



## MECHANICAL SPECIFICATION

1988-000-MESPC-0052

for the

## DESIGN, MANUFACTURE AND SUPPLY

of

## WATER TREATMENT SYSTEMS

for the

## BANFORA GOLD OPERATION

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### ATTACHMENTS

- Duty Specification Sheets
- Supplier Data Sheets
- Water Test Results
- Filter Water Standard

### REFERENCES

- General Datasheet - 1988-000-GEDAS-0001 - Site Data Sheet
- General Specification - 1988-000-GESPC-0003 - Technical Information Requirements
- Electrical Specification - BAN-0003-E-TS-005 - Low Voltage Motors
- Electrical Specification - BAN-0003-E-TS-008 - Control Panels and Cubicles
- Electrical Specification - BAN-0003-E-TS-009 - Electrical Equipment Supplied with Packages
- Electrical Specification - BAN-0003-E-TS-011 - Preferred Electrical Equipment
- Mechanical Specification - 1988-000-MESPC-0018 - Mechanical Plant and Equipment
- Transport and Shipping Specification - 1988-000-GESPC-0001 - Packing Instructions
- Transport and Shipping Specification - 1988-000-GESPC-0002 - Documentation and Marking Instructions

0	11/08/17	ISSUED FOR TENDER	NEW	R	MS	
REV NO.	DATE	DESCRIPTION OF REVISION	DESIGNED	DESIGN APPR'D	PROJECT APPR'D	CLIENT APPR'D

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## **1.0 SCOPE OF WORK**

This purchase specification comprises all work to be undertaken for the design, manufacture and supply of water treatment systems in accordance with the attached Duty Specification Sheets, Supplier Data Sheets and Contract documents.

All deviations from the requirements of this specification shall be stated in the tender documentation. In the absence of such statements, it shall be understood that all requirements of this specification have been fulfilled without exception.

### **1.1 Work Included**

Work shall include, but not be limited to, the following items:

- A fully containerised packaged potable water treatment system complete with all necessary items to achieve and maintain the discharge water quality and flowrate nominated in the Duty Specification Sheets.
- A fully containerised packaged filtered water treatment system complete with all necessary items to achieve and maintain the discharge water quality and flow rate nominated in the Duty Specification Sheets.
- All necessary pumps, piping, sequencing controls, valves, level elements, alarms, piping, etc. to enable the system to be set up and operated automatically.
- A prewired control panel containing all instrumentation and control devices, PLC system, circuit breakers, motor starters, drive stop / start pushbuttons and run lights.
- All power, control and instrumentation cabling between the control panel, motor starters and field devices integral to the water treatment system.
- Programming of PLC to control the water treatment systems, control the water levels in the discharge tanks (provided by others) and control output to suit varying feed water tank levels and pressure.
- A split type, reverse cycle air conditioning unit for the containers.
- Any additional instrumentation and devices required to provide a safe, efficient overall operation that ensures equipment and personnel protection.
- Provision of first fill reagents, filter media, lubricant and all other consumables as required.
- Provision of sufficient chemicals, reagents, spare parts and other consumables required to support operation of the plant for 6 months.
- Shop assembly and testing.
- Furnishing a field supervisor at jobsite, if required.
- Commissioning of the water treatment system on site.
- Drawings, data and documentation (to be provided with Tender and After Award) as necessary for verification to the Contract requirements and compliance with specification 1988-000-GESPC-0003 - Technical Information Requirements.
- Packaging, transportation and delivery to the nominated delivery point in accordance with the Transport and Shipping Specifications 1988-000-GESPC-0001 and 1988-000-GESPC-0002.

### **1.2 Work Excluded**

Excluded from the Supplier's supply shall be the following:

- Foundations, including any anchor bolts / holding down bolts.
- Supply and installation of all piping external to the system.
- Supply and installation of all power, control and instrumentation cabling external to the system.
- Lubricants and greases other than initial fill quantities applied during shop assembly.
- Unloading at site and erection / assembly into the plant.

