THE ANALYSIS AND MANAGEMENT OF HSE PROACTIVE REPORTING SYSTEM WITHIN IN AMENAS OPERATIONS

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Abstract-: The reactive reporting system is widely used to introduce HSE performances and to notify the robustness of management aspects in place. However, lagging indicators are not sufficient to measure employees' perception and to demonstrate organisational efforts or leadership commitment to HSE requirement.

Being proactive throughout leading indicators is the most appropriate way to perform reporting process and to assess HSE performance measurement. Hence, proactive reporting system contributes effectively to explain the attitudes and to establish essential attempts to improve the whole HSE features.

This paper examines both the existing Tr@cker findings and the HSE performance measurement linked to In Amenas Operations with a further benchmarking assessment of leading and lagging indicators.

In addition, a survey has been carried out to gauge both HSE culture on site and familiarity of employees with the elements of proactive reporting system in place. And while the human factors take an immense part when conducting the reporting process, a human reliability analysis was pursued to evaluate such contribution.

The findings show that the management targets are not achieved as a whole; for this reason more effort must be focussed within the reporting practices, regarding procedures, defining responsibilities and allocating crucial resources with no blame culture and contractors' involvement.

The current study serves as a baseline reference to evaluate forthcoming progress effort and to weigh against prospect improvement areas.

Keywords: Proactive reporting system, performance measurement, leading indicators, lagging indicators, Tr@cker

1. INTRODUCTION

The world's most successful companies worldwide all have outstanding safety programs committed to pursue a continuous improvement of performance, for them the safety is a condition of employment and HSE expectation focus on tackling industrial risks in a structured and proactive way.

Within a multinational joint venture, Sonatrach personal has the opportunity to learn from best practices of their associates; a valuable and meaningful HSE reporting system is one of the learning areas, where a safe system of work could be implemented and maintained to seldom accidents by properly sustained reporting system.

In fact, there are many reasons why companies have turned to proactive HSE reporting schemes as a primary means of measuring and improving the safety of production processes: near hit incidents are more frequent than more serious accidents and the rate of unsafe condition and/or unsafe act has been increased in a significant way and is contributing to create actual accidents.

Certainly, an HSE proactive reporting system if well implemented and monitored will provide a good measurement of HSE performance; this is a specific feature not only to prevent incidents but also to broaden effective HSE culture.

1.2. Background to the study:

This thesis work has been done at the In Amenas Operations site which is a joint venture between Sonatrach, BP and Statoil; the primary idea was founded during the HSE induction where it was suggested to cover a lack for HSE data analysis regarding a well established reporting system.

The thesis is designed as a state of the art regarding the use of HSE reporting system to measure performance indicators from a proactive perspective.

In fact, the introduction of the zero philosophy within the policy declaration is a milestone in term of attitudes; this mindset can be summed up in the statement that accidents do not happen, but are caused. All accidents are therefore preventable, so that the goal will be zero incidents, which requires that people are made responsible at every level and that constant emphasis is given to human performance, prevention and learning opportunities.

Data collected throughout the reporting cycle is used to represent performance and to compare them against targets; this will reflects the efforts made by management to improve HSE performance within In Amenas Operations and to address the challenge of sustaining a high achievement level and meeting the growing expectations from shareholders.

1.3. Problem statement:

Over time, it is the intention of the joint venture to link HSE performance reporting even more closely to the processes and programs that will continue to drive actions to proactive prevention, where the hope is enhancing standards for HSE systems across the site and provide a foundation for this advancement.

With the go ahead of the operating stage, HSE practices are already a heritage from the EPC (Engineering, Procurement and Construction) phase, where data are stored with no development and the reporting process is not well understand by all the staff, in particular the new comers.

The thesis is provides a critical look at the assumptions that analyse such reporting programmes in place and identifies some of their limitations, moreover to the scope of reporting, it defines the various data items involved, and describes the methodology for how the information will be used to assess and benchmark performance for further decision making process.

