

On Some Aspects Regarding the Waste Management Specific to Manufacturing Processes in Accordance with ISO 14001

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Abstract: - The manufacturing processes are some of the largest generators of industrial wastes. Current legislation in the field of waste management specifies the obligation to manage this with minimal impact on soil, water, air, environment, etc. In this sense, in this paper is detailed the methodology of assessment of environmental aspects, and the case study consists of implementation of ferrous waste management from the manufacturing industry in accordance with ISO 14001. Also, considering the Pareto chart, it was improved the environmental quality, and by implementation of corrective action it was minimized the significant environmental aspects.

Key-Words: - environmental aspects, assessment, manufacturing processes, ISO 14001.

1 Introduction

The environmental management in accordance with ISO 14001 consist of structuring the organization's activities and processes in order to improve the environmental performance and profitability of the organization while simultaneously minimizing the amount of waste discharged into the environment.

The implementation of an environmental management system not only allows the organization to correspond to the expectations regarding its environmental performance, but also to control their costs and comply with environmental laws and regulations [1], [2], [3], [4], [5].

The government program establishes the basic principles of environmental policy of Romania, in accordance with European and international, providing protection and nature conservation, biodiversity and sustainable use of its components. European legislation that includes provisions relevant to waste planning is represented by [6], [7].

Law 27/2007 for the amendment OUG 78/2000 on waste regime provides that waste producers and holders must ensure the recovery or disposal of waste by own means or by sending them to the waste units authorized. Delivery and receipt of production waste, household waste, construction waste, demolition and hazardous waste in the view of eliminating them, must be carried out only under contract.

Practices acquired in inadequate waste management inherited from the past and present in Romania, have led to noncompliance by a large number of deposits and the inappropriate storage of considerable quantities of waste continue to be produced. The most common method of waste disposal remains landfilling. The selective collection is made only in certain centers - pilot and many of the recyclable materials are lost by storage. Only a small proportion is used as secondary raw material and recycled.

In accordance with the Accession Treaty, Romania shall ensure gradual reduction of waste in 101 non-compliant municipal landfills. According to Directive 1999/31, Romania must reduce the amount of biodegradable waste deposited annually to 2.4 million tons till 2018. This target of 2.4 million tons was established in accordance with Art. 5 and represents 50% of the total quantity (by weight) of biodegradable municipal waste produced in 1995. Other transitions were obtained for some targets in the field of packaging waste by 2013 to reduce considerably the amount of waste to be stored. National Waste Management Plan and Regional Waste Management Plans were developed in a partnership consultation process with regional stakeholders, which identified and prioritized investment needs at regional level in order to fulfill commitments to this sector. Local authorities are responsible for implementation of these

commitments in accordance with national strategy for public services [6], [7].

2 The Environmental Initial Analysis

An organization that has not implemented an environmental management system must achieve an initial environmental analysis aims to:

- Identify environmental issues;
- Identification of applicable regulations;
- Examination of current practices including those relating to procurement and subcontracting;
- Assessment of emergency situations and environmental accidents in the past.

How the organization interacts with the environment, respectively elements of processes / services or its products that may interact with the environment are called environmental aspects. Often these environmental issues can be identified in normal (N), abnormal (A) or emergency (SU) situations.

The process of identification of environmental aspects is made by analyzing processes / services, phases, operations, activity areas, taking into

account normal operating conditions, the on / off and emergency situations possible.

It is a continuous process and society update this data annually and at every change that appears in its activities or services.

3 The Methodology of Environmental Aspects Assessment

The factors that influence the environmental aspects and environmental impacts are shown in the following figure.

Criteria for assessing the significance of environmental impacts involve defining criteria for evaluating the importance of environmental aspects of its activities, products and services, to determine which have a significant environmental impact.

The assessment method of environmental aspects consists of analyzing of identified environmental aspects by assessing their impact on the environment, using the following criteria [8], [9]. An example of matrix of environmental aspects assessment is presented in Table 1.

