Occupational safety and health in eco-industry - part 1: surver of knowledge and needs related to specific risks within the production and treatment of industrial wastewater

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Bezpečnost a ochrana zdraví při práci v eko-průmyslu - Část 1: Průzkum znalostí a potřeb souvisejících se specifickými riziky při produkci a čištění průmyslových odpadních vod

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rizika   vzdělávání   eko-průmysl   odpady   odpadní vody   znalosti   informační

potřeby   projekty   Česko

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Abstract

The first article from intended series of articles focused on selected results of the THESEIS project (Training on Health & Safety for workers in the Environmental Industrial Sector) presents results of a questionnaire survey carried out in enterprises producing industrial wastewater and in wastewater treatment centres in the Czech Republic. The survey was aimed to identifying of existing knowledge and skills of employees who are exposed to specified risks related to water pollution due to industrial production during their working activity. At the same time learning needs of these

persons were indentified.

Keywords: wastewater, eco-industry, risks, knowledge, training needs, surveys, Czech Republic

Abstrakt

První ze skupiny článků věnovaných vybraným výsledkům projektu THESEIS (Training on Health & Safety for workers in the Environmental Industrial Sector) předkládá výsledky dotazníkového šetření provedeného v podnicích produkujících průmyslové odpadní vody a na pracovištích zpracovávajících odpadní vody v České republice. Průzkum byl zaměřen na zjišťování stávajících znalostí a návyků zaměstnanců, kteří jsou z titulu své profese při činnosti vystaveni specifickým rizikům vyplývajícím ze znečištění vod následkem průmyslové výroby. Současně byly zjišťovány vzdělávací potřeby dotčených osob.

Klíčová slova: vody odpadní, eko-průmysl, rizika, znalosti, potřeby vzdělávací, průzkumy, Česká republika

Introduction

The pollution management sector of the eco-industry includes operations and services related to solid waste management, recycling, waste water treatment, air pollution control, soil & groundwater remediation, noise & vibration control etc. According to recent studies (ECORYS 2009) [1] the EU-25 direct employment related to this sector exceeds the 2.5 million full time job equivalents. Eco-industry has a competitive advantage in the world, especially because it was earlier that any other industry faced with the negative consequences of environmental pollution. In addition, it also has great potential to contribute to the Lisbon Agreement for employment growth.

The EU eco industry is besides other trends facing the demand for the new skills and a higher skill-level due to technical evolutions in the sector. Moreover the increasing public concern about hazardous substances, quality of water resources, contaminated sites, polluted air and the new legislation targeted at these concerns, enhances the need for improving workforce competencies. Therefore THESEIS project aims at developing an appropriate training for individuals working in the pollution management sector of eco-industry. The training model will be developed and implemented using a phased, extensively interactive collaborative approach incorporating early stakeholder involvement in the design of the learning outcomes and services, as well as utilizing graphic-oriented tools for the analysis and design stages for the production of vocational training material.

Different sources are used to determine the education concept of eco-industry workers and the actual content of the training model within the THESEIS project. One of these sources there are surveys carried out in partnership countries. In Greece, Belgium, Sweden, Finland, Germany, Czech Republic, Poland and Bulgaria two separated surveys were carried out in the first half of 2012:

- 1st survey: Identification of knowledge, skills and training needs of workers in eco-industry sector
- 2nd survey: Identification and documentation of NQF for workers in pollution management of eco-industry sector.

Both surveys were aimed at indentifying skills and training needs of employees whose work is directly related to ecology, environmental protection, waste management etc. and who are exposed to specific risks of water pollution due to industrial production. They were focused on two target groups: wastewater operators and waste management professionals.

This article brings description of the course and results of the **1st survey** performed in the Czech Republic. More information of both above mentioned surveys will be also published in this journal afterwards.

Aims of the survey

The aim of the survey for the purpose "identification of knowledge, skills and training needs of workers in eco-industry sector" which was carried out by Czech partner (Occupational Safety Research Institute) was - according to the THESEIS aims – to collect all necessary data about knowledge and skills and training needs of employees at workplaces where pollutants from wastewater are disposed (waterworks, water distribution, water treatment, wastewater treatment, sewer systems, sludge tec.) and in enterprises for treatment of wastewater arising from industrial production. In summary, these persons are in the THESEIS project and in this survey of knowledge, skills and training needs of workers in eco-industry known as "wastewater operators".

Methodology

As a priority for the 1st survey an ordinary survey was selected. The survey was carried in the period 14th May – 22nd June 2012 in companies dealing with water treatment and related technologies, enterprises engaged in cleaning, decontamination, remediation and disposal of hazardous substances and chemicals, waste disposal or environmental damage arising in connection with environmental pollution, and to other companies - especially producers of industrial/ wastewater (areas: food, production and processing of plastics, paper products and printing, chemical industry – primarily the production of paints and varnishes, energy – primarily the production of fuel). Further some eco-enterprises were selected (mainly focused on chemical production), then also so called „safe companies" (companies with the award „Safe Enterprise"), companies implementing Environmental Management System. According to the project description, each country co-operating on THESEIS project should have surveyed a group of at least of 100 respondents. The project coordinator of THESEIS did not define the requirements for the qualification and experience of respondents (wastewater operators).

