



Industrial Hazardous Waste in the Republic of Macedonia

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Abstract: There are many industries in the Republic of Macedonia that use raw materials and/or auxiliary chemical substances in their operations. In many companies toxic, aggressive or flammable goods are used daily and thus hazardous and chemical wastes are generated. All these hazardous and chemical wastes have to be handled and disposed according to the new rules and regulations of Macedonia. In the frame of the project “National Waste Management Plan and Feasibility Studies” a Special Study on Industrial Contaminated Sites in the Republic of Macedonia (“Hotspots”) was accomplished. The findings were that the up-dated list of companies subject of an A-Integrated Environmental Permit (being potentially the biggest generators of emissions waste in particular) may be a good start for estimating the waste generation from the industry sector in the state. The result was that a List of 75 big companies and a separate List of 36 small enterprises (SMEs) has been completed. An inventory made resulted in the identification of 16 major industrial contaminated sites. Additionally, further investigation by field survey and chemical analysis of the actual situation concerning hazardous properties of the dumped waste, and evident soil & groundwater contamination, was carried out on the defined hotspots. The obtained results were used to adjust the priority scores and possibly the ranking of the hotspots.

Key words: Hazardous waste, industry, Republic of Macedonia

Introduction

Industrial solid wastes consist of all solid waste generated in industries, either from the industrial process or any other source within the industrial premises. Distinction has to be made between industrial non hazardous waste (all solid wastes generated within the industrial premises, which don't comprise any hazardous constituents, or with hazardous waste constituents below the minimum standards/norms) and industrial hazardous waste including all hazardous wastes generated within the industrial premises, e.g. solid hazardous waste according to the EU list. Treated industrial wastewaters (e.g. sludge) that comprise hazardous constituents exceeding minimum standards/norms are included in total hazardous waste quantities.

There are many industries in the Republic of Macedonia that use raw materials and/or auxiliary chemical substances in their operations. In many companies toxic, aggressive or flammable goods are used daily and thus hazardous and chemical wastes are generated. All these wastes are dangerous for human and the environment, often even in small quantities. All these hazardous and chemical wastes have to be handled and disposed according to the new rules and regulations of Macedonia and EU (Law on Waste Management, 2004; Draft Regulation on Hazardous Waste Management, 2004; Directive 91/689/EEC on Hazardous Waste; Basel Convention, 1989; National Solid Waste Management System, 1999).

In the frame of the project “National Waste Management Plan and Feasibility Studies” a Special Study on Industrial Contaminated Sites in the Republic of Macedonia (“Hotspots”) was accomplished. The findings were that the up-dated list of companies subject of an A-Integrated Environmental Permit (being potentially the biggest generators of emissions waste in particular) may be a good start for estimating the waste generation from the industry sector in the state. The result was that a List of 75 big companies and a separate List of 36 SMEs has been completed. An inventory made resulted in the identification of 16 major industrial contaminated sites. Additionally, further investigation by field tests of the actual situation concerning hazardous properties of the dumped waste, and evident soil & groundwater contamination, was carried out on the defined hotspots. The obtained results were used to adjust the priority scores and possibly the ranking of the hotspots.

Generators of Industrial Hazardous Waste in Macedonia

Annual HZW Generation

Classification of the waste generated in the industries on annual base in Macedonia was prepared according the EU Waste Codes of the List of Wastes (1991) and its considered form. It was found that the total quantities of industrial waste (non-hazardous and hazardous) and HZ Waste generated are 19,445,603 t/y and 4,623,394 t/y. If mining is excluded (mining is excluded from the scope of the LWM but included in the List of Wastes) the identified quantity of generated industrial waste (non-hazardous and hazardous) and HZW are 2,199,603 t/y and 77,394 t/y, respectively. The biggest quantities of waste (non-hazardous and hazardous) are generated by processes in mining: 17,246,000 t/y and 4,546,000 t/y, respectively. The second group are thermal processes with 2,090,726 tons/y of generated waste of which 75,347 tons/y hazardous wastes. The two biggest generators of hazardous waste in this sector are MHK Zletovo lead and zinc smelter with generation of 70,000 t/y Pb-Zn slag and flue gas dust and Steelwork-Skopje generating 5,000 t/y of flue gas dust, suspected to contain several DS (based on the raw material used-scrap non-standardized iron). The quantities of the other industrial waste (non-hazardous and hazardous) and hazardous waste, coming from different waste streams defined by the EU LoW are 108,877 tons/y and 2,047 tons/y, respectively.

HZW Handling

In general, there is no proper HZW Management System in place within the industrial sector of Macedonia, meeting any international standard. This is a result of the accumulated waste management problems from the earlier period (lack of vertical and horizontal administrative and technical coordination and organization; lack of legal regulations and economic measures); inadequate social and economic attitude towards waste and waste management; lack of public and professional awareness and education (EU waste management policies and positive practices are not enough recognized and replicated) as well as lack of financial sources allocated to waste management. The sorting by waste types is driven by the rules of market demand i.e. the parts of the wastes which are for sale are segregated from the other waste which is land-filled on site or sent to the municipal landfills (Fig. 1).