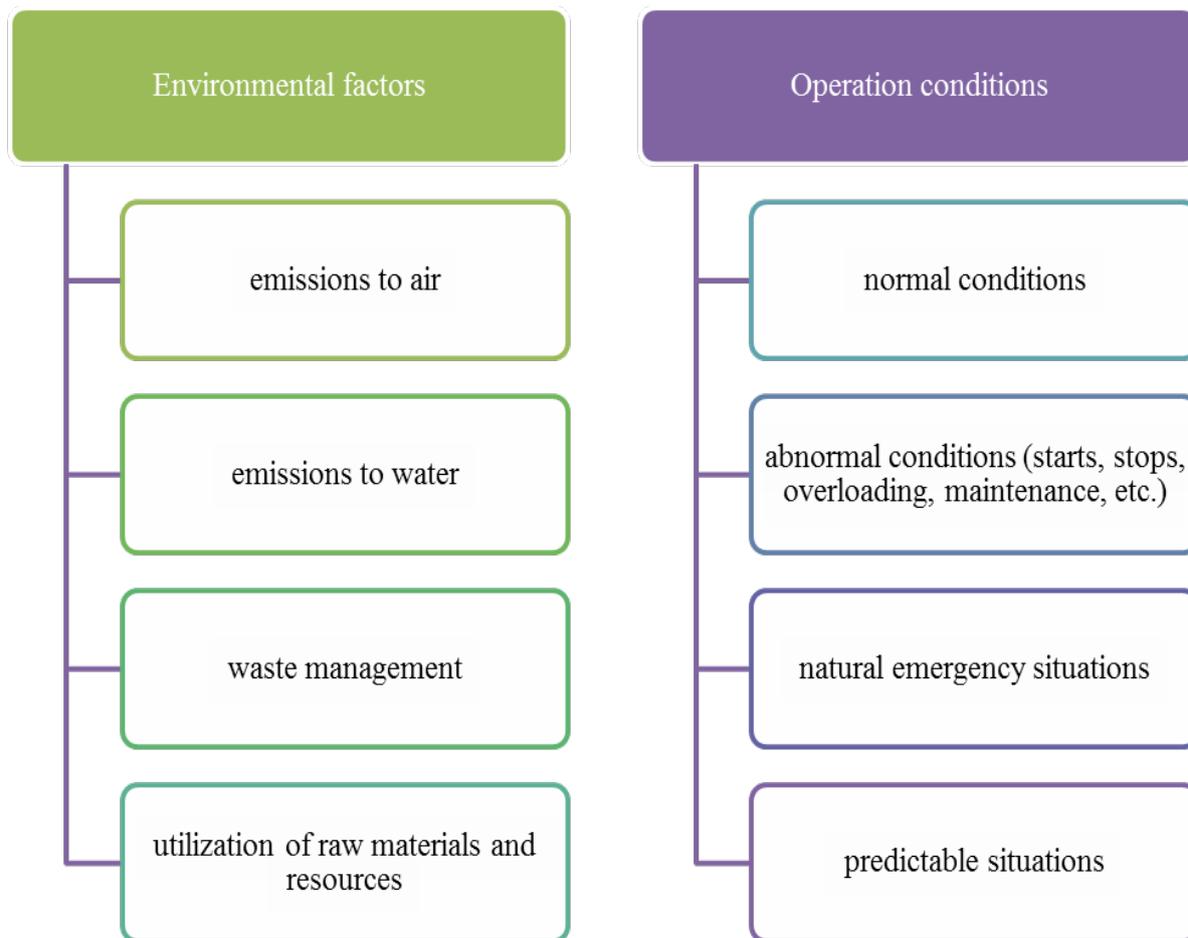


Fig. 1 Environmental aspects and impacts

Table 1. Matrix assessment of environmental aspects

Criteria	Coefficient	10 point	5 point	1 point
Regulation (R)	5	There are not met the legal requirements / regulations	Conformity. Monitored indicators do not exceed the maximum limits.	Conformity. Not covered by legal provisions.
Impact (G)	4	Risk to human and environment	Risk for environment	There is no risk to the environment
Quantity (C)	3	Significant level	Medium level	Low level
Likelihood (F)	2	Daily	Average	Occasional
Public opinion (V)	1	Complaints and systematic criticism	Sporadic complaints and criticisms	There are no complaints or criticisms

To determine what impact is significantly must be set criteria for the application of its organization:

- Framing with requirements of legal regulations: the exceeding permissible limit of contaminant; non-compliance with requirements for waste management; compliance measures for authorization, court decision;
- The severity, frequency, impact;
- Attitude of stakeholders (environmental bodies, neighbors, customers, etc.).

