	fluoride	F	mg/l	-	-	-	1.5	-	0.73
		nitrate	NO ₃ ⁻	mg NO ₃ /l	-	45	-	50	-	29.2
		nitrite	NO ₂ ⁻	mg NO ₂ /l	-	-	-	3/ 0.2	-	<0.011
		boron	B	mg/l	-	-	-	0.5	-	0.066
		nickel	Ni	mg/l	-	-	-	0.02	-	<0.005
chromium		Cr	mg/l	-	-	-	0.05	-	<0.05	
total chlorine		Cl ⁻	mg/l	-	-	-	5	-	-	
No Direct Consequence to Health	Acceptability to Consumers	color	-	TCU	-	-	50 TCU	-	15 TCU	uncolored
		odour	-	dilution	-	-	acceptable	-	-	1
		taste	-	dilution	-	-	acceptable	-	-	-
		turbidity	-	NTU	-	-	25 NTU	-	5 NTU	0.18
		residue on evaporation	-	mg/l	-	-	2,500	-	-	non turbide
		total dissolved solids	TDS	mg/l	-	-	-	-	1,000	537
		Anionic surface active agent	-	mg ABS/l	-	-	0.5	-	-	758
		mineral oils	-	mg/l	-	-	0.3	-	-	<0.10
		phenolic compounds	-	mg/l	-	-	0.002	-	-	<10
		hardness	(CaCO ₃)	°f	-	-	100	-	-	0.043
		calcium	Ca	mg/l	-	-	300	-	-	41.0
		chloride	Cl	mg/l	-	-	600	-	250	89.2
		copper	Cu	mg/l	-	-	1	2	1	29
		iron	Fe	mg/l	-	-	1	-	0.3	<0.011
		magnesium	Mg	mg/l	-	-	150	-	-	<0.057
		manganese	Mn	mg/l	-	-	0.5	0.4	0.1	49.4
		sulfate	SO ₄	mg/l	-	-	600.0	-	250	<0.080
	zinc	Zn	mg/l	-	-	5	-	3	192.0	
	aluminum	Al	mg/l	-	-	-	-	0.2	<0.068	
	sodium	Na	mg/l	-	-	-	-	200	<0.05	
	ammonia	NH ₄	mg NH ₄ /l	-	-	-	-	1.5	98.4	
	residual chlorine	Cl ⁻	mg/l	-	-	-	-	0.6-1.0	<0.06	
	Potentially Affecting Water Supply Facilities	pH	pH	-	-	-	6.5 - 8.5	-	-	7.3
Carbonate		CO ₃	mg/l	-	-	-	-	-	0	
			°f	-	-	-	-	-	0	
Total alkalinity		HCO ₃	mg/l	-	-	-	-	-	222	
			°f	-	-	-	-	-	18.2	
Mineral acidity			°f	-	-	-	-	-	0	
Total acidity			°f	-	-	-	-	-	1.5	
iron bivalent	Fe ²⁺	mg/l	-	-	-	-	-	<0.01		
iron trivalent	Fe ³⁺	mg/l	-	-	-	-	-	<0.057		
Other Supporting Parameters	Temperature	T	°C	-	-	-	-	-	18.3	
	Electrical Conductivity	EC	mS/m	-	-	-	-	-	75	
	Potassium	K	mg/l	-	-	-	-	-	4.67	
	salinity	-	‰	-	-	-	-	-	0.1	

