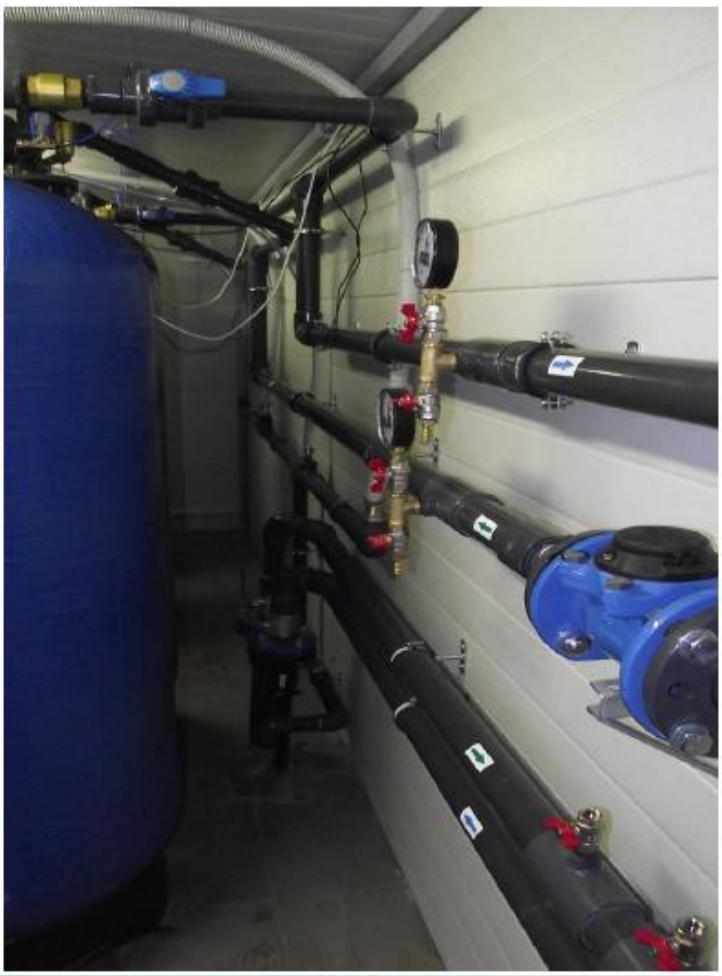

Pilot investment

Ground drinking water quality improvement system with automated iron removal filters and pumping station at Kudirkos Naumiestis and Bagotoji settlements, Lithuania

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Summary

Background information

This summary gives an overview of the drinking water quality improvement investment implemented at Šešupė river pilot area. Water purification facilities for iron removal from groundwater were designed and installed at Kudirkos Naumiestis (Šakiai district municipality) and Bagotiji settlements (Kazlų Rūda municipality). Design, construction, installation and setup works were performed by specialized JSC "Axante". The selection of the company was performed according to the public procurement requirements established in Lithuania.
The design of water purification facilities was based on the groundwater quality parameters and estimated outputs. The measured iron concentrations in the groundwater before implementation of the investment have exceeded the maximum level for iron in drinking water, i.e. 200 μg/L. This concentration is set as the Specific Limit Value (SLV) for the drinking water in the Lithuanian Hygiene Norm (HN 24:2003). The higher concentrations of iron in the drinking water can cause aesthetic problems such as bad taste, brownish color of the water, staining. Also, it can deposit in the water distribution system leading to the pipes fouling.
The water purification process consists of oxidation and filtration steps. The principle of iron removal from drinking water process is based on soluble ferrous compounds oxidation to insoluble ferric compounds. Oxidation is followed by filtration process. Formed precipitates (iron hydroxide) are removed in this stage.

This summary provides detail description of the investment performed at Kudirkos Naumiestis settlement. The analogous system with lower maximum output (4 m^3/h) was installed at Bagotoji settlement.

The area of the selected location for the construction of the water purification plant in Kudirkos Naumiestis is 4393 m^2. The site plan of the station is provided in Annex 1. The general plan showing existing and new buildings in the area is provided in Annex 2.
The iron removal facilities consist of the pressurized aerators and the automatic pressurized filtration system. For the removal of excess sludge, filters must be periodically regenerated. Residual concentration of iron in the purified water does not exceed 200 μg/L.
The water purification equipment is installed in the container building (Annex 3). The principal scheme of the water purification equipment arrangement is provided in Annex 4. The building is situated in Šakiai district, Kudirkos Naumiestis, Kybartai Street 13.

