Int. J. Environ. Res., 8(1):193-204,Winter 2014
ISSN: 1735-6865

The Design of an Estimation Model for Environmental Liability Insurance (ELIS)

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Received 20 May 2013; Revised 2 Oct. 2013; Accepted 9 Oct. 2013

ABSTRACT: Pricing for an insurance policy can be described as the process of calculation of expected compensation to be paid to property losers as well as associated costs of potential risks. Loss forecast is accurate if the risks will be identified appropriately in order to calculate the frequency and expected severity of losses.This is particularly important about environmental risks since most of them appear in the long run. Environmental risk assessment model is both able to estimate the environmental liability premium for environmental pollution and degradation, and it can play a valuable role in promoting this industry. ELIS (Environmental Liability Insurance) software calculates the environmental risk number in industry sector and insurance charges for events resulting in environmental pollution. This paper deals with designing the model and outputs of the software. The user selects the type of project, and input the descriptive information concerning the occurrence of possible environmental pollutions. The model calculates risk numbers, the type of accidents, classification and weighting of severity of environmental impacts, risk priority numbers (RPN); pollutant volume and environmental sensitivity, environmental cost of contaminates, and finally Net premium for Possible Accidents. The case study indicated the applicability of then model. For this case an oil refinery in Iran was selected with a capacity of 85,000.barrels of refined oil per day. The calculated premium on the basis of losses arising from air pollution was evaluated to be equivalent to 70,000$ US. The same procedure can be applied to evaluate the amount of premium for soil and water pollution.

Key words: Insurance, Compensation, Premium, Risk, Environment, Pollution, ELIS software

INTRODUCTION

Today, environmental pollution has become an intellectual challenge for most of developed and developing countries (Karimzadegan *et al.*, 2007; Vargas-Vargas *et al.*, 2010; Yuan *et al.*, 2010; Mossalanejad, 2011; Ghaderi *et al.*, 2012; Tisseuil *et al.*, 2013; Nasrabadi *et al.*, 2013). Industrial and sometimes commercial activities are major pollution sources (Baghvand *et al.*, 2010; Nasrabadi *et al.*, 2010; Afkhami *et al.*, 2013). For this reason, liability against contaminating the environment has been discussing since long ago and this formed the basis for emerging a new type of insurance. Environmental liability insurance beside other measures taken by industrial firms shifts the attention to reliance on risk management techniques in this particular context, emphasizing on prediction and reduction of environmental risks. In ELI like any other type of insurance, the insurer must have precise information about probability of risk, rate and extent of the damage caused by that risk.(Karimi, Ayat, 2010). Given the rate of losses, the insurer can calculate a rational premium and determine the amount to be paid by the insured by adding overhead costs for bureaucratic affairs based on the current market status. These are

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economic literature axioms of insurance and ELI makes no difference with other types. Therefore, not only precise information on probability, predictability and intensity of risk is a prerequisite for accurate estimation of premium fee but it is necessary as reserve for occurrence of events already covered by the insurance policy. ELIS has been designed to estimate liability insurance towards the environment by calculating a risk number for any environmental accident in accordance with FMEA (Failure Mode and Effect Analysis) within database SQL server 2008 by using C#.net.

MATERIALS & METHODS

The rationale of this program is presented on fig. 1. The user selects the type of project, and input the descriptive information concerning the occurrence of possible environmental pollutions. The model calculates risk numbers, the type of accidents, classification and weighting of severity of environmental impacts, risk priority numbers (RPN); pollutant volume and environmental sensitivity, environmental cost of contaminates, and finally Net premium for Possible Accidents. The abbreviations used in the flowchart shown in fig. 1 and related formulas are given as follow:

- ✓ C_i=Concentration of pollutants
- ✓ EV_i=Volume of Emission
- ✓ LF_i=Loss Factor
- ✓ LC_i=Loss Coefficient (Tables 8,9,10)
- ✓ EC_i=Environmental Costs (Table 11)
- ✓ EPC_i=Environmental Pollution Costs ($EPCi=LCi\times EC_i\times EV_i$)
- ✓ L=Total environmental pollution cost ($\sum_{i=1}^{3} EPCi$)
- ✓ CF=Correction Factor
- ✓ R=Risk number (R=S×O×D)
- ✓ ELP=Environmental Liability Premium (EP=L×(R/1000))
- ✓ NELP=Net Environmental Liability Premium(NELP=ELP×CF)
- ✓ i=1,2,3(1=air,2=water,3=soil)

