A Performance evaluation of the human barriers security - application of omega 20 method

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Abstract

The majority of the food companies are on the way to work outsteps, the interrogation on the concept of security is not new, it exists since the origins of humanity but was accentuated as of the advent of the industrial era. To control the industrial risks, one consequently developed many systems and safety measures active of the simple sensitizing until the most complex systems of prevention and intervention, amongst other things the instrumented system of security .So undeniable progress was recorded, the results in security seem to reach a threshold which requires, to be crossed, a true taking into account of the human factors and organizational. Moreover, if the interest of the companies for the security is perpetual, the current context remains largely marked by, on the one hand, the strong technical culture available to these companies ; in addition, the negligence of the human factors and organizational , and yet all the industrialists agree to regard the man as a probable factor of error and/or as a primary cause of the major accidents: more than 70% of the industrial accidents are due to a human error a Though there are several causes which could explain the negligence of the human factors and organizational , we believe that the main cause consists of the scarcity of practical and simple methods which can be applied even by technicians no according to the statistics of the major accidents. Though there are several causes which could explain the negligence of the human factors and organisational, we believe that the main cause consists of the scarcity of practical and simple methods which can be applied even by technicians no specialists in the human factors. Nevertheless, these methods must be ready to determine these factors in particular the human one in all its complexity and all its dimensions (physics, psychological, cultural, religious, etc.) like its work environment, its formations and qualifications. Beyond these causes, we make the general assumption here that the adaptation of a method evaluation of the performance of the human barriers of security jointly to the other mainly technical methods could bring us to an exhaustive evaluation of the performance of the safety fences. Use font size 11 for the abstract text. It should not be exceeding 200 words.

Keywords: Human barriers of security , industrial risks , the human barriers evaluation , method omega20

1. Introduction

The evaluation of the human barriers of security cannot be summarized with the simple evaluation of human competences. Their reliability does not depend solely on the men in charge of their implementation, it also rises from the situations conceived, arranged or organized to enable them to fulfill their mission. As opposed to what can imply the expression" human reliability ", human reliability is not reducible with the only reliability of the only human component. It is actually that of the man taken in his environment, by complex nature (equipment, procedural, organisational, cultural…). Human reliability depends on these various factors human and environmental, of their complementarity and their influences on the various processes concerned in the work of the men (cognitive, emotional, sociological, physical,…). For a given situation, it is a question of identifying the most determining factors with respect to the success of the task of human security considered and of characterizing them according to the assistance that they bring to the man to fulfill his mission (factors of assistance), or threats which they make weigh on the success of this one (disturbing factors) [Rasmussen J.1986]. The evaluation of the human barriers of security cannot be summarized either with the simple evaluation of the safety regulations as presented in the procedures. Indeed, the work of the man is different from the simple application from prescribed rules: it consists into cubes adjustments permanent, more or less important, and more or less conscious, compared to these rules being able to lead according to the cases to inappropriate actions or to actions favorable to the security. The mechanical application by the man of the safety regulations is not possible: indeed, these rules make irremediably the object of an interpretation on behalf of the man, according in particular to its experiment and context of the situation. Moreover, the situations of work are by nature singular, taking into account their variability in particular in terms of requirements of exploitation, organisational constraints or technical resources. This variability, by excluding the possibility of to envisage in their exhaustiveness all the situations of work, confirms the impossibility of a mechanical application by the man of the safety regulations. The evaluation of the human barriers of security thus implies a work of qualitative analysis of the real methods of their implementation, taking into account in particular knowledge of the agents concerned and their work conditions. This approach thus fits in an ergonomic approach of the situations of work. The human factor is a body of knowledge resulting from various social sciences and technology which allow the adequacy between the man and his task. human reliability is a science of the failures of the man [Villemeur 88]. The EEC defines it as the body of knowledge concerning the prediction, the analysis and the reduction of the human error while being focused on the role of the man in the operations of design, maintenance and management of the systems sociotechnic.
[Leplat,J.1988]. According to various research in this field, one finds several explanation of this concept of human reliability, showing and defining much more his role in safeguarding of the man in the syst-my industrialists:

- According to Nicolet and Cellier : The Humain Reliability is the probability that an individual, a team or a human organization achieve a mission under conditions given inside acceptable limits for a certain length of time. Sociotechnic reliability.
- According to Leplat: human reliability is the aptitude of an operator man to carry out necessary tasks under requirements and not to carry out tasks suitable for degrade the performances of the system.
- According to Miller: It is the probability for an operator man of carrying out tasks required under requirements and of not carrying out tasks suitable for degrade the performances of the system.