Based on the existing documents, 16 (former) industrial dumpsites have been selected for further investigation. The map with the locations of the “hotspots” identified in Republic of Macedonia is presented in Fig. 2

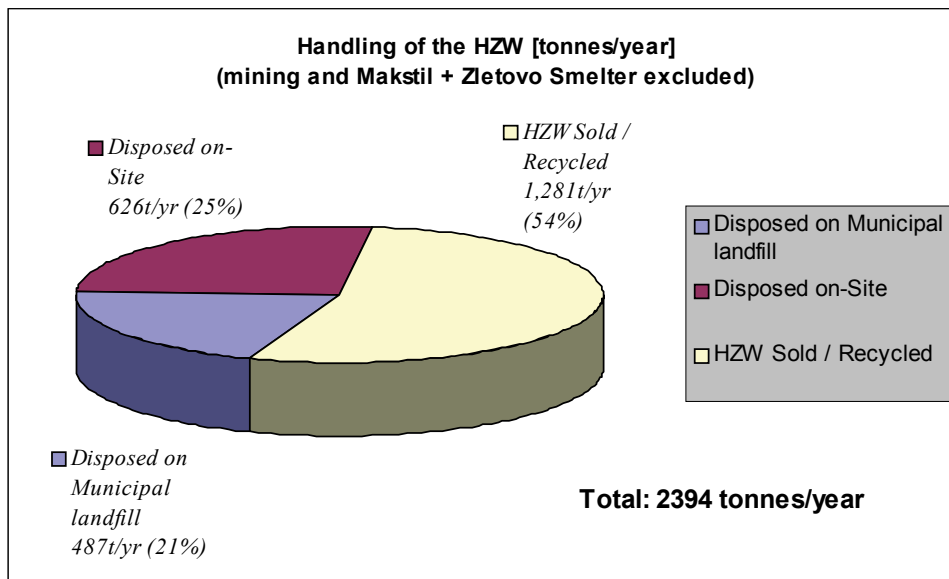


Fig.1: Handling of hazardous waste (mining and big thermal processes are excluded)

