SeaQuest

Comprehensive service of cleaning water distribution network – preventing secondary contamination of the distributed water

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Is it worth adding anything to water?

It is commonly known that the best solution is not to add to water anything that changes its desired parameters achieved in the process of water treatment. Can we put this sentence into practice nowadays? A good example seems to be water disinfection. Disinfectants, and actually their side-effects, can affect human health (THM). It is important to know that sediments absorb significant amounts of disinfectants, which results in aggravated turbidity and exceeding other water quality norms during the process of administering disinfectant (uncontrolled removal of sediments). It is impossible to imagine however not administering them while there are bacteria present in water distribution networks. Therefore disinfection is a compromise, optimization of the whole process of water distribution.

With SeaQuest the situation is similar, though its influence on human organism is negligible. Amounts of phosphates administered and, eventually, their small amounts consumed by Clients confirm this. Taking legal regulations in this regard into consideration the amount of phosphates necessary to achieve desired effects in a network is a few times smaller than the amount described in legal norms concerning water quality. Moreover, an average consumer drinks up to 2 liters of water daily. Therefore the amount of phosphates consumed by him or her is insignificant when compared with the real need of human organism for this element. Now that we are certain that phosphates are safe for human organism and their influence is insignificant, let us consider a technical possibility to implement the proposed method as an effective way to counteract secondary contamination of water in a network as well as present other advantages of using SeaQuest.

Why then is it worth using SeaQuest?

Water sale has been declining for the past ten-odd years. The expenses of Water Distribution Plants are rising due to network age, network type and material of which it is made. Moreover, water stagnation, calcium carbonate in water result in sediments formation and corrosion, which leads to consumers' discontent, penalties and increasing water production costs. Even if water quality at water treatment facilities is excellent, tap water still does not conform to standards, which results in Clients' complains and building a negative image of the Water Distribution Plant.

SeaQuest, which has been known worldwide for 20 years, has been used in Poland for ten years. Thanks to our complex service of cleaning sediments and removing corrosion from water distribution networks, the quality of water supplied to Clients conforms to standards described in the Act of the Minister of Health regarding water quality, what is more, the network is stabilized and the water can be continuously supplied to Clients. Preventing secondary contamination of water which ruins the effects of water treatment is nowadays the number one issue for Polish Water Distribution Plants. Considering all aspects of water production (health, technological, and economical) we offer you a powerful tool to control the whole water distribution network without the necessity to plan an investment. You will find the details of our method in the hereby brochure.

Opinions about us

Over the years, as the only company in the market, together with a few dozen of our Clients, we have worked out our own work methodology, which proved to be effective as all projects that we have carried out have been successfully completed. Such a work methodology we presented to the Kielce Fair Committee (TIWS - Water and Sewerage Infrastructure Fair), who awarded us a Gold Medal in 2010 as well as to the Polish Promotional Emblem "TERAZ POLSKA" Committee, from whom we received an honorable mention. Regardless of external awards our greatest success is our Clients' satisfaction and references we have received from them.

Explanation

Talking about action of phosphates in a water distribution network we mean exclusively the SeaQuest preparation offered by us. As the only company we have proven the complexity of SeaQuest action and practical implementation of principles described in the hereby brochure. We do not simply improve organoleptic properties of water, but we offer a complex service. In the hereby brochure we present a possibility to lead to a situation in which the quality of tap water is practically the same as at the Water Treatment Station, without the necessity to build up long lasting investment plans.

We invite you to reading and cooperation!

1. SeaQuest – action

Polish water distribution networks are made of various materials, prone to corrosion and sediments formation. Pipelines exploited for dozens of years are subject to aging processes. The amount of sediments and corrosion products with time significantly increases, which leads to merely complete diminution of pipeline diameter. At the same time during water distribution water parameters are worsened due to its contact with sediments and sludge banks.

Water Distribution Plants cannot afford replacing all pipelines for new ones. Such an investment would result in paralysis in cities and would require huge financial expenses. Thanks to using SeaQuest preparation we are able to slow down the processes of water distribution networks corrosion and deterioration. Water distribution becomes a controlled process so that consumers can be protected from sediment particles leaking into water. As a result we achieve a network which is free from sediments and secondary contamination, while the economic calculation is favorable. Water Distribution Plants which use SeaQuest confirm that due to using SeaQuest the amount of consumers' complaints about water quality decreases. It is possible as phosphates contained in SeaQuest bind iron and manganese ions into colorless complex compounds. Thus organoleptic properties of water as well as the comfort of work on the water distribution network are enhanced and Customer satisfaction rises. Any actions supporting the process of water distribution network cleaning, that is rinsing particular network sections, are carried out on the basis of water analyses results. Therefore actions on the network are planned, spread over time and they contribute to optimization of the effects of dosing SeaQuest preparation.