LEGEND

10 (Bold+Underline) Exceed criteria values of NT 09.14

10 (Underline) Exceed criteria values of WHO

Appendix 4 Characteristics of Water Quality Analysis Parameters

Category	Parameter	abb.	Characteristic
Potential Hazard to Public Health	1 Bacteriological Parameters	Total coliform bacteria	CT Indicator of bacteriological contamination. It must not be detected in the disinfected water.
		Thermotolerant coliform	CF Indicator of faecal contamination. It must not be detected in the disinfected water
		Faecal streptococci	ST Indicator of faecal contamination. It must not be detected in the disinfected water
		<i>E-coli</i>	E. Coli Indicator of faecal contamination. It must not be detected in the disinfected water
	2 Toxic Chemicals	arsenic	As Consumption of elevated levels of arsenic through drinking water is causally related to the development of cancer, particularly skin, bladder and lung.
		cadmium	Cd Cadmium accumulates primarily in the kidneys and has a long biological half-life in humans. It is carcinogenic.
		cyanide	Cn Effect on the thyroid and particularly the nervous system.
		total mercury	Hg Methylmercury affects mainly the central nervous system
		lead	Pb Lead is toxic to both the central and peripheral nervous systems, inducing subencephalopathic neurological and behavioural effects. Infants and pregnant women are most susceptible.
		selenium	Se The toxic effects of long-term selenium exposure are manifested in nails, hair and liver.
		antimony	Sb Antimony after inhalation exposure is carcinogenic in the lung.
		silver	Ag Argyria is considered, however the risk has not been cleared.
		barium	Ba Potential to cause hypertension.
		molybdenum	Mo Carcinogenicity is suspected however no data are available.
	3 Health Concerning Chemicals	fluoride	F Low concentration of fluoride at around 1 mg/L can provide protection against dental caries, but concentration above 1.5-2 mg/L may give rise to dental fluorosis which may cause enamel pitting and obvious brown stain, and higher concentration between 3-6mg/L may cause skeletal tissues.
		nitrate	NO ₃ ⁻ Nitrate is reduced to nitrite in the stomach of infants. Nitrite will help oxidization of haemoglobin to methaemoglobin, the latter of which prevents transportation of oxygen in the body.
		nitrite	NO ₂ ⁻ Methaemoglobinaemia may cause cyanosis and, at higher concentrations, asphyxia.
		boron	B Effect on human health due to short and long term oral exposures to boric acid and borax is the toxicity to male reproductive tract such as testicular lesions and the nervous system.
		nickel	Ni Health concern due to nickel is possibly carcinogenic, male and female reproductive effect, growth and development of children and mortality during pregnancy.
		chromium	Cr chromium(VI) is a carcinogen via the inhalation route, although the limited data available do not show evidence for carcinogenicity via the oral route.
cobalt		Co High concentration of cobalt is carcinogenic	
total chlorine		Cl ⁻ Potential to cause hypertension.	
Effects on drinking water characteristics	4 Acceptability to Consumers	colour	- The yellowish brown caused by the soluble substance and colloid substance which are contained in
		odour	- Unpleasure is caused with mold's smell substances or organic compounds.
		taste	- Taste originates from natural inorganic and organic chemical contaminants, biological sources and synthetic chemicals. Extraordinary taste causes unpleasure.
		turbidity	- Turbidity has close relevance to disinfecting efficacy. There is a risk of aggregation or absorption of microorganisms on high concentration of suspended solids thereby causes failure of water
		residue on evaporation	- Drinking water becomes significantly and increasingly unpalatable at TDS levels greater than about
		total dissolved solids	TDS 1000 mg/L and residue on evaporation levels greater than about 2500 mg/L.
		pH	pH For effective disinfection, the pH should be less than 8, however, lower pH is corrosive.
		Anionic surface active agent	- It become a cause of foaming and it might not be acceptable.
		mineral oils	- a number of other hydrocarbons may give rise to a very unpleasant "diesel-like" odour
		phenolic compounds	- If phenol compounds react with residual chlorine, it gives characteristic odor to water.
		hardness	(CaCO ₃) Hardness more than 200 mg/L can result in scale deposition and increase in soap consumption.
		calcium	Ca The threshold value for the taste of calcium is said to be 100-300 mg/L
		chloride	Cl High concentration of chloride gives a salty taste to drinking water. The threshold value of chloride on the taste is said to be 200-300 mg/L.
		copper	Cu Staining of laundry and sanitary ware occurs at copper concentrations above 1 mg/litre.
		iron	Fe At the level above 0.3 mg/L, iron stains laundry and plumbing fixtures.
		magnesium	Mg Magnesium is one of the least toxic anions.
		manganese	Mn At the level above 0.1 mg/L, manganese may be objectionable with water discoloration.
		sulfate	SO ₄ The presence of sulfate in drinking water can cause noticeable taste.
	zinc	Zn Zinc imparts an undesirable astringent taste to water about 4 mg/litre.	
	aluminium	Al At levels above 0.1 mg/L, aluminium often leads deposition of aluminium hydroxide floc in distribution system and the exacerbation of discoloration of water by iron.	
	sodium	Na Concentration in excess of 200 mg/L may cause noticeable taste.	
	ammonia	NH ₄ The threshold odour concentration of ammonia at alkaline pH is approximately 1.5 mg/litre.	
	residual chlorine	Cl ⁻ High concentration of residual chlorine cause noticeable taste.	
5 Potentially Affecting Water Supply Facilities	Total alkalinity	(HCO ₃)	The water with low alkalinity (less than 20 mg/L) makes an iron pipe corrode easily
	Mineral acidity	(HCO ₃)	These parameters are used to calculate the erosive free carbonic acid.
	Total acidity	(HCO ₃)	
	iron bivalent	Fe ²⁺	High ratio and value of iron bivalent indicates the necessity of iron removal.
	iron trivalent	Fe ³⁺	
Other Supporting Parameters	Temperature	T	Temperature affects the solubility of substances and the growth of organisms.
	Electrical Conductivity	EC	The value correlates with the value of TDS.
	Potassium	K	The value relatively correlates with the values of other inorganic chemicals.
	salinity	-	The value indicates the concentration of inorganic salts and correlate with residue on evaporation.

Source: GDWQ 3rd edition (WHO, 2004), GDWQ 2nd edition (WHO, 1996) and Japan drinking water analysis method (,)