To calculate the premium for environmental liability, first, type of the project is chosen in terms of the location of industrial sector and general information about it. Then, based on the type of activity in that industry, likely environmental incidents are listed. Data collection is questionnaire-based and likely environmental accidents in any industry are specified by using experts' opinions. (Benjamin J. Richardson, 2008)

Information regarding the project is registered. In the *activity group*, the type of activity in question is identified and its name appears in *title*. If the project or activity contains any specific information, it is included in *comments*. The important point of this form is evaluation of insurability conditions of the project. For this purpose, the following should be evaluated:

1.Is the damage to the environment accidental and unintended?

2.Is the damage to the environment inherently measurable?

3.Will the damage to the environment lead to catastrophic events?

4.Are the environmental risks divided to numerous similar cases?

5.Does organization's damage to the environment have a low likelihood?

A main feature of this software is calculation of risk numbers according to FMEA pattern as follows later. This gives a worthy aid to industrial managers to identify and prioritize the risks of their activities. This software informs insurance companies of environmental risks facing the insured. (Tables 1 to 3 show effective factors in calculating risk numbers using FMEA method.)

Information on the project and the accident are collected. For example, these accidents might happen when an oil platform is being constructed: (DDDAU, 2003)

- Accidental discharge of wastes to sea and surrounding rivers
- Emission of polluted gases
- Mismanagement of wastes
- spilling of fuels to soil and water

To calculate risk number, type of the accident is selected and it is obtained based on FMEA pattern.

Classification and weighting of severity of environmental impacts is given in Table (1).

Classification and weighting of probability factor of occurrence is given in Table (2).

Classification and weighting of detection factor is given in Table (3)

Risk number, ranging between1 to 1000, is calculated as follows:

$$R = D \times O \times S \quad (1)$$

Where,

R= risk number

D= risk detection weight number

O= occurrence probability weight number

S= severity of environmental impacts weight number.

After R is calculated, risk numbers are sorted in a descending order in order to take necessary actions