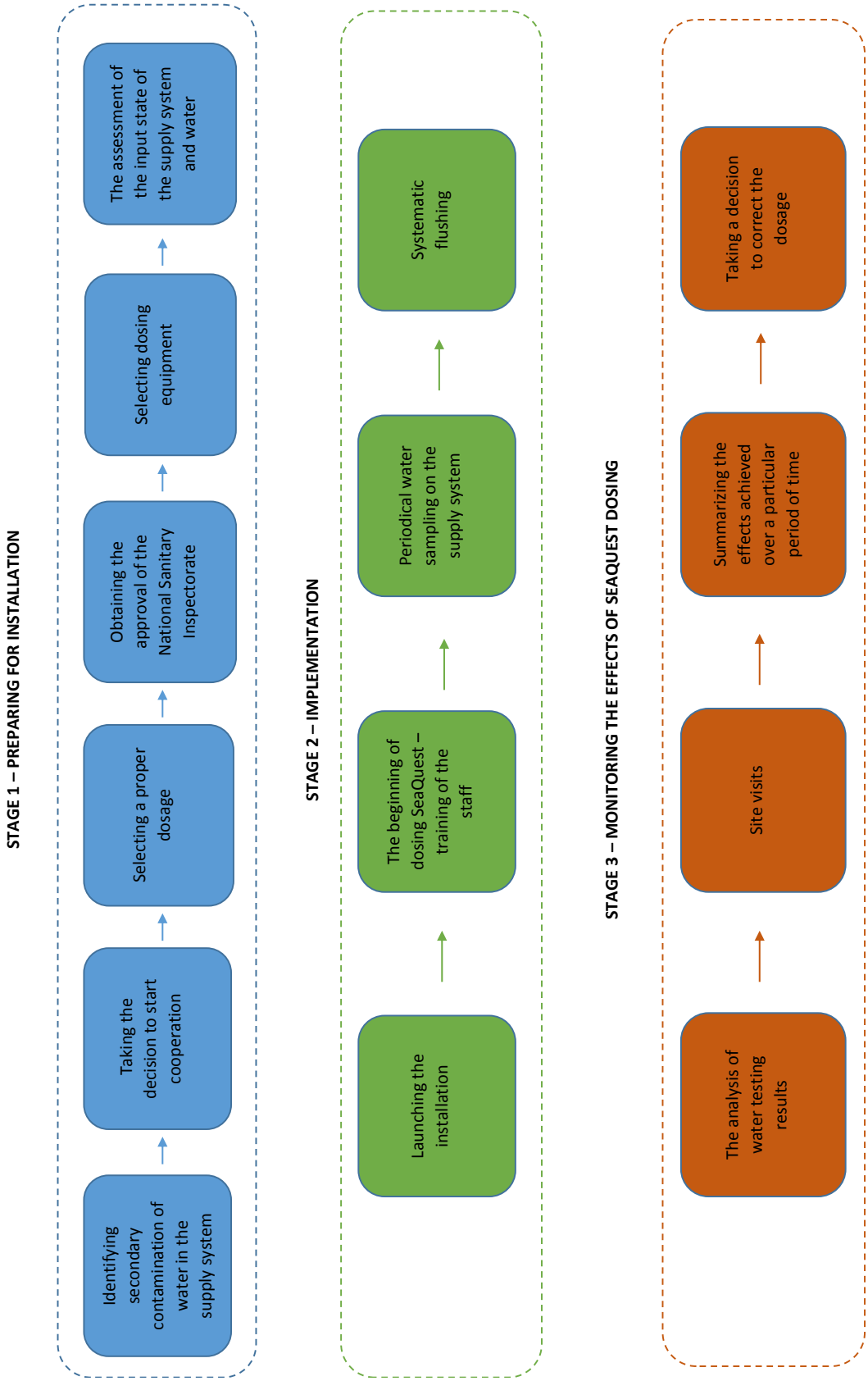
SeaQuest action in the field of eliminating causes and results of water secondary contamination is comprehensive and complex. While preparation dosing thin polyphosphate protective layers, which separate tap water from the inner surface of the pipeline, are formed. Thus reaction of the distributed water with the material of which the pipeline is made is prevented. Not only the technical condition of the network but also its sanitary state is improved. Removing sediments we eliminate places which are a favorable environment for microorganisms living in water distribution networks. It guarantees bacteriological safety of water delivered to consumers while optimal doses of disinfectants are maintained and the risk of carcinogenic trihalomethanes (THMs) formation in case of using sodium hypochlorite for disinfection is reduced.

