CHAPTER 7
RISK SITUATIONS

In environmental assessment, risk analysis involves two distinct approaches: the first involves a contextualizare of chance or hazard that can be associated with a project (e.g. accidental discharge caused by the effects of some chemical pollutants), and the second term is associated with the probability of occurrence of the event which may lead to damage of an environmental factor or the environment as a whole.
Environmental assessment as a whole, the whole, starting from pozable situations whose consequences are unknown possible effects due to implementation of a given project, realizing such a projection in space and time of the consequences related to the various stages of the project (construction/operation/decommissioning), proposing a whole series of measures to mitigate the effects of the predicted (cancel), decreasing environmental hazards.
Thus in calculating the levels of risk are taken into account, the two elements that define hazard (danger) that is marked by *gravity*, the second term that remains tied to the probability of the phenomenon. Taking into account this definition of risk, it was proposed a simple equation for calculation as follows:

RISK= PROBABILITY x GRAVITY

7.1. Risk analysis

In addition to the calculation of risk, a risk analysis must also contain a component dedicated to risk management means finding the best ways of implementing the project so that the desiderata of the socio-economic order to be attained with minimizing environmental risks. Thus the risk analysis phase is completed in several stages, as follows:

- Identification of risk
  Presumes a recognition risk process and defining the main attributes associated with them
- Risk estimation;
  Presumes some stages of objective analysis, scientific advice, which enables an accurate quantification of the magnitude, intensity and spatial scale of adverse consequences. In this stage are generated models, schemes of monitoring, evaluation and diagnosis directly from the environment in the long term, so that the analyses to drive toward results as conclusive.
- Risk assessment
  Requires an entry for the balance of the benefits and possible adverse effects related to project implementation, so that the decision-making process should be grounded in a way that is as objective as possible. If one project involving several alternatives to which it is assigned for each part of the alternative more risk category, one can achieve a ranking of risks so that the decision-making process should be able to appeal and to such rating scale.
- Risk analysis
  Based on the ranking of risk that must be parcursesunt determined the actions undertaken at the level of each category of risk. Are considered in the light of such actions such as: avoidance/accept/reject or transfer.
- Risk monitoring

This phase overlaps the current procedures for monitoring the environment of constructive stages, entered into operation or decommissioning projects, thus always a correlation with situations assessed theoretically linked to environmental hazards and those found directly through direct measurements. In this way it can make adjustments, if appropriate, leading to avoid situations in which environmental factors may have suffered, thus intervening at an early stage, by way of pro-active, applying the precautionary principle.

- The realization and implementation of a Plan of response
  Involves the development of documentation as detailed and clear in order to describe the steps that must be follow in a situation with potential risk so that they can be removed in such a way as effectively as direct effects or those with potential for propagation.

Through the process of evaluating the environmental risk considering the level of safety and security of the project versus environmental factors in part or in whole, being taken appropriate decisions related to the operation of the project.

Currently, apply methodologies for comparative assessment of environmental risks (CRA-Comparative Risk Assessment) and criterial analysis (MCDA-Multi-Criteria Decision Analysis) at the level of some large-scale projects (as is the case of main pipelines transport natural gas), which exceed the scope of certain State and analysis entities through which is weighing the effect of a project at regional and world the analysis thus far more broader. Within NATO, were organized more events through which we analyzed the environmental risks as part of general security risks, recognizing the strategic importance of environmental factors and solutions for access to natural resources.

Risk analysis in the identification of hazards, including estimates on the size of the effects and likelihood of events. To determine the potential risk of an incident it is necessary to analyse and coordinate three categories of independent factors:

- the source of danger (pollution);
- transfer vectors;
- target (protected source).

Source of danger or source of pollution is characterized by:

- the nature and quantity of pollutants discharged into the environment;
- physical characteristics, chemical, biological pollutants (density, water solubility, volatility, biodegrabilitatea).