Indeed, the term "human error" covers several significances according to the angle under which she is seen. The diversity from the points of view is related to the multiplicity of the disciplines which analyze it (psychology, ergonomics, engineering…).
In the field of work, Rasmussen (1983) defines the human error as being the negative counterpart of the human activity, likely to lead to a failure of the operator.
The definition adopted by Leplat (1985) is founded on the analysis of the activity within work; the error thus seems like a characteristic of the activity or consequence of this one. The error thus constitutes revealing or a symptom of the activity. It results in an action unsuited on the system, action which will not succeed in making the results in conformity with the goal.
Villemeur (1988) defines it as a deviation compared to an action, with a sequence of actions or a strategy presumedly optimal and being used as reference. It results from dysfunctions on the level as of sensory, mental activities or physics of the human operator. It is a difference between the behavior the operator and what he should have been.

2. Methods of analysis of human reliability:

There exist a large number of methods evaluation of human reliability. Studies conducted by experts confirm the presence of at least 70 methodologies relating to the evaluation of human reliability. According to the difference that there is between these methods, it is frequent to classify these methods in 3 families or generations of methods according to the subjacent ideal models:

• Methods of 1st generation: Centered on "the human error" comparing the individual to an element among others of the technical system (model mechanist of the individual). These methods aim at identifying the human failures, dependent on a context. These methods propose a approach of simple characterization of the contexts of the human missions in reference to a set of generic tasks and/or of factors of context (examples: defects of procedure, or formation or indications) with which coefficients or probabilities of failure are associated. [Ineris,Ω20] Examples of methods of 1st generation:

- Therp (Technique for Human Error Rate Prediction), Swain, 1963.
- Teseo (Technica Empirica Stima Errori Operatori), Bello and Colombari, 1980.
- Slim (Success Likelihood Index Method), Embrey, 1983.
- Heart (Human Error Assessment and Reduction Technique), Williams, 1985.
- HCR (Human Cognitive Reliability), Hannaman and al, 1984.

- Methods of 2nd generation: The methods of the 2nd generation are interested more in the cognitive processes making it possible to explain and predict the human failures. Based on a more systemic approach, these methods more make it possible to take into account the existence of a certain dependence between the various factors of context.

Examples of methods of 2nd generation:

- Cream (Cognitive Reliability and Error Analysis Method), Hollnagel, 1998.
- Atheana (A Technique for Human Event Analysis), Cooper and al, 1996.
- Mermos (Méthode d'Évaluation de la Réalisation des Missions Opérateur pour la Sûreté), le Bot and al, 1998.

• Methods of 3rd generation: One 3rd generation of methods starts to appear, being distinguished from both others by a more important taking into account of the organisational environment of work likely to lead and force the individual with the error.

Examples of methods of 3rd generation:

- Wpam (Work Process Analysis Model), Davoudian, 1994.
- Fram (Functional Resonance Analysis Method), Hollnagel, 2004.
- Bora (Barrier- and Operational Risk Analysis), Aven et al., 2004.
- Omega 20 (Évaluation de performance des barrières humaines de sécurité), Ineris 2006.

3. Concept of barrier to the human barrier of security:

These barriers are called "barriers of checking". Those which take seat with the course (or downstream) of the activity or the process likely to present accident risks major and whose function of security will be to detect a drift envisaged and to act in order to limit its consequences. The action of these barriers falls under the kinetics of the incidental or accidental sequence. The detection of the drift can be realized at various stages of the dangerous activity: by These barriers "barriers of correction are called" .exemple very upstream of the dreaded event like certain rounds of monitoring and inspection campaigns of the equipment or downstream from the dreaded event like the corrections of drift of processes (intervention on rise in abnormal temperature of an engine) or even downstream from dangerous phenomenon (intervention on a case of fire). [Miche,E.2009]

4. Principles of human job evaluation of security by the method omega 20:

The method Omega 20 was conceived for more a large number of barriers. For teaching reasons, it was elaborate starting from a vision of the work of the man close to the operation of the instrumented systems of security.