2. ASSET DESCRIPTION AND SITE OVERVIEW

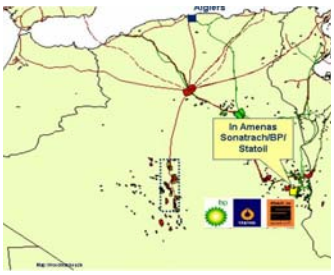
In Amenas Operations, a joint venture between Sonatrach, BP and Statoil is the largest ambitious wet gas multi-field development in Algeria, it is located some 1,300 km from the capital city of Algiers and 100 km west of the border with Libya, "it involves the development and production of natural gas and gas liquids (LPG and condensate) from four wet gas fields in Illizi basin (Tiguentourine) of south eastern Algeria.

The project started in June 2006 with expectation to produce around 9 billion cubic metres of gas and some 50,000 barrels of liquids a year (BP, 2007).

Regardless the plant downtime and outages the design capacity is 29.85 million standard m3 per day, the In Amenas gas plant yield maintains an annualised wet gas production rate of 28.2 million standard m3 a day.

The objectives of the project are gathering and processing of fluid mixture and the recovery of natural gas and liquids (LPG and condensate) to meet the terms of the In Amenas production sharing contract; which covers the on specification product streams being transferred to third parties (Ohanet).

The In Amenas operations employed around 746 workers includes 310 contractors.



3. THE HSE INPUTS ANALYSIS:

The preliminary treatment highlights the most typical trends, such as reliability of data, accuracy of results …

Differentiating collected data on useful versus trivial will provide a baseline for evaluating future efforts, it may also offer a basis for setting improvement goals and problem solving concerning training and HSE awareness in later stages of the implementation.

It is essential that for uploaded data to be completed and as accurate as possible:

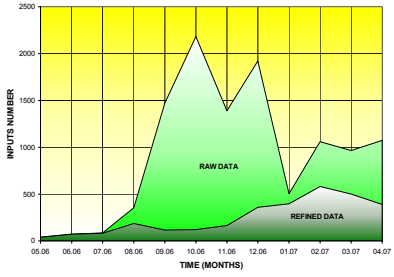
- Completeness means that all data that fall within the scope and are relevant to the business or performance unit have been included in the figures reported;
- Accuracy refers to the correctness (likely range of deviation) of the reported figure and accuracy has important implications for the consistency of the reported data in the long term, for instance the comparability of data on a year basis.

A reliability coefficient could be calculated using the following formula:

Reliability coefficient % = 100*useful items / total items. (5.1)

Total items = useful items + trivial items.

For our case the Reliability index equals to: **26.6%**



In addition to the reliability index, some other findings from the HSE inputs analysis are:

1. The contractors are not well involved in the reporting process, although their role is crucial since they are in a continuous touch with both equipment and people;

2. The major contributors to hazards are people, but ASA is not well introduced and applicable to mitigate unsafe acts;

3. The commitment from managers is essential to implement and to monitor the proactive reporting process.

3.1. Suggested best practices:

1. Appropriate specific job and HSE related training;

Formal procedures to define the system criticality and how the task could be done effectively;

2. Checklists and formal inspections represent helpful tools to identify defects and suggest mitigation measures;

3. Communicating results through feedback in a simple and meaningful manner to reinforce safe behaviours;

4. Reviewing and following up corrective actions, especially situations linked already to hazards;

5. A reward programme is required to enhance the reporting practices and to encourage people to be proactively involved.

4. ANALYSIS OF REPORTED ITEMS:

4.1. The HSE performance matrix:

The concept behind the HSE matrix is to measure both leading and lagging indicators of business units, rank them relatively to each other, populate the matrix, and assess business unit performance as per relative position to peers.

Business units are those where BP has equity and is deemed to have operational responsibility and hence HSE responsibility.