Timetable

The investment plan was completed in the frame of the WATERPRAXIS project. It serves as the water quality improvement model project for ground drinking water quality improvement at small settlement. The investment was completed in 6 months period, starting from designing stage in June of 2011 and finishing with operating water purification plants, coming into operation in the end of November 2011.

Costs

Design and preparation of technical documentation for Kudirkos Naumiestis settlement - 2,027.34 euros

Design and preparation of technical documentation, Bagotoji settlement - 1,361.22 euros

Construction of water purification facilities at Kudirkos Naumiestis settlement - 30,842.22 euros

Construction of water purification facilities at Bagotoji settlement - 16,060.30 euros

Funding

The investment combined financial resources from the WATERPRAXIS project and local municipality funding.

The technical characteristics of the iron removal plants at Kudirkos Naumiestis settlement

Maximum output - 9 m^3/h;
Regeneration intensity - 228 l/min.;
Regeneration time - 8-10 min.;
Regeneration periodicity 2-4 days;
The maximum allowable working pressure - 8 bar;
The permissible ambient temperature of 5-50°C.

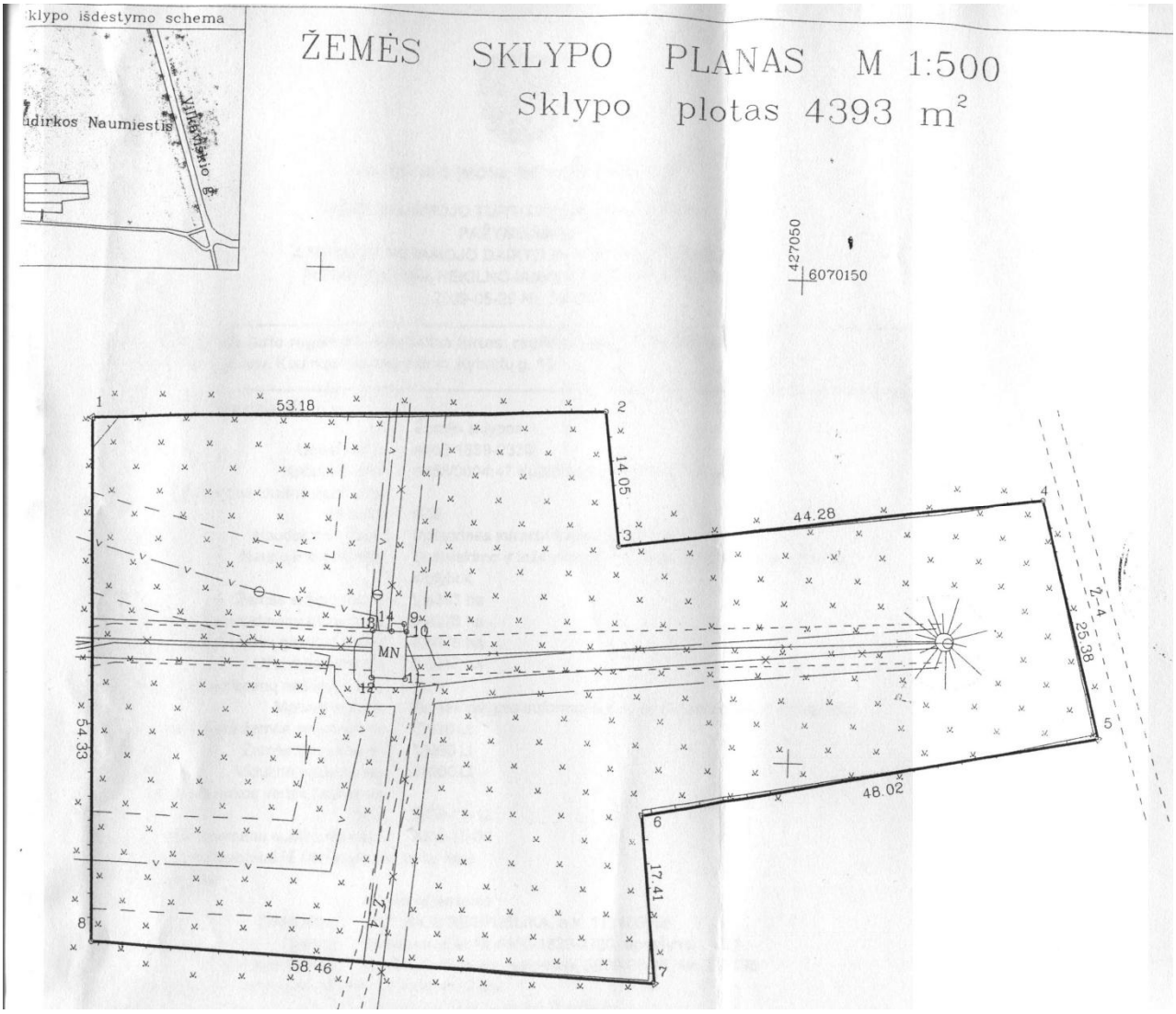
Technological flowchart

Scheme of the technological flowchart is given in Annex 5. Two parallel water purification equipment lines, consisting of oxidizers (aerators) and filters are installed in the water treatment station. Water, extracted from the artesian wells is fed into the aerators. Compressors are used for oxygen injection into the water. Excess air is removed using automatic de-aerator. After oxidation step, water is fed into automatic filters. Oxidized iron compounds, and, partly, manganese and ammonia compounds, are precipitating on the filter media. The purified water is supplied for the consumers.

Regeneration (back-washing) cycle

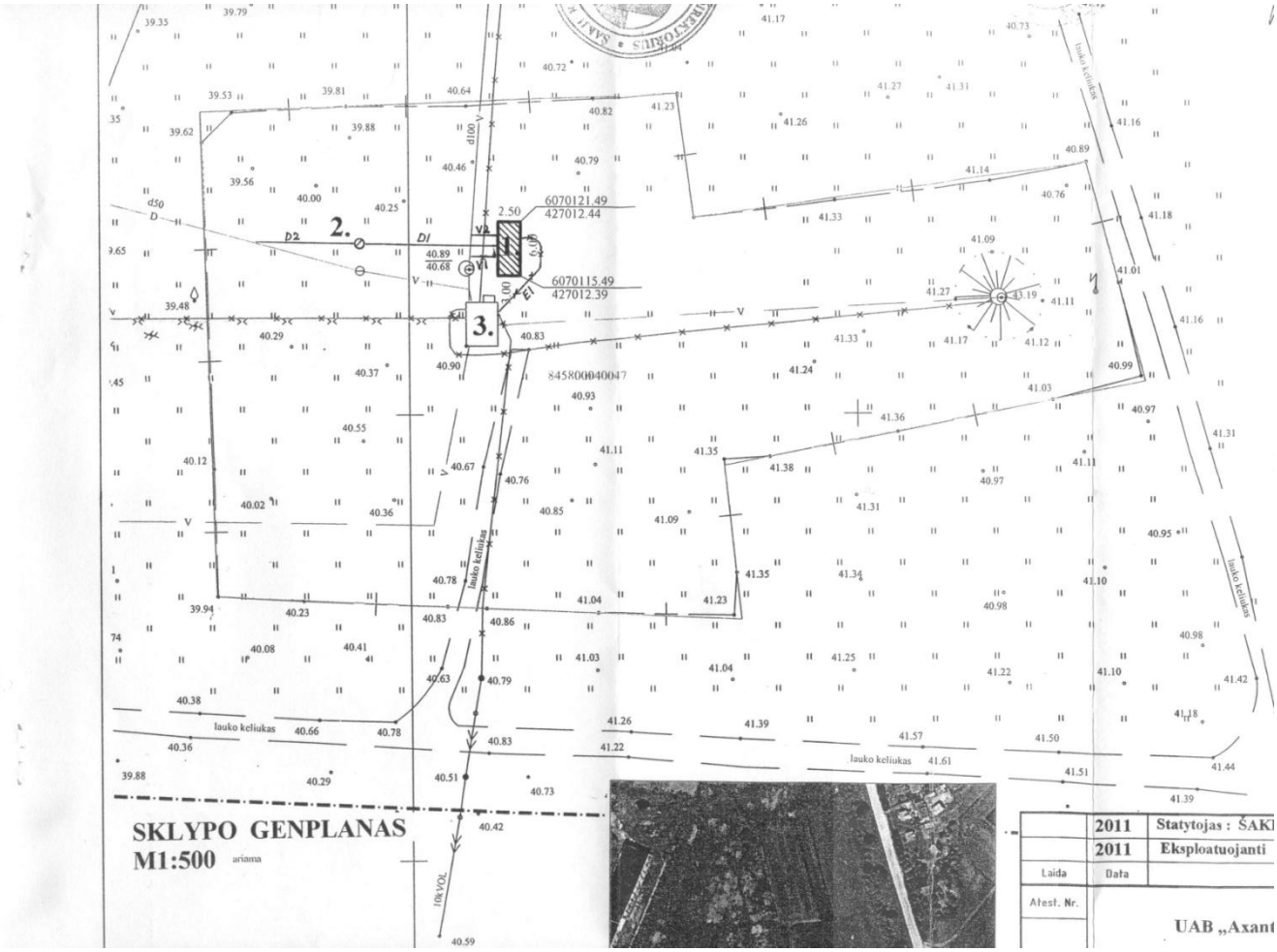
Automatic iron removal filters are in turns regenerated during night time. The regeneration is performed by back-washing procedure; the regeneration time normally is about 9 minutes. Direct flow washing time is about 2 minutes. Duration of regeneration cycles is adjustable and can be revised on the setup stage and during the exploitation.