Indeed, Omega 20 considers that the man is composed of three systems: a sensory system, a cognitive system and a driving system. With the image of the instrumented systems, we suppose that these systems intervene successively in acquisition and the information processing, the decision making and the production of a behavior of security. [Ineris Ω20.2009]

• Detection (or obtaining information): It is a question of obtaining one or more information making it possible to identify or detect a failure or a drift being able to lead to a major accident or the phenomenon in itself. The operator can play a more or less active part in obtaining this/this informations.

• Diagnosis allowing the choice of the action of safety: It is a question of producing a diagnosis from one or of the information obtained at the conclusion of the previous phase and of making the choice of the action of safety which will have to be realized.
• Action: It is of an action (or a sequence of actions) manual or relayed by a technical system which, under condition of its effectiveness, is opposed to the scenario of major accident envisaged (actions on a safety member or an element attacker of the installation).

4.1. Principles of evaluation of work environment:

The method Omega 20 regards the man as a user of the resources and means (in time, competences, information…) placed at its disposal to allow him to fulfill its missions. She proposes a approach aiming at evaluating the adequacy or the sufficiency of these means with respect to the objectives to reach. We chose the application of the method omega 20 because it joins together the aspect of the man and the safety fence. Omega 20 proposes to carry out this evaluation starting from a whole of the general determining human reliability, characteristics or descriptions of the conditions and the environment of the work of operators, and selected factors for their relevance with respect to more a large number of interventions or tasks of securities "determining factors" essentially relate to the relationship between a signal or information, the men and the actions of safety to be realized:
• Presentation and access of information
•Availability of the operator.
• Quality of the useful information to the diagnosis.
• Level of guidance for the choice of the action.
• Level of stress in the context of the action.
• Level and complexity standard of the action.
The identification of these factors (or determining factors) is a exercise which requires to know the situations of work concerned well, so much from the point of view of than it is necessary in term of security (ex: closing of a valve) that from the point of view of the work of the implied operators, such as they usually carry out it, including in certain degraded situations. It is by the game of the comparison between the situations of work such as they are provided and the situations of work such as they are really managed that it is possible to highlight the factors facilitating or disturbing the realization of the missions of security entrusted to the men.

4.2. Methodology of the method omega 20:

The application of the method Omega 20 understands initially a qualitative analysis carried out in working group requiring an effort of data collection on the situation of work studied. The collected data initially make it possible "to select" the barrier by making sure that it satisfies the three following minimal criteria:
. • Independence.
• Effectiveness.
• Response time.
Once "selected", the barrier is evaluated for its contribution to the reduction of the accident risks. This evaluation is carried out T through the criterion of the degree of confidence.
[De Dianous, N .2008]

4.3. Performance evaluation of the human barriers of security: degree of confidence "NC":

The method suggested applies that the optimal degree of confidence of a barrier is of 2 (10-2 ≥ PFD ≥ 10-3) and that this level decrease since the requirements related to the three sub-functions (obtaining information, treatment allowing the choice of the action and realization of the action) composing the function of safety ensured by the barrier are partially or not satisfied.
The method requires the examination of three tables (a table by sub-function) then the examination of the minimal conditions of taking into account of the BHS when it utilizes several actors. The degree of confidence retained for the human barrier of security corresponds to the difference between the optimal degree of confidence [Miche,E 2008] and summons it rebates on the three tables corresponding to each sub-function. It will be null if the minimal conditions to take into account are not observed.

