**Translation from Bulgarian!**
**Transcript!**

# MINISTRY OF HEALTH

# C E R T I F I C A T E

**No. 47**
**of 07.03.2007**

This Certificate attests that the mineral water supplied from water intake facility
***"Bore exit No. 1hg"***

***Sofia-Knyazhevo Mineral Water Field, Vitosha Region, Sofia City, Capital City Municipality, Sofia Area has the following characteristics:***

## *A. Geological and Hydrogeological Characteristics*

### *Location*

Sofia-Knyazhevo Mineral Water Field is situated in the South-West end of the Sofia Pan at Vitosha Region, Sofia City, Capital City Municipality.

### *Mineral Water Forming Environment*

The mineral water of Sofia-Knyazhevo Mineral Water Field is formed in a ground water-exchange pressure system of fissure-and-vein type in effusive rocks – andesite and pyroclastics rocks of the Upper Cretaccous Period ($_9K_2^{med}$) in the Massif of Lyulin Mountain and the ring around the Vitosha pluton.
The Pliocene deposits ($N_2$) – Lozents Suite, represented by clays and sandy clays, in some places with small sand interlayers serve as an upper water impermeable layer of the Upper Cretaccous effusive rocks in the drainage zone of the water field.

### *Water Field Feeding*

This mineral water is of infiltration origin. It is fed on account of atmospheric precipitation.
The feeding zone of mineral water of Sofia-Knyazhevo Water Field, which is also the area of the water pressure origination is in the ridge and slopes of the South-Eastern part of Lyulin Mountain and the North-Western parts of the andesite ring around the Vitosha pluton.
Drainage takes place mostly in fault dislocations through natural springs or exploitation of bore exit wells.
Temperature of the mineral water is in the range $21.2^0$C to $31.8^0$C.
Mineral water catchment is in the effusive rocks – andesites, andesite breccia, andesite tuffs and tuffites, which in the drainage zone of the mineral water field are found at the depth from 62 m to more than 264 m under the ground surface.
Mineral water circulation takes place through hydraulically complexly connected fissures and tectonic zones.

***Mineral water springs in the water field***

This mineral water field features two natural rising springs and six bore exits. The water bore exits are situated at a distance of 700 m away from each other and are separated in two groups: Eastern group at the Mineral Bath with temperature $31.2^0$C and Western group at the Klisurska Bath with temperature $23^0$C. The bore exits are comparatively deep (from 320 m to 525 m). Bore exits Nos. 1VKP, 2VKP, and 3VKP situated around the Mineral Bath were completed by Vodkanalproject in the period from 1961 to 1966. Bore exits No. 1hg and 6hg were made by the Committee of Geology in the period from 1967 to 1971.

*Bore exit No. 1hg* was made in 1967 – 1968 at level 658.95 with depth 481.00 m and features the following structure:

- 0.00 – 22.00 m cased in a steel casing pipe Dia 168 mm;
- 0.00 – 254.00 m cased in a steel casing pipe Dia 127 mm;
- 201.00 – 400.00 m cased in a steel casing pipe Dia 89 mm;
- 400.00 – 481.00 m open trunk Dia 89 mm;

The bore exit has passed through the following geological profile:

- 0.0 – 21.0 boulders with sand-and-gravel between them;
- 21.0 – 26.0 m – andesite;
- 26.0 – 75.0 m - andesite tuff;
- 75.0 – 116.0 m – andesite with mylonitic zone in the interval 114 – 116 m;
- 116.0 – 259.3 m – andesite tuff with mylonitic zone in the intervals 155 – 158 m and 245.5 – 259.3 m;
- 259.3 – 306.0 m – andesite;
- 306.0 – 408.0 m - andesite tuff with tectonic processes in some places;
- 408.0 – 425.0 m – tectonically faulted zone;
- 425.0 – 481.0 m – heavily altered andesite.

***Exploitation Resources***

The following exploitation resources were approved for a period of 10 years by Order No. RD-575 of 14.08.2001 of the Minister of Environment and Waters with regard to Sofia-Knyazhevo Mineral Water Field water pressure system of fissure rocks in andesite and pyroclastics rocks of Senonian age ($_{18}K_2^{med}$) in the South-South-Western part of the Sofia Graben – water intake facilities of bore exit No. 1VKP, bore exit No. 3VKP, Bore exit 1hg, Bore exit No. 6hg, Bore exit "Knizhna Fabrika", piped natural spring of Banski Kaptazh, and piped natural spring of Klisurska Bania:

*Regional Exploitation Resources*

| Mineral Water Field | Regional Exploitation Resources of Mineral Water by Categories | | | Temperature |
|---|---|---|---|---|
| | $Q^{p}_{EP1}$ (l/sec) | $Q^{p}_{EP2}$ (l/sec) | Allowable Reduction S allowable (m) | $T^{0}C$ |
| Knyazhevo | 2,971 | 4,457 | - | 21.2 – 31.8 |
| | 7,425 | | | |

