ANALYSIS AND EVALUATION OF ENVIRONMENTAL RISK IN THE CERAMIC SECTOR

(Application of Experimental Spanish Standard UNE 150008 ex. to a ceramic enterprise)

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INTRODUCTION

The determination of environmental risks and the responsibilities deriving from these are matters of growing interest for every type of organisation.

Different organisms (financial and insurance bodies, public authorities, etc.) are using non-standardised practices to identify, analyse and evaluate the environmental risks of organisations, as well as possible liabilities, to thus have a better understanding of the issues involved when making decisions regarding the granting of credit, setting insurance terms, making investments, buying shares, sale and purchase.

In the European Union, environmental risk is considered in the White Book on Environmental Responsibility. In the IPPC Directive [1] as well, the concept of environmental risk has great importance on being one of the conditioning elements when authorising new activities.

Risk analysis is a line of work that has been functioning for several decades in industrial high risk sectors, such as the petrochemical, nuclear and aeronautical industry. **Environmental risk analysis** is dedicated to identifying, analysing and evaluating risks for the environment with a view to designing effective risk management control, directed towards reducing risks. It is not, however, a system of risk management in itself, but, rather, a management tool such as the Environmental Audit or Life Cycle Analysis.

The appearance of Spanish Experimental Standard UNE 150008 ex. in June 2000 has been intended to unify criteria for conducting environmental risk analysis, on being applicable to any type of organisation.

The object of this work is the application of this standard to the ceramic floor and wall tile manufacturing sector in the province of Castellón (Spain) and, specifically, to two types of companies, one with an ISO 1400:96 certified System of Environmental Management and the other without this certification. The purpose of the study, besides analysing the environmental risks of both organisations, is to be able to determine to which extent the application of a System of Environmental Management favours the reduction of environmental risks.

The following methodology is used:

- General gathering of information on the activity and facilities, (plans, process and flow diagrams, grounds, access roads, supply lines, tanks, storage, wastes, emissions, discharges etc.)
- Selection of elements to be analysed.
- Identification, evaluation and typification of hazards.
- Detailed analysis of hazards and postulation of accidents.
- Analysis and postulation of scenarios and events.
- Estimate of the consequences of the accidents.
- Quantification of risk.
- Acceptability of risk.
- Reduction of risk or preventive measures.
- Design of plans and emergency programs.

The scope of the study encompasses the activities that are conducted in the physical area where the industry is located, i.e., those activities performed by the company, or subcontracted, over which the organisation can have control.

DEFINITIONS:

Following the section of definitions in Standard UNE 150008:2000 EX, and for a better understanding of the work, the basic definitions are set out below.

Accident: Unforeseen event that produces undesired consequences.

Injury: To the effects of the Standard at issue, two types of injury are distinguished:

a) Injury to natural elements: destruction, loss of quality or of utility caused to the earth, to the water, to the air and to the ecosystems.
b) Injury caused as a consequence of the "injury to natural elements ". This, in turn, is broken down into three types

    a. Personal injury: Physical injury, illness, death, physical, mental or moral suffering caused to physical persons.
    b. Material injury: Destruction, wear, breakage or loss of useful value of things (including artistic, historical and cultural heritage) and injury, illness or death caused to animals and plants considered as goods belonging to persons.
    c. Injury to wild flora or fauna: Injury, deterioration, illness or death in animals or plants, as well as deterioration or destruction of their habitats or of the necessary conditions for their reproduction.

Scenario: Physical place of the facility or environment where the initiator event originates and evolves.

Risk estimate: Process by means of which the frequency and probability of the consequences that can derive from the materialisation of risk are determined.

Evaluation of environmental risk: Process of comparison between the estimated risk and the risk criterion.

Hazard identification: Process by means of which the existence of a hazard is recognised and its characteristics are defined.

Environmental indicator: Element of the environment whose state or variation allows establishing the existence or prediction of an effect on the environment.

Facility: This includes the buildings, accesses, grounds, supply networks and transport of any element and any other necessary infrastructure for carrying out the activities of the company.

