

INTRODUCTION OF ISO MANAGEMENT SYSTEMS IN MUNICIPAL ENTERPRISES PROVIDING WATER SUPPLY, WATER PREPARATION AND WASTEWATER TREATMENT IN THE MAJOR CITIES OF THE RUSSIAN FEDERATION

I. RUKAVISHNIKOVA¹, M. STRUKOVA¹, I. GABOVA², L. STRUKOVA¹ & A. KARAEVA¹

¹Ural Federal University, Russia.

²Institute of Industrial Ecology, Russian Academy of Sciences, Russia.

ABSTRACT

This article gives information about current situation in the introduction of management systems that comply with ISO standards at water utilities in major Russian cities. Analysis of collected data has shown that the number of plants with international certificates is not large. It might be due to the fact that water and wastewater treatment plants in Russia used to be monopolies on the water services market and worked without any competitors until recently. Constant underfinancing of municipal institutes of water industry also interferes with international certification and other direction of forced development. The article analyses basic reasons for management systems' implementation on municipal water utilities. It compares experience and the results of implementation of Environmental Management Systems complying with ISO 14001 standard on water utilities of Moscow and St. Petersburg. It analyses prospects of international certification of water industry facilities at the current stage of Russian society development.

Keywords: environmental management system, implementation of management systems, ISO International Standards, quality management system, water management, water utilities.

1 INTRODUCTION

Current Water Strategy of the Russian Federation [1] implies making and implementing management decisions that should provide maximum social and economic effects and creation of conditions for efficient interaction of water relations' members. The document declares that provision of guaranteed access of all the people of Russia to a quality drinking water is the national issue. The purpose of water industry development is solving this issue. So, the Water Strategy defines social and environmental priorities of country's water policy.

Water utilities (institutions of water supply public services (WSPS)) are responsible for water preparation, water supply and wastewater treatment in the Russian Federation [2]. They are the main elements of water industry that define quality of public services. Efficient work of water utilities also provides for the decrease of negative impact on water objects by improving the quality of wastewater treatment, and for keeping natural ecosystems safe.

Efficiency of WSPS institutions' work and ability to provide environmental safety in the region depend largely on its management level. One of the most common and worldwide well-proven directions of management systems' development is conditioning them to ISO standards [3] and acquiring corresponding certificates. Thousands of institutions including water utilities of the USA [4–6], Europe, Asia [7], Australia [8] have ISO 9000, ISO

14000-series certificates. In Russia, water utilities gained interest in introduction of internationally certified management systems only in the last decade. The only prove-the-rule exception is a singular experience of St. Petersburg water utility [9]. This institution implemented ISO-9001, ISO-14001, OHSAS 18001 systems in 2003–2005.

This article gives data on major Russian cities' water utilities holding of international certificates; analyses reasons of low utilities' activity on ISO certification; gives forecast on prospects of international standards' implementation in WSPS institutions.

We decided to thoroughly analyse implementation of Environmental Management Systems (EMS) standards – ISO 14001. It seemed interesting to us to compare experience and results of EMS implementation and certification at water utilities of St. Petersburg and Moscow.

2 ISO 14000 STANDARDS IN RUSSIA

Compliance of level of environmental activity organization with international standards shows institution's high stability and social responsibility. It scales up businesses' investment attractiveness, raises its competitiveness primarily on the world market. Probably, that was the reason why in the Russian Federation the first ones who got interested in ISO 14000 EMS certification were players of industries with the toughest competition. In Russia, these industries are metallurgic and metal industry, chemical industry, mechanic engineering, oil and gas industry, lumber industry etc.

First companies certified in compliance with ISO 14001 international standards were: JSC Vologda Bearing Factory (precision engineering), OJSC Severstal (metal industry), OJSC Nizhny Tagil Iron and Steel Works, OJSC Corporation VSMPO-AVISMA (metal industry), OJSC AVTOVAZ (car manufacturing), OJSC Russian Coating Corp., The Saint-Petersburg Paper Mill, Branch of «Goznak», SUE Vodokanal of St. Petersburg (water utility), OJSC Novolipetsk Iron And Steel Works, Ural Steel llc., OJSC Uralelectromed (metal industry), OJSC Lukoil (petroleum industry), OJSC Gazprom [12]. It is interesting that alongside with manufacturing companies this list includes St. Petersburg Water Utility. It is worth noticing that for many years it was the only water industry company that passed ISO 14000 certification, so as some other ISO certifications.

3 INTERNATIONAL CERTIFICATION OF WATER UTILITIES' MANAGEMENT SYSTEMS IN THE RUSSIAN FEDERATION

Data on water utilities' management systems certification of major Russian cities with population more than 1 million was acquired from the analysis of information given on official websites of these institutions. It is shown in Table 1.