For the survey of respondents' knowledge a quantitative method for data collection (a questionnaire) was used. The data obtained was performed by statistical analysis of absolute and relative frequency distribution for each question. The descriptive statistical characteristic of the arithmetic mean was used for each question. The arithmetic mean was determined by applying the school marks for degree of knowledge: excellent = 1, good = 2, average = 3, fair = 4, poor = 5. The results obtained were compared with requirements of competencies for these professionals [2]. These requirements were compared also with training needs of respondents.

The questionnaire contained **51 questions**. Knowledge and skills of the respondents were identified in following thematic areas:

- **A.1 - Knowledge on the safety procedures or plans for company and project site**
- **A.2 - Guidelines for personal safety**
- **A.3 – Hazards**, further divided into
    - A.3.1 - Accident Hazards
    - A.3.2 - Physical Hazards
    - A.3.3 – Chemical Hazards
    - A.3.4 - Biological Hazards
    - A.3.5 - Ergonomic, Psychosocial and Organizational Factors
- **A.4 - Safety guidelines for confined spaces**
- **A.5 - Guidelines for hazardous materials**
- **A.6 - Fire safety guidelines.**

Received statistical data were evaluated according to individual questions and to thematic areas. For purposes of this

article, the content is limited to evaluation of results of individual thematic areas. Besides the knowledge of respondents also their educational needs were surveyed.

Results of the survey

The total number of respondents in the Czech Republic was 103. Respondents generally reported these job positions: wastewater operator, wastewater engineer, environmentalist, health and safety manager, health and safety prevention officer, director and chief operating officer.

A survey conducted in the Czech Republic showed that the worst results (worst means) have appeared in the group A.6 - Fire safety guidelines and A.3 – Hazards, following with A.5 - Guidelines for hazardous materials and A.2 - Guidelines for personal safety. These and other results - see **Chart 1.**
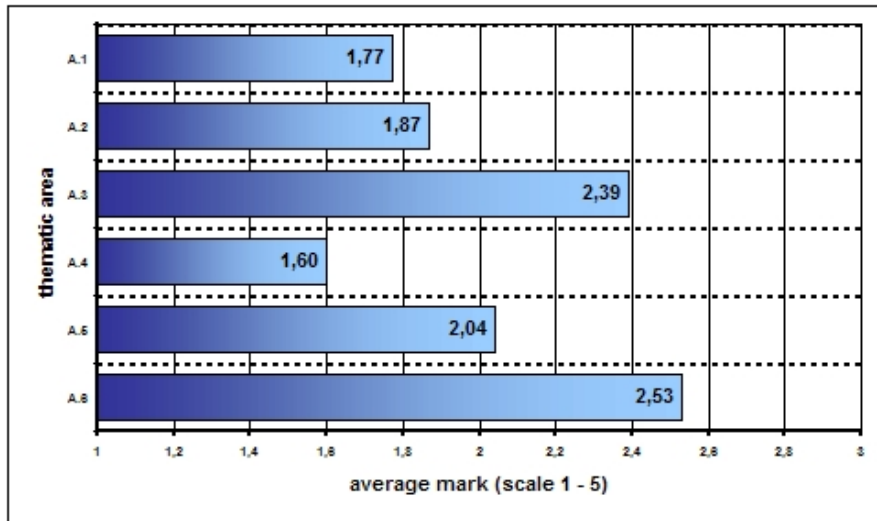

Chart 1: Arithmetic means of thematic areas A.1 - A.6

Legend: The higher the value of average mark, the worse the knowledge and skills of respondents

Detailed sub-findings according to thematic areas are shown in **charts 2 - 11** **(PDF)**. These charts show how respondents answered each question and what was the five-point rating scale of knowledge level (from excellent to poor).

Following findings arise from the analysis of obtained data:

Excellent level of knowledge and skills was shown by respondents **in thematic area A.4 - Safety guidelines for confined spaces**. **Good level** of knowledge was demonstrated also **in thematic area A.1 - Knowledge on the safety procedures or plans for company and project site** and **in thematic area A.2 - Guidelines for personal safety**. In the group A2 questions with **the best arithmetic means** were occurred, specifically with the average value to 1,5. For instance the question A.2d (Are you aware of your surroundings, e.g. watch for hazards?) where the average mark 1,12 was gained. These positive results are attributed to increased attention of management on OSH issues at the workplaces, improving safety culture and gradual acquirement of workers' and co-workers' habits leading to occupational safety and health. This is also one of the aims of OSH training.