An environmental aspect is deemed to have a significant impact on the environment when the score calculated by the formula:

$$P = F \cdot 2 + G \cdot 4 + C \cdot 4 + R \cdot 5 + V \cdot 2, \text{ if } P > 26 \rightarrow \text{AMS. (1)}$$

Examples of environmental issues:

- general waste;
- aerosols;
- welding fumes;
- waste paint / solvents;
- pollutants for emissions car;
- emission spray painting;
- car wash wastewater;
- use compressed air;
- electricity;
- natural gases;
- storage tanks.

3 The Case Study

Determination of waste in Romania was done in the past only on technical standard 350/96 SR 13, which perform a very general classification in waste group. First takeover of CED in Romania was conducted in 1999 by issuing GD 155/1999, published March 23, 1999 in the Official Gazette no. 118. This was recently repealed by GD 856/2002 on waste management records and approving the list of wastes, including hazardous wastes.

In this sense, the case study consists of implementation of ferrous waste management from the manufacturing industry in accordance with ISO 14001.

The organization proposes that the effects of its activities on the environment are within the law limits and / or existing regulations and to act for their continuous reducing to identify all environmental issues that can be present, previous, real or potential, positive or negative.

According to industry sources where ferrous material is formed, it can be established the following classification:

- recycled ferrous materials coming from steel industry;
- recycled ferrous materials coming from industrial activity;
- recycled ferrous materials coming from cassations of fixed assets.

During the manufacturing processes with metalworking cutting tools, avoid overheating of machine tools and throwing hot chips on combustible materials

The machining of metals and alloys containing magnesium, aluminum, titanium etc. whose dust is pyrophoric, will be executed carefully, taking into account the chips and metal powders which can ignite, thus causing fires and explosions. Waste resulting from the machining processing will be collected in closed containers and will be destroyed by burning in special places.

Cotton rags, tow and generally fabrics that were used to clean parts and being soaked with oil, present self-ignition hazard, will be collected in cans and discharged after work in special places for it.

It is prohibit degreasing, cleaning or washing parts prepared for brazing which must be done only with non-flammable solution. Hammer for soldering used in workshops, when are heated, must be kept on incombustible supports. It also prohibits the use

or leaving the soldering hammer near combustible material.

Machine operation is allowed only specially trained workers; at the end of the shift, the installation will be compulsory stopped from the main switch.

Environmental factors affected by various types of waste are:

- a) air, that constitutes a waste carrier vector in the form of particles in all other environmental factors;
- b) water as a factor in itself and as a vehicle for spreading in soil, and all the environment;
- c) soil, vector of direct action on groundwater and through its on wildlife and human;
- d) flora, affected by air, precipitation, soil and water;
- e) wildlife affected by air, water, soil and flora;
- f) industrial and civil constructions subject to corrosion and degradation exacerbated by pollution;
- g) human, element that supports the impact of waste through other environmental factors, having a double posture: the original source and final receiver.

Waste impact on the human is manifested through effects at all four levels:

- a) physiological (pollutants actions that produce from sensory effect until pathological changes);
- b) mentally (direct action on the nervous system and behavior changes or indirectly, by creating conditions of stress);
- c) moral (alterations of concepts and values due to the breaking of contact with nature);

d) social (changes in the quality and quantity of food, in the economy and in social development in terms of the number and composition of the groups, changes generated by conflicting states).

The main sources of pollution are:

- Improperly stored waste;
- Accidental loss oil from vehicles and equipment;
- Storage of substances in an uncontrolled manner in different areas;
- Noise levels do not fall within the allowable limits.

The distribution of environmental aspects based on AMS score it is represented in figure 2.

Based on the AMS score, it was plotted the Pareto diagram (figure 3.) and considering the main significant environmental aspects, they were implemented the corrective actions.

4 Conclusions

The objectives of implementation of ferrous waste management from the manufacturing industry are:

- Protect the environment and increase the quality of life;
- Waste collection management;
- Minimization of waste;
- Recovery of waste;
- Reduce the effect of waste on human health;
- Saving of natural resources by maximum reusing of recoverable components..