Most water utilities in the Russian Federation started to implement management systems complying with ISO standards rather recently. Probably, it is due to monopoly position of utilities that existed until recently, and lack of competition. Almost all of them were municipal institutions. The pioneer and the leader in certification was St. Petersburg water utility. Later, Moscow water utility also implemented systems of quality and environmental management. In recent years, there was a positive tendency in the sphere of implementation of integrated management systems complying with international standards at private WSPS facilities, and primarily at Rosvodokanal [13].

Out of 15 Russian metropolises, only six have management systems with international standard certificates. Water utilities of Yekaterinburg (popul. 1.4 mln), Kazan (popul. 1.2 mln), Chelyabinsk (popul. 1.18 mln), Samara (popul. 1.17 mln), Perm (popul. 1.03 mln), Volgograd

Table 1: International certificates of WSPS institutions' management systems.

Institution	Number of consumers, mln	Management system/Current certificate	Years of management system creation
Moscow JSC Mosvodokanal	14,2	ISO 9001 / ISO 9001:2008, ISO 14001 / ISO 14001:2004	2007–2009 2009–2010
St. Petersburg SUE Vodokanal of St. Petersburg	5,2	ISO 14001/ ISO 14001:2004 OHSAS 18001/ OHSAS 18001:2007	2001–2003 2004
		ISO 9001 / ISO 9001:2015 ISO 27001/ ISO 27001:2005	2003–2005 2011–2012
Nizhniy Novgorod OJSC Vodokanal of Nizhniy Novgorod	1,3	ISO 9001 / ISO 9001:2008	2013
Omsk OJSC OmskVodokanal	1,2	ISO 9001 / ISO 9001:2008 ISO 14001/ ISO 14001:2004 OHSAS 18001/ OHSAS 18001:2007	2010 2010 2010
Rostov-on-Don OJSC PO Vodokanal	1,1	ISO 9001 / ISO 9001:2008	2010
Voronezh RVK-Voronezh	1,0	ISO 9001 / ISO 9001:2008 ISO 14001/ ISO 14001:2004 OHSAS 18001/ OHSAS 18001:2007	2012–2013 2012–2013 2012–2013

(popul. 1.02 mln), Krasnoyarsk (popul. 1.05 mln) don't hold ISO certificates, so as most water utilities in towns and cities. Some of institutions listed above are planning to implement and certificate management systems in the near term. It applies, for example, to MUE Vodokanal of Yekaterinburg. Although, information about these plans was posted on the website few years ago, and nowadays standards are still not implemented.

All the water utilities of metropolises that don't have international certificates are organized as municipal unitary enterprises. It is obvious that this fact conditions for these institutions' lack of ability or interest in implementation of management systems and its international standards certification.

4 PROBLEMS OF MUNICIPAL WATER UTILITIES IN RUSSIA

The expertise of water industry condition [14] shows that most water utilities have common problems:

- low water quality;
- imperfection of technologies;
- wear and tear of key assets;
- lack of qualified personnel;

- underfunding of the industry;
- unsatisfactory quality of wastewater treatment.

Due to significant wear and tear of the Russian average water losses amount to 23% per year, and in some cities this factor reaches to 40% and accident incidence rate runs up to 5–6 accidents per year per 1 network km. Water utilities' infrastructure was created mostly in 70–80s. Network and WSPS facilities wear and tear, according to Ministry of Regional Development, amounts to 60%–70%, in some regions – more than 80%. Only half of water and wastewater that go through water treatment facilities is purified to regulated standards.

Having a monopoly in water supply and wastewater disposal spheres, these water utilities don't use competitive methods of selection of best technological and managerial decisions. There is a common practice of unstructured budget funding of separate projects or budget covering of water utilities' expenses ad hoc. Serious problem of industry development, as most experts think [15], is government-led policy of tariff rates repression in water supply and wastewater treatment industry.

The foregoing seems to mean that state-owned legal entity of water utilities slows down its development. Constant underfunding doesn't allow implementing cash-consuming projects including implementation and certification of management systems complying with international standards. But apparent leader in quantity and relevance of international certificates (primarily, ISO certificates) is SUE Vodokanal of St. Petersburg. Quality of its services is proven by victories in a number of reputed international and Russian contests. It proves that state-owned legal entity is not always a barrier for institution's development.

Unlike most of the municipal water utilities St. Petersburg utility doesn't have any problems with underfunding. Its funding sources are: St. Petersburg budget, federal budget, internal funds, credit lines and grants [16]. Leading European banks (Nordic Investment Bank, European Bank of Reconstruction and Development, European Investment Bank) provide easy-term loans for the water utility. The institution regularly takes grants from various partners, primarily from environmental partnership North Dimension (NDEP) [17]. It is reasonable to assume that reasons of such a significant exposure of foreign partners in St. Petersburg water utility's operations are stellar reputation of the institution and shared interests in providing acceptable water characteristics in Baltic Sea.

