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4. HAZARDOUS WASTE MANAGEMENT TECHNICAL SYSTEMS AS THE ENVIRONMENTAL EMERGENCY RESPONDING SUBSYSTEMS OF CROATIA

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INTRODUCTION

For purposes of this paper, terrorist activity that generates hazardous waste causing changes in the environment is considered an environmental emergency. Certain legislative, institutional, scientific, technological, information and other preconditions exist in the Republic of Croatia that are needed for the functioning of preparedness, response, mitigation and environmental restoration systems for environmental emergencies caused by hazardous wastes. The existing system currently covers the hazardous waste management needs, interests and international obligations of the Republic of Croatia for cases of environmental emergencies only partially. Aiming to improve the situation, a preliminary survey of the current legislative framework has been conducted, relevant data processed, observations recorded, and hazardous waste management technical capacity assessment for cases of environmental emergency made.

SHORT OVERVIEW

Certain technical capacities for hazardous waste collection, storage, treatment and disposal exist in Croatia. The said activities are developing according to economic and environmental principles. To that effect, hazardous waste is considered dangerous goods, and hazardous waste handling activities are considered services in the free market of goods and services. Further, the above activities should be conducted in an environmentally sound and healthy manner. In line with the Environmental Emergency Plan of the Republic of Croatia, legal and natural persons certified for hazardous waste handling are the response units for removal and handling of hazardous waste generated by an environmental emergency. These units are equipped and trained for collection, storage and treatment of only specific hazardous waste types. Only some response units are equipped and trained for *in-situ* environmental clean-up in cases of oil spills, and discharges of some oil derivatives, acids and alkalis. At present, these units do not perform a 24-hour service, but voluntarily respond to phone calls in cases of environmental accidents. A short overview of legislative framework governing this area follows:

- hazardous waste is defined in Appendices I, II, and III of the Law on Ratification of the Basel Convention and contains the substances exhibiting one of the following properties: explosiveness, reactivity, flammability, corrosiveness, irritability, harmfulness, toxicity, infectivity, carcinogenicity, mutagenicity, teratogenicity, ecotoxicity, and the property of releasing toxic gases in chemical reactions or biological decomposition processes,
- hazardous waste is classified according to hazardous features exhibited by the substance which appears in highest quantities and in concentrations above threshold values,
- hazardous waste, apart from originating from a production activity or a service or household, may also be generated by uncontrolled introduction, discharge or disposal of solid or liquid hazardous substances or oil and oil derivatives into the environment,

- legal or natural persons whose actions or processes generate hazardous waste are considered hazardous waste generators,
- hazardous waste generated by uncontrolled discharge, introduction, or disposal of hazardous substances or oil and oil derivatives may cause changes in the environment or environmental emergencies,
- legal and natural persons that have caused changes in the environment by uncontrolled introduction, discharge or disposal of solid or liquid hazardous substances or oil and oil derivatives into the environment are considered environmental polluters,
- terrorist activity generating hazardous waste is considered environmental emergency,
- types, quantities and features of hazardous waste that might be generated as a result of a terrorist activity should be defined by competent experts in the environmental risk assessment procedure,
- in case of an environmental emergency caused by unknown hazardous substances, types, quantities and features of generated hazardous waste should be determined by physical and chemical analyses in certified laboratories, prior to its management.

The Republic of Croatia has prescribed certain environmental damage reduction and mitigation measures. This paper focuses only on the measures important for understanding the functioning of the hazardous waste management systems as terrorist attack responding subsystems. According to the regulations in force:

- hazardous waste shall be handled in such a manner as to avoid human health hazards, hazards for flora and fauna, environmental pollution, uncontrolled disposal and incineration, or possible explosions or fires,
- collection, storage, treatment and disposal of hazardous waste may be conducted exclusively by the legal and natural persons certified for such activities by the decision of the Ministry of Environmental Protection and Physical Planning (MEPPP),
- transport of hazardous waste should be carried out in compliance with the regulations on packaging, labeling and transport of hazardous substances,
- legal and natural persons engaged in collection, storage, treatment, transport or other activities related to hazardous substances or oil and oil derivatives above threshold values, must develop environmental emergency response plans,
- waste generators must determine types, quantities, hazardous features and the related risk-labels for hazardous waste that they generate and for hazardous waste that could be generated in an environmental emergency,
- when there is a risk of accidental soil pollution, pollution of flora and fauna, and of cultural and natural heritage as parts of the man-made environment, hazardous waste management measures should be defined within environmental emergency response plans, in accordance with the Environmental Emergency Plan of the Republic of Croatia,
- in case of an environmental emergency, only legal and natural persons certified for hazardous waste handling may perform environmental clean-up, which consists of the removal and management of hazardous waste generated by discharge, introduction or disposal of a hazardous substance or of oil and oil derivatives,
- environmental polluter that is responsible for the resulting damage should without delay undertake all measures defined in the environmental emergency response plan and cover all costs of environmental clean-up,

- when the polluter is unknown, the competent administrative authority should immediately undertake all measures defined in the environmental emergency response plan and cover all costs of environmental clean-up.
- hazardous waste must be handled in the territory of the Republic of Croatia, if there are adequate facilities for it,
- hazardous waste can be handled in other countries, parties of the Basel Convention, if there are no facilities for it in the Republic of Croatia.