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## **2.0 STANDARDS AND CODES**

### **2.1 Standards**

The equipment shall comply with the latest edition of the following standards:

AS 4024 (Series)      Safety of machinery

### **2.2 Project Specifications**

1988-000-GEDAS-0001	Site Data Sheet
1988-000-GESPC-0001	Transport and Shipping Specification - Packing Instructions
1988-000-GESPC-0002	Transport and Shipping Specification - Documentation and Marking Instructions
1988-000-GESPC-0003	Technical Information Requirements
1988-000-MESPC-0018	Design, Manufacture and Supply of Mechanical Plant and Equipment
BAN-0003-E-TS-005	Electrical Specification - Low Voltage Motors
BAN-0003-E-TS-008	Electrical Specification - Control Panels and Cubicles
BAN-0003-E-TS-009	Electrical Specification - Electrical Equipment Supplied with Packages
BAN-0003-E-TS-011	Electrical Specification - Preferred Electrical Equipment List

## **3.0 GENERAL REQUIREMENTS**

All components shall be capable of operating continuously in an environment containing high concentrations of fine, abrasive dust and in the extremes of the climatic and atmospheric conditions specified in Site Data Sheet 1988-000-GEDAS-0001.

The equipment will be exposed to the elements and cleaned by hosing down.

All materials of construction for this equipment, components and accessories shall be new, suitable for the service and meet the requirements of this Specification and any standards, codes and documents reference herein.

The sequence of Design, Procurement and Manufacture shall be that as necessary to ensure completion of the Scope of Work subject of this Specification by the dates nominated in the Contract.

The components shall have minimum split sections determined by shipping weight or dimensional limitations for the intended job site and/or delivery point.

## **4.0 MECHANICAL REQUIREMENTS**

The water treatment system shall be designed to treat the incoming water and nominally achieve the discharge water quality and flowrate as nominated in the Duty Specification Sheets.

The discharge water quality shall be independent of the demand water flowrate, i.e. the system shall be self regulating in terms of capacity.

In order to provide a sufficient supporting strength for the external piping, all battery limit pipes shall be made of steel for a pipe section from the last two supports to the battery limit flange.

The supply shall incorporate all necessary access platforms as are required for day to day operation and maintenance of the water treatment system.

All equipment components shall, where applicable, conform to Mechanical Specification 1988-000-MESPC-0018 as a minimum.

## **5.0 ELECTRICAL REQUIREMENTS**

All low voltage 3 phase electric motors shall comply with Electrical Specification BAN-0003-E-TS-005 - Low Voltage Motors.

All control panels and boxes shall comply with Electrical Specification BAN-0003-E-TS-008 - Control Panels and Cubicles.

All electrical requirements for mechanical equipment shall comply with Electrical Specification BAN-0003-E-TS-009 - Electrical Equipment Supplied with Packages.

All electrical equipment and instrumentation shall comply with Electrical Specification BAN-0003-E-TS-011 - Preferred Electrical Equipment List.

The Supplier's PLC shall accept 4-20 mA inputs from level transmitters (provided by others), one level transmitter on the water tank supplying the water treatment system, and one level transmitter on the treated water tank receiving water discharged from the treatment system. This arrangement will apply to each treatment plant specified in the Duty Specification Sheets unless otherwise specified.

The control panel shall contain volt free contacts rated at 2 A, 24 VDC for running and fault status indication on the plant control system (by others).

### 5.1 Voltages

Unless otherwise specified, all voltages, instrumentation and controls shall comply with the following requirements:

Low Voltage	415 V, 3 phase, 50 Hz, solidly earthed neutral
High Voltage	11,000 V, 3 phase, 50 Hz, non-effectively earthed neutral
Heaters	240 V, single phase, 50 Hz
PLC / DCS Inputs	24 VDC
PLC / DCS Outputs	Voltage free contacts suitable for 24 VDC
Instrument Signals	4 - 20 mA DC fully isolated
Instrument Power Supply	240 V, 50 Hz or 24 VDC via regulated power supply
Instrument Air Supply	700 kPag, free of oil, mist and water
Instrument Actuator Design Pressure	500 kPag minimum, 800 kPag maximum
Temperature measurement up to 300°C	PT100, three wire RTD elements are preferred. 24 VDC loop powered.
Temperature measurement over 300°C	Mineral insulated thermocouples. 24 VDC loop powered.

### 5.2 Programming

The plant shall include a basic level of automation to detect and initiate backwash cycles such that operator duties will only consist of routine monitoring and periodic maintenance. The feed pumps shall have the capability to be switched off when the treated water storage tank is full or when the raw water storage tank is empty.

The water treatment system PLC shall generate all alarm and control points required from the feed water and discharge water tanks level transmitter signals. No additional level switches shall be required for control of the plant.