Shuttle vectors are:

- air;
- water (surface and underground);
- soil (like contact surface);
- biodiversity.

Target (protected): environmental factors and human health.

7.2. Calculation of risk associated BRUA

Quantifying risk calculation/may be based on a simplified classification system, where the probability and severity of an event are noted down, assigning them a score.

Classification of probability	Severity classification
3 – big	3 - raise
2 – medium	2 - medium
1 – small	1 - easy
0,5 - very small	0 - null

The risk is calculated by multiplying the probability factor with that of gravity.
According to the situation examined in the context of documentation were identified the following issues related to potential risks that could threaten the environmental factors for the two main phases of the project BRUA (construction/operation) as follows:

7.2.1. Air environmental factor

Stage of construction:

- There are no stationary pollution sources;
- operation of the machinery lead to the emission of pollutants into the air at low levels and a large disipated land area;
- waste management in the organizations of the construction site and deposits (including wastewater from the chemically treated cesspits, tanks of toilets modulation) is consistent-in consequently fermentation processes are avoided, and the generation of odors is annulled;

Probability of occurrence of harm/traps and air pollution in construction stage of BRUA is:

$$2 X 0 = 0$$

Stage of running:

- There are no stationary pollution sources;
- waste management-level compression stations from jobsite is consistent-in consequently fermentation processes are avoided, and the generation of odors is annulled;
- sewage systems can be cleaned periodically, shall be washed periodically due to the volume of water used-as a result of fermentation processes are avoided;
- accidental release/controlled natural gas volumes through taps or from the compression stations remain pozabil (both as regards the volumes as well as regards the effects of) natural processes do not lead to a response. Intervention systems and limitation of crashes (through the provision of several types of elements) are unable to isolate and effectively limit emissions of natural gas leading to economic losses and in whose limitations have to be considered in equal measure these technology investments.

Probability of occurrence of harm/traps and air pollution in operation of BRUA is:

$$0,5 X 0 = 0$$

Stage of decommissioning:

Decommissioning phase will include a whole series of steps that will be followed in the opposite direction toward the stage of building, but the categories of environmental risk factor for air to be posable. In addition are released into the atmosphere (limited) amounts of natural gas that have remained inside the duct, aeration stage. To the extent that the probability of occurrence of harm/odors and air pollution will be:

$$0,5 X 0 = 0$$

7.2.2. Water environment factor

Stage of construction:

- do not produce wastewater construction stages;
- domestic waters of the toilets are retained in watertight tanks, chemically treated, emptying, being taken at regular intervals using emptying and transported to the nearest sewage treatment plants;
- crossing works of water courses, where does not apply to guided drilling technique, the cofferdams of the diversion, being detained in such particulates but also accidental leaks of hydrocarbons;
- any accidental spills of hydrocarbons that could be washed towards the natural water courses remain isolated at the polders level grassed with gradual discharge at the level to which you can apply remediation treatments;

The likelihood of environmental factor in construction stage of BRUA is:

0,5 X 0 = 0

In step operation:

- technological processes are not necessary volume of water;
- for household use waters used at the level of compression stations are purified through micro sewage treatment plants, to be discharged into natural bodies of water in compliance with NTPA001. The likelihood of damage to the water purification stations of the compression stations remains small, waste waters continuing to be held at the level of the waste water tank where can replacement; In addition, during the crash, the production of waste water can be limited through organisational measures.