Another holder of several international certificates (ISO 9001, OHSAS 1800) is municipal water utility of Khabarovsk (popul. 610,600) [18]. Short-term plans of this water utility include introduction of EMS ISO 14001. We might assume that activities in certification are connected to Khabarovsk's proximity to the Amur River near the Chinese border. Therefore, foreign partners are also interested in the quality of utility's services (primarily wastewater treatment), including those connected to efficient management.

We may preliminary conclude that the leaders in international certificates' quantity are municipal water utilities whose results are significant to foreign partners are due to possession of common water resources. This thesis, though, requires further research.

Main motives of implementation of management systems complying with international standards at municipal water utilities are:

1. Pursue for raising quality of services and lowering institution's harm to environment [9, 10, 16].
2. Interest in gaining foreign investments.
3. Necessity for competition with private Russian WSPS operators.

5 EXPERIENCE OF IMPLEMENTATION AND CERTIFICATION OF ENVIRONMENTAL MANAGEMENT SYSTEMS AT WATER UTILITIES OF ST. PETERSBURG AND MOSCOW

The first WSPS institution in the Russian Federation that implemented Environmental Management System and certified it for compliance with ISO 14001:1996 in 2003 was SUE Vodokanal of St. Petersburg.

Table 2: Main stages of EMS implementation at water utilities of St. Petersburg and Moscow.

№	SUE Vodokanal of St. Petersburg	JSC Mosvodokanal
1	Choice of consulting company Education of top management Appointment of CEO's representative that would lead EMS implementation	Choice of consulting company Assignment of implementation procurement officer Choice of a pilot subsidiary
2	Choice of a pilot subsidiary	Diagnostic audit. Company's EMS development and implementation scheduling
3	Creation and training of a working team. Examination of current management system condition and its ISO 14001 compliance degree. Compilation of research data review	Creation of a working team that will develop and implement EMS (formation of environmental operations management structure)
4	Development of environmental policy and objectives of environmental protection, EMS manuals, required for system procedures.	Education of working team.
5	Educational internal audit managed by consulting company specialists.	Preparing EMS documentation: environmental policy; EMS manual; environmental aspects registers; environmental objectives; environmental protection measures programme, registers, standards, terms, instructions.
6	Assignment of responsibilities, filling-in forms of system procedures, detection of significant environmental aspects, setting target environmental indexes	Training of internal auditors and personnel. Educational and internal audits. Formation of internal audits programme.
7	Definition of trainees. Creation of training programs. Personnel training	Internal audits.
8	Start of internal environmental audit system. Internal audit performed by consulting company. Report preparation. Top management qualification of report	Report on EMS functioning at the facility according to environmental performance indexes. Top management qualification of report
9	Choice of a certification body. Certification audit.	Choice of a certification body. Certification audit.

Moscow water utility implemented Environmental Management System and certified it for compliance with ISO 14001:2007 in 2010.

Table 2 gives comparison of main stages of EMS in Moscow, wherein one of the authors took part, with stages of system implementation in St. Petersburg [10].

Stages of EMS implementation don't differ significantly. Though there are some nuisances connected to participation of company management and chosen consulting company in the process of implementation. In St. Petersburg, the top management took a part in the implementation of the management system. Moscow gave most of the duties to a consulting company. As a result, implementation of environmental management system in Moscow was faster. Although, it might be due to the fact that ISO 14001 was the first international standard implemented in St. Petersburg, while Moscow implemented ISO 9000 standard beforehand.

Main results of EMS implementation at water utilities of Moscow and St. Petersburg (according to official websites):

1. Ability to combine achievement of basic production and environmental activities' goals, thereby providing economically efficient downshift and avoidance of environmental harm.
2. Acquiring the ecologically responsible institution image in Russia and abroad.
3. Rise of investment attractiveness.
4. Use of advantages of territorial and national environmental leadership.

6 PROSPECTS OF EMS IMPLEMENTATION AT RUSSIAN FACILITIES OF WATER INDUSTRY

Nowadays the serious pre-condition for EMS implementation at the most of Russian water utilities is stricter environmental legislation:

- There were multiplying coefficients set to rates for use of federal water bodies in 2014.
- The Federal law was passed in 2014 that divides companies into several categories by the level of environmental impact. The law changed the system of regulation, introduced term "best technologies available" and new rules of stimulating companies for transition to modern technologies [19]. For water industry facilities, it may turn into millions of extra payments and fines for environmental harm.