Table .1 : Correspondence between degree of confidence, probability of failure and the factor of reduction of the risk [Ineris , Ω 20.2009]

PFD	**NC**	**Factor of reduction of the risk**
$10^{-3} \leq PFD < 10^{-2}$	2	100
$10^{-2} \leq PFD < 10^{-1}$	1	10
$PFD \geq 10^{-1}$	0	1

The paragraphs which follow present indicative tables to evaluate the adequate level of rebate. For each sub-function, the tables indicate two types of requirements to be filled out to ensure an optimal level of performance. In a practical way, the application of these tables is done in the following way:

- A worthless rebate is obtained provided that each of the two requirements for the success of the task are satisfied.
- An intermediate rebate is obtained (- 1) when at least one of the two requirements for the success of the task is only fairly satisfied.
- A maximum rebate is obtained (- 2) since one of the two requirements for the success of the task is not satisfied

The choice of a rebate is carried out on the basis of qualitative judgement built by the people of the working group taking part in the performance evaluation of the barrier. The choice of the rebate is based in particular on the identification which will have been made factors of assistance or disturbing factors determining with respect to the success of the task of evaluated security:

• First sub-function: obtaining information

Within the framework of this first sub-function, the activity of the operator can be of different nature. Two cases arise:

• The operator plays a “passive” role: the operator is alerted or solicited by the arrival of fortuitous information (alarm envisaged, physical phenomenon,…) ; the arrival of information can come to stop the activity in progress.

• The operator plays an “active” role: he must engage in a planned activity (for example a phase of monitoring, a round,…) of risk prevention whose finality is obtaining one or more information enabling him to detect anomalie or a drift of the process. The term “information” has a rather broad connotation, it includes in particular the value of a parameter of operation, a physical measurement, the characterization of a state (seals or not tight, closed valve or not, held or not in pressure…), etc

“Detection passivates”/ Table .2 : Estimate of the degree of confidence on the sub-function of obtaining information (case of detection passivates) [Ineris,Ω 20.2009]

rebate	**Characteristic of the situation of work**
0	Clearly perceptible and identifiable information: Information available in a hierarchical way (for example: visual and sound dedicated alarm clearly distinct from the other types of alarms) giving the state of the system, whatever the environmental conditions (night, fog,…) who would be likely to prevent or obstruct the perception of this information. And Total availability of the operator: The operator is present at the place where information is available and it can stop any other activity in progress. The work conditions are favorable to the maintenance of a good level of vigilance.
-1	Perceptible and identifiable information with a moderate difficulty: Information available in a way not hierarchical in the middle of a limited number of other Information. And/Or Availability of the operator: The operator is present at the place where information is available and it can have to manage an acceptable number of other tasks at the same time without reconsideration of his capacities of perception.
-2	Not easily perceptible and identifiable information: Information drowned among other information, or not easily detectable information (localization of information not adapted to the activity of the operator, perception being able to prove to be difficult, in particular under certain environmental conditions or the framework of the course of the scenario). Or Low availability of the operator: The operator is seldom present at the place where information is available or it is present in a nonforeseeable random way or it can have to manage a significant number of tasks at the same time.

“Detection activates”/ Table .3 : Estimate of the degree of confidence on the sub-function of obtaining information (case of detection activates) [Ineris,Ω 20.2009]

rebate	**Characteristic of the situation of work**
0	Facility of obtaining/information (S) required (S): Identification or obtaining simple information (clearly identifiable information, not of possible confusion,…) compared to the qualification level expected of the operator and work conditions considered to be nonconstraining (favorable environmental conditions, good accessibility with information…). **And** Total availability and commitment of the operator: This task is a planned activity, dimensioned well in the workload of the operator, and perceived like priority by the operator. This one has a sufficient manoeuvre margin to cope with possible risks without compromising the realization of the task under the requirements.
-1	Conditions of obtaining/information (S) required (S) fairly easy Identification or obtaining the information carried out with an effort (intellectual and/or physical) acceptable compared to the qualification level expected of the operator and with the access terms with information. **And/Or** Availability and commitment of the operator: This task is an activity planned and dimensioned in the workload of the operator, and perceived like important by the operator. This one has a more reduced manoeuvre margin to cope with possible risks.
-2	Impossibility or difficulty of obtaining/information (S) required (S): Identification or obtaining the information not easily realizable or carried out with an effort (intellectual and/or physical) great or work conditions considered to be strongly constraining (accessibility with very difficult information, strong painfulness of the activity,… **Or** Low availability and commitment of the operator: This task is not envisaged or is not correctly dimensioned in the workload of the operator or this task can be perceived like priority with respect to other constraints of exploitation.