Environmental hazard: Any property, condition or situation, of a substance or of a system (facility, equipment, etc.) that can cause injury.

Risk evaluation process: Process by means of which the necessary information is obtained so that an organisation is able to make an appropriate decision on the convenience of adopting preventive measures and in such a case, the type of measures that should be adopted.

Risk: Combination of the probability or frequency of materialisation of a certain hazard and the magnitude of its consequences. Thus, Risk = P x I (where P = Probability or frequency and I = Injury or consequences).

Environmental risk: Specific case of risk in which the danger of causing injury to the environment, or to persons or to goods, as a consequence of injury to the environment, is assessed. Thus: Environmental risk = P x EE x V (where P = Probability or frequency, EE = Estimation of Effects and V = Vulnerability of the affected environment)

Event initiator: First event or set of simultaneous events by which an accidental sequence is set off, which goes from the first event to the accident.

REALISATION (METHODOLOGY)

General gathering of information on the activity and facilities: For this we will define the main activity of the company (ceramic production of redware, whiteware, porcelain tile, trims or accessories, etc.), other activities (spray drying, cogeneration, cutting, polishing etc. We will need plans of the facilities (of the industrial facilities, cadaster or land registry), flow diagrams of each unit process, with specification of inputs (materials, energy, natural resources, etc.) and outputs (processed products, wastes, emissions, water discharges, consumption data, etc.).

Plans of position of accesses, electric cables, gas pipelines, collectors and pipes, tanks and storage. Lastly, we will have documentary specifications of products used (including safety sheets on raw materials or hazardous substances), control records of air emissions and periodic analyses, records of wastes and discharge analyses.

Selection of elements to be analysed: For the determination of the range of the element to be analysed, when selecting a very wide range (an entire process, an entire section, an entire plant), we can lose of sight of aspects that would be more evident in a smaller range. It is preferable to carry out the analysis by stages or process steps. We should not forget the analysis of activities such as maintenance, waste processing, management and any other activity not directly related with the production process.

1.IDENTIFICATION, EVALUATION AND TYPIFICATION OF HAZARDS:

Standard UNE 150008:2000 EX. indicates that analysis and identification are required of possible sources of hazard (source diagnosis), the environment (environmental diagnosis), as well as identification of all possible accident initiator events and lastly, accident prevention and / or mitigation measures.

1.1. Detailed analysis of hazards and postulation of accidents:

Once the general hazards have been identified, we will enter into detail on each one of these and determine the possible related accidents.

<u>Source diagnosis: Substances:</u> We will thus identify hazards related to the substances used, raw materials and auxiliary materials, by-products and intermediate and final products, their harmful, toxic, inflammable character, hazard for persons or the environment, their physico-chemical and toxicological characteristics in terms of storage or handling conditions, synergies or incompatibilities. We need to establish a criterion of hazard, relating the hazard of a substance to its quantity; for instance, drinking water could produce an environmental accident if large quantities were involved (e.g. 1000 m^3) or a very toxic substance could cause an accident even though small quantities were involved (e.g. lead).

<u>Source diagnosis: Storage</u>: We will identify all the areas where substances are stored, especially considering those that are hazardous. We will verify storage conditions, that is: physical state, pressure, temperature, storage form, bags, big-bags, silos, tanks, drums, stockpiles, loading, unloading and conveying processes, storage enclosure, covered, in the open air, on an insulated floor, on the bare ground, safety elements, incompatible storage, etc.

<u>Source diagnosis: Processes</u>: We will document all the processes that could have some environmental impact, including the equipment involved, their possible shortcomings, conditions of the environment, human errors, process automation, control systems, operating frequency, possible accidents.

<u>Source diagnosis: Management of the facilities</u>: We will verify compliance with applicable environmental legal requirements on the activity, processes, products and services, as well as the method used by the organisation to update and verify compliance with these requirements. We will identify the level of training of personnel involved in work with a possible environmental impact, documentation on equipment, labour conditions, safety measures, responsibilities as regards security and the conditions of order and cleanliness.