The water treatment package PLC program shall be made available to the Purchaser for information prior to the factory acceptance testing.

### 6.0 SURFACE PROTECTION

The equipment components called for herein shall be factory finished and painted in accordance with the Manufacturer's standard finish, provided that the Manufacturer's standard finish is compatible with the process fluids. If this is not the case, a suitable alternative shall be proposed.

Painting and factory finish shall be suitable for outdoor installation and exposure to the elements. Standard colours shall be submitted with the proposal for the owner's selection and approval.

### 7.0 ASSEMBLY AND TESTING

The Purchaser, or a designated inspection agent, shall have access at any time to the work while it is in preparation or progress, and the Supplier shall provide proper facilities for such access and inspection.

Inspection procedures shall be in accordance with the Manufacturer's standards or as required by specific codes, but shall as a minimum include testing of the control panel. The Supplier shall advise the Engineer accordingly to allow witnessing of these tests.

A copy of all inspection and test reports, including those for materials used, shall be available upon request by the Purchaser.

#### 7.1 Factory Acceptance Testing

The water treatment plants, including control panels, shall be fully trial assembled to ensure the proper fit of all parts, and test run at the Supplier's works for a minimum continuous period of 12 hours prior to disassembly and shipment to site. Components that must be disassembled for shipment shall be properly match marked.

The Purchaser reserves the right to witness testing, or to appoint an agent to witness testing. The Supplier shall give the Purchaser a minimum of 21 days' notice prior to testing being conducted.

#### 7.2 Preparation for Shipment

The goods shall be shipped to the nominated delivery point in accordance with the following instructions:

- Packaging and transportation of equipment and materials shall comply with the Transport and Shipping Specification 1988-000-GESPC-0001.
- Documentation, delivery and shipping package marking of goods shall comply with the Transport and Shipping Specification 1988-000-GESPC-0002.

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- Equipment and spare parts identification tags in accordance with 1988-000-GESPC-0002.
  - Equipment labels in accordance with 1988-000-MESPC-0018.

All connections, flanges and openings shall be thoroughly sealed to prevent the ingress of fine dust, moisture, vermin or other deleterious material into the equipment.

Equipment sensitive to water damage shall be protected to preserve it in a dry state for up to 6 months during transport, storage and installation when subject to heavy, driving rain.

Damage to equipment resulting from inadequate packaging shall be rectified at the Supplier's expense.

#### **8.0 PERFORMANCE GUARANTEE**

The Supplier shall guarantee the performance of the equipment to meet the requirements specified in the Duty Specification.

**DUTY SPECIFICATION SHEET**

<b>Equipment Name</b>	Camp Potable Water Treatment Plant Camp Potable Water UV Steriliser Plant Potable Water UV Steriliser Mine Services Area Potable Water UV Steriliser
<b>Equipment Number(s)</b>	TBC
<b>No of Units Required</b>	1x Complete Treatment Plant, 3x UV Sterilisers
<b>Process Description (Note 3)</b>	Bore water is pumped to the camp and stored in a tank (by others). The water will flow by gravity from the tank to the inlet flange of the treatment plant for processing.  The potable water discharged from the treatment plant will be stored in the Camp Potable Water Tank (by others) from where it is distributed to the camp by the distribution pumps (by others). A UV steriliser will be installed at the pump discharge to disinfect the water before use.
<b>Duty Cycle</b>	Continuous
<b>Duty Characteristics</b>	
Treated Water Requirements	Potable water
• Quantity, m <sup>3</sup> /h	13.1
• Quality	As per WHO Drinking Water Standards
• Discharge Pressure, m TDH	15 (TBC)
Incoming Water	
• Flowrate, m <sup>3</sup> /h	Supplier to Advise
• Pressure, m	Gravity fed from bore water tank at static head of 1 m to 5 m
• Quality	Refer to Table 1 - Ground Water Test Results
• Total Dissolved Solids (TDS), max mg/L	Refer to Table 1 - Supplier to advise maximum allowable limits
• Turbidity, max NTU	Refer to Table 1 - Supplier to advise maximum allowable limits
<b>Nominated Equipment / Instrumentation</b>	
Centrifugal Solution Pumps	By Supplier in accordance with ISO 2858
Electrical Equipment / Components	Refer to Specification Electrical Requirements
Instrumentation	Refer to Specification Electrical Requirements
<b>Control Panel</b>	
Voltages	Refer to Specification Electrical Requirements
Location, Indoor / Outdoor	Indoor
<b>Other</b>	<p>It is envisaged that the potable water treatment system will be a containerised unit that includes the following processes:</p> <ul style="list-style-type: none"> <li>• Filter feed pumps (duty / standby).</li> <li>• Flocculant dosing unit.</li> <li>• Filters including dual media, activated carbon and cartridge types.</li> <li>• Back wash system.</li> <li>• Chlorination system and feed pumps.</li> </ul> <p>The Supplier shall supply three UV Sterilisers for the following systems:</p> <ul style="list-style-type: none"> <li>• Plant Potable Water UV Steriliser rated at 25 m<sup>3</sup>/h.</li> <li>• Camp Potable Water UV Steriliser rated at 25 m<sup>3</sup>/h.</li> <li>• Mine Services Area Potable Water UV Steriliser rated at 12.5 m<sup>3</sup>/h.</li> </ul>
<b>Notes</b>	<ol style="list-style-type: none"> <li>1. All motors shall be tropic proofed.</li> <li>2. The following additional equipment and accessories shall be supplied: <ul style="list-style-type: none"> <li>• Workbench and storage cupboard.</li> <li>• Fire detection system and alarm.</li> <li>• Safety shower (for installation outside the container).</li> <li>• Test kits.</li> <li>• Spares and consumables as detailed in this specification.</li> </ul> </li> </ol>