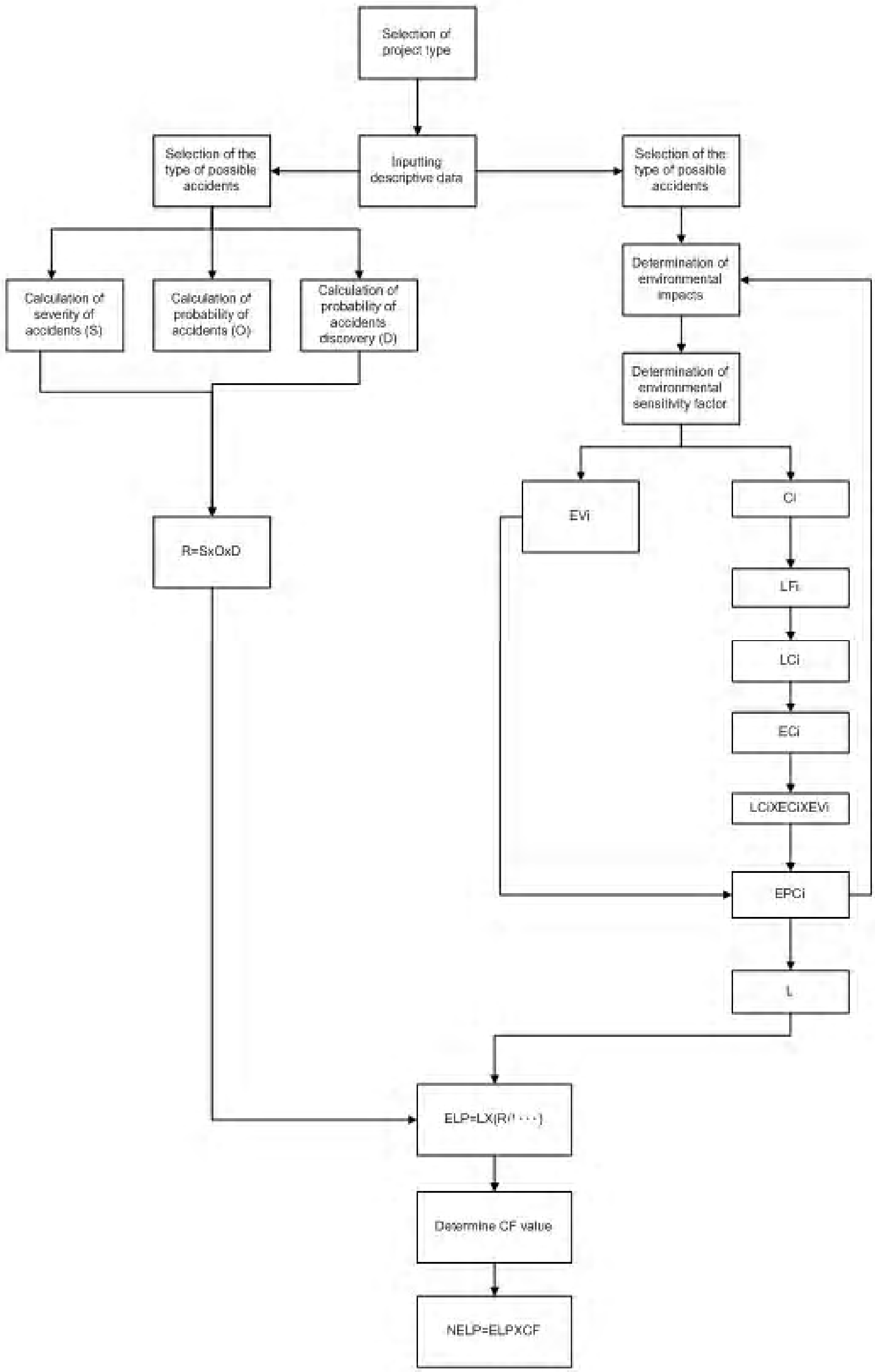

Fig.1. ELIS flowchart

Table 1. Classification and weighting of severity of environmental impacts(S)

			Range of impact				
			Within jurisdiction of the organization				beyond Jurisdiction of the organization
			Slight	Low	Relatively high	High	
			The impacts are beyond jurisdiction of the organization	The impacts are traceable beyond jurisdiction of the organization	The impacts are traceable within jurisdiction of the organization	The impacts are traceable within jurisdiction of the related unit.	The impacts are traceable only at the place of occurrence
Severity of impact	Very high	death of human and animals, heavy damages to national capitals and environment, damages to buildings	5 or 6	6 or 7	7 or 8	8 or 9	10
	High	harm to human and animals; damage to national and global capitals and environment (ozone depletion, green house effect, climate change, …)	4 or5	5 or 6	6 or7	7 or 8	8 or 9
	medium	Local or temporary effect on plants, soil or water; degradation of natural resources and overconsumption of energy	3 or4	4or 5	5 or 6	6 or 7	7 or 8
	Low	Discomfort and partial minor losses to health of human and animals	2or 3	3or 4	4or 5	5 or 6	6 or 7
	Very low	Without any impact	1	2 or 3	3 or 4	4 or 5	5 or 6

Table 2. Classification and weighting of probability factor of occurrence (O)

	Permanent-normal	Highly likely-normal	likely-abnormal	occasional-emergency	rare– emergency
Duration of occurrence	Several times a day	Once in every two days	Once a week	Once in every 15 days	Once a month (or more than a month)
	10 Very long time duration	8 or 9	7 or 8	6 or 7	5 or 6
	8 or 9 Long time duration	7 or 8	6 or7	5 or 6	4 or5
	7 or 8 Normal time duration	6 or 7	5 or 6	4or 5	3 or4
	6 or 7 Short time duration	5 or 6	4or 5	3or 4	2or 3
	5 or 6 Negligible duration	4 or 5	3 or 4	3 or 2	1

Table 3. Classification and weighting of detection factor (D), (AIAG manual, 1996)

DetectionProbability	Description	Weight
Impossible	Using existing controls and guidelines, it is impossible to identify and control the aspect or its impact.	10
Low	Using existing controls and guidelines, there is a little probability to be able to identify and control the aspect or its impact.	7-9
likely	Using existing controls and guidelines. The aspects or its impacts are likely to be identified.	4-6
Relatively High	Using existing controls and guidelines, there is a high probability to identify and control the aspect or its impact.	2-3
Definitely	Using existing controls and guidelines, the aspect or its impact will definitely be identified and controlled.	1

for identifying significant and insignificant aspects according to contents of Table4:

Note1. Levels of a significant impact (A) are determined by the insured, based on organizational sources including technological, human-based and financial issues.

