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| 1 | Name of Project | Introduction of the system for preparing and mineralising the samples in closed test tubes into activities of chemico-bacteriological laboratory of the Minskochistvod Enterprise (ChBL of MOS) |
| 2 | Term of implementation of the project | 2024-2025 years |
| 3 | Applicant organisation proposing the project | MINSKVODOKANAL UE |
| 4 | Objectives of the Project | Improving the accuracy and reproducibility of the test results when carrying out the monitoring of waste water, surface and ground water as well as sewage sludge for determining the metals. |
| 5 | Tasks planned to be performed within the framework of the project implementation | 1. Purchase of the system for preparing and mineralising the samples in closed test tubes.2. Introduction of the system for preparing and mineralising the samples in closed test tubes into activities of the chemico-bacteriological laboratory of MOS. |
| 6 | Target groups | Legal entities and individuals of the city of Minsk |
| 6.1 | Brief description of the measures within the project | 1. Purchase of the system for preparing and mineralising the samples in closed test tubes2. Installation and setting-up of the system for preparing and mineralising the samples in closed test tubes.3. Introduction of the technique4. Training of the personnel. |
| 7 | Total volume of financing | Approximately 112,000 US dollars |
| 8 | Source of financing | Volume of financing (in US dollars) |
| 8.1 | Donor’s funds | 112,000 US dollars |
| 8.2 | Co-financing | 1% for training the personnel that is 1120 US dollars |
| 9 | Project implementation place (region/district, city) | City of Minsk |
| 10 | Contact person: Initials, surname, position, phone, e-mail address | E.I.Kasevich, Head of the chemico-bacteriological laboratory of MOS of Minskochistvod Enterprise+375 29 7039494kasevich\_ei@minskvodokanal.by |
| 11 | Justification  | Heavy metals are one of the major pollutants of household and industrial waste water. They are present in waste water in dissolved forms and precipitate as poorly soluble oxides, hydroxides and salts.Domestic and industrial raw waste water differ markedly in the quantity and nature of impurities. The mineral composition of sewage waters varies greatly, the elements to be detected are present in a wide range of concentrations (from several micrograms to tens of milligrams per litre); the waste water contains often organic compounds of various nature in high concentrations, due to which the waste water shall not be considered as a simple object of analysis. The sample preparation process is the most complex and time-consuming stage of the analysis, which is often crucial for obtaining reliable results. When determining the gross content of elements, it is necessary to transfer all the sample components to a dissolved state, therefore, the water samples shall be mineralised. The composition of the waste water entering the centralised waste water disposal system from industrial enterprises (organisations) of the city of Minsk and Minsk district and further by stages of purification at the Minsk treatment plant is monitored by the chemico-bacteriological laboratory of MOS for 7-12 metals (about 650 tests on 70 samples per month) for compliance with the requirements established by the Integrated Permit (IP No.5) and Laws and Statutory Instruments for environmental protection and sanitary-epidemiological legislation of the Republic of Belarus.In the chemico-bacteriological laboratory of MOS, the process for preparing the samples for determining the metals is carried out by acid decomposition using the boiling on hot plates. In so doing there is a number of negative disadvantages: high labour intensity of the process (constant monitoring of the boiling process), there is a risk of loss of the substance being determined during the boiling and uneven heating of the hot plate.There is another method of sample preparation in closed glasses using a decomposition system or a mineraliser (microwave oven), which is designed for destruction of organic substances in natural and waste water, when carrying out the physical and chemical analysis for heavy-metal contaminants by any methods. Such a sample preparation system minimises the exposure of laboratory personnel to acids. Nitric acid vapours are discharged through a header and condensate collector either into an external fume hood or into a special absorption system (scrubber).Thus, the use of a microwave decomposition system will shorten significantly the time to be taken for dissolving the sample, reduce the quantity of reagents to be used and harmful emissions into the atmosphere as well as likelihood of the substance loss due to splashing when boiling the solutions and individual elements will be protected from loss through the formation of volatile compounds. The use of a sample mineralisation system for determining the metals will improve the efficiency and productivity of the process, provide a rational organisation of the work and possibility to monitoring the process in automatic mode as well as increase the accuracy and reproducibility of test results. |
| 12 | Results of implementation of the project | The use of preparation and mineralisation of samples in closed test tubes will improve the efficiency and productivity of the sample preparation process, increase the accuracy and reproducibility of test results when carrying out the in-process control of waste water, surface and ground water as well as sewage sludge for determining the metals. |