Source diagnosis: Waste management; wastes, discharges and emissions:

Emissions: Identifying emission points and sources, including scattered sources. To verify the emission control and analysis system, compliance with applicable legislation with regard to analysis frequency, polluting elements and their concentration, records on emissions, other controls. If legally requirable, verification of surveillance of the immissions and dispersion studies.

Discharges: We will verify if discharges take place: if there were no discharges, we would verify the appropriate separation of industrial wastewater, sanitary and rain water streams, the possible extraction of pollutants deposited in the soil by the rain and/or wind, and stockpiles of materials on the bare ground. If water discharges occur, verify: authorisation for discharges and required conditions, compliance with conditions, if minimisation actions have been taken into account, separation of the different wastewater streams, treatment facilities, point of discharge to the exterior, analysis of those discharges in accordance with the conditions laid down in discharge permits, tank holding capacity (if there are any tanks), state of maintenance, cleaning and fitness of the collector network.

Wastes: We will verify the existence of minimisation plans, as well as the impact on the receptor environment (state and conditioning of stores for wastes or their storage on the ground and state of the ground). Management of wastes that can join urban refuse and inert waste. Management of hazardous wastes. It should be verified whether: all the operations are carried out with the appropriate safety measures, appropriate storage, conditions of hazardous waste containers or packing, labelling according to enforceable law and the temporary waste storage. Transfer of hazardous waste ownership, delivery to authorised waste managers, documents on entry, control, monitoring and verification of completion of legal documents. Records of hazardous wastes, verification of compliance with enforceable law and up-to-date records.

Source diagnosis: State of the soils: According to the activity of the company and past and present activities at the location, to determine the possible effects on the soil. Spillages, former practices, burial of wastes (including wastes that could be added to urban refuse and inert waste), soil protection by roofing constructions, buried facilities (old fuel-oil or gas-oil tanks, sludge tanks), facilities that could affect soils (collector networks, sludge tanks, loading and unloading operations)

Source diagnosis: Noise, smells, light, electromagnetic and radioactive contamination: If required, analyse their compliance with enforceable law or preventive criteria.

Source diagnosis: Auxiliary facilities and infrastructures: Such as cooling equipment, process water, vacuum equipment, compressors, air cleaning equipment, filters, wastewater treatment facilities, transformers, etc.

Source diagnosis: Human error: This is one of the most frequent sources of hazard and, at the same time, one of the most difficult to evaluate. Among the causes of human error we find: exhaustion (excessive overwork), lack of training for assigned work (to cover unforeseen personnel absences), lack of motivation, inadequately defined communication channels, etc.

1.2. List of accident initiator events:

Once all the possible accident sources have been determined, a list will be drawn up detailing these and the main accident initiating events and their causes. Those that are excluded need to be justified. Examples of event initiators are: fire, spillage of substances inside the facilities, spillages outside the facilities, emissions, immissions, etc. Examples of causes are: breaking of equipment, collisions, break downs, overflows, loss of watertightness, operating errors, human error, unknown causes, etc.

1.3. Existing measures for prevention and/or repair:

The measures will be listed, which the company has in place to avoid each event initiator from taking place and those which, if the accident happened, would be available to control and/or relieve its consequences. Examples of existing measures are: Physical barriers, containing systems, border drainage, preventive maintenance of facilities and equipment, controls, detectors and alarms, operational procedures, signals, etc.

1.4. Diagnosis of the environment

1.4.1. Hazards deriving from the location of the facility:

We will consider the effects on three elements, the natural environment, the human environment and the socioeconomic environment.

We will select the impact indicators for each environment; these indicators will allow establishing the impact or effect on the environment. Examples of indicators for each element capable of being impacted follow.

Indicators of the natural environment: These are divide into three groups, inert or abiotic environment, biotic environment and other indicators.

Examples of the first group are: Alteration of climatic conditions (of microclimates or micro reservations of interest), alterations of physico-chemical characteristics of the air in relation to those of the zone (quality, noise, smells, exhaust gases), effects on the quantity or quality of the waters, modifications of the soil (uses, dumping, natural barriers, vicinity to stream beds, etc.)

