Send Orders for Reprints to reprints@benthamscience.ae

The Open Ecology Journal, **2015**, *8,* **(Suppl 1-M9) 61-64**

Open Access

Systemic Risks Management and Ecologically Oriented Gas Industry Development Strategy

Vladimir N. Bashkin[1,2,*] and Valery V. Lesnych[3]

[1]*Gazprom VNIIGAZ LLC, Razvilka, Leninsky District, Moscow region, 142719, Russia*

[2]*Institute of Physicochemical and Biological Problems of Soil Science RAS, Pushchino, Moscow Region, 142292, Russia*

[3]*NIIgazeconomica LLC, Staraya Basmannaya st., 20-8, Moscow, 105066 Russia*

Abstract: It is worth noting in the paper that standardization as a legislative mechanism of risk management should by no means be applicable to all types of risks. More often limits are set on risks accepted by gas companies or corporations. It was carried out that these limits depend on the level of economic and financial development, specific technologies, environmental regulation and other factors which are applicable for ecologically oriented gas industry development strategy.

Keywords: Risk management, risk methodology, gas industry, strategy, ecology.

INTRODUCTION

Risk management is a multi-stage iterative process where risk analysis is the core component. Risk analysis process also consists of multiple steps (Fig. **1**) (Risk Management Standards 2003; Risk rating 2004; Samsonov *et al.* 2007; Rusakova & Lesnykh, 2010).

At present more attention both nationally and internationally are paid to systemic risks management and ecologically oriented gas industry development strategy. This is mainly related with shifting the gas prospecting and production to the Polar Regions where environmental legislation are getting gradually more strong and the relevant accidental and regular pollution damages require the risk calculations and proper managements.

Risk detection is a continuous process involving analysis of conditions in order to identify risks that were not previously recognized. For this a set of steps are taken on a constant and regular basis, which may be either pre-scheduled or ad hoc, depending on occurrence or change of circumstances essential for the gas industry and its key subsystems.

Accordingly, we should aim to consider the main steps of risk methodology in gas industry management.

RISK METHODOLOGY IN GAS INDUSTRY MANAGEMENT

Risks can be detected through:

1) analysis of the company's or industry's performance, examination of the statistical data that characterize the inner and outer environment, study of occasional cases that may have a potential impact on gas industry development;

2) analysis of risk management experience in gas industry and its subsystems;

3) analysis of risk management experience in other sectors of the fuel and energy complex;

4) survey of the risks below the criticality level;

5) analysis of significant discrepancies between the actual and planned results in the course of plans, programs and projects implementation in the gas industry.

Sources of information in risk detection are the following:

1) previous risk assessment;

2) reports on losses;

3) insurance statistics;

4) audit reports;

5) internal control data;

6) various data bases;

7) management reports;

8) plans, business plans, programs and reports on their implementation;

9) feasibility studies;

10) reports on the performance results of the gas industry, its subsystems, other sectors and companies of the fuel and energy complex;

11) mass media;

*Address correspondence to this author at Institute of Physicochemical and Biological Problems of Soil Science RAS: Moscow Region, 142292 Russia; Tel: +7 916 860-20-38; Fax: +7 4967 33-05-95;
E-mail: Bashkin@issp.serpukhov.su