Fig. 2 The environmental aspects assessment

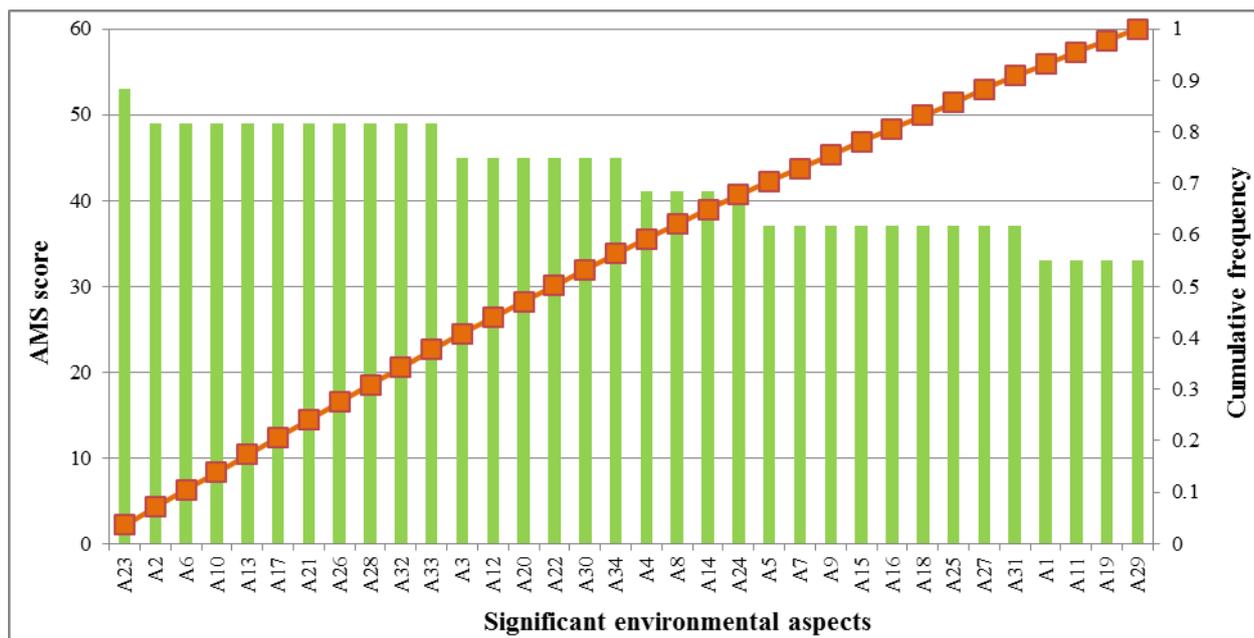


Fig. 3 Environmental quality improvement

Measures to reduce these emissions targets:

- waste used as raw material should be stored in closed, covered and concrete spaces;
- raw materials will be stored in closed, covered and concrete spaces;
- before sorting and storage, waste are unloaded on a concrete platform;
- access paths and roads from inside will be concreted.

To assess the impact on environment the organizations directly participate to preserve, protect and improve the quality environment by:

- Pollution prevents and minimization of environmental damage occurrence;
- Decisions in accordance with environmental requirements;
- Maintain and improve the quality environment;
- Sustainable use of resources and environment;
- Creation of educational programs in the field of environmental protection, waste management, etc.

References:

- [1] S. Beder, *Environmental principles and policies. An interdisciplinary introduction*. University of New South Wales Press Ltd, 2006, Available from: <http://down.cenet.org.cn/upfile/27/200772519718121.pdf>
- [2] C. Alpogi, *Sustainable Development Principles. Theoretical and Empirical Researches in Urban Management*, Year 2, Number 3, 2007.
- [3] *SR EN ISO 14001: Environmental management systems - Requirements with guidance for use*, SRAC, Bucharest, 2005.
- [4] *Environmental management*. Available from: http://www.environheal.pub.ro/portal1/index.php?option=com_content&task=category§ionid=6&id=24&Itemid=44, Accessed: 21/November/2014
- [5] *SR EN ISO 14001 - Environmental management systems*. Available from: <http://www.masterqualitycons.ro/sistem-de-management-de-mediul.html>, Accessed: 28/January/2015
- [6] 2006/12/CE *European Directive*.
- [7] 1999/31/CE *European Directive*.
- [8] A.-E. Dumitrascu and A. Nedelcu, "Implementation of Waste Management System," in *Recent Advanced in Engineering, Proceedings of the 3th European Conference of Chemical Engineering (ECCE '12) and Proceedings of the 3th European Conference of Civil Engineering (ECCIE '12)*, pp. 85-88, Paris, France, December 2-4, 2012.
- [9] A.-E. Dumitrascu, *Environmental quality management (in Romanian: Managementul calitatii mediului)*, MATRIXROM Publishing House, Bucharest, 2016.