

HABILITATION THESIS

Sanitation constructions and their impact on the environment

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ABSTRACT

The research activity of the candidate began in September 1994 with registration at Master and engaging at IPROTIM Design Institute of Timisoara within the urbanistic team.

In 1995, the candidate graduated Advanced Studies (Master) with the dissertation "Study rinse process using quick filters without running automated valves".

In parallel, within the urbanistic team (water supply and sewage) from IPROTIM acting as designing engineer worked or was project manager on several projects in the sanitation field.

The candidate was entered in the PhD in 1996, under the scientific leadership of Prof. PhD. Eng. Mirel Ion.

In 2005, the candidate submitted his doctoral thesis entitled "Contributions to the study of rinsing processes using quick filters with multiple layers" at Politehnica University of Timisoara and confirmed by the Ministry of National Education under the Order no. 3151, dated 25.01.2006 .

PhD thesis investigated water clarification processes using quick filters with multiple layers.

Experimental research results were made on a laboratory plant within the Department of Hydrotechnical Engineering, with water from Bega river and highlighted, efficiencies achieved with upward and downward filtration plants equipped with multiple layers, consisting of homogeneous material (quartz sand - for upward filtration) and inhomogeneous (polystyrene, anthracite, quartz sand, garnet and magnetite - for downward filtration) .

The experimental research has shown upward filtration performance equipped with structures of homogeneous materials compared to those of the downward filtration. These results were obtained while the Bega water, used in the experiments, was made up of the colloidal suspensions obtained after a preliminary settling in the suction basin of the supply pumps from laboratory.

The main results of the thesis were presented at several national and international conferences and published in national scientific journals. The candidate has also been involved as a member or coordinator on several contracts and research projects at national and international projects and also with partners in production.

Habilitation thesis summarizes some of the research work of the candidate after obtaining doctoral thesis from the Politehnica University of Timisoara, in October 2005.

Selected activity proves original achievements and relevance of academic, scientific and professional contributions for an independent development of future career on the academic and research line.

The presentation of post-doctoral work it was conducted in two main directions: "Sanitation constructions", presented in Chapter 2, and "Environmental impact of sanitation constructions", presented in Chapter 3.

Scientific research results are materialized mainly through publications of scientific specialist articles and books, textbooks and laboratory and design guidance.

In recent years, the candidate was that the main priority, publishing scientific articles in journals and various scientific journals indexed in the Web of Knowledge (ISI), or in magazines and books of different scientific manifestations indexed in other relevant international BDI databases.

The candidate has published over 70 scientific papers, of which 13 in journals indexed in the Web of Knowledge (ISI) and 12 in other journals indexed in international databases BDI. Main achievements and results are presented in detail in Chapter: B. Scientific achievements, academic and professional.

Another important component of the candidate in Activity Research consists of worldwide documentation for scientific activities in civil engineering field. By engaging in specialized scientific committees, international events or publications, also the activity of scientific reviewer of publications, the candidate aims his training and development from professional and scientific point of view.

The research activity on main direction: "Sanitation constructions" presented in Chapter 2, refers to the centralized systems of water supply and sewerage in populated centers.

In the country, of the 13,842 localities, approx. 10% of them are equipped to European standards as regards the centralized systems of water supply and sewerage in populated centers. The most important European funds are currently allocated to this work.

Within the IPROTIM Timișoara, Center for Research from Department of Hydrotechnical Engineering and S.C. DELTA PROJECT S.R.L. candidate has designed over 400 papers in the sanitation field.

The candidate is certified by the Ministry of Regional Development and Public Administration for verification of projects requirement B9, D and Is, but also for the expertise of sanitation construction and communal household, B9 requirement. Because of these certificates, the candidate succeeded to sign several contracts, especially, with Water and Sewerage Companies from the country to solve problems in the functioning of centralized systems of water supply and sewerage in populated centers.

Of Urbanism issues, it is certified by R.U.R. The Superior Council with Authorized signatory for elaboration of urban equipping - G1.

The candidate is certified by I.S.C. as project supervisor for: CCIA category B; Roads, bridges, tunnels national interest; Hydrotechnical Works category A; Technical and urban works - Water supply and sewerage and land reclamation.