Annex 1
The site plan of the water purification station



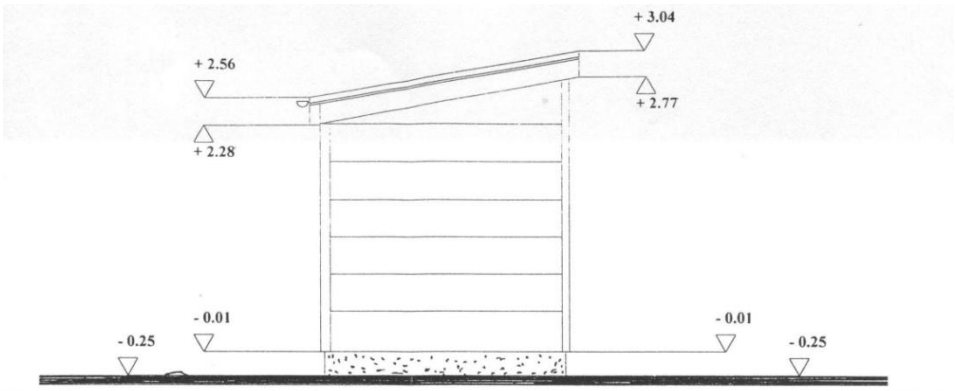
Annex 2

The general plan showing existing and new buildings in the area



Herein: 1 – container building; 2 – filters' back-washing effluent well; 3 – pump-house with artesian well.

Annex 3
Container building for water purification equipment



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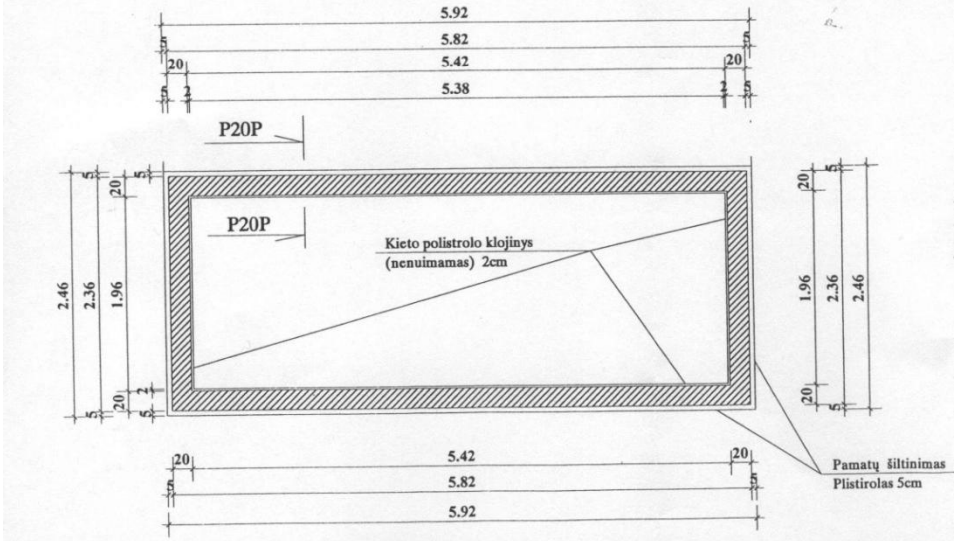