Second sub-function: diagnosis allowing the choice of the action to be realized /
Table .4 : Estimate of the degree of confidence on the sub-function of information processing [Ineris,Ω 20.2009]

rebate	**Characteristic of the situation of work**
0	Good quality and accessibility of the useful information to the diagnosis Explicit presentation and sufficient level of information: direct information nonprone to interpretation on the state of the system (and the localization of the accident), of the incident or the defect (respect of conventions of presentation of information, the case of the faulty indicators is announced, etc). The operator has if necessary a comfortable time to step back on the quality and the level of useful information, and to look further into the diagnosis. And/Level of guidance adapted to the situation: The use of procedure is not necessary or, in the contrary case, the decision is guided by explicit procedures (clear instruction and clarification of the consequences of the action on the system) or helps contextual provided by the system (on the system of control, indication near the signalling devices or of the control units…) allowing to determine the action easily to realize
-1	Acceptable quality of the useful information to the diagnosis: Presentation of information not directly usable to make the diagnosis but methods of treatment are designed to obtain the useful information with the diagnosis but which can sometimes cause error (certain types of calculations, conversion of unit,…) Or level of information not always sufficient but it is possible to deepen it diagnosis by the search for additional information (the operator then has a reasonable delay to step back and to collect the necessary information) And/Or**:**Guidance envisaged but sometimes insufficient: A certain level of guidance is necessary: the general rules to be applied are known or formalized but a certain level of interpretation of the rules is necessary to decide action to be taken (for example, the procedures treat many known cases but a reflection remains necessary to decide).
-2	Insufficient quality of the useful information to the diagnosis: Insufficiently explicit information (ambiguous, or asking complex calculations, crossings of data or a reflection mobilizing of nonfamiliar knowledge). Or insufficient level of information to identify the problem or the state of the system, the deepening of the diagnosis is not easily possible taking into account the context or of the organisation of work (insufficient serviceable time, geographical insulation,…). Or/Insufficient guidance: Application of the not easily possible rules taking into account the situation: very general or too precise rule which requires quasi-systematic adaptations, or too significant number of possible choices of actions, the catch of retreat or the request of an external opinion being difficult (insufficient temporal resources necessary compared to the course of the scenario or recourse to a third not envisaged in the organisation of work).

Third sub-function: action of safety to be realized/ Table .5 : Estimate of the degree of confidence on the sub-function of realization of the action of safety. [Ineris,Ω 20.2009]

rebate	**Characteristic of the situation of work**
0	Acceptable level of stress: Essential resources with the realization of the action considered to be sufficient: absence of temporal pressure or time of intervention largely lower than the kinetics of the accident, not of exposure to the danger, significant experiment of the situation, sufficient feedback on the engaged activity,... And/Simple and not very demanding task: Nombre d'actions limité, sans enchaînement complexe (par exemple : fermer plusieurs vannes sans notion d'ordre), système robuste aux erreurs (détrompeur, temporisation, codes couleurs ou symboles évitant le risque de confusion,...) ou permettant d'alerter l'opérateur pour lui donner la possibilité de revenir en arrière. Les moyens d'actions étant facilement accessibles et facilement manœuvrables.
-1	Level of possible but tolerable stress: Essential resources with the realization of the action judged being able to prove to be insufficient, in particular under certain difficult conditions (little temporal margin, exposure to the danger,…) And/Or**:**Fairly demanding or difficult task: Number of actions limited but higher level standard: significant efforts of memorizing or concentration, sequences strict to respect (for example: to stop the P1 pump then only after, to close the V1 valve and then the V2 valve. To modify the order of these actions would involve an accident) but the system makes it possible to the operator to retrogress. Or the means of actions can be fairly accessible and manoeuvrable.
-2	Level of important stress: Extremely felt pressure: essential resources with the realization of the action judged unsuited compared to the objectives to reach (time considered to be insufficient, exposure to the danger, effect of panic,…). Or **/**Tries very demanding, difficult or impossible: Too high level standard (significant number of actions with strict sequences, impossibility of stopping the effects of an engaged activity per error,…) and/or accessibility or difficult or impossible maneuverability of the means of action.

