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METHOD FOR ASSESSING THE ENVIRONMENTAL IMPACTS

Ionel Virgil CRISTE*, Georgeta Madalina ARAMA, Ana ANGHEL

National Research and Development Institute for Industrial Ecology-ECOIND

* mmc@incdecoind.ro

ABSTRACT

This paper presents a method for assessing the environmental impacts associated with environmental aspects generated from the activities, products or services of an organization, environmental aspects related to new or planned developments, to new or modified activities products and services.

The method takes into account the normal and abnormal operating situations, and the emergency situations.

The method proposed for assessing the environmental impacts uses a grid with four evaluation criteria, for each criterion is assigned a rating from 1 to 10.

The purpose of assessment of environmental impacts is to identify and then keeping under control the environmental aspects that have or can have a significant impact on the environment.

The method is used in INCD ECOIND in the compartment *Management Systems* for the initial environmental analysis performed into organizations in the purpose to design, develop and implement the environmental management system according to SR EN ISO 14001:2005 standard.

Keywords: assessment, environmental aspects, environmental requirements, environmental impacts, operating situations, pollution source, migration path, pollutant target.

INTRODUCTION

Now, in the context of the legislation becoming more stringent, and of the policies and strategies for gaining market segments, each economic unit is looking more and more to achieve and demonstrate the economic growth with an appropriate level in environmental performance, trying to exert control over their own work impacts on occupied sites.

The internal market response to environmental constraints is an increase in the number of organizations that are implementing an environmental management system or are registered in the Community Eco-Management and Audit Scheme (EMAS) to prove their compliance with environmental legislation and to adequately manage the environmental problems.

Both the implementation of environmental management system and EMAS registration are based on the initial environmental analysis which includes two aspects:

- ♣ identify the applicable legal requirements relating to the environment
- ♣ identify all direct and indirect environmental aspects with a significant impact on the environment,

The direct environmental aspects are associated with the activities, products and services of the organization itself over which it has direct management control.

The direct environmental aspects include, but are not limited to: legal requirements, resource use, emissions, discharges, waste, noise, risk of accidents.

The indirect environmental aspects may result from the interaction of an organization with third parties, and that can be influenced, into a reasonable measure by the organization.

The initial environment analysis is a study that guides the organization on the legal requirements and environmental aspects which need attention in managing to achieve the policy to prevent and reduce pollution.

This paper presents a methodology for identifying the environmental aspects and for assessing the associated impacts. This methodology was developed based on the experience of the initial environmental analyses done in organizations with different profiles of activity in areas such as water supply and sewerage services, chemistry, mechanical engineering, textile industry, food industry, IT, research, trade, tourism.

TERMS AND DEFINITIONS:

- a) Initial environmental analysis - means an initial comprehensive analysis of environmental aspects, environmental impact and environmental performance resulting from the activities, products and services of an organization;
- b) Environmental aspect - an element of its activities, products or services of an organization that has or may have an impact on the environment
- c) Significant environmental aspects - an environmental aspect that has or can have a significant impact on the environment
- d) Environmental impact - any change to the environment, whether adverse or beneficial, resulting from the activities, products or services of an organization
- e) Normal conditions of operation - normal functioning, defined by the technological norms and / or the latest update of the business rules of the organization or any other document on the subject (operating parameters)
- f) Abnormal conditions of operation - operation in a range of parameters other than the technical standards. These abnormal conditions of work are, mainly, situations that may occur when starting / stopping the installations (planned or unplanned), working for increased / decreased production, in nighttime or revisions and repair periods.
- g) Operating conditions in emergencies - operation under extreme abnormalities that can lead to accidents with serious consequences, extent and possible remedial action on the environment and human health;
- h) Environmental Risk - a measure of the likelihood of damage to life, health, property and / or the environment that may occur as a result of accidental hazardous situations

THE APPLIED METHOD

The applied method comprises the following steps:

1. Collecting existing information about environmental issues:
 - a) environmental conditions and legal requirements
 - b) existing environmental authorizations and facilities
 - c) the consumption of raw materials and energy, discharges, wastes and emissions;
 - d) the views expressed by stakeholders;
 - e) procurement activities;
 - f) design, development, manufacture, distribution, servicing, use, reuse, recycling and disposal of the organization products;
 - g) those organization's activities with the highest costs and environmental benefits.
 - h) site history

Visits, interviews with people whose activity is relevant in monitoring and protection of the environment, examining the procedures and practices of environmental management, considering / relevant environmental incidents/ accidents from the past.