Examples of the second group are: Effects on the fauna, flora and structure of the ecosystems.

Other indicators are for instance: Effects on the landscape and impacts on protected natural spaces.

Indicators of the human environment: Those will be evaluated that affect the population which, in turn, produce added environmental effects. Examples: Demographic alterations on urban, residential or rural areas, effects on town planning; and we will evaluate the effects on public health, effects on morbidity, changes in common illnesses in the area, epidemiology, etc.

Indicators of the socioeconomic environment: We will divide these into three groups, economic activities, infrastructures and historical and cultural heritage.

With regard to the economic activities we can consider the effects caused by the activity on agricultural activities, cattle farming, forestry, fishing, industries, tourism and other activities conducted in the area.

With regard to infrastructures we will monitor impacts on transport and communication networks (including livestock travelling routes), waste collection and storage systems, energy supply and transport, water supply and telecommunications infrastructures.

Lastly there are the effects on the historical and cultural heritage, which would be centred on impacts on monuments, works of art, archaeological remains, etc.

1.5.- Diagnosis of the hazards deriving from the environment on the facility:

The influence of the environment on the facility can be a source of hazards that should be identified in a proper study. The following can be identified: Natural hazards such as: earthquakes, flash floods, flooding, torrential rains, hurricane winds, lightning, etc.

Technological hazards: nearby industrial facilities of risk, infrastructures, transport systems, chemical products, etc. Technological hazards: nearby industrial facilities of risk, infrastructures, transport systems, chemical products, etc.

Social hazards: riots, attacks, war, sabotage, epidemics

Hazards deriving from the type of life led: drug, alcohol and tobacco use or consumption, stress, etc.

2.- ESTIMATE OF ENVIRONMENTAL RISK

After identifying the potential sources of environmental hazards, we will perform an estimate of the probabilities or frequency of occurrence, which according to the characteristics of the environment and the arising consequences will allow estimating the environmental risk of each event and finally of the whole facility.

According to Standard UNE 150008:2000 EX, three areas will be established for determining the consequences: Consequences on the natural environment, on the human environment and on the environment socioeconomic.

In order to consider all the accident possibilities, a certain initiator should be determined for each event, with all the possible resulting scenarios. Given the range of events and scenarios that appear in the study (an "event-tree" is used as a tool); for each event we will consider two possible scenarios, the most serious and the most likely.

2.1.- Estimate of the probability / frequency of a given scenario:

In view of the hazards identified, based on experience, historical data and other sources, we have assigned the following criteria:

	Extremely probable	< once a month	**5**
Once a month	> highly probable	> once a year	**4**
Once a year	> probable	> once every 10 years	**3**
Once every 10 years	> possible	> once every 50 years	**2**
Once every 50 yearss	> improbable		**1**

2.2.- *Estimate of consequences:*

We estimate the consequences or injury that each scenario produces in the environment, applying the following tables (hazard is multiplied by 2 to highlight it)

Effects on the natural environment = quantity + 2 x hazard + extent + quality of the environment

Effects on the human environment = quantity + 2 x hazard + extent + affected population

Effects on the socioeconomic environment = quantity + 2 x hazard + extent + assets and production capital.

where: Quantity = quantity of substance released into the environment (ranging from 4 = high to 1 = small)

Hazard = intrinsic hazard of the substance; harmful, toxic, cumulative, etc. (ranging from 4 = high to 1 = small)

Extent = environmental area affected or persons affected by the impact (ranging from 4 = high to 1 = small)

Quality of the environment = ranging from 4 = high, space protected to any degree and 1 = low quality

Affected population = more than 100 persons = 4, between 25 and 100 = 3, between 5 and 25 = 2 and fewer = 1

We thus find values between 5 and 20

Gravity will be evaluated in function of the following values:

	Evaluation	**Value**
Critical	Between 20-18	Gravity 5
Grave	Between 17-15	Gravity 4
Moderate	Between 14-11	Gravity 3
Light	Between 10-8	Gravity 2
Negligible	Between 7-5	Gravity 1

2.3.- Risk estimate:

Once the frequencies or probabilities of the different scenarios and possible consequences on the three possible environments have been determined, the risk estimate is made.