Aiming to present average, practical results of using SeaQuest in the Polish market in 2010 we carried out a research to estimate its effectiveness. The research showed the following advantages of SeaQuest dosing:

- an improved comfort of work on the water distribution network,
- rise in customer satisfaction with the quality of the water delivered to them,
- decrease in the network's failure frequency,
- an improved quality of cooperation with Sanitary Inspection agencies,
- an improved image of the Water Distribution Plant,
- an enhanced sanitary condition of the network,
- an improved water quality due to the actions carried out on the network.

A graphical presentation of results, in a form of a diagram, is **on page 12**.

2. Cooperation scheme



3. Description of principles of cooperation with PROTE

3.1. Stage 1 – Preparatory actions

Due to the high complexity and diversification of water distribution networks, it is important to properly identify the individual aspects of the current usage of the network and the quality of the distributed water. SeaQuest preparation is not used for water treatment, but to eliminate the causes and results of secondary contamination of water in the network.

After proper identification of the situation on the particular network the decision to start cooperation – SeaQuest dosing - is taken. As far as cooperation is concerned, PROTE's part is not limited to simply selling the preparation, but we also offer help and professional advice on every stage of cooperation.

In the regulation about the quality of drinking water used by humans of September 4th 2001 the permissible phosphorus content P_2O_5 is 5 mg/l. Today the norms do not require carrying out water tests for phosphorus concentration in drinking water, as its influence on the human organism is negligible. Phosphorus was removed from legislation and the valid Regulation of the Minister of Health of March 29th 2007, concerning requirements for drinking water does not specify the value of the above mentioned parameter. Each time SeaQuest dosage is determined individually, so that we can achieve its optimal results, and what is more, the dosage is a few times lower than the previous norm that is 5 mg P_2O_5/l.

Before starting the process of water system cleaning, it is necessary to obtain the State District Sanitary Inspector's approval for using SeaQuest (according to § 18.1. of the Regulation of the Minister of Health of March 29th, as amended). As part of the cooperation with Water Distribution Plant our worker helps to prepare the application.

A properly chosen dosing set enables us to automatically apply a suitable amount of SeaQuest to the water distribution network. Usually it is a simple installation, whose basic parts are: a container for the 10% solution of the preparation (about 300 l – 500 l), electrical mixer and a dosing pump coupled with water flow.

Our primary goal during using SeaQuest is to prevent secondary contamination of water in a water distribution network as well as to remove sediments from it while the continuity of water sale is maintained. That is why it is so important to monitor the effects of the carried out project and all factors related to it, such as amount and type of sediments, amount of customer complaints, the network proneness to malfunctions, water losses before starting using SeaQuest. Such an approach enables us to present the effects of dosing SeaQuest better in the future.

3.2. Stage 2 – Implementation

When we have finished preparations to the process of dosing SeaQuest we can launch the dosing set on the facility.

After checking if the dosing set works properly and checking its settings the solution of SeaQuest preparation is prepared and dosing is started. During the first preparation of SeaQuest solution PROTE's worker is present. During the visit the Client's personnel is trained. In the place where dosing is carried out we leave the instructions how to operate the installation, the material safety data sheet, and the National Institute of Hygiene certificate, as well as the guidelines concerning Health and Safety.

Once the dosing process is started it should be supervised according to the water quality monitoring plan on the network. The monitoring plan, its frequency and scope on the network are determined together with the network Administrators so that SeaQuest effects can be well presented.

Network flushing, which is systematically carried out according to PROTE's recommendations, is the process that facilitates sediments removal. The flushing carried out while dosing SeaQuest contributes to the removal of substantial amounts of softened sediments as well as to a faster cleaning of water pipelines. After some time a flushing lasts shorter, and the amount of water necessary to flush a given section of a pipeline decreases (by several dozen percent). The frequency of such systematic network flushing depends on the results of monitoring of changes in water quality, carried out while dosing SeaQuest, on the amount of sediments persisting in in water pipelines, their structure as well as the water flow speed characteristic for the given section of the network.

