

## GENERAL ASPECTS OF ENVIRONMENTAL RISK ASSESSMENT

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**ABSTRACT:** This paper presents the purposes of risk assessment, risk assessment types and general methodology of qualitative and quantitative risk assessment and evaluation matrix SOURCE – PATH - RECEIVER.

**KEY WORDS:** Environmental, risk, hazard, exposure

### 1. INTRODUCTION

The need for additional information on risks identified pollution or polluting activities carried out on a site may cause the competent authority to commission environmental risk assessment to determine the likelihood of damage and possible injured by that claim. [ 1 ]

**Risk** is the probability of an adverse effect in a specific time and is often described as relations:

$$\text{Risk} = \text{Hazard} \times \text{Exposure} \quad (1)$$

$$\text{Risk} = \text{Probability} \times \text{Severity} \quad (2)$$

### 2. GENERAL METHODOLOGY FOR QUANTITATIVE RISK ASSESSMENT

Qualitative risk assessment takes into account the following factors:

**1. hazard/source** - refers to specific pollutants that are identified or suspected to exist on a site, their toxicity and their particular effects, [ 2 ]

**2. course of action** - is the way in which toxic substances reach the point at which deleterious effects, or by direct ingestion or

Risk assessment is carried out according to Annexes A4, A4.1 and A4.2 of MAPPM Order no. 184/1997 for the approval procedure of environmental audit .

The overall objective of risk assessment is to control risks from a site, identifying:

- pollutants or hazards most important;
- resources and receptors at risk;
- mechanisms by which the risk;
- significant risks that arise on site;
- general measures necessary to reduce the risk to an "acceptable level".

contact with the skin, or by migrating through the soil, air or water;

**3. target/receiver** - are goals to which certain acts harmful effects of toxic substances on the site, which may include human beings, animals, plants, water resources and buildings. Overall quantitative risk assessment comprises five stages:

1. description of intent;
2. hazard identification ;
3. identify consequences ;
4. estimating the size of the consequences;
5. estimating the probability of consequences.

### 3. ANALYSIS OF THE RELATIONSHIP SOURCE - PATHWAY -RECEPTOR

Often it is useful to review summarizes source - pathway - receptor in the form of a diagram - tree, before attempting risk assessment because it clearly identifies the action, danger and consequences. [3 ], [ 4]

Based on information presented in Table 1 will systematically analyze each pollutant in relation to its potential paths of action on receptors specify will decide whether there is a causal relationship or is likely to exist..

The importance of risk each receiver can then be assessed, identifying those risks require some form of remediation required - this procedure is the risk estimation.

Table 1. Matrix analysis of source-pathway-receptor relationship

| <i>Pollutant</i>           | <i>Danger</i> | <i>Source</i> | <i>Way</i> | <i>Target</i>                         | <i>Achieve the target</i> | <i>Importance of risk</i> | <i>Need remedial work</i> |
|----------------------------|---------------|---------------|------------|---------------------------------------|---------------------------|---------------------------|---------------------------|
| Pollutant 1                |               |               |            | Groundwater, Surface water, Air, Soil |                           |                           |                           |
| Combinations of pollutants |               |               |            |                                       |                           |                           |                           |

Calculation / risk quantification is based on a simple classification system where the probability and severity of an event is

classified low, randomly assigning a score (Table 2).

Table 2. Types of scores given probability and severity of risk

| <b>Probability (P)</b> | <b>Gravity (G)</b> | <b>Risk (R)</b> |
|------------------------|--------------------|-----------------|
| 3 – high               | 3 – major          | 6 – 9 - large   |
| 2 – medium             | 2 – slow           | 3 – 6 - medium  |
| 1 - low                | 1 - average        | 1 – 3 - small   |

The risk factor could then be calculated by multiplying the probability of gravity, to obtain a comparative number, such as 3 (high) x 2 (average) = 6. This will allow comparisons between different risks.

The result is greater, the greater the attention that will be paid to controlling risk.

### 4. CLASSIFICATION OF SOURCES, PATHWAYS AND RECEPTORS IN ENVIRONMENTAL RISK ASSESSMENT

#### 4.1. Classification of pollution sources and nature of pollutants

- Solid, liquid, gaseous, organic, inorganic;
- The concentration of pollutants and mobility, solubility, availability and retention in plants:
  - the matrix of soil, groundwater, surface water;
  - In general deposits, drums, box or buried layers;
- Spatial distribution and total volume of contaminated material.
- Corrosive or other forms of attack on the material;
- Toxic, carcinogenic, irritant dermatological or respiratory asphyxiating;
- Flammable, explosive;
- Phytotoxic.

#### 4.2. Classification of targets / receptors

- Groundwater systems;
- Surface water courses:
  - off-site;
  - on site;
- Human receptors:
  - occupants / users / neighbors existing and future location;
- Future developments;
- Soil and crops: current and future;
- Natural ecosystem:
  - fauna and flora;
  - natural reserves.

#### 4.3. Classification of the ways in which the pollutants reach the receiver

- Direct contact or ingestion of contaminated materials;
- Migration of pollutants through:
  - Layers of permeable or cracked;
  - Groundwater and surface water discharge;
  - Pit mine / galleries access;
  - Transport off-site by vehicles;
  - Infrastructure services.

### 5. CONCLUSION

- Competent environmental authority requests the titleholder an environmental risk assessment, if the average balance was identified by the existence of a significant pollution level II on its location;
- Risk assessment is carried out according

to Annexes A4, A4.1 and A4.2 of MAPPM Order no. 184/1997 for the approval procedure of environmental audit.

- The overall objective of risk assessment is to control risks from a site, identifying:
  - Pollutants or hazards most important;
  - Resources and receptors at risk;
  - Mechanisms by which the risk;
  - Significant risks that arise on site;
  - General measures necessary to reduce the risk to an "acceptable level".
- Calculation / risk quantification is based on a simple classification system where the probability and severity of an event is classified low, randomly assigning a score

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