

Human Factors Approach

An efficient management tool for the safety of Nuclear Transportation

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ABSTRACT

Within the Nuclear Industry, a majority of actors are very sure of the reliability of their industrial, logistics process and organization, of their well-trained employees and well-fitted tools. In fact our first mistake is often to consider that efficient organization is enough. We never reach the “No Error level” because we also forget that “to err is human”. LEMARECHAL CELESTIN (LMC), which is a transport Company subsidiary of TN International located in France, has tested out a Human Factors Approach as an efficient means in order to tend towards the “No Error level”. The Human Factor Approach can help the nuclear Industrialists to analyse the reported incidents, to estimate the risks and thus to avoid the deadly accident. By using the human dimension on decision process this approach is to reinforce a real culture of transport safety.

INTRODUCTION

LEMARECHAL CELESTIN (LMC) has been involved in nuclear industry for half a century. Originally LEMARECHAL Company in Valognes (in the vicinity of La Hague) was founded in October 1958 and CELESTIN Company was founded in February 1963.

In 2001 the two companies merged and LMC is now a fully owned subsidiary of TN International.

Within the AREVA Group, LMC is part of the Business Unit Logistics.

The Workforce of LMC is around 140 employees.

LMC has a resource pool of 100 truck drivers who are available to perform 4000 national and international transport assignments a year and 2000 in-house transport assignments for the nuclear facilities of La Hague and Marcoule every month.

LMC has a fleet of 170 trucks (see picture 1) and trailers.



Picture 1 : one of LMC's truck

LMC main activity is road transport for radioactive materials. LMC's main customers are TN International, AREVA NC, AREVA NP and CEA.

In addition to pure transport operations, LMC is able to maintain security vehicles in the Melox and La Hague road Terminals, multi-line articulated trucks (see picture 2) and emergency vehicles in Marcoule. Moreover LMC operates 1 maritime terminal (sea/rail and sea/road inter-modal facility) and 3 rail/truck inter-modal terminals including the Valognes terminal (see picture 3 in the vicinity of Cherbourg) which is the world's biggest terminal for rail/road transfers of nuclear materials (1000 transfers of between 25 and 120 tonnes each year)



Picture 2: multi-line articulated truck



Picture 3 : Valognes railway terminal

THE HUMAN FACTORS APPROACH

Our aim is to integrate the human factor aspects to decision-making process: in the treatment of incidents but also in a preventive way in the organisation of a new flow of transport or in the preparation of a tricky operation.

It is based on the following principles:

- develop a **corporate culture** encouraging strictness and the right application of the rules. Recognize that to err is human. Help people giving all information in order to set off useful actions of prevention. The aim is largely more ambitious than it looks like. To reach it, it's important to develop in the company a real participative system of management which corresponds to the whole following principles and which, according to the financial aims of the Company and his ambitions as far as Quality or Security are concerned, allows a constructive dialogue with the guarantee for everyone to express.

- be in charge of the training course and the information of the operators** according to such an approach. The whole staff has had training courses; they took place in small groups or sometimes in individual training, not to disturb the organisation of work. On this occasion some in-house rules were cleared, specially the ones dealing with the documents of the Quality system. This one is still a vulnerable subject, because of its complexity.

●**improve communication** and organize regular meetings with the managers and the drivers. Thus, meetings are possible with the staff manager, the labour unions or the industrial security committee. But these meetings which have a procedural character in a legal environment can be completed with participative meetings where everyone is asked to talk about difficulties but also to express, either solutions or ideas for improvements.

As it was done with the participative security visits, LMC request his managers to go more frequently in the field in order to develop the dialogue with the operational staff. Besides, thoughts are organised gathering the general manager, managers, drivers and operators to talk about the annual target of the Company. During these thoughts some subjects as Investment plan, evaluation of the staff in order to give productivity bonus and the security policy of the Company are talked about.

●**Set up close relationship.** In each firm, logisticians have to organize the preparation for transport: planning, appointment of the teams and equipment, administrative procedures...They have an important role: a good preparation for transport helps in highly reducing the risks.

Moreover these logistic teams are in close touch with the drivers; so they are in good position to pull up the information, because as we now know such an approach is not natural for everyone. Regular meetings are set up with the logisticians and the organizers of the human factors approach to collect the information. It's difficult to realise such an in-house communication. In LMC, 2/3 employees are itinerant.

● Use some tools (incidents sheets, daybook) to **collect all the information** (see figure 1)and classify it, even the ones concerning minor incidents.