Note2. Legal requirements must be seen and observed in risk assessment.

Note3. After a certain period of time, by various measures, reduction of R and change in organizational sources, according to note1 the organization can change A.

Note 4. The risks of official operations are calculated in a lump sum and for all the buildings in the organization.

For each accident, its impacts and environment are determined. Concentration of pollutants, loss factor and allowable emission are specified in next section.

First, type of the accident is selected based on the industry in which it happened.

The impacts of each accident are obtained with respect to concentration of pollutants, environmental sensitivity and volume of emission.

The affected environment is consisted of air, water and soil, which is determined according to type of the accident. (Alahyari, Teymur, 2006)

Table (5) presents the elements of pollutants in air, water and soil.

Concentration of the pollutants (C) depending on the environment is defined as follows:

- Concentration in water, where the environment can be surface water, groundwater or water for agricultural uses.
- Concentration in air, where the environment can be 1) existing industrial sites 2) newly constructed sites,
- Concentration in soil, where the environment can be residential, recreational or industrial sites.

Volume of emission (EV) is estimated considering the type of accident and environment of the impact by using environmental measurements or simulation models.

Sensitivity of the environment

As shown in Tables 6 and 7, sensitivity of the environment is achieved with regard to its type.

Table 4. Determination of significant/insignificant aspects

Risk levels(R)	Aspect status	Necessary action
values more than A Existence of Legal requirement	Significant	The aspects should be kept under control by defining the objectives, guidelines and/or necessary training as well as cyclic monitoring. The measures are described in the form and their results are recorded followed by calculation of R.
values lower than A	Insignificant	No further measures are necessary. Solutions or improvements at lower costs may be taken into consideration and monitoring is required to ensure that existing controls are useful and efficient.

Table 5. Pollutants in air, water and soil

Pollutants in water	Pollutants in soil	Pollutants in air
BOD_5	Cd	CO
COD	Cu	SO_2
Phosphate	As	NO_2
Nitrate	Hg	O_3-1hr
(CN)Cyanide	Pb	O_3-8hr
(Cd)Cadmium	Cr^{6+}	$PM_{2.5}$
(Cr)Total Chrome	Zn	PM_{10}
(Co)Cobalt	Ni	Toxic Gas
Molybdenum (Mb)	F	
Nickel (Ni)	Phenol	
Lead (Pb)	B	
Selenium (Sn)	Oil and petroleum residues	
Silver (Ag)	Discharge of hazardous effluents to soil	
Vanadium (V)		
Arsenic (As)		
Oil and petroleum residues		
Detergents		
pH		
Turbidity		

Table 6. Sensitivity of the environment (water and soil)

Sensitivity level	1	2	3	4
Type of the area	Forest; protected area	Warm weather and coastal area	Temperate climate area	Desert and arid area
sensitivity coefficient	2	1.8	1.5	1

Source: Iranian Department of the Environment (DOE), 2008

Table 7. Sensitivity of the environment (air)

Type of region	Description	Sensitive coefficient
Non-sensitive	Places with no particular sensitivity (outside cities and residential areas)	1
Semi-sensitive	residential areas and sensitive biotic areas	2
Sensitive	Cities with polluted air	3

The loss coefficient (LC) is defined as a function of pollutant concentration which indicates the severity of damage to the environment.

Table 9 shows the estimate of loss coefficient of water pollutants considering their amount in surface water, groundwater and water for agricultural uses, soil contaminants in residential, recreational/natural and industrial areas, and type and concentrations of soil contaminants. Air pollutant indices (AQI) are listed in Table 10.

In order to determine cost or loss in terms of emission unit, costs announced by organizations responsible for environmental conservation are used.With respect to the conducted studies, figs in Table11 are modifiable in accordance with the cases and national provisions.

However these figures are modifiable in accordance with the cases and national provisions.

Now, likely losses of each contaminant are obtained from loss coefficient, environmental sensitivity and unit emission price. Hence, total losses for each contaminant can be calculated for each accident. (Carol J.Forrest and Diana L.Wesley, 2009).