RESULTS AND DISCUSSION

Analysis of the data in the National Register of Legal and Natural Persons Certified by MEPPP for Hazardous Waste Management Activities has been conducted. The analysis has shown that the Register does not contain sufficient data for an evaluation of capacities of the existing hazardous waste management system for responding to environmental emergencies.

The questionnaire has managed to collect additional data. Fundamental databases now contain the following information and data: company title and location of certified activity; name, phone, fax and e-mail of the authorised officer; names and codes of all hazardous waste types handled; available capacities for collection and transportation, available capacities for storage and daily treatment or disposal, according to the operation categories referred to in Annex IV to the Basel Convention. Table 1 is an overview of data gathered from the databases. Tree maps show the dispersion of the existing capacities building for waste management.

Table 1 specifically contains data on built capacities for collection, storage, and recycling/recovery/incineration, according to hazardous waste types generated by different activities. Circles within the maps mark the areas with existing capacities for waste management, with the numbers in circles denoting the number of certified companies.

Analysis of the presented data yield the following results:

- out of 313 hazardous waste types in the Croatian Waste Catalogue and the European List of Hazardous Wastes, collection of 69 hazardous waste types falling in 12 industry groups, storage of 84 hazardous waste types in 15 industry groups, and treatment and disposal of 73 hazardous waste types falling in 15 industry groups are possible in Croatia,
- hazardous waste types that are not listed in this paper can not be handled in the Republic of Croatia,
- maps display an unbalanced distribution of existing facilities around the Croatian territory, being predominantly concentrated in the north part,
- capacities of the hazardous waste management technical system are limited by the hazardous waste types that can be handled, the technical possibilities and their distribution in the Croatian territory.

CONCLUSIONS

In case of an environmental emergency caused by terrorist activity, which could generate hazardous wastes that can be handled in the Republic of Croatia, the wastes in question must be handled within Croatia.

In case of an environmental emergency caused by terrorist activity, which could generate hazardous wastes that cannot be handled in the Republic of Croatia, its collection and temporary storage, and export for treatment in other countries, parties of the Basel Convention must be ensured.

As the capacities of existing facilities are limited by the hazardous waste types that can be handled, the technical possibilities and their distribution in the Croatian territory, the emergency response plans based on the data presented and the potential demand should consider their rational use.

As hazardous waste management emergency response teams are self-sustaining economic entities, their 24-hour service and hazardous waste management service fees should be ensured in accordance with the market principles.

The data presented, combined with the data at the disposal of the Waste Management Department of the Ministry of Environmental Protection and Physical Planning and the data to be obtained from the environmental accident risk assessment, can be used in improving and strengthening the preparedness, response, mitigation and environmental restoration systems for environmental emergencies caused by terrorist activities.

In co-operation with all interested stakeholders, and based on an integrated assessment of environmental emergency preparedness, response, mitigation and environmental restoration systems, one of future priority tasks is improvement of legislative, institutional, technological, safety, information and financial frameworks for capacity building in the management of waste that might be generated during such emergencies.

SUMMARY

The main objective of this paper is the assessment of the possibilities as well as the vulnerabilities of the current hazardous waste management technical system as the environmental emergency responding subsystem. In this paper, terrorist activities as possible sources of hazardous waste are considered an environmental emergency. This paper provides a short review of the relevant legal framework and current national capacities for collection, storage, preparation and disposal of hazardous waste. Certain possibilities as well as vulnerabilities of current capacities in case of a terrorist activity are considered. Further activities for improvement of the current hazardous waste management technical systems as the environmental emergency responding subsystem are proposed.