For each scenario the probability (between 1 and 5) is multiplied by the gravity of the consequences (between 1 and 5) obtaining a value between 1 and 25, 25 being the highest risk. This is for each of the analysed environments. This gives three risk estimate values (one for each environment) and an overall value (the sum of these), giving the total risk for each scenario.

2.4.- Evaluation of environmental risks:

Finally, three tables have been drawn up (one for each environment) indicating on their axes the probability or frequency of a scenario occurring and its gravity (both values range from 1 to 5). In these tables, all the possible scenarios detected including their risk evaluation are specified for each environment,.

Examples of identified sources of hazard:

RAW AND AUXILIARY MATERIALS
Spray-dried powder
Glazes
Frits
Wastewater facility additives
Screen printing vehicles
Screen prints
Ceramic pigments
Cleaning products
Lubricants
Laboratory reagents
Chemical products for printing screens
Photographic chemical products

STORAGE
Gas-oil tank
Raw materials store
Packing store
Lubricant store

PROCESSES
Spray-dried powder reception
Press feed
Pressing
Drying
Glazing
Decorating
Firing
Sorting
Cutting
Maintenance
Glaze preparation
Screen preparation
Photolitho filming
Palletising

MANAGEMENT OF FACILITIES
Exhaustion of personnel
Training or refreshing skills
Lack of motivation
Poor maintenance
Inadequacies in communication
Absence of order and cleanliness
Unfamiliarity with legal requirements
Labour conditions

WASTES
Combustion and drying gases
Used oils
Dust
Volatile organic compounds
Sanitary waters
Process wastewater
ceramic sludges
Refuse
Solvents
Photographic reagents
Mercury
HW packing
Non-HP packing
Contaminated absorbents
Fluorescent tubes
Vehicle batteries
Batteries
Oil filters
Bag filters
Aerosols
Contaminated cloths and cotton wool

SOILS
Permeable soil
Sloping ground

NOISES AND SMELLS
Press noise
Co-generation plant
Glaze preparation
Glazing
Wastewater treatment facility

AUXILIARY FACILITIES
Sludge tank
Air cleaning equipment
Boilers
Wastewater treatment facility
Co-generation
Transformers
Sewerage system
Gas pipeline
Process water pipes
Sanitary water pipes

Examples of possible identified initiator events (accidents):

Internal discharge
External discharge
Overflow
Spillages
Explosion
Fire
Emissions
Immissions
Noise
Smells
Transport accident
Handling accident
Storage accident
Accident in use
Ground filtration
Failure in pipelines

Examples of originating causes:

Breakage
Holes/cracks
Equipment breakdown
Failure in gaskets and connections
Failure in pumps, compressors, fans.
Handling accident
Human error
Torrential rains
Flooding
Strong winds
Extreme heat
Sinking ground

Failure in safety systems
Imprudence
Poor conditioning
Poor maintenance
Lack of training
Other natural risks
Unfamiliarity with legal requirements
Lack of order and cleanliness
Interaction of various factors
Unknown

Examples of possible identified scenarios:

A series of "standard" scenarios has been identified, which in no case claims to be complete or exclusive. It is necessary to keep in mind that possible scenarios vary from company to company, requiring the application of values such as their geographical situation, facilities, conditioning of the industrial grounds, worker training, existence or non-existence of Management Systems (Quality or Environmental), etc.