**Table 1 Ground Water Test Results**  
(Camp Potable Water Treatment Plant Feed Water)

Analyte	Unit	Min	Max	Mean
Aluminium, Filtered as Al	mg/L	<0.1	<0.1	<0.1
Aluminium, Total as Al	mg/L	0.1	3.5	0.553
Antimony, trace Filtered as Sb	µg/L	<1.2	<1.2	<1.2
Antimony, trace Total as Sb	µg/L	<1.2	<1.2	<1.2
Arsenic, Ultra-low Total as As	µg/L	<1.0	<1.0	<1.0
Barium, Filtered as Ba	mg/L	0.008	0.388	0.071
Barium, Total as Ba	mg/L	0.008	0.37	0.069
Cadmium , Total as Cd	mg/L	<0.0006	<0.0006	<0.0006
Cadmium, Filtered as Cd	mg/L	<0.0006	<0.0006	<0.0006
Calcium , Total as Ca	mg/L	1.65	65.1	22.6
Calcium, Filtered as Ca	mg/L	2.61	76.1	24.1
Chromium - Hexavalent	mg/L	<0.003	0.015	0.003
Chromium , Total as Cr	mg/L	< 0.002	0.008	0.003
Chromium, Filtered as Cr	mg/L	< 0.002	0.007	0.003
Cobalt , Total as Co	mg/L	<0.002	0.005	0.002
Cobalt, Filtered as Co	mg/L	<0.002	0.006	0.002
Copper, Filtered as Cu	mg/L	<0.009	0.012	0.009
Copper, Total as Cu	mg/L	<0.009	<0.009	<0.009
Iron , Total as Fe	mg/L	< 0.23	2.68	0.466
Iron, Filtered as Fe	mg/L	<0.23	0.4	0.235
Lead , Total as Pb	mg/L	<0.006	<0.006	<0.006
Lead, Filtered as Pb	mg/L	<0.006	<0.006	<0.006
Magnesium, Filtered as Mg	mg/L	0.9	34.1	9.03
Magnesium, Total as Mg	mg/L	0.8	31.4	8.43
Manganese , Total as Mn	mg/L	<0.007	1.74	0.134
Manganese, Filtered as Mn	mg/L	<0.007	2.02	0.140
Mercury, Filtered as Hg	mg/L	<0.00010	<0.00010	<0.00010
Mercury, Total as Hg	mg/L	<0.00010	<0.00010	<0.00010
Molybdenum , Total as Mo	mg/L	<0.003	0.006	0.003
Molybdenum, Filtered as Mo	mg/L	<0.003	<0.003	<0.003
Nickel, Filtered as Ni	mg/L	<0.003	0.024	0.004
Nickel, Total as Ni	mg/L	<0.003	0.028	0.004
Potassium , Total as K	mg/L	0.29	32.5	2.60
Potassium, Filtered as K	mg/L	0.31	34.9	2.79
Selenium, trace Total as Se	µg/L	<0.80	<0.80	<0.80
Silver , Total as Ag	mg/L	<0.0007	<0.0007	<0.0007
Silver, Filtered as Ag	mg/L	<0.0007	<0.0007	<0.0007
Sodium , Total as Na	mg/L	0.63	15.1	8.07
Sodium, Filtered as Na	mg/L	1.0	15.6	8.64
Strontium , Total as Sr	mg/L	0.011	0.418	0.158
Strontium, Filtered	mg/L	0.012	0.419	0.159
Vanadium , Total as V	mg/L	<0.004	0.033	0.009
Vanadium, Filtered as V	mg/L	<0.004	0.033	0.010