1874-2130/15

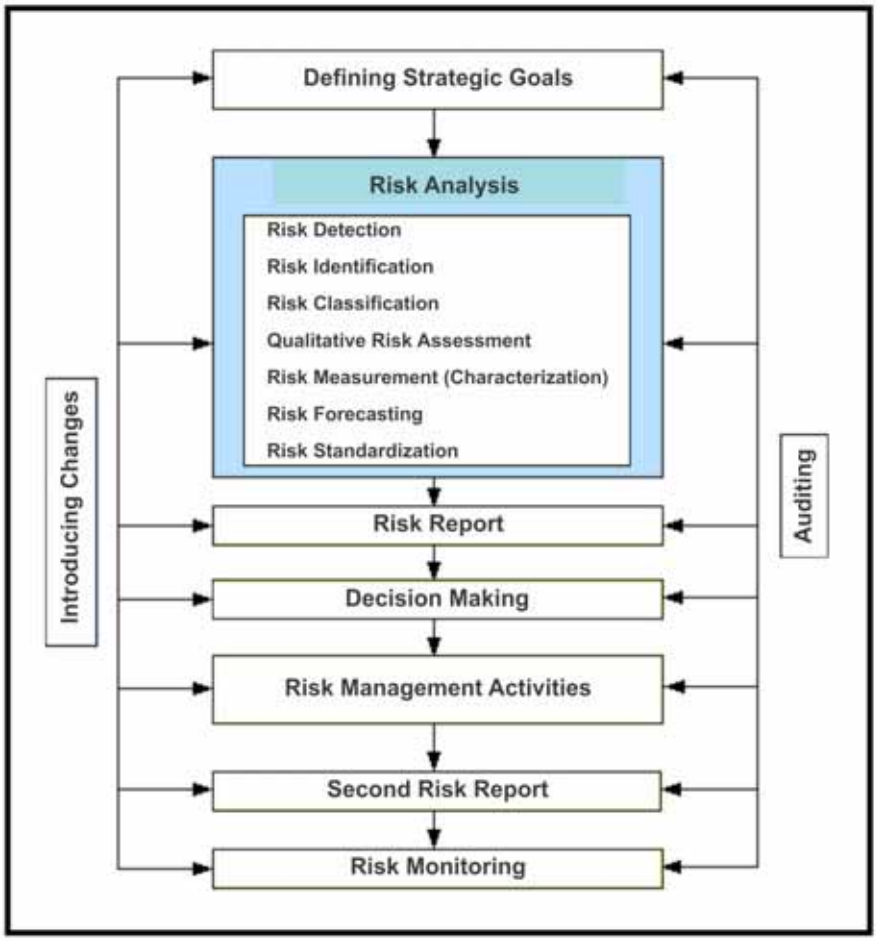

Fig. (1). Master scheme for risk analysis and management.

12) expert reviews and other sources.

Indicators of risks evidence normally are:

1) damage to and losses incurred by the facilities, subsystems and the gas industry as a whole;

2) inconsistent and random parameters used in calculations when making important decisions (economic, technical, social, environmental, etc.) as well as lack or insufficiency of such instability record.

Risk identification is a process used to obtain and analyze information on the properties and classification features of each detected risk in order to organize overall effective risk management within the gas industry.

The objective of risk identification is to determine common and individual features of each risk which would allow to register risks, establish interconnection between them, obtain information required for quantitative risk assessment and develop risk management strategies.

The main purpose of risk identification is to accurately describe risk properties substantial for risk management, specify conditions for their realization and determine the classification features.

Risk description includes:

1) qualitative assessment of risk consequences;

2) identification of risk causes (factors) whether it is a random event, a process, a combination of events, circumstances, etc., and their description;

3) development of a cause-and-effect scheme to establish the relation between the risk, its factors and other risks;

4) risk management procedure at the initiation of risk identification: establishing who manages the risk, how decisions are taken, how description is made of the response, control and monitoring activities, what is the reporting procedure.

Risk classification is a process of structuring multiple detected and identified risks in accordance with specific classification criteria.

Risk classification is performed to:

1) ensure conditions for effective analysis of all the risks associated with the gas industry;

2) optimize conditions for development of unified risk management strategies and procedures;

3) ensure conditions for automation of risk management activities at the corporate level.

Risks are normally classified according to the cross-classification method which involves several non-hierarchical classification criteria.

These criteria are determined by practical needs and include:

1) criticality level;

2) direct impact on the key problem solution in the gas industry or its subsystems;

3) origination details;

4) exposure areas (production, finance, social, and natural environment, etc.);

5) geographic features (local, regional or national);

6) time-related properties (immediate, continuous, delayed).

The qualitative risk assessment is a process of obtaining qualitative indicators of risk probability and potential impact on the gas industry development relying on expert evaluations as the main source of information. The objective of qualitative risk assessment is to minimize the uncertainty level related to risk magnitude (scope) and prioritize risks for optimum distribution of resources allocated for risk management.

The main purposes of qualitative risk assessment are to transform the expert judgments based on empirical evidence into adequate qualitative indicators and to analyze and interpret the results so as to make them adequate for making management decisions.

Experts engaged in qualitative risk assessment are either individuals or specialized institutions with sufficient expertise and experience in drafting and implementing risk management decisions, possessing the necessary information and other resources. Estimation of the expert's opinion can be based on weighting coefficients, which show whether the expert's evaluations comply with the averaged assessments and measurement results, or it can be based on the expert's self-appraisal, job position, experience, academic degree, etc. A promising approach that ensures reliable quantitative assessment is a combination of expert opinion and inconsistent methods (Strategic Risks 2005).

The results of qualitative risk assessment are the following:

1) probability of risk exposure;

2) scale of the risk's negative impact on the gas industry objectives;

3) other indicators required for effective risk management such as risk sensitivity, vulnerability, risk management capacity.

Indicators obtained in the course of qualitative risk assessment are random variables which are typically represented by their mathematical expectations. Dispersion of these indicators is considered to be an indicator featuring the reliability of the risk assessment results.

Qualitative risk assessment consists of the following stages:

1) identification of the most efficient assessment method for each particular case;

2) definition of requirements list for experts and other parties to the assessment process; specifying members of the expert group and their number;

3) development of a risk assessment procedure;

4) interviewing experts in compliance with the method selected and the procedure developed;

5) analysis and validation of results;

6) transformation of qualitative risk assessment into a quantitative analysis;

7) interpretation of assessment results.