Net premium for each accident can be evaluated using, likely loss of each accident, the risk number and the correction factor. The correction factor (CF) can be determined through negotiation between insurer and insured experts. This depends on many items such as

Table 8. Loss coefficient of water pollution

No	contaminant	Agricultural water						Groundwater						Surface water					
		Loss coefficient	Concentration	Loss coefficient	Concentration	Loss coefficient	Concentration	Loss coefficient	Concentration	Loss coefficient	Concentration	Loss coefficient	Concentration	Loss coefficient	concentration	Loss coefficient	concentration	Loss coefficient	concentration
1	BOD_5	2	351	1	101-350	0	0-100	2	201	1	51-200	0	0-50	0	51-200	1	201	2	0-50
2	COD	2	201	1	101-200	0	200	2	201	1	101-200	0	0-100	0	101-200	1	201	2	0-100
3	Phosphate	1	-	1	-	0	-	2	6	1	1-5	0	0-1	0	1-5	1	6	2	0-1
4	Nitrate	1	-	1	-	0	-	2	21	1	11-20	0	0-50	0	51-100	1	101	2	0-10
5	(CN)Cyanide	2	0.5	1	0.2-0.5	0	0-0.1	2	0.5	1	0.2-0.5	0	0-0.5	0	0.6-1	1	1	2	0-0.1
6	(Cd)Cadmium	2	0.1	1	0.06-0.1	0	0-0.05	2	0.6	1	0.3-0.5	0	0-0.2	0	0.3-0.5	1	0.6	2	0-0.2
7	Total Chrome (Cr)	2	6	1	1-5	0	0-1	2	6	1	1-5	0	0-0.5	0	0.6-1	1	1	2	0-1
8	(Co)Cobalt	2	0.1	1	0.06-0.1	0	0-0.05	2	6	1	1-5	0	0-1	0	1-5	1	6	2	0-1
9	Molybdenum (Mb)	2	0.2	1	0.02-0.1	0	0-0.01	2	0.2	1	0.02-0.1	0	0-0.01	0	0.02-0.1	1	0.2	2	0-0.01
10	Nickel (Ni)	2	5	1	3-4	0	0-2	2	5	1	3-4	0	0-2	0	3-4	1	5	2	0-2
11	Lead (Pb)	2	6	1	1-5	0	0-1	2	6	1	1-5	0	0-1	0	1-5	1	6	2	0-1
12	Selenium (Sn)	2	0.5	1	0.2-0.5	0	0-0.1	2	0.5	1	0.2-0.5	0	0-1	0	1-5	1	6	2	0-0.1
13	Silver (Ag)	2	0.5	1	0.2-0.5	0	0-0.1	2	0.5	1	0.2-0.5	0	0-1	0	1-5	1	6	2	0-0.1
14	Vanadium (V)	2	0.5	1	0.2-0.5	0	0-0.1	2	0.5	1	0.2-0.5	0	0-0.1	0	0.2-0.5	1	0.5	2	0-0.1
15	Arsenic (As)	2	0.5	1	0.2-0.5	0	0-0.1	2	0.5	1	0.2-0.5	0	0-0.1	0	0.2-0.5	1	0.5	2	0-0.1
16	Oil and petroleum residues	2	20	1	11-20	0	0-10	2	20	1	11-20	0	0-10	0	11-20	1	20	2	0-10
17	Detergents	2	1	1	0.6-1	0	0-0.5	2	1	1	0.6-1	0	0-1.5	0	1.6-3	1	3	2	0-0.5
18	pH	2	15	1	8-14	0	0-7	2	12	1	6-12	0	0-7	0	8-14	1	15	2	0-5.9
19	Turbidity	2	201	1	51-200	0	0-50	1	-	1	-	0	0-50	0	51-200	1	201	2	-

a-Discharge of concentrations more than those speculated in this table is permitted if the effluent does not increase concentration of chloride, sulfate, solutes in the receiving source to more than 10% in a radius of 200 m.
b- Discharge of concentrations more than those speculated in this table is permitted if the ratio of increase in chloride, sulfate, solutes in the receiving source to consumed water does not exceed 10%.
c-The units for all elements are: mg/lit