Analyte	Unit	Min	Max	Mean
Zinc, Filtered as Zn	mg/L	<0.018	0.438	0.034
Zinc, Total as Zn	mg/L	0.018	0.437	0.040
Sulphur, calculated	mg/L	<2	8.2	2.42
Ammoniacal Nitrogen as N	mg/L	<0.41	3.64	0.500
Chloride as Cl	mg/L	3.9	31.2	6.85
Nitrite as N	mg/L	<0.08	0.11	0.081
Phosphate, Ortho as P	mg/L	<0.6	<0.6	<0.6
Phosphorus , Total as P	mg/L	<0.12	0.23	0.125
Sulphate as SO <sub>4</sub>	mg/L	<4.4	24.5	5.9
Solids, Total Dissolved 180 °C	mg/L	53	309	166.8
Total Suspended Solids	mg/L	1.0	227	30.4
COD (Total)	mg/L	<11.0	24	12.7
Cyanide, Free as CN	mg/L	<0.008	<0.008	<0.008
Cyanide, Total as CN	mg/L	<0.009	<0.009	<0.009
Phenols Mono (Phenol Index)	mg/L	<0.10	<0.10	<0.10
Fluoride as F	mg/L	0.1	0.3	0.158
Sulphide as S	mg/L	<0.020	0.038	0.021
Ammonium as NH <sub>4</sub> (Calc)	mg/L	<0.53	4.7	0.649
Nitrite as NO <sub>2</sub>	mg/L	<0.025	0.36	0.035
Bismuth, Filtered as Bi	mg/L	<0.010	<0.010	<0.010
Bismuth, Total as Bi	mg/L	<0.010	<0.010	<0.010
Chromium-Hex Filtered	mg/L	<0.003	<0.003	<0.003
Cyanide, Free (WAD)	mg/L	<0.005	<0.005	<0.005
Nitrate as NO <sub>3</sub>	mg/L	3.2	83.7	11.2
Oil and Grease	mg/L	<0.60	<0.60	<0.600
Silicon, Low Level Total	µg/L	4.6	35	20.7

**Notes**

1. Results summary of 36 samples taken between 03/08/2015 to 17/08/2015, report 1216249 STS Excel Extract, Gryphon Minerals Burkina Faso.



**DUTY SPECIFICATION SHEET**

<b>Equipment Name</b>	Filtered Water Treatment Plant
<b>Equipment Numbers</b>	TBC
<b>No of Units Required</b>	1x Complete Treatment Plant
<b>Process Description (Note 3)</b>	<p>Raw water, sourced from the local river and rain water harvesting, is stored in the Raw Water Tank (by others). The raw water pumps (by others) distribute raw water throughout the plant, including to the feed water inlet flange of the treatment plant.</p> <p>The treated water discharged from the plant will be stored in the Filtered Water Storage Tank (by others) for use in the elution circuit and gland water system.</p>
<b>Duty Cycle</b>	Continuous
<b>Duty Characteristics</b>	
Treated Water Requirements	Filtered water
• Quantity, m <sup>3</sup> /h	60.0
• Quality	As per Table 3 - Filtered Water Standard
• Discharge Pressure, m TDH	15 (TBC)
Incoming Water	
• Flowrate, m <sup>3</sup> /h	Supplier to Advise
• Pressure, m	Supplier to Advise
• Quality	Refer to Table 2 - Surface Water Test Results
• Total Dissolved Solids (TDS), max mg/L	Refer to Table 2 - Supplier to advise maximum allowable limits
• Turbidity, max NTU	Refer to Table 2 - Supplier to advise maximum allowable limits
<b>Nominated Equipment / Instrumentation</b>	
Centrifugal Solution Pumps	By Supplier in accordance with ISO 2858
Electrical Equipment / Components	Refer Section 5.0 Electrical Requirements
Instrumentation	Refer Section 5.0 Electrical Requirements
<b>Control Panel</b>	
Voltages	Refer Section 5.0 Electrical Requirements
Location, Indoor / Outdoor	Indoor
<b>Other</b>	<p>It is envisaged that the filtered water treatment system will be a containerised unit that includes the following processes:</p> <ul style="list-style-type: none"> <li>• Filter feed pumps (duty / standby).</li> <li>• Filters to suit water quality requirements.</li> <li>• Feed water pressure control.</li> <li>• Back wash system.</li> </ul>
<b>Notes</b>	<ol style="list-style-type: none"> <li>1. All motors shall be tropic proofed.</li> <li>2. The following additional equipment and accessories shall be supplied: <ul style="list-style-type: none"> <li>• Fire detection system and alarm.</li> <li>• Spares and consumables as detailed in this specification.</li> </ul> </li> </ol>