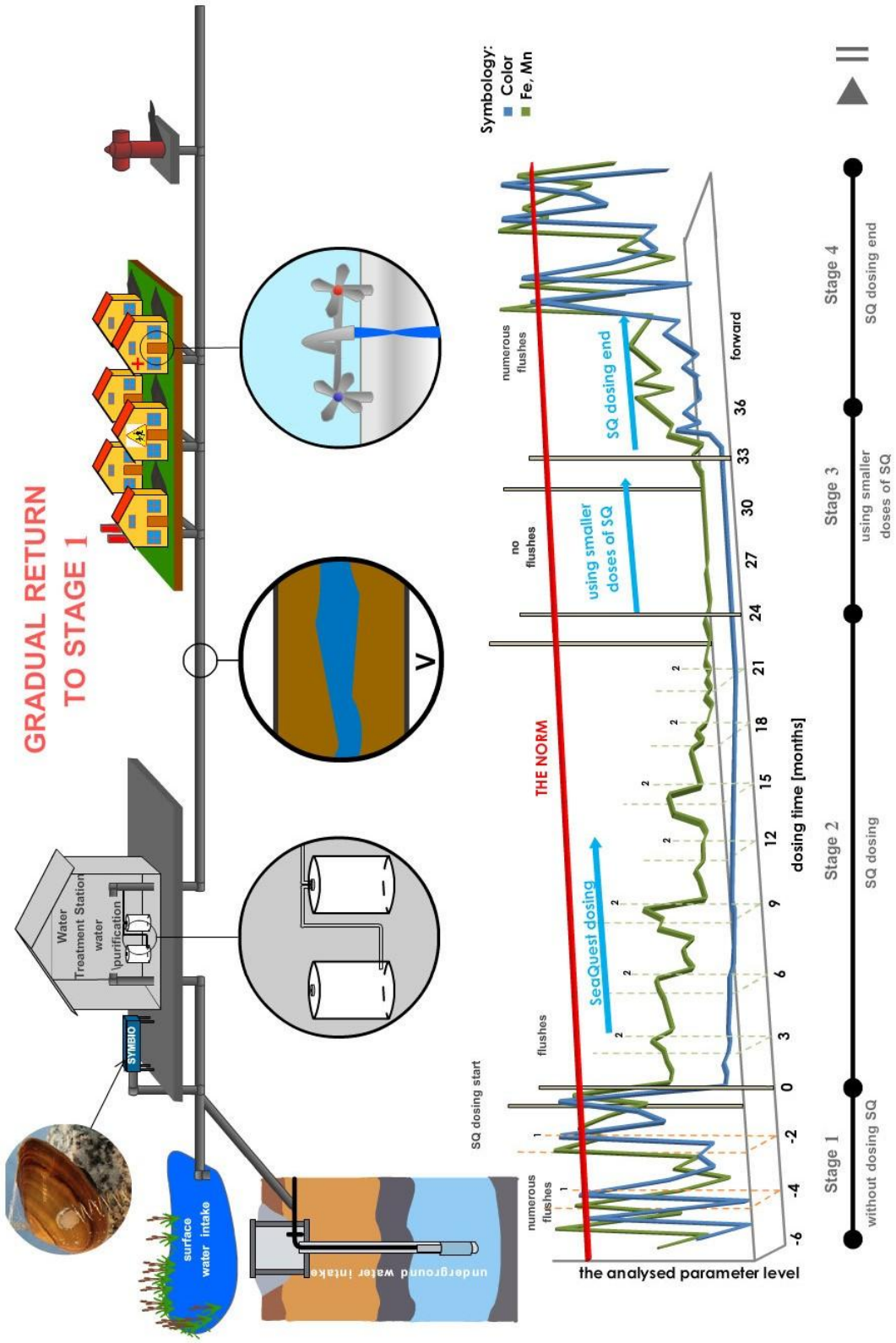
3.3 Stage 3 – SeaQuest effects monitoring

Water samples are taken according to the plan of monitoring changes in water quality in the water distribution network. After the results of water analyses are provided by the Water Supply Company, PROTE specialist analyzes the data he has received. Most often the data is presented in form of charts in order to visualize the influence of SeaQuest on the improvement of water physical and chemical parameters in a given sampling point, within a given time frame. In order to fully analyze the situation in the water distribution network we take into account any remarks and notes of the water pipeline personnel, conclusions of works carried out in the network or pipeline flushing.