REFERENCES

1. Law on Environmental Protection (Official gazette *Narodne novine* #82/94)
2. Law on Waste (*Narodne novine* #34/95)
3. Rule Book on Waste Types (*Narodne novine* #27/96)
4. Environmental Emergency Plan (*Narodne novine* #82/99)
5. Law on Ratification of the Basel Convention (*Narodne novine* - International treaties #3/94)

KEYWORDS

Hazardous waste management, terrorist activities response

Table 1.: Capacities building for hazardous waste management

COLLECTION			STORE-HOUSE			CAPACITIES FOR R/D OPERATIONS		
HR Ident. No EWC No	Capacity m3	%	HR Ident. No EWC No	Capacity t	%	HR Ident. No EWC No	Capacity t/day	%
						02 01 05	3,6	0,10%
05 00 00	13	0,55%						0,00%
05 01 03	30	0,70%	05 01 03	200	1,50%	05 01 03	25	0,72%
05 01 05	38	0,00%	05 01 05	200	1,50%	05 01 05	25	0,72%
		0,73%	05 06 03	200	1,50%	05 06 03	25	0,72%
06 01 01	40	0,73%	06 01 01	60	0,45%	06 01 01	4	0,12%
06 01 02	40	0,73%	06 01 02	60	0,45%	06 01 02	4	0,12%
06 01 03	40	0,73%	06 01 03	60	0,45%	06 01 03	4	0,12%
06 01 04	40	0,73%	06 01 04	60	0,45%	06 01 04	4	0,12%
06 01 05	40	0,73%	06 01 05	60	0,45%	06 01 05	4	0,12%
06 01 99	40	0,73%	06 01 99	40	0,30%			0,00%
06 02 03	40	0,02%	06 02 03	60	0,45%	06 02 03	25	0,72%
07 01 03	1	0,02%			0,00%			0,00%
07 01 04	1	0,00%	07 01 04	200	1,50%	07 01 04	25	0,72%
		0,00%	07 01 08	200	1,50%	07 01 08	25	0,72%
		0,00%	07 02 08	200	1,50%	07 02 08	25	0,72%
		0,00%	07 02 10	200	1,50%	07 02 10	25	0,72%
		0,00%	07 04 04	200	1,50%	07 04 04	25	0,72%
		0,00%	07 04 08	200	1,50%	07 04 08	25	0,72%
		0,00%	07 05 08	200	1,50%	07 05 08	25	0,72%
		0,00%	07 05 10	200	1,50%	07 05 10	25	0,72%
		0,00%	07 06 03	200	1,50%	07 06 03	25	0,72%
		0,00%	07 06 04	200	1,50%	07 06 04	25	0,72%
		0,00%	07 06 08	200	1,50%	07 06 08	25	0,72%
		0,00%	07 07 04	200	1,50%	07 07 04	25	0,72%
		0,18%	08 01 00	200	1,50%	08 01 00	25	0,72%
08 01 01	10	0,18%	08 01 01	10	0,08%			0,00%
08 01 02	10	0,03%	08 01 02	210	1,58%	08 01 02	25	0,72%
08 01 07	1,5	0,40%	08 01 07	200	1,50%	08 01 07	25	0,72%
08 01 10	22	0,00%			0,00%	08 01 10	9	0,26%
		0,00%	08 03 01	200	1,50%	08 03 01	25	0,72%
		0,00%	08 03 02	200	1,50%	08 03 02	25	0,72%
		0,00%	08 03 05	200	1,50%	08 03 05	25	0,72%
		0,51%	08 03 06	200	1,50%	08 03 06	25	0,72%
08 03 08	28	0,00%	08 03 08	200	1,50%	08 03 08	9	0,26%
		0,00%	08 04 02	200	1,50%	08 04 02	25	0,72%
		0,00%	09 01 01	200	1,50%	09 01 01	25	0,72%
		0,27%	09 01 02	200	1,50%	09 01 02	25	0,72%
10 01 04	15	0,16%	10 01 04	200	1,50%	10 01 04	25	0,72%
11 01 00	9	0,73%			0,00%	11 01 00	9	0,26%
11 01 05	40	0,73%	11 01 05	60	0,45%	11 01 05	4	0,12%
11 01 06	40	0,73%	11 01 06	60	0,45%	11 01 06	4	0,12%
11 01 07	40	0,00%	11 01 07	60	0,45%	11 01 07	4	0,12%
		0,09%			0,00%	11 04 00	6,5	0,19%
11 01 08	5	0,24%	11 01 08	5	0,04%			0,00%
12 00 00	13	0,04%			0,00%			0,00%
12 01 09	2	0,73%	12 01 09	200	1,50%	12 01 09	27	0,78%
12 01 06	40	0,73%	12 01 06	40	0,30%			0,00%
12 01 07	40	0,73%	12 01 07	40	0,30%			0,00%
12 01 10	40	0,09%	12 01 10	40	0,30%			0,00%
12 01 12	5	0,73%	12 01 12	205	1,54%	12 01 12	25	0,72%
12 03 01	40	0,73%			0,00%	12 03 01	10	0,29%
12 03 02	40	0,27%			0,00%	12 03 02	10	0,29%
13 00 00	15	0,73%	13 00 00	138	1,04%	13 00 00	709	20,47%
13 01 01	40	0,00%	13 01 01	40	0,30%			0,00%
		0,04%	13 01 02	40	0,30%			0,00%
13 01 03	2	0,73%	13 01 03	240	1,80%	13 01 03	25	0,72%
13 01 04	40	0,00%	13 01 04	240	1,80%	13 01 05	25	0,72%
		0,73%	13 01 07	200	1,50%	13 01 07	25	0,72%
13 01 08	40	2,02%	13 01 08	40	0,30%			0,00%
13 02 00	110	0,73%	13 02 00	50	0,38%	13 02 00	1084,5	31,32%
13 02 01	40	4,20%	13 02 01	40	0,30%			0,00%
13 02 02	229,4	1,12%	13 02 02	638,2	4,80%	13 02 02	56,7	1,64%