2. Inventory of all activities, sub-activities and setting the activities and services flow charts

3. Identifying the environmental aspects of the site doing the analysis inputs-outputs (both intentional and unintentional ones).

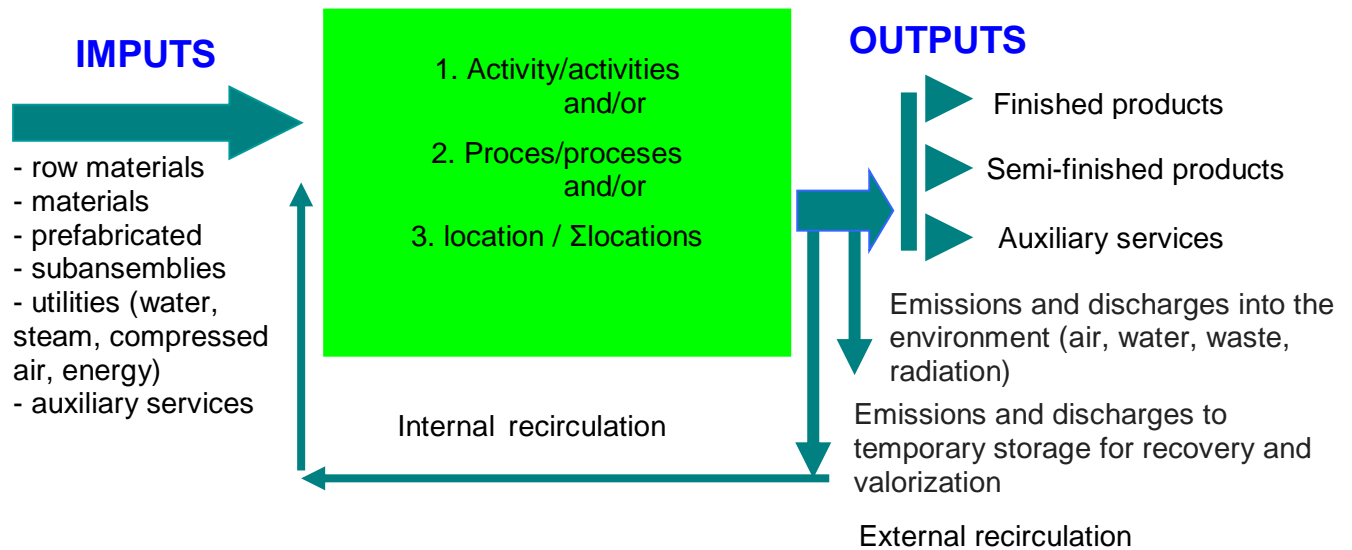
The analysis is done for the past and present activities, products and services, for new ones and for those planned for the change.

Are considered:

- legal requirements and permit limits;
- emissions to air;

- discharges to water;
- production, recycling, reuse, transportation and disposal of solid or otherwise wastes, particularly hazardous wastes;
- soil operation and contamination
- use of natural resources and raw materials (including energy);
- additives and auxiliaries and semi-manufactured goods;
- local issues (noise, vibration, odor, dust, visual appearance, etc.).
- transport issues (both for goods and services);
- risks of environmental incidents/ accidents and the impacts that may occur;
- effects on biodiversity.

Identification of environmental aspects shall be made for normal operating conditions (N), abnormal operating conditions (A) and emergency situations (U)



4. Evaluation of environmental impacts

To perform the assessment of environmental impacts shall be established:

- the evaluation criteria,
- the scoring system for each criterion
- the rating scale of environmental impacts

An organization shall consider the following factors in assessing the significance of an environmental impact:

- the potential to cause environmental harm;
- fragility of the local, regional or global environment;
- the size, number, frequency and reversibility of the impact;
- the existence of relevant environmental legislation and its requirements;
- the importance of impact for stakeholders and employees of the organization.