Permeable soil
Impermeable soil
Containers for waste discharges
Existence of emergency plans
Availability of containing equipment
Suitable training
Existence of signs
Operating control
Day of occurrence (weekend or working day)
Detection time (greater or lesser)
With rainwater collectors
Without rainwater collectors
With process water collector
Without process water collector
Emission into the facility
Emission outside the facility
Distance to the population
Type of adjacent companies
Type of adjacent grounds
Proximity to reservoirs, water streams, gullies
Hazard of the substance
Quantity of the substance involved
Accident duration time
Risk situation (internal or external)

HAZARD SOURCE	INITIATOR EVENT	CAUSE	POSSIBLE SCENARIOS	PROBABILITY/FREQUENCY
RAW MATERIALS USE				
Glazes	Spillage	Handling accident	Permeable soil	5
			Impermeable soil	4
			Risk situation	3
			Hazard of the substance	3
			Existence of containing measures	1
			....	
STORAGE				
Gas-oil tank	Ground filtration	Human error	Permeable soil	2
			Impermeable soil	4
			Risk situation	3
			Hazard of the substance	5
			Existence of containing measures	2
			Operating control	1
			.....	
AUX. FACILITIES				
Sludge tanks	Overflow	Rupture	.....	
		Torrential rains	.....	
		Equipment breakdown	.....	
		Poor maintenance	.....	
		Human error	.....	

ASSUMED SPILLAGE OF A STOCK OF GLAZE DURING TRANSPORT FROM THE DELIVERY VEHICLE TO THE GLAZE PREPARATION AREA. COMPANY LOCATED IN AN INDUSTRIAL AREA, ADJACENT TO OTHER COMPANIES FROM THE SAME SECTOR. THE VEHICLE IS OUTSIDE THE PLANT. THE GROUND IS NOT PAVED WITH ASPHALT. THE GLAZE IS CLASSIFIED BY THE SUPPLIER AS HARMFUL (Scenario 1) AS TOXIC (Scenario 2).

Working out the example: HAZARD SOURCE: Raw materials use - Glazes

EVENT: Spillage

CAUSE: Handling accident

POSSIBLE SCENARIOS: E_1 = Permeable soil

E_2 = Impermeable soil

E_3 = Risk situation

E_4 = Hazardous

E_5 = Existencia de medidas de contención

E_1 = Permeable soil

ESTIMATE OF THE CONSEQUENCES ON														
NATURAL ENVIRONMENT					HUMAN ENVIRONMENT					SOCIOECONOMIC ENVIRONMENT				
QUANTITY	HAZARD	EXTENT	QUALITY OF THE ENVIRON.	VALUE	QUANTITY	HAZARD	EXTENT	POP. AFFECTED	VALUE	QUANTITY	HAZARD	EXTENT	ASSETS AND PRODUCTION CAPITAL	VALUE
2	3	2	3	13	2	3	2	2	12	2	3	2	1	11

E_1 = Permeable soil

ESTIMATE OF THE CONSEQUENCES ON														
NATURAL ENVIRONMENT					HUMAN ENVIRONMENT					SOCIOECONOMIC ENVIRONMENT				
QUANTITY	HAZARD	EXTENT	QUALITY OF THE ENVIRON	VALUE	QUANTITY	HAZARD	EXTENT	POP. AFFECTED	VALUE	QUANTITY	HAZARD	EXTENT	ASSETS AND PRODUCTION CAPITAL	VALUE
3	4	2	1	14	3	4	2	2	15	3	4	2	1	14

E_2 = Impermeable soil — Greater quantity — Glaze classified by supplier as toxic (lead content exceeding 5%)

ESTIMATE OF GRAVITY OF THE CONSEQUENCES						RISK ESTIMATE			
NATURAL ENVIRONMENT		HUMAN ENVIRONMENT		SOCIOECONOMIC ENVIRONMENT					
EVALUATION	ASSIGNED VALUE	EVALUATION	ASSIGNED VALUE	EVALUATION	ASSIGNED VALUE	NATURAL ENVIRONMENT	HUMAN ENVIRONMENT	SOCIOECONOMIC ENVIRONMENT	OVERALL
MODERATE	3	MODERATE	3	MODERATE	3	12	12	12	36
MODERATE	3	GRAVE	4	MODERATE	3	15	20	15	50

RISK EVALUATION		
Very high risk	De 21 a 25	
High risk	De 16 a 20	
Medium risk	De 11 a 15	
Moderate risk	De 6 a 10	
Low risk	De 1 a 5	