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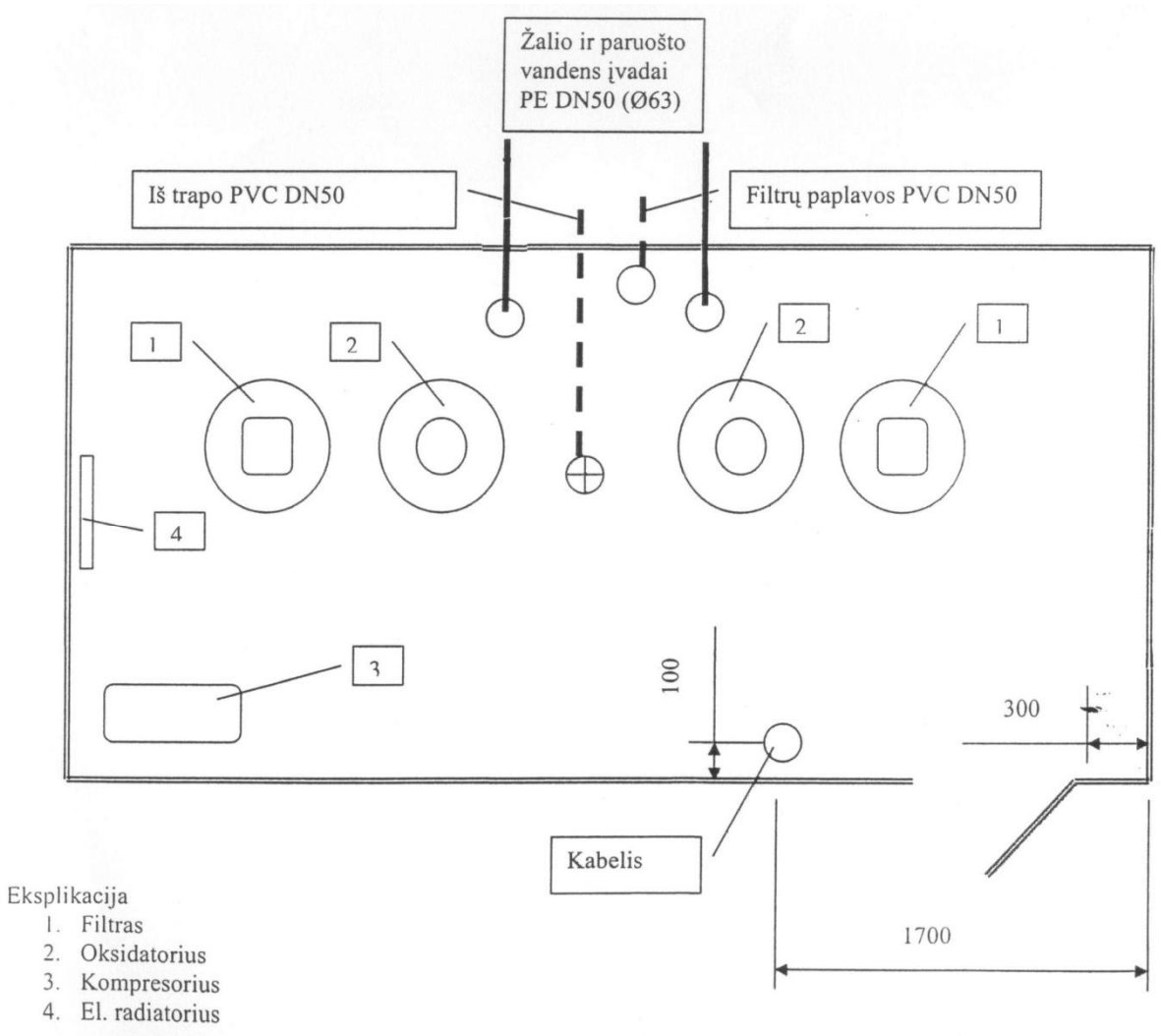
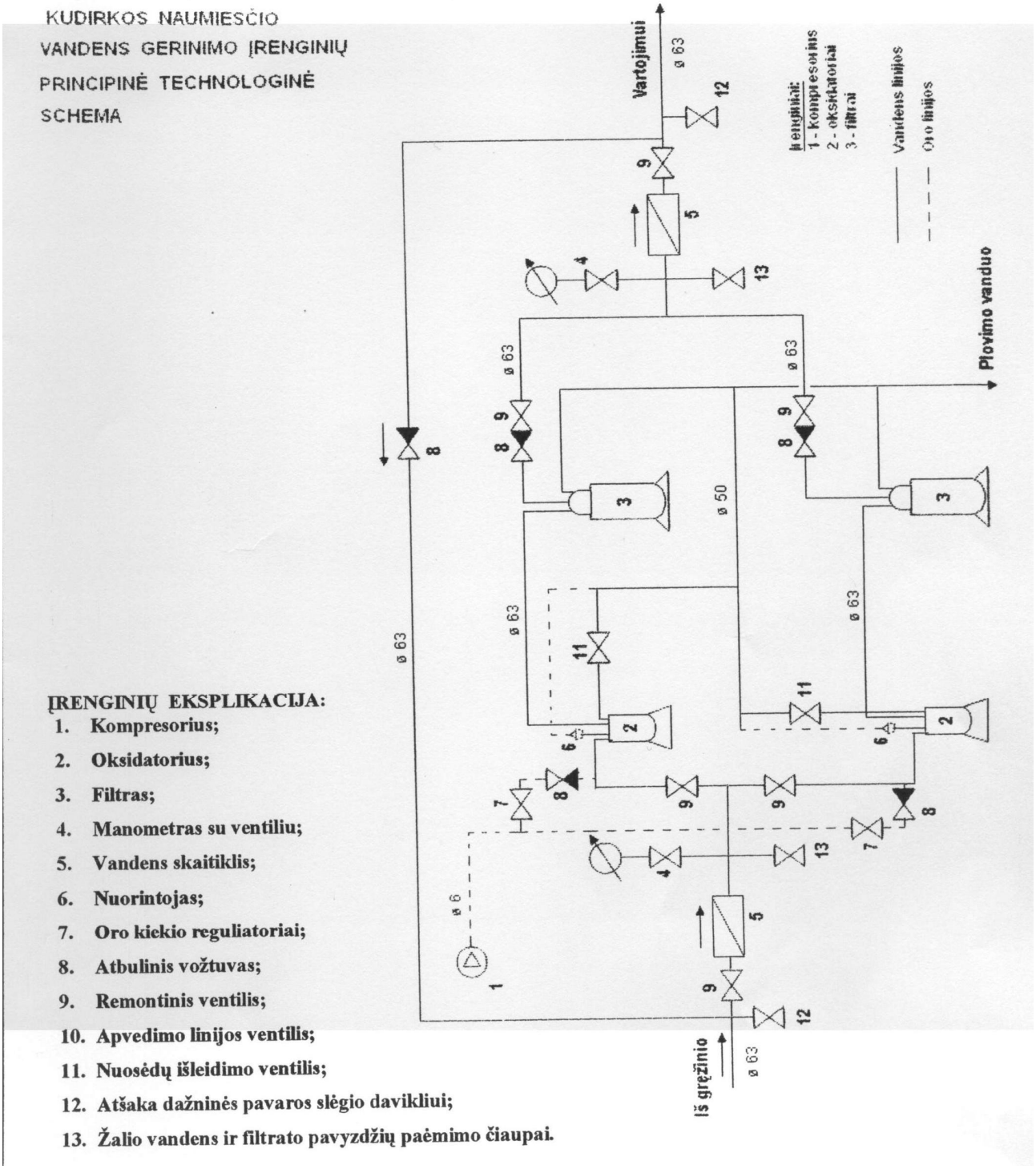
Annex 4

The principal scheme of the water purification equipment arrangement



Herein: 1 – filter; 2 – oxidator; 3 – compressor; 4 – electric heater.

Annex 5
Technological flowchart



Herein: 1 – compressor; 2 – oxidator; 3 – filter; 4 – manometer with valve; 5 – water-meter; 6 – deaerator; 7 – air flow controller; 8 – reverse valve; 9 – maintenance valve; 10 – rimming line valve; 11 – precipitate escape valve; 12 – branch for pressure control; 13 – raw water and filtrate sampling pipes.