Also, the candidate is member of the Technical and Scientific Council of ARA Association, member of the Technical-Economic Council of A.B.A. Banat, AGIR member, AIIR member, member of the Public utility - Technical Commission of the Municipality of Timisoara and member of the Technical Commission of Territory Arrangement and Urbanism of Timis County.

This approach gives the candidate, who is also teacher, to be a recognized specialist in the sanitation field, with rich experience who can cover all the issues in this field (design, verification, expertise, execution and technical assistance/consultancy). The applicant was an

official reviewer 6 doctoral committees (in 4 commissions to UTCB and two committees to UPT) in the field of civil engineering and installations.

A second direction for research activity refers to: "The impact of sanitation constructions on the environment", presented in Chapter 3.

In general, sanitation works are constructions that ensure the protection of the environment.

Through the contract BC 542/23.10.2006 "The demarcation of sanitary protection zones with severe regime and restriction, sizing hydrogeological protection perimeters for drinking water catchments from Oradea" was intended to protect drinking water sources in Oradea by identifying existing pollution sources, sizing of sanitary protection zones and designing construction works for enclosure of sanitary protection zones with severe regime.

The research contract with S.C. RAJA S.A. BC 1 of 05.01.2010: "Construction of sewerage treatment plants from South Constanta, Mangalia agglomerations" was Technical expertised more offers for sewerage treatment plants according to the requirements of the specifications. Following the analysis presented a report to the expertise for these offers. In case of South Constanta, Mangalia, sewerage treatment plants must correspond to the highest requirements in order to protect emissaries (of the lake).

The candidate has participated as project director and won the contest to design: "Study on the carrying capacity of the sewerage network in areas at risk of flooding from Timișoara". Lately due to climate changes, increased calculation rain intensity causing flooding in the lowlands of the hearth of Timisoara city. The sewerage network of Timisoara is a unitary system. In risk areas, sewerage networks are undersized, lifetime being exceeded.

In this study, it was proposed, in flood risk areas a stormwater sewerage network, pumping stations, retention basins and discharge pipes.

Regarding plans for future research activities and training of the candidate, regarding research areas listed above, the following research topics will continue or will be developed:

- Treatment of geothermal waters for their use as hot wastewater for homes, motels, hotels etc;
- Separation of sewerage systems of wastewater from the rainwater;
- Implementation of vacuum sewerage systems in rural areas and residential neighbourhoods;
- Implementing energy technologies in wastewater treatment from populated centers;
- Implementing water castles on hearth populated centers to reduce energy consumption or transfer from peak hours in basics;
- Refurbishment rainwater sewerage systems by correlating network operation system, pumping station and waterstorage basin;
- Rehabilitation of sanitation networks from populated centers;
- Optimizing exploitation of water supply networks and sewerage;
- Due to climate changes requires revision of STAS 9470-73, regarding the maximum rainfall, intensity, duration, frequency of rain, using new mathematical models which will be valid to new requirements, for all localities in Romania;
- Develop laboratory of water supply and sewerage within the Department of Hydrotechnical Engineering and purchasing of some pilot plants for wastewater treatment, sewerage networks under pressure with pumping and repumping.

To improve and develop research activity on short and medium term, the candidate follows:

- To identify and promote common research topics within institutions and faculties with similar or complementary development activities, in the region or abroad;
- To cooperate more closely with the University of Civil Engineering Bucharest, Faculty of Hydrotechnical Engineering on specific subjects;
- To form a joint research team for special problems on the sanitation field.

To improve and develop long-term research activity, the candidate follows:

- To develop specific courses in the field of sanitation;
- To review STAS, Standards regarding design, implementation, operation and maintenance of sanitation works.
- To prepare engineers in the field of sanitation, through graduation papers targeted in this direction;
- To organize postgraduate courses for specialists from the Water - Sewerage Companies and the Romanian Waters Administration, in the sanitation field.

An important aspect of the further development of the candidate's career is to establish a research team focused on the direction of civil engineering – sanitation constructions, and to recruit PhD students from the students of Master.