Methodology

Methodology to outline the HSE performance matrix can be done according to the following steps:

1. Selecting the best business units with the high leading values, in addition to the worst business unit with the high lagging values;

2. Showing figures about each parameter with the according five ranking basis, which equals to reference value over five;

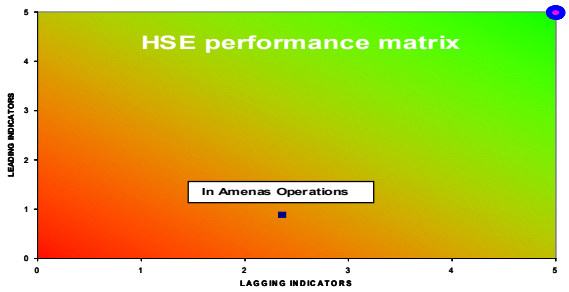
3. Expressing actual figures of the business unit and frequency of each parameter using the frequency formulae;

4. Ranking parameters according to 5 basis by dividing frequencies over the five ranking basis;

5. Ranking parameters for lagging indicators should be corrected to have an increase escalation order, this equals to five minus ranked parameter;

6. Calculate the performance ranking by multiplying results found in the previous step times the weighting;

7. Presenting final results on the HSE performance matrix.



4.2. The incident severity index:

The incident severity will be monitored to assess the effectiveness of the safety management system, the current study will be compared against a safety performance baseline records (BP, 2002).

Incidents that will be included in the calculation of the incident severity index include: fatalities; injuries and illnesses classified as DAFWC, restricted work case, medical case, or first aid, environmental damage (releases, spills, non-compliances…) and near hits.

The incident severity index will be calculated in two ways: actual (AISI) and potential (PISI), the former will be weighted according to the available data about incidents and the later will be calculated following the probable outcomes both potential severity and potential recurrence.

Actual incident severity index = 372

Potential incident severity index = 475

These represent an **additional probability of 30%** of incidents reoccurrence in comparison with the current year.

5. PERSONAL HSE SURVEY:

The concept of reporting system especially the proactive side must be widen known by employees, it is therefore important to have a common understanding of tools and means and know how the reporting process can be done.

A questionnaire had been undertaken to gauge employees' perception of the proactive reporting system and to seek their views on ways to further improve the process according to the familiarity and understanding of each element.

The questionnaire structure was formed from simple and clear questions forms with a multiple choice tick box answers, it enabled adding comments by the end to ensure probity

The survey form was communicated by emails to nearly 436 users through the internal network; in addition there was a further distribution to workers who have no access to computers and IT facilities by means of hard copies.

Among the total number of questionnaires sent out, some 63 had been completed and returned, which equated to nearly 14.5%, where all the returned forms have been analysed and

The survey layout consist of different sections, each section represent a reporting concern: familiarity, process, tools, purposes, barriers, and feedback entries, this permit to have a detailed glance about the proactive reporting process with In Amenas Operations.

Each section is described in details to illustrate its importance and significance to provide a direct source of information about perception of employees with the existing proactive reporting system in place.

The layout of sections defined in the questionnaire form is as follows: employees' segmentation by job categories, responsibility, familiarity with process & tools, purposes, barriers, importance and feedback entries.

By the end of the questionnaire a section for further comments or suggestion has been added.

After the examination of the survey outcomes, it has been concluded that only 14.5 % of the whole workforce responded voluntarily to the questionnaire, which means unfamiliarity with either the surveys practice or the proactive reporting process.

The qualitative analysis provides some findings about the respondents' perception, whereas outcomes per each job category is quiet different especially for managers;

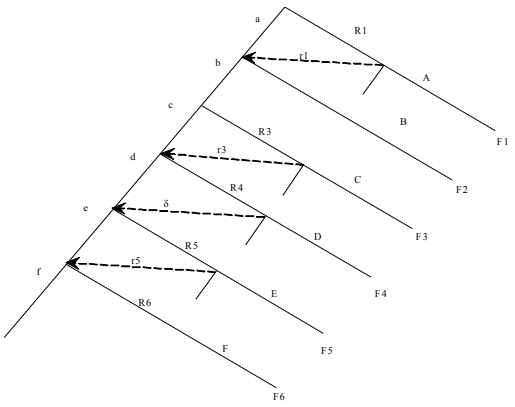
On the other hand, the quantitative analysis offers some probabilities estimation for the human contribution to the reporting process; this will be used in the human reliability analysis study.