RISK EVALUATION			
ENVIRONMENT NATURAL	HUMAN ENVIRONMENT	**SOCIOECONOMIC ENVIRONMENT**	OVERALL
E_1 MEDIUM RISK	E_1 MEDIUM RISK	E_1 MEDIUM RISK	E_1 MEDIUM RISK
E_2 MEDIUM RISK	E_2 HIGH RISK	E_2 MEDIUM RISK	E_2 HIGH RISK

Risk for the natural environment:

Gravity Probability	1	2	3	4	5
1					
2					
3					
4			E_1		
5			E_2		

Risk for the human environment:

Gravity Probability	1	2	3	4	5
1					
2					
3					
4			E_1		
5				E_2	

Risk for the socioeconomic environment:

Gravity Probability	1	2	3	4	5
1					
2					
3					
4			E_1		
5			E_2		

					ESTIMATE OF THE CONSEQUENCES ON...										
					NATURAL ENVIRONMENT					HUMAN ENVIRONMENT					
SOURCE DANGER	EVENT INITIATOR	CAUSE	POSSIBLE SCENES	PROBABILITY / FREQUENCY	QUANTITY	DANGER	EXTENSION	QUALITY OF THE ENVIRON	VALUE	QUANTITY	DANGER	EXTENSION	POP. AFFECTED	VALUE	QU
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						ESTIMATE OF GRAVITY OF THE CONSEQUENCES													
	SOCIOECONOMIC ENVIRONMENT					NATURAL ENVIRONMENT		HUMAN ENVIRONMENT		SOCIOECONOMIC ENVIRONMENT		RISK EVALUATION				RISK EVALUATION			
LUE	QUANTITY	DANGER	EXTENSION	ASSETS. AND PRODUCTION CAPITAL	VALUE	VALUATION	ASSIGNED VALUATION	VALUATION	ASSIGNED VALUATION	VALUATION	ASSIGNED VALUATION	NATURAL ENVIRONMENT	HUMAN ENVIRONMENT	SOCIOECONOMIC ENVIRONMENT	GLOBAL	NATURAL ENVIRONMENT	HUMAN ENVIRONMENT	SOCIOECONOMIC ENVIRONMENT	GLOBAL
0					0	REVIEW VALUATION	0	REVIEW VALUATION	0	REVIEW VALUATION	0	0	0	0	0	REVIEW VALUATION	REVIEW VALUATION	REVIEW VALUATION	REVIEW VALUATION
0					0	REVIEW VALUATION	0	REVIEW VALUATION	0	REVIEW VALUATION	0	0	0	0	0	REVIEW VALUATION	REVIEW VALUATION	REVIEW VALUATION	REVIEW VALUATION
0					0	REVIEW VALUATION	0	REVIEW VALUATION	0	REVIEW VALUATION	0	0	0	0	0	REVIEW VALUATION	REVIEW VALUATION	REVIEW VALUATION	REVIEW VALUATION
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CONCLUSIONS:

The application of the methodology described in Standard UNE 150008:2000 EX. for "Analysis and evaluation of environmental risk" provides small and medium-size companies with a tool that facilitates the detection of critical elements in connection with their environmental behaviour and provides a standard system for upgrading the analysis of their environmental risks.

This tool can be used for the development of the ISO 14001:96 "Emergency plans and response capacity" requirement as verification of accident possibilities that could impact the environment, and the preparation of emergency plans or operating control procedures to control and / or reduce such accidents.

In view of the forthcoming appearance of legislation on environmental civil liability, whose bill contains annexes that also refer to the obligation of ceramic industries to take out insurance, this Standard becomes a highly useful tool for insurance companies to determine the environmental risk of an activity, as well as for the industry in detecting, controlling and reducing risk and, therefore, of reducing insurance premiums.

The present work has been applied to two types of company, one certified by Standard ISO 14001:96 and the other one engaged in the certification process. As an "event-tree methodology, on determining an event initiator and several possible causes, a multitude of possible scenarios materialises, which cannot be entered into in detail in a summary of this type. The paper has set out the principal elements and presented an example of the use of the tool for a better understanding.

[1] Council Directive 96 / 61 / CE, on integrated pollution prevention and control..