**Table 2 Surface Water Test Results**  
(Filtered Water Treatment Plant Feed Water)

Analyte	Unit	Min	Max	Mean
Aluminium, Filtered as Al	mg/L	<0.1	0.2	0.123
Aluminium, Total as Al	mg/L	1.40	4.4	3.11
Antimony, trace Filtered as Sb	µg/L	<1.2	<1.2	<1.2
Antimony, trace Total as Sb	µg/L	<1.2	<1.2	<1.2
Arsenic, Ultra-low Total as As	µg/L	<1.0	<1.0	<1.0
Barium, Filtered as Ba	mg/L	0.012	0.087	0.038
Barium, Total as Ba	mg/L	0.042	0.129	0.077
Cadmium , Total as Cd	mg/L	<0.0006	<0.0006	<0.0006
Cadmium, Filtered as Cd	mg/L	<0.0006	<0.0006	<0.0006
Calcium , Total as Ca	mg/L	3.69	10.9	6.4
Calcium, Filtered as Ca	mg/L	3.31	10.2	5.5
Chromium - Hexavalent	mg/L	<0.003	<0.003	<0.003
Chromium , Total as Cr	mg/L	0.004	0.017	0.009
Chromium, Filtered as Cr	mg/L	<0.002	0.003	0.002
Cobalt , Total as Co	mg/L	<0.002	0.007	0.003
Cobalt, Filtered as Co	mg/L	<0.002	<0.002	<0.002
Copper, Filtered as Cu	mg/L	<0.009	<0.009	<0.009
Copper, Total as Cu	mg/L	0.010	0.015	0.010
Iron , Total as Fe	mg/L	1.37	4.69	3.22
Iron, Filtered as Fe	mg/L	<0.23	0.29	0.235
Lead , Total as Pb	mg/L	<0.006	<0.006	<0.006
Lead, Filtered as Pb	mg/L	<0.006	<0.006	<0.006
Magnesium, Filtered as Mg	mg/L	1.30	4.2	2.41
Magnesium, Total as Mg	mg/L	1.40	4.4	2.82
Manganese , Total as Mn	mg/L	0.039	0.439	0.163
Manganese, Filtered as Mn	mg/L	0.023	0.384	0.084
Mercury, Filtered as Hg	mg/L	<0.00010	<0.00010	<0.00010
Mercury, Total as Hg	mg/L	<0.00010	<0.00010	<0.00010
Molybdenum , Total as Mo	mg/L	<0.003	0.01	0.004
Molybdenum, Filtered as Mo	mg/L	<0.003	<0.003	<0.003
Nickel, Filtered as Ni	mg/L	<0.003	<0.003	<0.003
Nickel, Total as Ni	mg/L	0.004	0.021	0.010
Potassium , Total as K	mg/L	1.54	7.21	2.56
Potassium, Filtered as K	mg/L	1.33	6.69	2.35
Selenium, trace Total as Se	µg/L	<0.80	<0.80	<0.80
Silver , Total as Ag	mg/L	<0.0007	<0.0007	<0.0007
Silver, Filtered as Ag	mg/L	<0.0007	<0.0007	<0.0007
Sodium , Total as Na	mg/L	1.16	7.64	2.65
Sodium, Filtered as Na	mg/L	0.860	6.94	2.73
Strontium , Total as Sr	mg/L	0.033	0.138	0.064
Strontium, Filtered	mg/L	0.027	0.109	0.053
Vanadium , Total as V	mg/L	0.005	0.017	0.010
Vanadium, Filtered as V	mg/L	<0.004	<0.004	<0.004