*Local Exploitation Resources*

| Water Intake facility | Local Exploitation Resources of Mineral Water by Categories | | | Temperature |
|---|---|---|---|---|
| | $Q^{l}_{EP1}$ (l/sec) | $Q^{l}_{EP2}$ (l/sec) | Allowable Reduction S allowable (m) | $T^{0}C$ |
| Bore exit No. 1 hg | 0.330 | 0.495 | Well-spring at level 658.95 | 34 |
| | 0.825 | | | |

*Mineral water from Sofia-Knyazhevo Mineral Water Field* features a limited content of mineral salts (M=0.135 – 0.170 g/l) with alkaline reaction (pH 8.5 – 10.0) with hydrocarbonate-sulphate-sodium composition of the dissolved substances, with nitrogenous gaseous composition.
The similar chemical composition of the mineral of water of Sofia-Knyazhevo Mineral Water Field with the analysis of the mineral waters of Bankya, Sofia-Gorna Banya, and Sofia-Centre mineral water fields is due mainly to the fact that their catchment basin consists of the vulcanites of the Upper Cretaccous Period. The latter builds-up the Lyulin massif and the ring around the Vitosha Pluton, where the feeding zone of these fields is situated. In terms of chemical analysis the same are hydrocarbonate or hydrocarbonate-sulphate-sodium highly alkaline, ultra-fresh and fresh, with mineralisation from 0.120 to 0.300 g/l and are characterised by a nitrogenous gaseous composition.

***Catchment Works***

Natural water sources in the mineral water field are caught in vertical shafts with depth 8 m with regard to "Banksi Kaptazh" and 17 m depth with regard to "Klisurska Banya".
Underground catchment chambers have been built at the mouths of all bore exits.

***Sanitary Safeguarded Zone***

Safeguarded zones of Sofia-Knyazhevo Mineral Water Field were approved by Order No. 120 of 12.01.1977 of the Minister of Public Health and the same are current.

***B. Chemical Analysis:***

| 1. Anions | Mg/l | Mmol/l | Eq% | 2. Cations | Mg/l | Mmol/l | Eq% |
|---|---|---|---|---|---|---|---|
| F | 0.2 | 0.011 | 0.60 | NH4 | 0.0 | 0.000 | 0.00 |
| Cl | 2.8 | 0.078 | 4.48 | Li | 0.02 | 0.003 | 0.17 |
| Br | - | - | - | Na | 30.4 | 1.599 | 91.75 |
| J | - | - | - | K | 0.35 | 0.009 | 0.51 |
| $SO_4$ | 23.6 | 0.245 | 28.12 | Ca | 2.0 | 0.049 | 5.62 |
| $CO_3$ | 0.0 | 0.000 | 0.00 | Mg | 0.4 | 0.017 | 1.95 |
| $HCO_3$ | 68.1 | 1.117 | 64.10 | Fe | <0.03 | 0.000 | 0.00 |
| $HSiO_3$ | 3.6 | 0.047 | 2.70 | Mn | <0.002 | 0.000 | 0.00 |
| HS | - | - | - | | | | |
| $NO_3$ | 0.0 | 0.000 | 0.00 | Total: | 33.1 | 1.677 | 100.00 |
| $NO_2$ | 0.00 | 0.000 | 0.00 | | | | |
| $HPO_4$ | - | - | - | | | | |
| Total: | 98.3 | 1.489 | 100.00 | | | | |

| | | | |
|---|---|---|---|
| Dry residue at $180^0$C | 0.079 g/l | $H_2SiO_3$ | 39.9 mg/l |
| Dry residue at $260^0$C | 0.064 g/l | Mineralisation | 171.333 mg/l |
| Electrical conductivity | 142 µS/cm | Carbon Dioxide | 0.0 mg/l |
| | | Hydrogen Sulphide | 0.1 mg/l |
| pH | 9.47 | Flow Rate | 0.45 l/s |
| | | Temperature | $28.0^0$C |
| Appearance: | Water is clear, colourless, odourless, free of residue | | |

| 3. Trace elements (mg/l) | | | |
|---|---|---|---|
| Arsenic | < 0.001 | Lead | <0.003 |
| Antimony | < 0.001 | Selenium | <0.001 |
| Cadmium | < 0.0004 | Mercury | <0.0001 |
| Chromium | < 0.005 | Manganese | <0.002 |
| Copper | < 0.005 | Barium | <0.002 |
| Nickel | < 0.002 | Boron | <0.05 |
| | | Cyanides | <0.01 |

*The above data are in accordance with Test Report No. 50 of 29.01.2007 of the Chemical Laboratory for Mineral Water analysis under "NSBFTR" EAD, Sofia*

4. **Radiological Indicators**

| | | | |
|---|---|---|---|
| Total α – activity | <0.02 Bq/l | Tritium | < 2 Bq/l |
| Total β – activity | 0.04+-0.01 Bq/l | Natural Uranium | < 0.008 mg/l |
| $Radium^{226}$ | 30 m Bq/l | $Radon^{222}$ | 7+- 1 Bq/l |