The likelihood of environmental factor in the running stage BRUA is:

0,5 X 0 = 0

Stage of decommissioning:

Decommissioning phase will include a whole series of steps that will be followed in the opposite direction toward the stage of construction, the categories of risk for water environment factor should be posable, likelihood of water pollution will be:

0,5 X 0 = 0

7.2.3. Soil environment factor

Stage of construction:

- are temporarily occupied areas of fertile soil horizons, but are protected by temporary removal from the strip (21/14 m) and storage; at the completion of the work, the layer of topsoil is re-seated and precautions are taken for the ecological functionality of the playback;
- hydrocarbon leaks are isolated and there is a contingency plan for the purpose of routine cleaning;
- press events/local erosion, installed in the embattled area, technological pathways to construction organizations and pipe deposits are corrected at the completion of the work;
- soil areas affected are played in natural/productive circuit;

The likelihood of environmental factor ground BRUA-building phase is:

0,5 X 0 = 0

Stage of running

- are permanently occupied expanses of land by the related objectives project BRUA (compression, valve stations), but areas remain extremely limited, reported at least to the extent of the whole project.

The likelihood of environmental factor in the ground operation of BRUA is:

0,5 X 0 = 0

Stage of decommissioning

Decommissioning phase will include a whole series of steps that will be followed in the opposite direction toward the stage of construction, the categories of environmental risk factor for soil to be overlapping, probability of soil pollution will be:

0,5 X 0 = 0

7.2.4. Environmental geology factor and subsoil

Stage of construction:

- the project does not involve the development of deep foundation works, able to lead to alterations in the horizons of subsoil geological strata and mixing;
- the project will lead to BRUA blocking access to some of the geological resources of the subsoil, and introducing a system of restrictions along the Strip safely to the goal (protection zone production), but there are possibilities of accessibility by relocation specific works; such blockage never becomes a permanent one;
- on some sectors are provided ample terracing works more as a result of the route in the level pipe curve BRUA. Geological material excavated volumes remain low, and should be stored in close proximity or assessed at the level of specific local projects as filling material; such sectors may appear on some rock exposures to light, but apply corrective and protective measures so that eventual degradation phenomena to be avoided.

The likelihood of environmental geology factor and in the basement of building BRUA is:

0,5 X 0 = 0

Stage of running:

- the project does not involve any sort of impact on environment factor in the basement and geology

The likelihood of environmental geology factor and basement in the functioning of BRUA is:

0,5 X 0 = 0

Stage of decommissioning:

Decommissioning phase will include a whole series of steps that will be followed in the opposite direction toward the stage of construction, the categories of risk factor of environment and geology will be overlapping. In addition it will pick up the regime of restrictions designed to protect strip that is taking place, having the effect of BRUA accessibility overall and subsoil resources. The likelihood of pollution of the subsoil and environment geology will be:

0,5 X 0 = 0

7.2.5. Environmental factor biodiversity

Stage of construction:

- the project will lead to damage to natural habitats, natural or anthropic, but lifetime disruption will be one small; measures are taken to reduce the impact by direct action of relocation/translocation populations (especially plants) or removal of fauna (before work) or deflecting (avoiding penetration of some species of fauna) in hazardous areas) during the work;
- the project will result in a fragmentation of habitats/populations, but the phenomenon will be short-lived and with a reduced space (21/14 m);
- at the completion of the work shall be made for a system of complex ecological restoration and playback in natural/circuits productive habitats affected; the measures involve the restoration of the original structure including biogenesis by (re) installation of the natural succession of vegetation, limiting the entry of invasive species and installation of microhabitats; items will be restored on original place;
- trouble (tedium) remains limited, induced at the level currently active areas (organization of building site, pipe and fronts), but a sliding scale so works for valuable items of flora/fauna constructive stages do not overlap with periods of maximum sensitivity (frailty);

The likelihood of damage to the environment factor biodiversity in the functioning of BRUA is being admitted that some sensitive areas are crossed inside protected areas (Nature 2000 sites):

1 X 1 = 1

Stage of running:

- compression stations remain the only goals to remain present at the level of semi natural habitats, busy area will be assigned operational objectives conduct amounts to industry; in order to limit the impact and reduce the ecological footprint solutions of increasing the capacity and support to biodiversity indices;
- during the operation the current operating activities are not in a position to significantly affect local populations of flora and fauna; the location of the compression does not affect natural habitat with the significance of bio-eco-cenotic high;
- at the level of forest areas by keeping passageways will technological surveillance induce a phenomenon of fragmentation, which will lead to diminishing Habitat interior surfaces; indices of biodiversity will be (at least partially) compensated by increasing areas of ecotons; is expected as a result of this change in the composition of the natural frame and consistency, habitats occur changes of biocoenosis and biocenotic structures (complex).