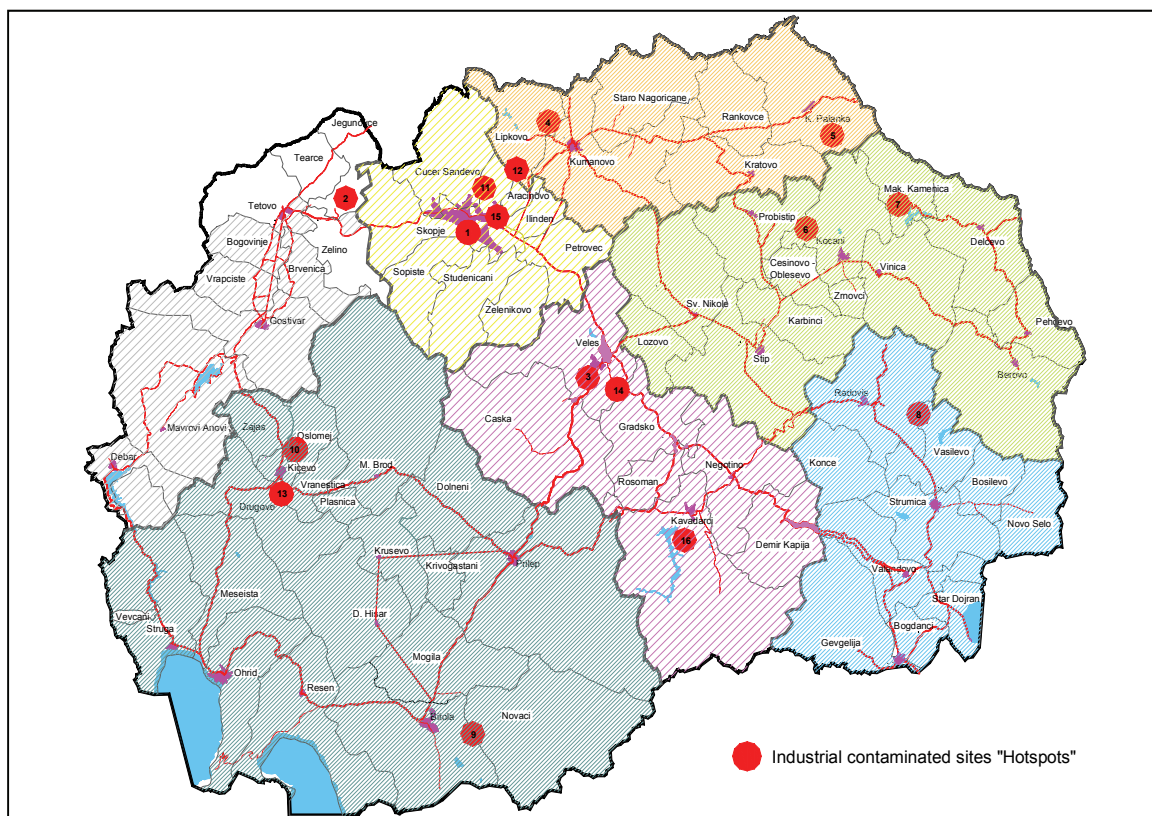


Fig. 2: "Hotspots" in the Republic of Macedonia (1. OHIS, Skopje; 2. Jugohrom, Jegunovce; 3. Zletovo smelter, Veles; 4. Lojane, Kumanovo; 5. Toranica mine and flotation, Probitip; 6. Zletovo mine and flotation, Probitip; 7. Sasa mine and flotation, M. Kamenica; 8. Bucim mine and flotation, Radovis; 9. REK Bitola; 10. REK Oslomej, Kicevo; 11. Makstil, Steel work, Skopje; 12. OKTA refinery, Skopje; 13. Tane Caleski, Kicevo; 14. Zletovo, fertilizer plant; 15. Godel, Skopje; 16. Feni industry, Kavadarci)

The desk study and field visits did not reveal sufficiently pertinent data on existing soil & groundwater pollution. Therefore, there was a need to carry out further investigation by field tests of the actual situation concerning hazardous properties of the dumped waste, and evident soil & groundwater contamination, which was done by this Project. The results of the programme were used to adjust the priority scores and possibly the ranking of the hotspots. The general objectives of this special study are:

- Gathering and reviewing existing data on ‘hotspots’;
- Specification of a methodology to identify the potentially most environmental dangerous industrial ‘hotspots’ in Macedonia, including sample taking of the identified and selected industrial ‘hotspots’;
- Prioritization and selection of the potentially most environmental dangerous industrial hotspots;
- Formulation of Recommendations for mitigation/remediation of the hotspots;
- Estimation of involved cost of mitigation/remediation.

Samples for chemical and physical analysis were taken according to the program including installation of piezometers, sampling and analysis of soil, surface and ground waters, solid waste etc.). Based on the findings and results of the study the “hotspots” were re-ranked as follows:

- High environmental risk (OHIS A.D, organic chemical industry at Skopje, Sasa, lead and zinc mine at M. Kamenica; MHK Zletovo, lead and zinc smelter at Veles; Bucim copper mine at Radovis).
- Medium environmental risk (Zletovo mine, lead and zinc mine at Probistip, Lojane, former chromium, arsenic, antimony mine at Kumanovo; Silmak ferro-silicon plant, former HEK Jugochrom at Jegunovce; Toranica, lead and zinc mine at Kriva Palanka; Makstil, iron & steel plant at Skopje).
- Low environmental risk (REK Bitola, thermal power plant and lignite mine at Bitola; MHK Zletovo, fertilizer factory, at Veles; OKTA Rafinerija, oil refinery at Skopje; REK Oslomej, thermal power plant and coal mine at Kicevo; Tane Caleski, former metal surface treatment at Kicevo; Feni Industry, ferro-nickel smelter at Kavadraci; Godel tannery at Skopje).

Projection of Waste Generation until 2010/2015

Based on data of installed and planned use of the capacities until 2010/2015 (given by the generators or assessed by the expert team), the amount and type of HZ waste generation was estimated. HZ Waste generation from mining sector (Chapter code 01) is expected to be increased for about max 10 %, i.e. the generated quantity may reach 5,000,000 t/y (i.e. an increase of 450,000 t/y). The rest of the identified 77,394 t/y HZW (mines excluded) includes the two biggest HZW generators (Zletovo Smelter and Makstill with a generation of a quantity of 75,000 t/y). Estimations are that these two companies will increase the capacity insignificantly. However, this year Skopski Leguri is going to start with the production with full capacity. The quantities of expected Fe-Mn and Si-Mn slag and flue gas dust will achieve 50,000 t/y (i.e. an increase of 30,000 t/y). The hazardness of this waste should be assessed (in the present overviews the waste generated by Skopski Leguri is included as non-hazardous with the quantity of 20,000 t/y).

The remaining quantity of about 2,394 t/y HZ Wastes generated from the other generators, of which 1,281 t/y is sold for recovery and 1,113 t/y need be handled. Estimating that around 400 t/y of HZW was not reported and that many companies of the SMEs enterprises were not included in this evaluation, their contribution is estimated at 500 t/y. Take this into consideration the total amount of generated HZW to be handled is estimated around 2,000 t/y. It may be assumed that capacities of these generators may not increase for more than 70 % up to 2010 i.e. the expected HZW may increase to

around 4,500 t/y (including flu gas dusts and waste waters sludge's resulting from new installed environment protective equipment due to the introduction of IPPC Permits). There is a significant uncertainty for the increase of the production up to 2015, so it is recommended that this should be investigated more in detail.

Recommendations for HZW Management

Recommendations for managing the HZW from manufacturing industry include: for small HZW generators the national government should create proper collection and disposal options, such as licensed transporters, regional collection depots, and a central HZW processing and disposal facility. The enterprises should pay for the removal of HZW and the government should encourage and eventually enforce through IPPC permitting, and inspection the proper industrial in-plant HZW management and raise awareness by publishing adequate information and awareness materials, as it is recommended in NWMP.

References

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