COLLECTION			STORE-HOUSE			CAPACITIES FOR R/D OPERATIONS		
13 02 03	61	0,73%	13 02 03	69,7	0,52%	13 02 03	25,25	0,73%
13 03 01	40	0,73%	13 03 01	200	1,50%	13 03 01	25	0,72%
13 03 02	40	0,73%	13 03 02	40	0,30%			0,00%
13 03 03	40	0,90%	13 03 03	360	2,71%	13 03 03	27	0,78%
13 03 04	49	0,73%	13 03 04	60	0,45%			0,00%
13 03 05	40	1,10%	13 03 05	40	0,30%			0,00%
13 04 00	60	0,64%			0,00%			0,00%
13 05 00	35	0,18%	13 05 00	35	0,26%	13 05 00	10	0,29%
13 05 01	10	9,71%			0,00%			0,00%
13 05 02	530	0,73%	13 05 02	200	1,50%	13 05 02	95	2,74%
13 05 05	40	1,93%	13 05 05	240	1,80%	13 05 05	25	0,72%
13 06 01	105,6	0,00%	13 06 01	240,64	1,81%	13 06 01	35,002	1,01%
		0,73%	14 01 02	200	1,50%	14 01 02	25	0,72%
14 01 03	40	0,73%	14 01 03	200	1,50%	14 01 03	25	0,72%
14 01 04	40	0,73%			0,00%			0,00%
14 01 05	40	0,00%			0,00%			0,00%
		0,03%	15 02 99	11	0,08%			0,00%
16 02 01	1,5	0,00%	14 02 03		0,00%	14 02 01	0,6	0,02%
		0,35%	14 02 03	200	1,50%	14 02 03	25	0,72%
16 06 00	19	4,27%	16 06 00	2	0,02%			0,00%
16 06 01	232,8	0,03%	16 06 01	0,8	0,01%			0,00%
16 06 02	1,5	0,08%			0,00%			0,00%
16 06 06	4,16	11,91%			0,00%			0,00%
16 07 02	650	0,73%	16 07 02	450	3,38%			0,00%
16 07 03	40	0,73%	16 07 03	240	1,80%	16 07 03	35	1,01%
16 07 04	40	0,73%			0,00%			0,00%
16 07 05	40	34,12%			0,00%			0,00%
16 07 06	1862	0,00%	16 07 06	280	2,10%	16 07 06	155	4,48%
		0,00%	18 01 03	200	1,50%	18 01 03	25	0,72%
		0,00%	18 02 02	200	1,50%	18 02 02	25	0,72%
		0,00%	18 02 04	200	1,50%	18 02 04	25	0,72%
		0,21%	19 01 00	200	1,50%	19 01 00	25	0,72%
19 02 01	11,5	0,82%			0,00%			0,00%
19 08 03	45	0,00%			0,00%			0,00%
19 08 06		0,00%			0,00%			0,00%
		0,09%	19 02 01	10	0,08%			0,00%
20 01 12	5	0,27%			0,00%			0,00%
20 01 13	15	0,00%			0,00%			0,00%
		0,00%	19 08 06	210	1,58%	19 08 03	25	0,72%
		0,00%	20 01 00	200	1,50%	20 01 00	25	0,72%
		0,00%	20 01 09	200	1,50%	20 01 09	25	0,72%
		0,00%	20 01 12	205	1,54%	20 01 12	25	0,72%
		0,00%	20 01 13	215	1,62%	20 01 13	25	0,72%
		100,00%	20 01 19	200	1,50%	20 01 19	25	0,72%
	5457,96			13305,34			3499,152	