LOW SIGNALS DETECTION

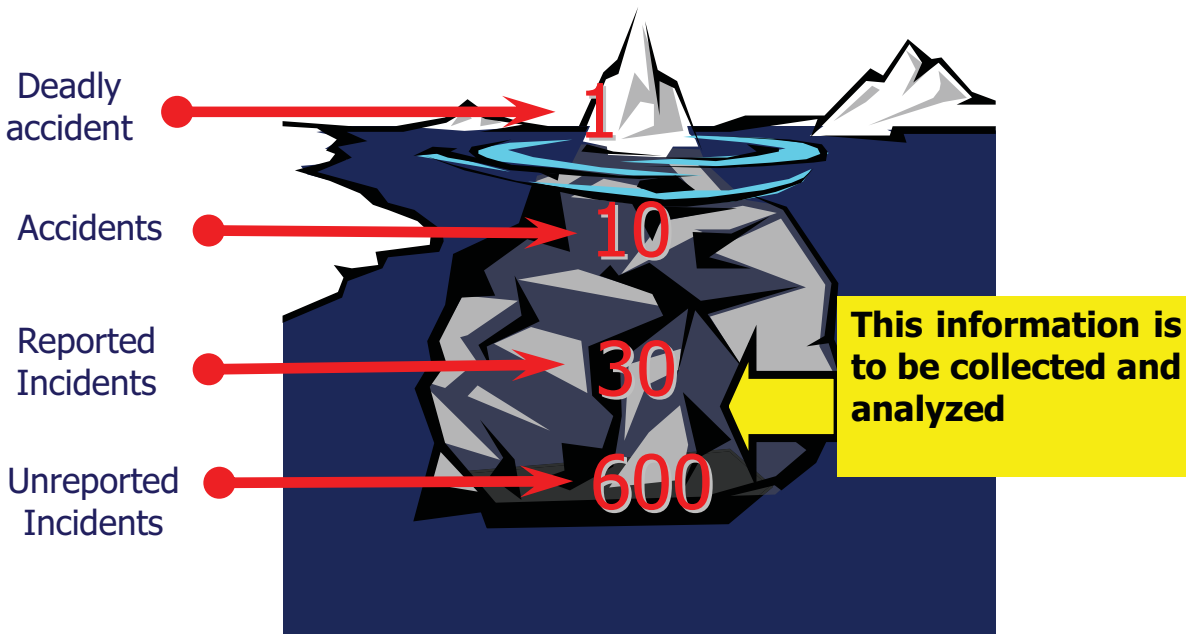


Figure 1 : collection of the low signals

They have a minimum of formalism and a maximum of flexibility; they contribute to the collect of useful facts : verbal information, customers' complaint, insurance reports, anomaly sheets, industrial accident reports, road control sheets...This flow up of information involves a notice board in the firm and a reporting of what was done after.

This information is classified, analysed and treated. There are three kinds of mistakes: perception error, non observance of a rule, inappropriate action; the actions used to correct are directly linked to that kind of mistakes.

- Add to these measures a **behavioural approach**. Interviews were realised with the drivers in that kind of situation and with the help of an outside expert so as to be sure of a high confidential level. The aim was to talk about all different behaviours which can have some impact on the level of risk. It was also time to precise what security represents for the drivers: they do not appreciate to waste time during the loading or unloading operations which involves stress and disturb them in the organisation of the transport. They are respectful of the rules thanks to a house style and fearing sanction. They like working conditions in the company, the quality of fleet, the driving time and break time and the good organisation of transport.

Road risk is not felt like an important risk; that one seems to be during handling operations.

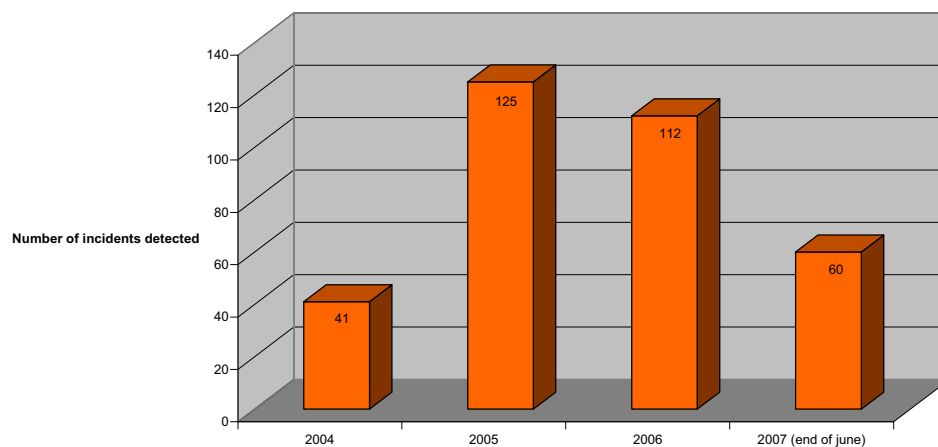
These interviews have been useful to create a document for personal analysis of situations, focused on “human factor”. These analysis of situations can be used either to analyse incidents or in a preventive way before an operation, to estimate the human factor level of risk involved and to identify possible present factors which might involve an accident or incident. For example: weather conditions, irregular working hours, a new route, routine aspect of some transport...

- Install an appropriate **function of control** including the human factor. The human factor approach was done in a confidence relation between the Management and the staff. However, trust doesn't exclude control. It must be won and must be based on proof. So control plans have been set up in LMC. These plans are used for all tricky operations, according to the nature and the difficulties of transport floods, they are more or less frequent. The controls are made with check lists and are realised by the managers and the Quality managers

SOME RESULTS

You can see results of that kind of approach in the long term; nevertheless, many first results are there and and it shows a good adaptability of the concerned actors.

The information system helped discovering several actions to take for improvement to reduce risks and stress factors for the drivers. In a few months, this system allowed identifying double incidents or problems, insuring a better detection of the forewarning events (see graph 1)



Graph 1 : Results of the approach

Good awareness of each one's issues and duties with a few preventive actions in behavioural field increased thanks to this approach.

Some strong points acquired must be perpetuated because they help in an efficient way to the safety of transport:

- the quality of the vehicle fleet, the comfort of the driver's cabin,
- the maintenance of the trucks and trailers, systematic controls realised on safety instrument,
- strictness of recruitment and the importance of training courses,
- the follow up of driving time and break time,
- Finally, a decisive factor, the strict preparation of transport and the logistic teams' availability.

CONCLUSION

As a conclusion, in fact, the difficulty consists in finding the right balance between the right to err and the fair sanctions for the mistakes.