6. HUMAN RELIABILITY ANALYSIS:

Performance of the person who is reporting is fundamental; it indicates how healthy is our system in place and the reaction of people against each step of the process. Although the human reliability is extremely difficult to predict accurately, some efforts should be made to have an overall inspiration about the contribution of human factors with the reporting practices.

Human reliability analysis (HRA) is a method for determining the reliability of human performance in specific tasks; it can be either qualitative describing reliability in words only or quantitative estimating probability figures of human error in a task.

The representation of the HTA tree considers the importance order of events' execution because of the potential dependencies; it is a systematic identification and analysis of common causes and dependent failures (shown on the right side of the tree with possible recoveries from each event) and the success factors (presented on the left side).



The error rate appears to be quite high (46.58%), even though accurate statistics are limited available information, the result reveals that this rate is very significant percentage of human reliability when carrying out the whole reporting process.

Improving human performance:

Usually, the most frequently as well as practiced applications for excellent management is the focus on combination of different systems: strong leadership accountability, performance appraisal, career and training development, and reward systems.

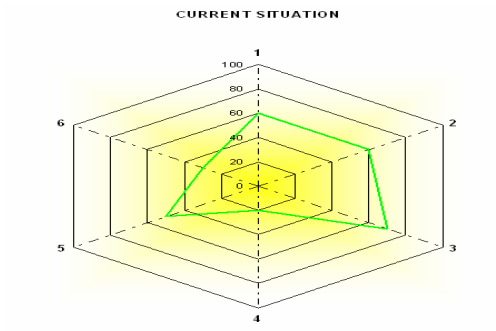
Each of the systems should be rated according to its existing importance, thus a screening criteria would be used to class the contributor factors to further reporting improvement.

Targeted elements for further improvement are the following:

1. Leadership commitment;
2. Appraisal and evaluation;
3. Adequate training;
4. Workers responsibility;
5. Reward programme;
6. Feedback importance.

The weighted evaluation offers a management but a fairly subjective tool to suggest appropriate decision making, where systems have to be monitored, reviewed and changed, if necessary.

An application rate of typical areas to improve the proactive HSE reporting system is presented as a radar graph in the figure below.



Equals priorities should be given for all progress areas to ensuring the effective management of planning and implementing the adequate reporting features.

Actually, the application rate is a reference to advance effort would be made with each targeted element, thus by quantifying expenditures and losses (from incidents) and figuring the net present values either for the current situation and the enhanced case.

During the decision making process right information is required to ensure the correct path and decision makers need to have the right skills to understand and make use of this information.

It is expected to have strong and direct information about the human performance and their progress, where the measurement depends not only on the process but also on people and culture, thus will help to allocate tolerable resources and reasonable expenses.

Human performance is having a prime importance if high standards of reliability are to be achieved. Therefore, personnel must work within a clear management structure in which all involved are fully aware of their own and others' responsibilities.

7. CONCLUSIONS AND RECOMMENDATIONS:

7.1. Conclusions:

The importance of HSE reporting scheme was highlighted through the theoretical and practical chapters of this study, as well as, providing conditions and performing the reporting system in order to improve both standards and practices.

The reporting programme is still in its early stages but shows signs of guarantee in term of achieving consistency and performance measurement, reporting improvement, HSE culture implementation and spreading best practices.

Results found in the reporting outcomes will be used as a baseline reference for future periods; this includes reliability index, safety inputs, performance matrix and incident severity index…

Actually, descriptive data indicates a reliability index of 26.6% for the whole HSE inputs over 12 months of study; this is a quiet tolerable indicator, because the project is in its first years of operating where most of data are an heritage from the construction phase and HSE is still largely a fresh matter for employees.

In fact, trends of actual HSE inputs illustrate that the system in whole is not fairly directed in term of procedures, apparatus, operation and monitoring.

It also reveals that there are many ways to interpret reporting system effectively; one is to build a comparison between the actual figures and those benchmarked, such procedure indicates a deficit with leading indicators for In Amenas Operations.