An indispensable part of the cooperation with the Client during SeaQuest dosing are site visiting the facilities and working consultation meetings organized in order to discuss the dosing process and water quality in the network. The information gathered this way plays an important role in preparing periodical, written summaries of the achieved effects.

In view of huge differences between water distribution networks it is difficult to clearly define the time needed to dose SeaQuest. The period of time necessary to achieve the effect of water pipeline cleaning is between one and three years, depending on the state of the water distribution network, the amount of sediments as well as the characteristics of water. After this time it is recommended to continue dosing SeaQuest, in smaller doses. It helps to maintain the quality of the distributed water at a high level, as well as prevent corrosion processes and re-deposition of sediments. Additionally we maintain an anti-corrosion polyphosphate protective layer. During SeaQuest dosing a decision to correct the dose can be taken, based on the results of analyses performed within the monitoring of changes in water quality in the water distribution network.

4. **Schematics of changes of the selected water parameters during dosing SeaQuest in water distribution network.**



5. Photo documentation performed during meetings with Clients

5.1. Pipelines before and after using SeaQuest

BEFORE **AFTER**

5.2. Flushing of water pipeline sections during SeaQuest dosing

6. SeaQuest in practice – the description of water parameters changes during SeaQuest dosing.

Sediments which precipitate on the inner surface of water pipelines cannot be removed suddenly, maintaining the continuity of water distribution. The methodology of work in a water network during SeaQuest dosing is based on an optimized, controlled actions. It is always adjusted to the situation in the given network. SeaQuest dose is calculated precisely to the parameters of the treated water and it is dosed to the network in proportion to water flow. It is possible thanks to using synchronizing the pump dosing SeaQuest with a signal transmitted by the water meter or flow meter. We make sure that the effects of using SeaQuest are optimized and the dose of SeaQuest is not too high.

SeaQuest has all necessary documentation: Material Safety Data Sheet and the National Health Institute certificate. The doses of SeaQuest used by us are considered trace amounts, and they do not increase the impact of phosphate compounds on human organisms, as they constitute an amount of approximately 4 mg per day. An adult person's daily demand for phosphates is around 800 mg. Taking the average dose of SeaQuest and the water consumed by people at the level of 2 liters per day into account, we can say that the phosphates consumed as a result of dosing SeaQuest do not reach even 0,5 % of the demand. Water Distribution Companies confirm that the influence of SeaQuest on sewage treatment plants is negligible. The small doses of the preparation constitute around 2-5 % of the total phosphorus at the inflow to the STP.

During ten years of cooperation with Water Distribution Companies regarding using SeaQuest we have worked out our own plan of actions in water distributions networks. During the entire period of cooperation we maintain constant contact with the Managers of the water distribution network, in order to exchange information and experience. What is important the network is not "addicted" to the SeaQuest preparation, and dosing can be interrupted at any time. Water Distribution Companies that decide to use SeaQuest, however, aim to achieve all the expected results, namely improvement of the quality of the distributed water, maintaining its stability and cleaning the network from sediments.

In a situation when the water distribution network is not cleaned or protected against corrosion processes in any way there might be such periods during which the sediments get into consumers' taps, being the cause of claims and complaints (stage I, schematic on page 8). The moment we start dosing SeaQuest to a water distribution network, the color of water immediately drops (stage II, schematic on page 8), customer satisfaction rises. Full cooperation and conforming to PROTE recommendations during dosing SeaQuest makes it possible to get rid of sediments, without distributing them to Clients (stage III, schematic on page 8). All the water quality norms and the continuity of water sale are maintained.

An indispensable part of the comprehensive water distribution network cleaning service with the use of SeaQuest preparation is the observation of the processes taking place in the network as well as water parameters monitoring. It is possible thanks to the copies of lab analyses of water samples taken from points recommended by PROTE, provided by the Water Distribution Companies. Such parameters as iron, manganese, turbidity, total phosphorus enable us to assess whether the dosage of the preparation is at a proper level and whether the preparation is evenly distributed within the network. Having the knowledge of water quality, thanks to previously selected points in the network, we can maintain water norms at Clients' taps so that they always get water of proper parameters. It is possible thanks to taking proper preventive measures in the network, such as flushing certain sections of the network. The first systematic flushing takes place usually three months after the start of dosing SeaQuest and it is considered the time

after which the water distribution network is stabilized and the water parameters are improved (stage II, schematic on page 8).