5. Application of the method omega 20 to the level of a storage section of gas:

A unit of secondary separation made up of two parallel separators which function in redundancy and having for function the separation of the particles of gas and water of oils. Indeed, one resorts to this second separation following the imperfections recorded in the primary operations of separation These separators are reserves of cylindrical form, inside whose the separation is carried out. They are connected, with the entry, by a drain of arrival of the crude (manifold) connecting principal separators (CS1, CS2, CS3, CS4) to the zone of storage; at the exit, the two separators serve storage vats to which they are connected. Also, there are two other drains; a water exit, connected to the low side of the tank and a gas input/output which is at the top of the tanks. The principal drain is divided into 3 conduits of which two are connected to the separators and 3rd is planned for the by-pass of the system in the event of problems unsolved by the redundancy (see figure “1”). These two separators are also connected to the same gas input/output which opens at the entry to inject the gas which will push the crude towards the storage vats, then it opens at exit to evacuate gas towards the torch. The gas injected comes from separators principal CS2, CS3 in two parallel circuits to ensure the redundancy and convergent towards a plain part. If an escape on the level of the connection of the plain part of the drain of gas injection (problem of sealing) is detected by the engineer of exploitation which will note that the redundancy of the separators does not solve the problem and that it will be necessary to make a by-pass of the secondary separators so that the crude leaves directly towards the storage vats. The engineer of exploitation must initially manually close the valve of gas connection VCS2 then that of entry of the crude in the functional separator, then to open the valve of by-pass. It is finally necessary to contact the service of maintenance. The gas leak does not present a danger of ignition or explosion in normal conditions since the installation is with the free air, far from an unspecified source of ignition. The density of gas is low compared to that of the air. That wants to say that the gas disperses quickly in the atmosphere (air mixture/gas much lower than the lower explosion limit). The gas leak causes a loss of pressure, that induces the incapacity to completely push the crude towards the storage vats. And if that lasts very a long time, the centers of separation will be affected.

Figure1.Une unit of separation particles of gas and water and oils

Table 6: Evaluation of the BHS, case of checking of the state of the secondary separator

independence	. The task of checking of the state of the crude separator is independent of any scenario of accident
effectiveness	• • The engineer of exploitation is trained and trained. • A circuit of round is designed to check the state of the systems and to take the operating parameters (pressure, flow…). • The gas leak on the level of the separator will be quite visible and detectable. • The system of deviation (by-pass) accessible and is dimensioned to answer any scenario of escape.
Rjesponse time Waited Response time estimated	The response time is not determined, but the operator is brought to react quickly to limit the delays of production and not to affect the principal separators (CS1, CS2, CS3, CS4). The duration of the round does not exceed the 20 minutes but the operator always begins his round with the secondary separator thus one can neglect the 20 however min. the operator does not respect the schedule of round and can be affected with other tasks. The by-pass of the secondary separator takes approximately 2 minutes
degree of confidence (NC)	Active detection: the engineer of exploitation must seek information on the state of the separator : • The visual and sound detection of the escape at the time of the round of checking is clear and does not have complexity or of confusion. • The engineer of exploitation is judicious to carry out a round every 2 hours (6 rounds per station) according to the requirements of the rules of procedure but there is a certain negligence of its share knowing that it is affected with other tasks. Partial conclusion: rebate of a level (- 1) Diagnosis and choice of the action:. • The manifestation of information is sufficiently explicit (the phenomenon itself) and does not have ambiguity or of complexity. It is enough to diagnose the exact site of the escape • The engineer of exploitation knows the significance of the problem and control the action to be taken (by-pass of the secondary gas separator: the crude is sent

	directly towards the storage vats). Partial conclusion: no the rebate Action of safety: • There N is no temporal pressure or of exposure to the danger knowing that the escape does not affect the production • The task of by-pass of the secondary separator in the event of escape is not complex (easily accessible and manoeuvrable valves). The engineer of exploitation is trained and trained to react in the event of an incident of escape) **maximum degree of confidence = 2 nap of the rebates = 1**

The evaluation of the BHS gave us the following result: NC=1, the negligence and the non-observance of the time intervals between the rounds, namely a round every 2 hours, as well as the assignment of the engineer of exploitation to other tasks because of the lack of manpower and that to the detriment of the rounds of monitoring and checking were the cause of the delay in detection and the reason for which we made a rebate on the level of active detection.