Average results were obtained in thematic area A.5 - Guidelines for hazardous materials.

Poor level of knowledge was demonstrated by respondents **in thematic area A.3** This fact shows that the issue of hazards, occupational risks, ergonomics, psychosocial and organizational factors needs constant attention within OSH

training. In our opinion, the space for this training should be much wider and the information provided by the trainers should be more detailed.

A surprising result was low level of knowledge in thematic area A.6 – Fire safety guidelines. Not only this group had the worst average, but also questions A.6b (Do you identify classes of fire?) and A.6c (Do you know how to extinguish different classes of fire?) with their arithmetic means 3,69 and 3,60 they fall to those which showed the worst respondents result. We believe that the result achieved is not a real picture of poor knowledge of respondents but may be due to methods used to train employees in fire protection and long-time (outdated) routine in terminology – different from the terminology used in the survey.

Within the questionnaire, respondents were allowed to express other topics which require more training in Health and Safety Issues by their opinion. There are their suggestions/requirements:

- more information on specific harmful/dangerous substances (specific pollutants in the working environment and their effects on humans – chemical and biological hazards) that may occur in the process of waste or industrial water disposal, more information on relevant protection of workers,
- detailed knowledge about personal protective equipment - PPE (which PPE has to be given to workers according to the risks of his job),
- information on risks related to machinery and other mechanical equipment (operation of machinery and equipment) used in the process of wastewater and industrial water treatment or disposal of solid waste,
- information on proper procedures and behaviour of workers in the process of wastewater and industrial water treatment or disposal of solid waste,
- information on pre-entry activities – steps to do before entry permit, e.g: personal protective equipment, emergency equipment needs, musculoskeletal disorders, air quality test, risk assessment and hazard controls, lock-out and tag-out procedures.

Conclusion

The wastewater operator must be able according to the competencies given in the profile of operator of waste-water treatment plan [2] to adopt health and safety measures in order to maintain the health and safety of her/himself and others, to maintain the safety of the plant, equipment and the working environment, to resolve problems which could affect health and safety and to deal with emergency situations. **He must be able:**

- **to recognise any hazards associated with the activity, e.g. recognise and describe**
    - hazards associated with the handling of machinery and tools: getting trapped, cuts, falls,
    - hazards associated with the handling of lifting and transport gear: getting trapped, cuts, strains, vibrations, noise etc.,
    - hazards associated with handling heavy weights and the application of force: falling objects, muscular and skeletal injuries etc.,
    - the risks of explosions and fire,
    - hazards associated with exposure to chemical, physical and biological agents,
    - hazards associated with the different characteristics of workplaces – platforms, stairways, gantries,
    - hazards associated with the supplies of water, electricity, compressed air and gas,
    - hazards associated with performance of work tasks,
    - hazards associated with the storage of products.
- **to apply preventive and protective measures suited to the hazards associated with each specific activity,**
- **to apply the existing legislation concerning health and safety measures at work,**

> ❧ **to be familiarized with risk management and application of first aid techniques.**

The wastewater operator may get above mentioned competencies pursuant specific knowledge and skills. From this perspective and with respect to results of this survey is necessary to create and develop knowledge and skills of Czech wastewater operators especially in the area of **recognising any hazards associated with the work activity**, in the area of **risk management,** in the area of applying of **preventive and protective measures for solving hazards associated with each specific activity,** in the area of the existing **legislation concerning health and safety measures at work.**

The previously mentioned data indicate that the level of knowledge of respondents and their need for continuing training is in compliance with competencies given in the profile of operator of waste-water treatment plan (and wastewater operators too).

The results of a survey of knowledge and needs for wastewater operators conducted in the Czech Republic will serve - as well as other results from surveys conducted in all participating countries - as one of the basis for a draft **of the content of training module (vocational education and training program)** for professionals in eco-industry. This VET programme will be focused on transferring knowledge and skills to deal with specific risks arising from these activities and alongside provision of knowledge and skills it will also contribute to the protection of persons exposed to these risks. It is anticipated that the adaptation of the new innovative training model will generate several direct benefits (improve labour conditions, decrease risks and possibility of accidents) both for companies and workers operating in the eco-industry sector addressed. In addition it will empower companies and individuals to engage in true lifelong learning, career planning and evolution and encourage new entrants into the sector, ensuring healthier and safer working conditions as well as improved competencies and skills, thus facilitating the mobility of the eco-industry workforce.

The educational program will be tested before creating the final version in all partner countries (in the middle of 2013). We will continue to inform Czech professional public about these activities, too.

Literature

1. *Study on the Competitiveness of the EU eco-industry : Final Report : Part 1 : ECORYS SCS Group*. Brussels, 2009. 285 p.

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Vzorová citace

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