The likelihood of damage to the environment factor biodiversity in the functioning of BRUA is:

$$2 X 1 = 2$$

Stage of decommissioning:

Decommissioning phase will include a whole series of steps that will be followed in the opposite direction toward the stage-building, risk factor categories of environmental biodiversity to be overlapping. In addition it will lift restrictions on the scheme requires keeping a monitoring strips along BRUA, if forest habitats lead to their fragmentation. In these circumstances it will be able to carry out a restoration of connectivity and amplification of the three-dimensional interior habitats, significantly reducing the fragmentation. The likelihood of damage to the environment factor biodiversity will be:

$$0,5 X 0 = 0$$

7.2.6. Landscape environment factor

Stage of construction:

- at the level of components of the landscape it will print a contrasting character, with the advent of industrial (depots, pipe dock organization) and as a result of conduct for works; the length of time will be reduced, the maximum recorded being the period at the level of objectives type of organisations and schemes of the pipe;

The likelihood of damage to the environment factor in the landscape construction of BRUA is:

$$0,5 X 0 = 0$$

Stage of running:

- solution of burying the pipeline leading to the cancellation of the impact on the landscape;
- for objectives (compression, valve stations) are provided for architectural solutions that will facilitate a better integration into the landscape, and supporting structures of type-green curtains;
- at the level of forest habitats, preserving technological surveillance are passageways will induce an impact on forest landscape, which will lose continuity, with the advent of contrast (color);

The likelihood of damage to the landscape environment factor in the functioning of BRUA is:

$$0,5 X 0 = 0$$

Stage of decommissioning:

Decommissioning phase will include a whole series of steps that will be followed in the opposite direction toward the stage-building, risk factor categories of landscape environment to be overlapping, the likelihood of damage to the landscape will be:

$$0,5 X 0 = 0$$

7.2.7. Social and economic environment

Stage of construction:

- associated to the project through the positive impact direct staff (job creation) and indirectly are not retained by categories of negative impact;
- for major transport routes (railways, roads, national roads, etc.) it provides for the execution of the installation of bus transportation through drilling conducted; for other ways of communications, building works will be accompanied by BRUA works temporary traffic diversion;

Probability of damage (negative) social and economic environment in the stage of building BRUA is:

$$0,5 \text{ X } 0 = 0$$

Stage of running:

- the project period BRUA operation will lead to the creation of a number of (direct) jobs (60) plus the securing of natural resource for a significant population of the European continent;
- for similar projects, developed in other countries (especially the USA), has been described a risk associated with a reduction in the value of real estate areas are situated in close proximity to transportation routes for natural gas, following the imposition of the restriction of creation of works and/or activities and to limit the opportunities of urbanization and growth in some localities of the area.

$$0,5 \text{ X } 3 = 1,5$$

Stage of decommissioning:

Decommissioning phase will include a whole series of steps that will be followed in the opposite direction toward the stage-building, risk categories for the social and economic environment to be overlapping. In addition there is a danger of generating some explosions as a result of improper handling of sections and technology BRUA decommissioning. To the extent that the probability of damage (negative) social and economic environment will be:

$$0,5 \text{ X } 1 = 0,5$$

A summary of the risk analysis is presented synthetic in table no.7.I:

Table no.7.I Synthesis of risk analysis

Environmental factor	Stage		
	Construction	Operating	Decommissioning
Air	0	0	0
Water	0	0	0
Soil	0	0	0
Geology and subsoil	0	0	0
Biodiversity	1	2	0
Landscape	0	0	0
Socioeconomic environment	0	1.5	0.5