*The above data are in accordance with Test Report No. 2057 of 25.01.2007 of the Accredited Laboratory under the Directorate of LAD of IAOS*

**5. Microbiological Indicators**

| | | |
|---|---|---|
| Total mesophilic aerobic micro-organisms at 20 +-2$^0$C for 72 hours< 10 KOE/cm$^3$ | Escherchia coli at 44$^0$+-0.5$^0$C | 0/250 cm$^3$ |
| Total number of mesophilic aerobic micro-organisms at 37 +-1$^0$C for 24 hours< 5 KOE/cm$^3$ | Enterococci (faecal streptococci) | 0/250 cm$^3$ |
| Coliforms at 37$^0$C – 0/250 cm$^3$ | Sulphite-reducing clostridium | 0/50 cm$^3$ |
| | Pseudomonas aeruginosa | 0/250 cm$^3$ |

*The above data are in accordance with Test Report No. 609035-3-11003 of 12.12.2006 for Microbiological Control of mineral water from water source, issued by the Directorate of Laboratory Analysis – Accredited Body for A Control under the Capital City RIOKOZ (Regional Inspectorate for Public Health Safeguarding and Control)*

Conclusion

Total mineralisation of water is 0.171 g/l. It is characterised as hypothermal, weakly mineral, hydrocarbonate-sulphate-sodium, containing metasilicate acid, free of any sanitary and chemical and microbiological indications of contamination. The content of the analysed trace elements and the values of the radiological indicators are within the standards for mineral water. The water has a stable physical and chemical composition and meets the requirements of the Regulation for Bottled Natural Mineral Drinking Water, Spring Drinking Water and Table Drinking Water (SG issue 68 of 2004, as amended and supplemented in Issue 22 of 2005, as amended in Issue 54 of 2006).

***C. Properties***

***Curative and Preventive Properties of the Mineral Water*** are determined by its hypotonicity, presence of hydrocabonate, sulphate and sodium ions, as well as by persistence of the metasilicate acid. Balneolgical treatment by drinking such type of water has an effect mainly on the gastric and intestinal functions, the hepato-biliary functions, and renal and urinary systems. Water has a markedly osmosis effect ("extraction") impact. It helps regulation of hyperacidity of the gastic. It has some choleretics and cholecystokinetic effects. It improves considerably diuresis and in consequence enhances the peristalsis of urethra. In case of inhalation treatment it has a secretolytic effect. The mineral water from that spring is one of the most weakly mineralised one in this country. Thanks to its hypotonicity and the presence of metasilicate acid in colloid form the water has a detoxication effect.

***When used for treatment by drinking and balneological prevention*** it has a favourable effect on the following diseases: renal and urological diseases (kidney stones, chronic pyelonephritis, lithotripcy conditions, post-operative conditions, etc.), cholelithiasis, chronic cholecystitis, cholangitis, cholangiohepatitis , chronic hepatitis, biliary dyskinesia, post-operative conditions, etc.), gastrointestinal diseases (gastritis, gastroduodenitis, peptic ulcer disease, enterocolitis, post-operative conditions, etc.), metabolitic and endocrinous diseases (gout, diabetes), chronic occupational intoxications with regard to persons exposed to toxic substances of the pharmaceutical industry, etc.).

With regard to mineral water drinking treatment and balneological preventive treatment it is required to observe strictly prescribed methods and doses (quantity of the water intake, its temperature, and method of intake, duration of the treatment and prevention).

*Use of the mineral water for drinking treatment and balneological preventive treatment should be made under a physician's prescription, by observing strictly prescribed methods and doses (quantity of the water intake, its temperature, and method of intake, duration of the treatment and prevention).*

***When used in inhalation balneology*** it has a favourable effect on chronic non-specific inflammatory diseases of the upper respiratory tract.

***In case of balneological external treatment and balneological prevention*** (after appropriate tempering of water) this water has a favourable effect on the following diseases: skeletal and muscular systems (degenerative and inflammatory joint diseases (remission) – arthrosis arthritis, coxarthrosis, rheumatic arthrosis, ankylosis spondylarthritis, etc.); of peripheral nervous system (discopathy, radiculitis, plexitis, etc.); of the internal organs (of the gastrointestinal tract – chronic gastritis, and colitis, cholecystitis, and hepatitis, etc.; of the renal and urinary systems – pyelonephritis whether calculary or not, cystitis, urethritis, etc.); orthopaedic diseases (rehabilitation of post-traumatic and post-operative conditions, etc.).

***Mineral water from the water intake "Bore Exit No. 1hg", deposit of mineral water "Sofia – Knyazhevo", Vitosha Region, Sofia City, Capital City Municipality, Sofia Area may be used for bottling of water for drinking.***

**This Certificate is valid for a period of 5 years from the date of its issue.**

**FOR THE MINISTER:**
**ATANAS DODOV, M.D., DEPUTY MINISTER**
**Order No. RD-15-246 of 28.02.2006**