Analyte	Unit	Min	Max	Mean
Zinc, Filtered as Zn	mg/L	<0.018	0.028	0.019
Zinc, Total as Zn	mg/L	<0.018	0.119	0.046
Sulphur, calculated	mg/L	2.30	9.7	4.50
Ammoniacal Nitrogen as N	mg/L	<0.41	<0.41	<0.41
Chloride as Cl	mg/L	4.00	13.5	7.6
Nitrite as N	mg/L	<0.08	0.2	0.091
Phosphate, Ortho as P	mg/L	<0.6	<0.6	<0.6
Phosphorus , Total as P	mg/L	<0.12	0.14	0.122
Sulphate as SO <sub>4</sub>	mg/L	7.00	29.1	13.3
Solids, Total Dissolved 180 °C	mg/L	44.0	136	76.8
Total Suspended Solids	mg/L	45.0	290	133.8
COD (Total)	mg/L	<11.0	49	23.9
Cyanide, Free as CN	mg/L	<0.008	<0.008	<0.008
Cyanide, Total as CN	mg/L	<0.009	<0.009	<0.009
Phenols Mono (Phenol Index)	mg/L	<0.10	<0.10	<0.100
Fluoride as F	mg/L	0.100	0.100	0.100
Sulphide as S	mg/L	<0.020	0.107	0.037
Ammonium as NH <sub>4</sub> (Calc)	mg/L	<0.53	<0.53	<0.530
Nitrite as NO <sub>2</sub>	mg/L	<0.025	0.66	0.101
Bismuth, Filtered as Bi	mg/L	<0.010	<0.010	<0.010
Bismuth, Total as Bi	mg/L	<0.010	<0.010	<0.010
Chromium-Hex Filtered	mg/L	<0.003	<0.003	<0.003
Cyanide, Free (WAD)	mg/L	<0.005	<0.005	<0.005
Nitrate as NO <sub>3</sub>	mg/L	<3.1	7.6	3.57
Oil and Grease	mg/L	<0.60	<0.60	<0.600
Silicon, Low Level Total	µg/L	6.11	11.7	7.9
<b>Other Results (Note 2)</b>				
pH		4.9	8.5	6.9
Temperature	°C	20	35.7	27.5
Conductivity	S/m	7	814	115.0
Dissolved Oxygen	mg/L	0.05	10.5	5.8
Turbidity	NTU	2.5	695	196

**Notes**

- Results summary of 13 samples taken between 03/08/2015 to 17/08/2015, report 1216249 STS Excel Extract, Gryphon Minerals Burkina Faso.
- Results summary of 124 samples taken at various locations between 14/10/2013 to 11/12/2016, report 170114\_Paramelètres Physico-chimique\_Eau de surface, Gryphon Minerals Burkina Faso.

**Table 3 Filtered Water Standard**

Parameter	Unit	Filtered Water Standard
pH	pH	6.5 - 8.5
TDS	mg/L	< 60
Turbidity	NTU	5
Conductivity	µS/cm	<77

**SUPPLIER DATA SHEET**INFORMATION TO BE  
PROVIDED BY SUPPLIER

<b>Equipment Name</b>	Camp Potable Water Treatment Plant
<b>Equipment Numbers</b>	TBC
<b>General</b>	
Manufacturer	
Make / Model	
<b>Plant Performance</b>	
Feed Water	
• Instantaneous Quantity Required, m <sup>3</sup> /h	
• Daily Quantity Required, m <sup>3</sup> /day	
• Feed Pressure Required, Min / Max, kPa	
• Feed Water Quality Limits, describe	
Treated Water Discharge	
• Instantaneous Quantity, m <sup>3</sup> /h	
• Daily Quantity, m <sup>3</sup> /day	
• Quality - Standard Complies To	
• Provide Typical Analysis	
• Maximum Particle Size, µm	
• Organics Present, ppm	
• Treated Water Outlet Pressure, m TDH	
Waste Water Discharge	
• Instantaneous Quantity, m <sup>3</sup> /h	
• Daily Quantity, m <sup>3</sup> /day	
• Quality - Standard Complies To	
• Provide Typical Analysis	
• Waste Water Outlet Pressure, m TDH	
<b>Treatment Plant</b>	
Container Size	
Number of Containers	
<b>Pumps - details of all provided</b>	
Function	
Make / Model	
Duty	
Motor, Voltage / Phases / Power, V / $\phi$ / kW	
Motor Manufacturer	
<b>Pumps - Dosing</b>	
Make / Model	
Feed Rate, L/hour	
<b>Filters</b>	
Function / Number of Units	
Make / Model	
Diameter, mm	
Media	
Media Depth, mm	