Water sampling points which constitute the monitoring plan are selected in such a way that the effects of using SeaQuest are presented as well as possible, which means they are located in the most problematic places, for example distant network endings, places where there were always problems with water quality and Clients' complaints.

During the first network flushing (after around one quarter from the start of dosing SeaQuest) a gradual water system cleaning takes place (stage III, schematic on page 8). The softened sediments are removed from the network with the use of hydrants as a result of systematic previously planned flushing. During this period we observe a decrease of iron and manganese concentration, as well as water coloring and turbidity. The process of using SeaQuest is discuss together with the Client in working sessions, whose aim is to summarize the results achieved to date and optimize the future actions in the network.

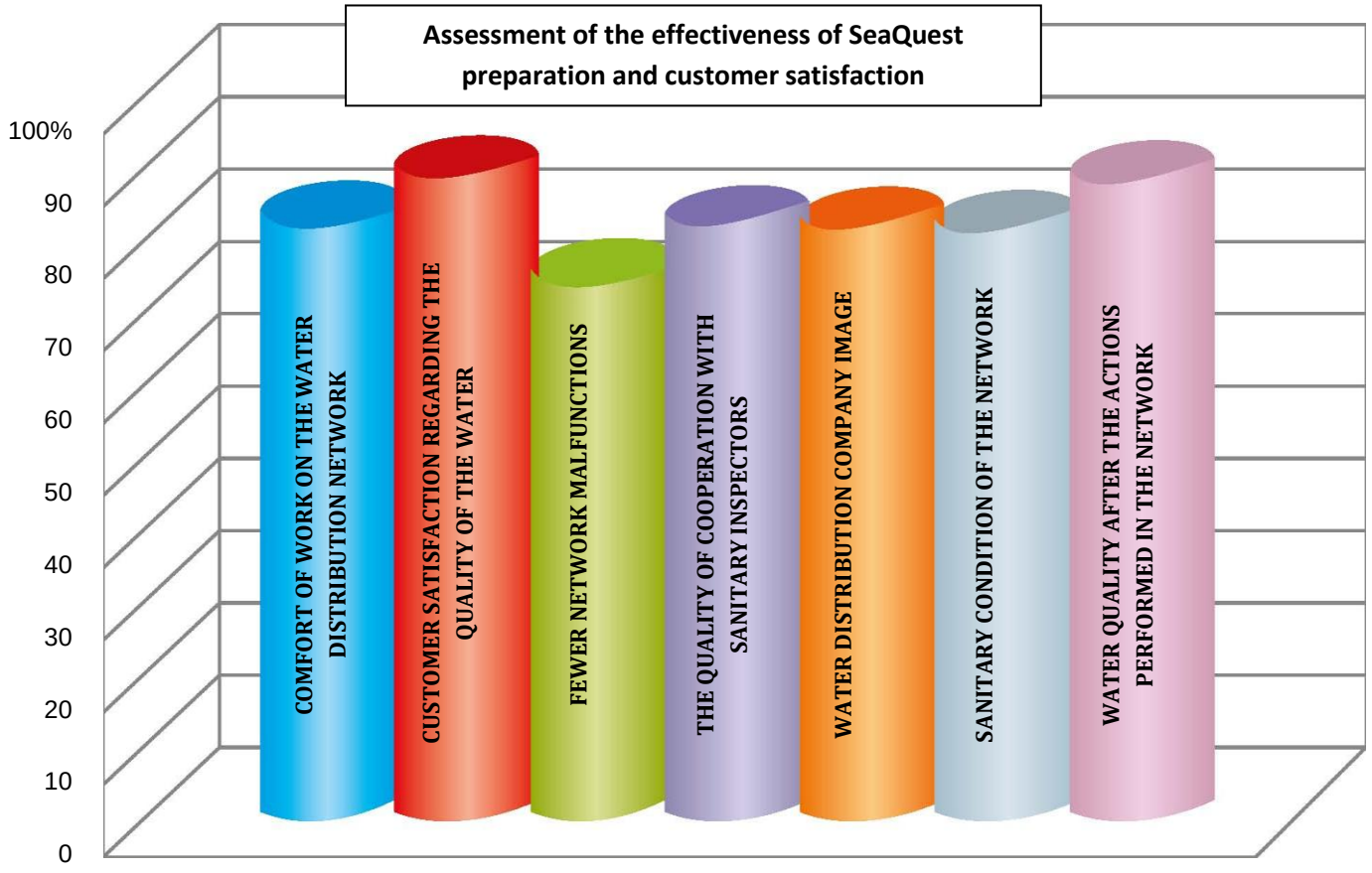
The method of dosing SeaQuest, properly monitored contributes to the saving of water used for network flushing. It is so because after the first quarter of using SeaQuest the actions in the water distribution network become predictable. We can plan a flushing every three months, guaranteeing that the sediments does not reach Clients' taps, even in times of malfunctions between one flushing and another. There is a certain time needed for SeaQuest to influence sediments, which can be gradually and effectively removed from the network by hydrants, if they only are in a proper state.