Table 9. Loss coefficient of soil contaminants

No	contaminant	Industrial area						Natural/recreational areas						Residential areas					
		Loss coefficient	Concentration	Loss coefficient	Concentration	Loss coefficient	Concentration	Loss coefficient	Concentration	Loss coefficient	Concentration	Loss coefficient	Concentration	Loss coefficient	Concentration	Loss coefficient	Concentration	Loss coefficient	Concentration
	Cd	0-12	0	13-24	1	25 ≥	2	0-30	0	31-60	1	61≥	2	0-180	0	181-360	1	361 ≥	2
2	Cu	0-450	0	451-900	1	901≥	2	0-1500	0	1501-3000	1	3000≥	2	0-6000	0	6001-12000	1	12000≥	2
3	As	0-75	0	76-150	1	151≥	2	0-150	0	151-300	1	300 ≥	2	0-600	0	601-1200	1	1200≥	2
4	Hg	0-12	0	13-24	1	25 ≥	2	0-30	0	31-60	1	61≥	2	0-60	0	61-120	1	120 ≥	2
5	Pb	0-600	0	601-1200	1	1200 ≥	2	0-1200	0	1201-2400	1	2400≥	2	0-2100	0	2101-4200	1	2400≥	2
6	Cr^{6+}	0-15	0	15-30	1	31 ≥	2	0-45	0	451-900	1	901≥	2	0-150	0	151-300	1	301 ≥	2
7	Zn	0-900	0	901-1800	1	1801≥	2	0-1800	0	1801-3600	1	3600 ≥	2	0-5000	0	5001-10000	1	10000≥	2
8	Ni	0-300	0	301-600	1	601≥	2	0-600	0	601-1200	1	1200 ≥	2	0-1500	0	1501-3000	1	3000≥	2
9	F	0-800	0	801-1600	1	1600 ≥	2	0-800	0	801-1600	1	1600 ≥	2	0-2000	0	2001-4000	1	4001≥	2
10	Phenol	0-10	0	11-20	1	21≥	2	0-10	0	11-20	1	21 ≥	2	0-50	0	51-100	1	101≥	2
11	B	0-3	0	4-9	1	10 ≥	2	0-3	0	4-9	1	10 ≥	2	0-9	0	10-18	1	19≥	2

a-Discharge of oil and petroleum residues, penetration or spill of hazardous effluents to soil (see Table5) are calculated with loss ratios of 2 or more.
b-The units for all elements are: mg/lit

Table 10. Loss coefficient of air pollutants

Loss Ratio	AQI	NO_2(ppm)	SO_2(ppm)	CO(ppm)	$PM_{2.5}$(mg/m^3)	PM_{10}(mg/m3)	O_3(ppm) 1hour	O_3(ppm) 8hour
0	0-50	-	0-0.034	0-4.4	0-15.4	0-54	-	0-0.069
0	51-100	-	0.035-0.114	4.5-9.4	15.5-65.4	55-154	-	0.07-0.084
1	101-150	-	0.145-0.224	9.5-12.4	65.5-100.4	155-254	0.125-0.164	0.085-0.104
1	151-200	-	0.225-0.304	12.5-15.4	100.5-150.4	255-354	0.165-0.204	0.105-0.124
1	201-300	0.65-1.24	0.305-0.604	15.5-30.4	150.5-250.4	355-424	0.205-0.404	0.125-0.374
2	301-400	1.25-1.64	0.605-0.804	30.5-40.4	250.5-350.4	425-504	0.405-0.504	-
2	401-500	1.65-2.04	0.805-1.004	40.5-50.4	350.5-500.4	505-604	0.505-0.604	-

a-For toxic gases (see table5) emission concentration is calculated depending on loss ratio of 2 or more.

Table 11. Environmental costs of air pollutants (EC)

Pollutant	Wang, Santini& Warinner (1994), US cities	RWDI (2006) 2005 Canadian $	AEA Technology (2005) €/TON	Air Pollutant Costs by Economic Category (2005 Canadian $/ton)
CO				205
$PM_{2.5}$		317000	48000	317000
O_3		1739		1086
PM_{10}	6508			3175
NO_X	4826		7800	934
SO_2	2906		10325	

a- Conversion rate of Euro to USD and GBP to USD are 1.3 and 1.6, respectively.

b-Since toxic gases are high hazardous, loss coefficient is considered to be 2 or more and external environmental costs are calculated based on PM2.5.

frequency of accidents for similar cases, the positions and layouts of different sections of industry, e.g. the distance of storage areas, utilities and production lines, etc and willingness of the insured industry or for the amount of liability converge.