The organization defines criteria for assessing the environmental impacts.

The criteria developed by an organization should take account of Community legislation, to be complete, to be subject of an independent checking, reproducible and accessible to the users.

The considered criteria for assessing the environmental impacts are:

- existing of environmental regulations for the generated impact (L);
- the frequency of occurrence of impact (F);
- the sensitivity of pollution receiver (S);
- the migration path of the pollutant in the environment (C);
- the risk level of analyzed impact (R).

$R = P \times G$; P - pollutant nature, G – impact size

Established scoring system:

- For each criterion is assigned a score between 1 and 10;
- The maximum score applies to the most critical case when the situation is most unfavorable;

- The score for each criterion shall be weighted by factors whose size depends on the importance of the criterion, as follows:
 - for the criterion L percentage is 40%;
 - for the criterion F percentage is 10%;
 - for the criterion S percentage is 10%;
 - for the criterion C percentage is 10%;
 - for the criterion R percentage is 30%;
- The total score for the impact is calculated by summing these weighted scores.

Assessment Grid of impacts:

Nr.	Criterion	Score	Score meaning	Weighting factor	
1	Existing of environmental regulations for the generated impact (L)	10	The impact is limited / controlled by environmental permit and / or environmental legislation	a = 4	
		5	The impact is limited / controlled only by stakeholder requirements		
		3	The impact is not limited / controlled by legislative acts		
2	Frequency of occurrence of impact (F)	10	The impact emerges in normal operating conditions	b = 1	
		5	The impact emerges only in abnormal operating conditions		
		3	The impact emerges only in emergency situations		
3	Sensitivity of pollution receiver (S)	10	The receiver of pollution is the man and two other environmental factors	c = 1	
		5	The receiver of pollution is constituted by more than one environmental factor other than human		
		3	There is only one receiver pollution / he is not the man		
4	Migration path of the pollutant in the environment (C)	10	The migration path is uncontrolled	d=1	
		5	The migration path is controlled		
		3	The environmental impact leads to indirect pollution.		
5	Risk level of analyzed impact (R) $R = P \times G$	Pollutant nature (P)	10	The major pollutant that causes the impact is toxic/prohibited substance / pollutant that causes global environmental issues. The waste is toxic and dangerous. The natural resource affected is part of the organization's priorities	e=3
			5	The major pollutant which determines the impact is dangerous (flammable, corrosive, carcinogenic, oxidant, etc.). The waste is assimilated at household waste. The natural resource affected is monitored only by the rules of the organization.	
			3	The major pollutant which causes the impact is harmless to humans and to the environment. Non-recyclable industrial waste + household waste / recyclable waste. Affected natural resource is not regulated.	
5	Risk level of analyzed impact (R) $R = P \times G$	Impact size (G)	10	The large amount of pollutants discharged lead to systematic violations of rules imposed on quality receiver. The quantities of waste require special control measures. Consumption of resources are much larger than the specific consumptions norms, requiring waste minimization programs.	

			5	The quantity of pollutants discharged lead to sporadic violations of the rules imposed on quality receiver. The quantities of waste can be keep under control with current measures. The consumption of resources exceeds the specific consumption norms only in low proportions without requiring special measures to minimize losses.	
			3	The amount of pollutant do not cause significant changes to the receiver. The quantities of generated waste are minor and do not raise issues of compliance with the rules. Consumption of resources fall into specific consumption norms.	

Note: scores may be given in the intervals 1-3, 4-5, 6-10 integer values

In this way we obtain:

→ Minimum Score: $3 \times 4 + 3 \times 1 + 3 \times 1 + 3 \times 1 + 9 \times 3 = 48$;

→ The maximum score: $10 \times 4 + 10 \times 1 + 10 \times 1 + 10 \times 1 + 100 \times 3 = 370$;

→ Mean score: $5 \times 4 + 5 \times 1 + 5 \times 1 + 5 \times 1 + 25 \times 3 = 110$;

5. Establishing the threshold of significance

The threshold of significance of environmental impacts is determined by the organization's management considering the frequency of occurrence in normal or emergency situations of the values above the permissible limits (the normative regulations).