In case there is interest from the side of a Water Distribution Company we keep records of flushing (the length of time, the flushed out water quality assessment). Our experience shows that after the first systematic flushing of a network the time needed to perform a flushing is significantly shortened, and consequently the amount of water used for flushing is cut. Between one planned flushing and another there is no need to do intervention site visits in order to let out colored water from the network. The Clients have no reasons to lodge complaints. It is also important to know that cleaning various complex water distribution networks from sediments **contributes to a raised sanitary safety, as well as decreased doses of disinfectants**.

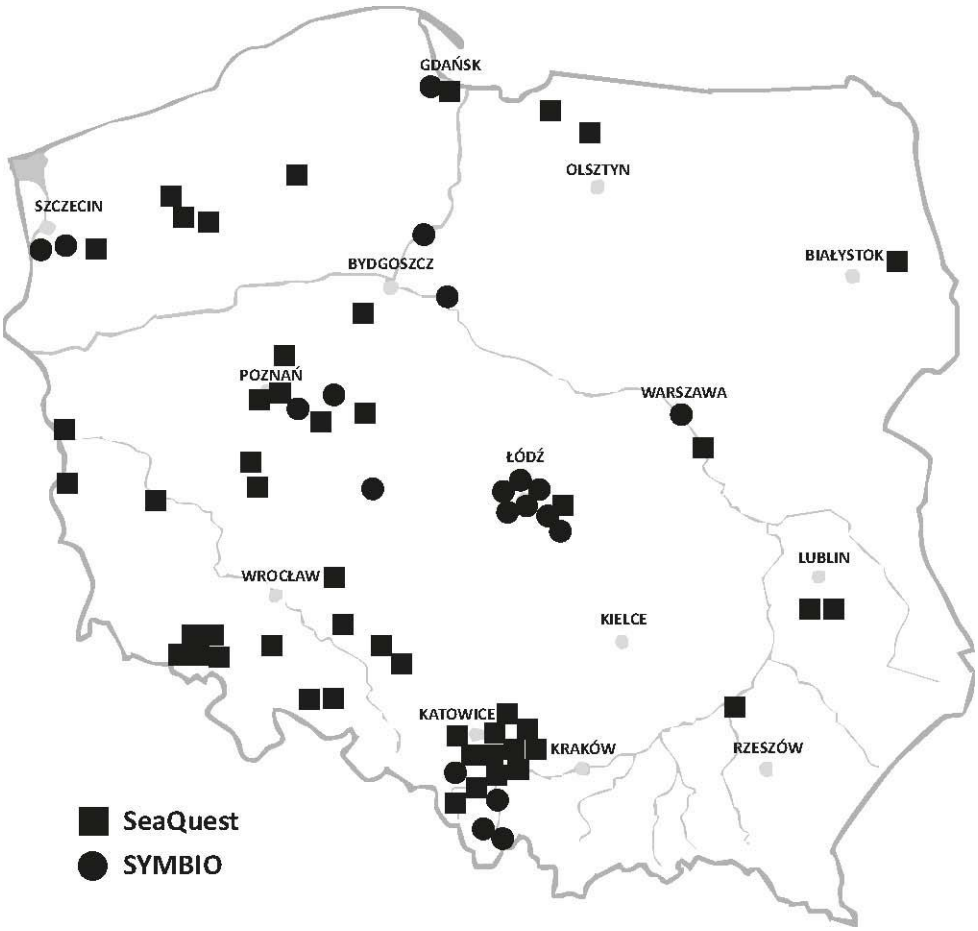
It is also known that the people in charge of Water Distribution Companies build the best possible image of their companies, leading the water distribution and treatment processes in an optimized way. SeaQuest is a tool helpful at the stage of distribution of water of the proper quality and it does not have any negative impact on the rest of activity of a given water distribution company. A proper technical and sanitary condition of the water distribution network has a positive influence on savings achieved regarding water, electrical energy, disinfectants. It also positively influences the Clients' opinions about the water quality. It is worth stressing out that thanks to cleaning water distribution network, the equipment used on water treatment station works with its nominal capacity as the working parameters of the network improve (the so called hydraulic resistance).