Net environmental liability premium is calculated with regard to total environmental pollution costs and risk number as follow:

$$EPCi = LCi \times ECi \times EVi \quad (2)$$

$$L = \sum_{i=1}^{3} \text{EPCi} \quad (3)$$

$$ELP = L\,(\text{R}/1000) \quad (4)$$

$$NELP = EPL \times CF \quad (5)$$

Where,

NELP= Net Environmental Liability Premium

L= total environmental pollution costs

R= Risk number

CF= correction factor

RESULTS & DISCUSSION

Technically, for confirming applicability of ELIS software, it was applied to an imaginary accident in Tehran Refinery, the results of which are shown as follow:

Tehran Refinery is one of the oldest Iranian refineries, which began operation in 1969 with a capacity of 85,000.00 barrels of refined oil per day. On later stage, its capacity was modified for several times up to 235,000.00 barrels a day. Tehran Refinery accounts for 15% of Iranian refining capacity, meeting major needs of Tehran for fuel. According to Fars News Agency reports, in last two years, production and sales of Tehran Refinery was 14 million cubic meters, sold only to internal customers, exclusively to NIORDC (Research center in brokerage company of Bank of Industry and Mine). Therefore, according to financial statements and sales rate of the company (Tehran Refinery), its revenues are estimated to be 806,120 billion IRR[1], in 2012-2013. Reviewing the present status of Tehran refinery, considering the presence of HSE management system and using tables 1-3 and equation (1) , the risk number will be150,as presented in Table 12.

Fire and explosion in a refinery result in emission of toxic and hazardous gases and other pollutants. Based on conducted studies and referring to Table 5, NO_x،SO-$_x$،H_2S،CO and toxic gases will be produced in such process. If there are 2tons of NO_X،SO_X،H_2S،CO and 10 tons of toxic gases, and given the residential and ecologically sensitive area where Tehran Refinery is located (Table 7), these sensitivity factor is equivalent to 2. Also, the loss ratio is 1for NOX،SO_X،H_2S،CO and 2 for toxic gases (Table 10).

Using Table (11) for environmental costs of air pollution resulting from each ton of NO_X،SO_X،H_2S،CO and toxic gases, ELIS model indicates a loss of 472,000.00$US caused by fire and explosion due to air pollution.

The same procedure can be followed for water and soil pollution damage costs. The net premium was calculated based on air pollution, due to the lack of information on water and soil.

Thus, the net premium for air pollution resulting from fire and explosion in Tehran Refinery is obtained from equations (2) to (5) :

Table 12. Risk number of fire and explosion on Tehran Refinery

Probability of detection (D)	Severity of impact (S)	Probability of occurrence(O)	Risk number (R)
6	5	5	150

$$NELP = L \times (\frac{R}{1000}) \times CF = 4720 \times (150/1000) \times 1 \times 10/100 = 70$$

It should be noted that the maximum possible loss (MPL) considering the emission of all different gases and their environmental economical values (Table 11). From the ELIS software is calculated to be 472,000.00$US and the liability insurance is calculated to be 70 million IRR (70000US$). It should be noted that these figures can be changed with respect to the insured parties for increasing the ceiling of the total insurance coverage.

It should be also noted that due to the lack of access to water, or soil related loss, the premium was calculated .only on the basis of losses arising from air pollution.It is important to notice that the rate of environmental liability insurance premium is not a function of the amount of insured investment, but a function of extent of environmental damages.

CONCLUSION

Today, most human communities are suffering from the pollution and its deleterious impacts, which should also be reflected in insurance industry. Although losses from pollution related to many types of insurance, *'public liability insurance'* falls to a special category in risk classification. Liability concept in association with pollution is somehow different. Hence, the following points are important to be considered:
1.Nature of pollution risks
2.Coverage of such risks by the insurer

In other words, environmental liability insurance is a useful tool to guarantee appropriate risk management of industrial activities. Environmental insurance is a suited solution for attracting investments on protection, management and reclamation of environment. Today, environmental insurance is a legal and economical instrument for the strict monitoring system to improve its efficacy, continuously. Many, view environmental insurance as a good vehicle to ensure reduction of risks and increase environmental safety of industrial machinery via sharing and allocating the resources in compliance with risk management criteria. In recent years, environmental liability insurance (ELI) has been recognized and acknowledged as a world-wide environmental policy. For this reason, ELIS software can provide a pricing process to perform calculations which at the end indicate the premium of environmental liability insurance using all different factors presented in this paper.

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