Based on the analysis of the risks associated with synthetic BRUA project, you can detach the following conclusions:

1. Construction stage of the project involves the presence of a risk BRUA at low level factor biodiversity following a change in the structure of forest habitats by inducing effects consisting of: Habitat fragmentation, the induction effect (amplification), decreasing areas of interior habitats-along the strips work. They will lead to a change, without however to be profound, the structure and functioning of the biocenoses at the local level.
2. In the operating phase of the project is notable for the presence of a BRUA risk at low levels of the factor biodiversity following a change in the structure of forest habitats by inducing effects consisting of: Habitat fragmentation, the induction effect (amplification), decreasing areas of interior habitats-along the strips of monitoring to be maintained. They will lead to a change, without however to be profound, the structure and functioning of the biocenoses at the local level.
   A low-level risk occurs and socio-economic impacts on the environment as a result of possible changes in the value of land and the real estate market dynamics in areas crossed by BRUA. Keep and a risk in terms of a possible explosion that might arise as a result of major damage at the level of transport and pipeline structure which represents a factor of stress felt by the socio-economic environment, even an insignificant occurrence probabilities.
3. Decommissioning phase remains marked by the presence of a threat, but greatly reduced the intensity of an explosion that can occur as a result of incomplete sections of the chimney flue pipe.
4. The average risk score for the project obtained by calculating BRUA arithmetic to calculate risk factors for each environmental factor (7) and for each design stage (3) remains at a low level:

$$R_{total} = (3 \times 7) : (1+2+1.5+0.5) = 0.2$$

It can thus be said that the environmental risks associated with the project to remain located BRUA low and can be easily removed as a result of implementing coherent response plans that will result in a significant reduction in terms of risk, acting upon the probability of such risks and the severity of the effect caused.

7.3. The proposal response plans for individualized risk categories

Synthetic analysis of risks for the project revealed BRUA presence of potential risks of low level environmental factor biodiversity and the environment in the early stages of social and economic construction/operation/decommissioning operation, respectively. Accordingly, the proposed response are plans that have as their objective the reduction of risks on those two BRUA environmental factors potentially concerned.

5.4.2.1. Response plan on the environmental factor of biodiversity

On the environmental factor of biodiversity, the project induces a potential BRUA risk in construction and operation phases, manifest through the effects of fragmentation of forest habitats as a result of the deployment of the Strip that will have a width of 14 m at the stage of construction and a width of 2 m to stage.
Linear route of the aisle increases potential pillage and introduction of invasive species on forest towards biocenoses, leading to an alteration of its structure and a significant reduction in interior habitats, known as disruption waves penetrate to a depth of 300 m.
In the construction phase, the effect is somewhat reversible, temporarily and partially the work originally created to suffer a significant write-down.
At the stage of operation remains but a strip of monitoring with a high enough bandwidth, but whose effects can be at least partly undone.
In consequence, the response plan will follow the development of natural structures leading to detachment of passageways and (re)clotting at the level of the canopy. In this respect it will have regard to the following measures:

1. Making a plantation with the trees in the wood floor species belonging to natural vegetation, to the tread of the Strip's external work, up to the limit of the strip. After planting, it will assess the leadership cuts through branches and through the provision of artificial bridges temporary leadership (scaffold). It will assess the

planting of the trees of the same species. The result will be the restoration of the crown, the cohesion which will lead to a significant decrease of the effects due to fragmentation.

2. At the level of the outer aisle tape monitoring will proceed to planting of shrub species belonging to the natural flora (spontaneous) of floor vegetation whose growth will in time lead to the reduction of the distance between the edges (from) fragmented and minimise the effect of edge and pillage.
3. Where possible, the monitoring will be reduced and teams by planting species shrub belonging to the natural flora (spontaneous) of floor vegetation. Such work will be carried out of the dam and the extremities (ends) passageways, where monitoring is done into forest habitats.