EMS implementation and certification will inevitably lead to significant perfection of environmental activities, which will provide for company's overall stability.

Another stimulus for EMS implementation at municipal institutions is positive experience of international certification leaders – Moscow and St. Petersburg water utilities, so as some private WSPS operators.

It allows us to suppose that in the near future number of water utilities with EMS would rise significantly.

7 CONCLUSION

Tempo of Russian facilities' ISO 14001 certification is significantly slower than world average. The most interested industries are those with harsh competition.

Less than a half of metropolitan water utilities of the Russian Federation hold international certificates. It might be due to their state-owned legal entity.

Main problems of municipal water utilities are significant wear and tear of key assets, industry underfunding, state policy of tariff rates repression in water industry services.

Interest in international certification is seen at facilities with foreign partners that are interested in its operational efficiency and social responsibility.

Motivation for implementation of management systems complying with ISO requirements is companies' dedication to world class service and minimization of environmental harm; interest in foreign investments; necessity for competition with private WSPS operators at the world market.

The main result of ISO 14001 Environmental Management Systems implementation and certification at water utilities of Moscow and St. Petersburg was ability to combine achievement of basic production and environmental activities goals, thereby providing economically efficient downshift and avoidance of environmental harm.

Stricter environmental legislation, positive experience of Environmental Management Systems implementation by several water utilities allow to forecast significant rise of number of water utilities certified with international standards in the near future.

ACKNOWLEDGEMENT

The work was supported by Act 211 Government of the Russian Federation, contract № 02.A03.21.0006.

REFERENCES

- [1] Water Strategy of the Russian Federation until 2020, The Russian Federation government decree of August 27, 2009.
- [2] About water supply and wastewater treatment, Federal Law № 416 of February 7, 2011.
- [3] ISO. Office of International Organization for Standardization Web Site, available at <http://www.iso.org/iso/home/standards.htm>, date of retrieval (22.02.2016).
- [4] Environmental Management Systems, A tool to help water utilities. manage more effectively [Project #2930]; water research foundation, available at http://www.waterrf.org/ExecutiveSummaryLibrary/91128_2930_profile.pdf, date of retrieval (22.02.2016).
- [5] Environmental Programs ISO 14001, Water branch of public utilities, Government of City of San Diego, available at <http://www.sandiego.gov/water/quality/environment/iso.shtml>, date of retrieval (22.02.2016).
- [6] ISO 14001 Certification, Charleston water system, available at <http://www.charlestonwater.com/211/ISO-14001-Certification>, date of retrieval (22.02.2016).
- [7] Kayaga, S., Mugabi, B. & Kingdom, W., Can ISO 9001 certification of water utilities in developing countries be used to evaluate institutional sustainability? *OIDA International Journal of Sustainable Development*, **9**(7), pp. 35–70, 2014.
- [8] Draft Position Paper on Environmental Management Systems in the Water Services Industry, National committee on water engineering engineers Australia, Online, available at www.engineersaustralia.org.au, date of retrieval (22.02.2016).
- [9] SUE «Vodokanal of St. Petersburg», available at <http://www.vodokanal.spb.ru/en>, date of retrieval (22.02.2016).
- [10] Karmazinov, F.V., Perednyaya, T.V. & Kirimitchiev, A.P., Experience of Management System Creation at SUE Vodokanal of St. Petersburg [in Russian]. *Economic Strategies*, **1**, pp. 20–27, 2007.

- [11] JSC Mosvodokanal, available at <http://www.mosvodokanal.ru>, date of retrieval (22.02.2016).
- [12] Deryagina, S.E., Astafieva, O.V., Strukova, M.N. & Strukova, L.V., Environmental management at the facility. *Economics of Natural Resources Use* [in Russian], **6**, pp. 113–116, 2007.
- [13] Rosvodokanal, group of companies, available at <http://www.rosvodokanal.ru>, date of retrieval (22.02.2016).
- [14] Analytical Centre for the Government of the Russian Federation, available at <http://ac.gov.ru/en/events/05142.html>, date of retrieval (22.02.2016).
- [15] Russian Association of Water Supply and Wastewater Treatment, available at <http://raww.ru/>, date of retrieval (22.02.2016).
- [16] Tzelikov, E.A., The way to perfection is endless [in Russian]. *Standards and Quality*, **7**, pp. 104–107.
- [17] Northern Dimension (ND), available at <http://www.northerndimension.info>, date of retrieval (22.02.2016).
- [18] MUE Vodokanal of Khabarovsk, available at <http://www.vodocanal.org>, date of retrieval (22.02.2016).
- [19] Amending the federal law “On the environmental conservation” and certain legislative acts of the Russian Federation, Federal Law № 219 of July 21, 2014.