6. Conclusion

Our theoretical and experimental study led us to results, and from which we showed the real state of these BHS and evaluated their performances and their aptitudes to achieve their functions of security. • The method Omega 20 showed its mettle in the field of the control of the industrial risks, it is a simple method intended for the experts to enable them to evaluate the BHS, it presents a simplified vision of the task human by regarding the man as an instrumented system of security (a machine), divided into three subsystems: detection – diagnosis – action, which makes it easy to be adapted for more a large number of user, It takes on in account the cognitive and physiological dimensions throughout the analysis, but it was noted that the method omega 20 does not take into account or neglects a certain number of characteristics of the man and his behavior (be capacities of anticipation of the risks and recovery of its own errors). These emotional, social and cultural dimensions can affect the performance of the BHS sometimes more important than cognitive dimensions and physiological takings into account in Omega 20, the catch in consideration of these dimensions requires complementary approachs of analysis which require knowledge in occupational psychology, ergonomics or sociology and a depth of more important analysis. These disciplines also make it possible to better take into account the aspects collective and relating to the co-operation between actors for the placement of the human barriers of security.

•the method does not make it possible to apprehend the whole of the modes of failure like modes of good performance of these barriers, which is inherent in any approach of analysis of this type. In other words, the vision of the work of the man on whom rests the method and the associated criteria of evaluation makes it possible to apprehend an essential part of dimensions of the operation of the human barriers.
•A taking into account limited of the organization: The human barriers of security are systems sociotechnic conceived, maintained and controlled by a set of organisational processes accompanying their evolution or life cycle: update of instructions, maintenance of the systems of supervision, formation and maintenance of competences, controls hierarchical and to that, etc

References

Boring, R., How many performance shaping factors are necessary for human reliability analysis ?, in PSAM 10 Idaho Falls, Idaho, USA. :Idaho National Laboratory, June 2010.
Commission of the European Communities., Human Factors Reliability Benchmark Exercise, Reactor Safety Programme 1985-1987, Nulear Science and Technology, 1989 – Eur 12222 En. 1989
De Dianous, N., Le, V., Evaluation des dispositifs de prévention et de protection utilisés pour réduire les risques

d'accidents majeurs Ω10, Rapport d'étude n°DRA-08-95403-01561B, 01/09/2008 : Ineris pour le Ministère chargé de l'environnement, rapport disponible sur www.ineris.fr.
Ineris., Maîtrise des risques accidentels par les dispositions technologiques et organisationnelles - DRA 77 Démarche d'évaluation des Barrières Humaines de Sécurité - Ω20, Rapport d' d'étude N° DRA-09-103041-06026B ,2009.
Hollnagel, E., Cognitive reliability and error analysis method . Cream Elsevier, 1998.
Leplat,J., Erreur humaine, fiabilité humaine dans le travail, A,Colin, 1985, 197 pages.
Miche,E., Perinet,R., Démarche d'évaluation des barrières humaines de sécurité -Ω 20, Rapport d'étude N° DRA-09-103041-06026B, INERIS pour le Ministère chargé de l'environnement ,2009.
Perine ,R ., Nghiern,T .,Evaluer la fiabilité humaine ; quelle(s) méthode(s) choisir ? Hal Id : ineris-00973592.2009.
Rasmussen,J., skill, rules and knowledge : Signals, signs and symbols and other distinctions in human performance models,IEEE, Transactions on systems, Man, and Cybernetics, SMC-13, 3, 257-266. 1983.
Rasmussen, J.,.Information Processing and Human-Machine Interaction, Amsterdam, North-Holland, 1986.
RSE., Erreurs humaines et défaillances organisationnelles, dans Revue Risque sécurité Environnement, n° 1,novembre - décembre 2009, Ecole des Mines de Paris.

villemeur,A .,Sûreté de fonctionnement des systèmes industriels, EYROLLES, 1988.

Biography

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