<b>UV Sterilisation Units</b>	
Number of Units	
Make / Model	
UV Radiation Design Dosage	
<b>Connection Details</b>	
Feed Water Inlet, Size / Standard / Material	
Potable Water Outlet, Size / Standard / Material	
Backwash Outlet, Size / Standard / Material	
Other Connections, Size / Standard / Material	List All Other Connections
<b>Control Panel</b>	
Construction	
IP Rating	
Contactors	
Overloads	
Circuit Breakers (Main)	
Circuit Breakers (Control)	
Indicator Lights	
Push Buttons	
Timers / Starter Relays	
Variable Speed Drives	
Electronic Motor Protection Relays	
<b>Air Conditioner</b>	
<b>Safety Shower</b>	
<b>Smoke Detector and Alarm</b>	
<b>Instrumentation</b>	
Flow Switch	
Level Control Units	
Other Instruments Provided	Provide details for all instruments provided
<b>Notes</b> The Supplier shall provide documentation as specified. This shall include, but not be limited to: <ol style="list-style-type: none"> <li>Design (performance) criteria.</li> <li>Fully detailed control philosophy, describing the plant operating and maintenance requirements.</li> </ol>	

**SUPPLIER DATA SHEET**INFORMATION TO BE  
PROVIDED BY SUPPLIER

<b>Equipment Name</b>	Filtered Water Treatment Plant
<b>Equipment Numbers</b>	TBC
<b>General</b>	
Manufacturer	
Make / Model	
<b>Plant Performance</b>	
Feed Water	
• Instantaneous Quantity Required, m <sup>3</sup> /h	
• Daily Quantity Required, m <sup>3</sup> /day	
• Feed Pressure Required, Min / Max, kPa	
• Feed Water Quality Limits, describe	
Treated Water Discharge	
• Instantaneous Quantity, m <sup>3</sup> /h	
• Daily Quantity, m <sup>3</sup> /day	
• Quality - Standard Complies To	
• Provide Typical Analysis	
• Maximum Particle Size, µm	
• Organics Present, ppm	
• Treated Water Outlet Pressure, m TDH	
Waste Water Discharge	
• Instantaneous Quantity, m <sup>3</sup> /h	
• Daily Quantity, m <sup>3</sup> /day	
• Quality - Standard Complies To	
• Provide Typical Analysis	
• Waste Water Outlet Pressure, m TDH	
<b>Treatment Plant</b>	
Container Size	
Number of Containers	
<b>Pumps - details for all provided</b>	
Function	
Make / Model	
Duty	
Motor, Voltage / Phases / Power, V / $\phi$ / kW	
Motor Manufacturer	
<b>Pumps - Dosing</b>	
Make / Model	
Feed Rate, L/hour	
<b>Filters</b>	
Function / Number of Units	
Make / Model	
Diameter, mm	
Media	
Media Depth, mm	

<b>UV Sterilisation Units</b>	Not Required
Number of Units	Not Required
Make / Model	Not Required
UV Radiation Design Dosage	Not Required
<b>Connection Details</b>	
Feed Water Inlet, Size / Standard / Material	
Potable Water Outlet, Size / Standard / Material	
Backwash Outlet, Size / Standard / Material	
Other Connections, Size / Standard / Material	List All Other Connections
<b>Control Panel</b>	
Construction	
IP Rating	
Contactors	
Overloads	
Circuit Breakers (Main)	
Circuit Breakers (Control)	
Indicator Lights	
Push Buttons	
Timers / Starter Relays	
Variable Speed Drives	
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<b>Air Conditioner</b>	
<b>Safety Shower</b>	
<b>Smoke Detector and Alarm</b>	
<b>Instrumentation</b>	
Flow Switch	
Level Control Units	
Other Instruments Provided	Provide details for all instruments provided
<b>Notes</b> The Supplier shall provide documentation as specified. This shall include, but not be limited to: <ol style="list-style-type: none"> <li>Design (performance) criteria.</li> <li>Fully detailed control philosophy, describing the plant operating and maintenance requirements.</li> </ol>	