Actually, the survey outcomes prove that commitment from management is fairly good, but deliverance of awareness and communication chain is broken somewhere with the rest of workforce.

Meaningful analysis of the people contribution in the reporting system tend to be a useful mechanism, this will check the strengths of the current arrangement in place, results indicate a failure gap of 46.58%, it signifies that a half of reporting process is deficient.

Finally, readers of this thesis should bear in mind that although the attempt to analyse and to assess the HSE proactive reporting system within the In Amenas Operations, much more effort should be made to follow up recommended actions and to review the evaluation at regular interval basis.

7.2. Recommendations

Several recommendations arising from this study are suggested in search for HSE sustainable excellence, where an active participation of the whole staff by getting involved in the reporting programme will ensure a successful HSE performance and give the opportunity to share experience, concerns, ideas, and best practices.

Further suggested recommendations for more deep analysis and management of the proactive reporting system are the following:

The opened observation should be followed up in order to correct the reported unsafe acts and unsafe conditions reported.

Evaluation of the use of Tr@cker and HSE observation cards, by counting users of each system and how it has been done is required to focus on areas for further improvements.

Professional staff and skilful people should be the only responsible for the Tr@cker analysis, changes and actions follow up, however standard users will have only the accessibility to enter inputs with no further change.

Procedures for HSE inputs reporting should be written down and instructed in a simple and meaningful way with both hardware and procedural improvements.

To continue proactively looking for areas of weaknesses, joint venture personnel should continuously encouraged to report unsafe act and condition cases in order to identify more potential deficient areas, and take corrective actions to prevent total recordable incidents, in addition contractor's personnel must be included in the training schemes and the whole reporting process.

It is recommended to follow up the decision making criteria next to the weighted evaluation, figures of expenditures to recover the reporting system would be validated in order to compare outflow versus progress and cost benefit gained from accident prevention should be taken into account.

The importance of proactive reporting system is vital for the industry; hence it requires an open approach to communication and a blame-free approach to consistent acquisition of key data and appropriate performance review.

REFERENCES:

[1]Bernhard Zimolong and Gabriele Elke, Occupational Health and Safety Management, Wiley, New York;

[2]Bob Eckhardt, 1998, what causes accidents?, Concrete products magazine, Prism Business Media;

[3]Center for chemical process safety, 1992, Guidelines for hazards evaluation procedures, American institute for chemical engineers, New York;

[4]Charles D. Reese, 2001, Accident/Incident prevention techniques, CRC Press, Technology & Industrial Arts;

[5]Daniel Patrick O'Brien, 2000, Business measurement for safety performance, CRC Press;

[6]Fred A. Manuele, 2003, On the practice of safety, Third edition, John Wiley & Sons Inc, New jersey;

[7]Jeremy Stranks, 2006, the manager's guide to health and safety at work 8th edition, Kogan page limited, United Kingdom;

[8]John Ridley and John Channing, 2003, Safety at work, Elsevier, Oxford;

[9]Ian G. Wallace, 2000, developing effective safety systems, Institution of Chemical Engineers (IChemE), London;

[10]Nicholas P. Cheremisinoff, 2001, Practical guide to industrial safety, Marcel Dekker Inc, New York;

OSHA, 2007, www.osha.gov, the official website of occupational health and safety administration, Washington;

[11]Patrick A. Michaud, 1995, Accident Prevention and OSHA Compliance, CRC Press, Technology & Industrial Arts;

[12]Richard A. Stephans, 2004, System safety for the 21st century, John Wiley & Sons, New Jersey;

[13]S. Gad, 2002, safety culture: A review of the literature, Health& safety laboratory, Crown copyright;

[14] Safety management consultants, 2006, Advanced safety auditing, UK;

[15] Step change in safety, 2003, safety observation system, step change in safety, Aberdeen;

[16] Sue Cox and Robin Tait, 1998, Safety reliability and risk management: an integrated approach, Butterworth-Heinemann, Oxford;

[17] Upstream HSE Leadership Team, Safety Performance: safety matrix- accident triangle- severity index- HiPlus and lessons learned documents, Brad Smolen, Houston, Texas;