7. Exemplary SeaQuest installations / launching dosing and personnel training

8. Customer satisfaction survey



9. Map of cooperation



10. Summary

We are obliged to perform according to high standards not only because of our Integrated Quality, Environment and Health and Safety System, but also because of our Clients' expectations. The form of cooperation presented in these materials has been worked out thanks to many years of contacts with Water Distribution Companies and the experience obtained regarding using SeaQuest. The scope of cooperation and calculations of dosages for a particular water distribution network are always individually made. We encourage you to meet with us and learn the details regarding the effects of using SeaQuest. In view of the fact that we would like to prepare for the meeting with you so that it is not merely a presentation but a technical meeting, we would like to ask you to fill in the questionnaire attached to this brochure.

11. Non-disclosure

Any information provided by you pertaining to your company will not be disclosed without a separate written consent from you.

SeaQuest preparation- basic data.

We kindly ask you to fill in the form.
The data you provide will be used only by PROTE, will not be distributed or copied.
It will enable us to prepare for you an optimized, individual offer.

I. DATA:

1. Name and surname .....
2. Post:.....
3. Name of the company which you represent (company stamp or the stamp of the person filling in the form):.....
.....
.....
.....
4.Telephone numer: fixed……mobile……..
5. E-mail address: …….....fax…….

II. WATER/NETWORK PARAMETERS

1. Parameters of treated water (you can attach exemplary reports of water analyses at a particular Water Treatment Station):

Fe concentration.....mg/dm^3, Mn concentration.....mg/dm^3, water hardness.....mg\CaCO3\dm^3 or ……^oN

2. Water flow in the place where water is pumped into the water distribution system

maximum Qhmax…….....m^3\h minimum Qhmin……m^3/h
average daily Qavd…….....m3\d

3. Is the water fed to the network continuously disinfected?
   □ YES □ NO
4. What is the maximum pressure in the pipeline with treated water, in the place where SeaQuest dosing set would be connected……[bar]
5. Do you have a measuring device whose signal could control SeaQuest dosing pump capacity (water meter/flowmeter) ?
   □ YES □ NO
   If yes, what kind of water meter/flowmeter do you have?
6. What kind of material is the water distribution network made of (circa)
   ……% ……..%
   ……% ……..%

III. GENERAL QUESTIONS

1. Would you consider an improvement of physical-chemical parameters of water distributed to citizens such as iron, color, manganese, turbidity desirable?

□ YES □ NO

2. Do you apply methods of cleaning water supply system, protecting the distributed water against corrosion and sediments formation as well as against secondary contamination of water?

□ YES □ NO

If yes, what are these methods……
……

3. Would you like to clean your water distribution network while maintaining a continuous sale of water and water quality norms?

□ YES □ NO

4. Would it be desirable in your case to reduce the amount of water used for rinsing sections of pipelines and carry out only the rinsing sessions which are planned?

□ YES □ NO

5. Are you interested in receiving more information about the complex service of cleaning the water distribution network and preventing secondary contamination of distributed water with the use of SeaQuest?

□ YES □ NO

6. Do you find the materials which you have received so far all-embracing?

□ YES □ NO

If not, why?.....
……..

In our offer addressed to Water Distribution Plants we also have SYMBIO Biomonitoring System. Thanks to installing SYMBIO Biomonitoring System the quality of water at water intakes is monitored every second. Everything is done automatically and maintenance-free. If you are interested in our offer presented at our website www.prote.pl, we are ready to visit you at your headquarters to talk about SeaQuest or SYMBIO. If you are interested in a meeting, please mark the following option.

□ YES

……..

We would like to thank all the companies who will send us the filled in form
by mail or e-mail.

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