The method proposes an initial significance threshold value equal to the mean score (110) but for which are not exceeded the permissible limits. Otherwise on choose a lower value.

Mean score: $5 \times 4 + 5 \times 1 + 5 \times 1 + 5 \times 1 + 25 \times 3 = 110$

Depending on the environmental performance values proposed in organization, the threshold of significance may fall below the set value.

An environmental aspect is considered significant if the environmental impacts is significant, that has a value greater than the threshold of significance.

In case that a single environmental aspect causes more environmental impacts, the environmental aspect is considered as significant if at least one of the environmental impacts generated obtain a total score that is framed as significant .

RESULTS AND DISCUSSION

In INCD ECOIND this method is presented in a procedure of environmental management system.

For effective work are used the following forms:

1. List of activities, products and services with an environmental impact

LIST OF ACTIVITIES, PRODUCTS AND SERVICES WITH AN ENVIRONMENTAL IMPACT		
Nr. crt.	Activity/ product/ service	Sub activity

The form is completed with all activities / services and sub activities of the analysed compartment.

2. Flow diagram to identify environmental aspects

Internal suppliers	Inputs	Sub-activity	Outputs	Internal client

The form shall be completed for each activity/ sub-activity of the analysed compartment taking into account:

- Identifying the inputs and outputs from the system;
- Highlighting everything that means a discharge of material into the environment (air emissions, wastewater, water leaks, liquid waste, solid waste, energy loss, noise, vibration, radiation);

- All discharges of materials into the environment will be input for the formulation of environmental aspects;
 - Indicating the internal suppliers and the internal clients
3. Identification of environmental aspects and impacts and assessment of environmental impacts.

Sub-activity	Inputs	Outputs	Environmental aspect	Operating conditions N, A, U	Environmental impact	Impact assessing							Total score
						Lx4	Fx1	Sx1	Cx1	R = PxGx3			
1	2	3	4	5	6	7	8	9	10	P	G	R	14

The form shall be completed as follows:

Column 1 is completed based on information drawn from the list of activities, products and services impacting the environment and the flow chart;

Column 2 and 3 are completed based on information drawn from the flow chart;

Column 4 is completed analysing the output for each activity / sub-activity; environmental aspects fits as possible in the categories:

- ♣ air emissions;
- ♣ water Spill;
- ♣ waste management;
- ♣ soil contamination;
- ♣ use of raw materials and natural resources;
- ♣ other issues (noise, vibration, radiation, improper visual impact, impact on human health, and so on).

Column 5 is completed by indicating the operating conditions, namely: normal (N) and abnormal (A) and urgency (U);

Column 6 is completed by indicating the impact and affected targets by each identified environmental aspect.

Column 7 is to identify the existence of environmental requirements governing the analyzed aspect / impact;

Column 8 is to identify the frequency of impact production depending on operating conditions;

Column 9 consists in analysing the receiver pollution sensitivity (environmental factor that takes the environmental impact), evaluating the number of receptors and their degree of damage due to the impact;

Column 10 is to determine the migration path of the pollutant in the environment (route followed by polluting from the pollution source to receiver). Examples of migration pathways that can be controlled, are the facilities such: ventilation duct and dispersion chimney for gas, meanings for recycling / recovery for waste, etc.

Column 11 is to present the pollutant nature, that the major pollutant that causes impact is toxic, dangerous or harmless;

Column 12 consists in the size of the impact, if the pollutant leads to systematic or sporadic violations of the norms imposed for the quality of receiver;

Column 13 is completed by multiplying the values from columns 11 and 12;

Column 14 is completed by summing the values from the columns 7, 8, 9, 10 and 13;

4. Centralized list of environmental aspects / impacts.

Contains information about the appropriate activity to environmental aspect and the description of environmental aspect and of associated environmental impact.