Qualitative risk assessment can be transformed into quantitative risk assessment by means of establishing consistency between the verbal definition of a qualitative assessment and a quantitative value of a certain indicator or interval of its values for each risk. This is done to confirm risk criticality and determine the scale of risk impact on the gas industry.

Risk measurement is the process used to obtain qualitative indicators that characterize the probability of risk occurrence and impact on the gas industry and its subsystems, by using calculation methods based on unbiased and reliable information. The objective of risk measurement is to minimize the uncertainty in risk size calculations and prioritize risks for optimum distribution of resources allocated for risk management. Initial data for risk measurement include statistical information on risk characteristics, and/or mathematical modeling results which assess the impact of risk factors. In the absence of statistical information on risk impact on the gas industry development, risk measurement is based on the internal or external data and other relevant statistics.

The following indicators serve as measurement parameters for each particular risk:

1) probability of risk exposure;

2) magnitude of a negative impact of risk on attaining specific goals of the gas industry and its subsystems development.

To determine the value of these indicators, perform additional verification of the results and effectively manage risks methods of statistical and scenario analysis as well as various approaches and tools may be applied, such as risk decomposition, stress testing, what-if analysis, backtesting, real options method – *Mark-to-Market, VaR (Value-at-Risk), EaR (Earnings-at-Risk), CFaR (Cash-Flow-at-Risk), CreditVAR, Operational VAR, SAR (Shortfall-at-Risk), SPAN (The Standard Portfolio Analysis of Risk)* and other indicators such as *Capital at risk, RAROC, RORAC, RARORAC,* etc. A list of measurable indicators that characterize risk magnitude is

specified in accordance with the methodology developed for each particular risk.

CONCLUSION

Thus, risk measurement involves:

1) identification of the most efficient measurement method for each particular risk;

2) drawing up a list of initial data comprised of unbiased actual information necessary to make reliable measurements; defining requirements for such data along with potential sources and procedures of their obtaining;

3) development of risk measurement procedure;

4) conducting measurements in accordance with the method selected and procedure developed;

5) verification, analysis and validation of the results generated in the course of measurement and their comparison with the assessment results;

6) interpretation of measurement results.

Risk forecast is a quantitative assessment of changes in risk indicators (including exposure probability, size of expected negative impact) at different forecast horizons. The scope of risk may vary due to internal changes in the gas industry (for instance, launch of new facilities, technologies, management techniques, etc.) and fluctuation of external factors (such as macroeconomic trends, geopolitical priorities, climate change, social processes, etc.).

Same methods can be applied to risk forecast for prompt and short-term risk measurement.

Risk standardization is setting the risk threshold level (negligible, tolerable, acceptable, and unacceptable) which is both the final stage of risk analysis and the first stage of risk management. Its main purpose is to determine the range of quantitative risk indicators enabling to attribute the latter to various categories of manageability. Risks with quantitative indicators below the negligible level are insignificant and do not require management and control. Risks higher than the acceptable level must be eliminated (if possible) or mitigated to the acceptable level through implementation of economically viable actions.

Acceptability levels of particular risks are specified by law in certain countries. For instance, the individual risk level (industrial accidents' mortality rate) established in the Netherlands must not exceed the rate of 10^{-6} events per year. The most complicate quantitative estimates are shown for (geo) ecological risks (Risk rating, 2004; Samsonov *et al.*, 2007).

It is worth noting that standardization as a legislative mechanism of risk management should by no means be applicable to all types of risks. More often limits are set on risks accepted by gas companies or corporations. These limits depend on the level of economic and financial development, specific technologies, environmental regulation and other factors.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

ACKNOWLEDGEMENTS

The authors express their deep appreciation and gratitude to Dr. S. Ovcharov, Gazprom VNIIGAZ LLC, for the consultation and active participation during result discussions.

REFERENCES

Risk Management Standards (2003) *Risk Management*, Russian Risk Management Society, Moscow.

Rusakova, VV & Lesnykh, VV (2010) Systemic risks management in gas industry development strategy. *Science and Technology in Gas Industry*, 2 (42), 85-9.

Risk Rating: Foreign and Domestic Experience (2004). *Emergency Situations Forecasting*, EMERCOM Russia, Moscow.

Samsonov, RO, Kazak, AS, Bashkin VN & Lesnykh, VV (2007) *Systems Analysis of Geo-Environmental Risks in Gas Industry*, Scientific World, Moscow.

Strategic Risks in Russia: Assessment and Forecast (2005) *Risk Management*, Business Express, Moscow.

Received: July 07, 2014 Revised: August 30, 2014 Accepted: August 30, 2014