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RISK AND SAFETY MANAGEMENT IN INDUSTRY, METHODOLOGY FOR THE IDENTIFICATION OF MAJOR ACCIDENT HAZARDS

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ABSTRACT
The identification of the possible accident scenarios is a key-point in risk assessment. The analysis of the risks, or risk assessment as a structured process is not self sufficient by itself, but is always part of explicit or implicit risk management process. The process of risk management, in general terms always starts with the analysis (risk assessment) providing data in information on the actual risk level present.
Keywords: RBI, Safety, Maintenance strategy, Risk assessment and reducation

1. INTRODUCTION
Being safe simply absence form a potential (possible) unfavorable condition such as being injured, ill, even killed or some other kind of loss, or perceived loss. Safety as a condition thus means to be safe, or to stay in other way, the unfavorable loss can not occure and that is subject of full certainty. Jump note: o the other side, being safe from something also means that related risk does not exsist (qualitatively), or that the risk is actually equal to zero (qualitatively). The analysis of the risks, or risk assessment as a structured process is not self sufficient by itself, but is always part of explicit or implicit risk management process. The process of risk management, in general terms always starts with the analysis (risk assessment) providing data in information on the actual risk level present. Next, the actual risk level needs to be somehow judged or compared to a certain criteria. In the most general terms, we weigh the benefits of taking risks against the perceived risk level -mostly on expected scale of damage level. In certain cases, such approach is unfair, inappropriate and irrational, especially if the risk taker and the benefit taker are separated (e.g., not the same person).

1.1. Being safety and risk
Risk is concept meaning a probability of a specific undesired outcome or loss. A certain hazard (situation which poses a level of threat to life, health, property or environment) present can under specific circumstances (related to a probability) lead to a cetain outcome with a certain loss. Definition is also a subject of variability in scientistific disciplines. Greater loss and greater event likelihood result in a greater overall risk. The reason for necessary safety aspects categorization is in the nature of inherent hazards that can lead to a specific risk or actual damage, meaning that usually preventive measures in order to avoid damage differ between categories. Continuing with the chemicals used by the industry (and consumed by the society), the following general characteristic steps are usually observed and managed: Research and development of a new product/preparation/chemical; Design, construction, regular operation and cease of operation in a chemical plant; Workers at the plant are usually to a certain extent exposed to the plant specific hazards, posing a threat to their safety (occupational) and health; Chemical products need to be transported to and from the plant-outside its

boundaries. Some general society wide management provisions for safety and security of the road, rail and sea based transport are in place; Inside industrial plants accidents involving hazardous chemicals occur. The accidental events are rare, but resulting fires, explosions and toxic releases usually lead to devastated plants, equipment, huge economic losses, fatalities among workers and contractors, offsite environmental damage.

1.2. Risk Management, Risk Assessment And Risk Reduction

The analysis of the risks, or risk assessment as a structured process is not self sufficient by itself, but is always part of explicit or implicit risk management process. The process of risk management, in general terms always starts with the analysis (risk assessment) providing data in information on the actual risk level present. The actual risk level needs to be somehow judged or compared to a certain criteria. In the most general terms, we weigh the benefits of taking risks against the perceived risk level-mostly on expected scale of damage level. In certain cases, such approach is unfair, inappropriate and irrational, especially if the risk taker and the benefit taker are separated. The risk judgment should come with an answer whether we are happy or not with it. The actual risk level is very low compared to set criteria. The risk level is at a practical low level and additional further risk measures does not have any sense, or the risk is as low as reasonably practicable-ALARP. The actual risk level is not really low, and we are excited at the level that we shall do something in practical terms, thus investing something into additional safety measures. However we do not want to react/invest in a gross disproportion, meaning that gain in lowered risk level should be in practical terms in a proportion to the investment. Now we came to the complicated case where goth risk level is above that set criteria and investment in risk reduction measure are just too high. If the risk level is not of a a concern and we are willing to take risks, we are again in ALARP region. If the issues apply, or the risks are high and risk reduction is not possible /practical, then we are facing a potential radical decision, possibly to eliminate risk source.

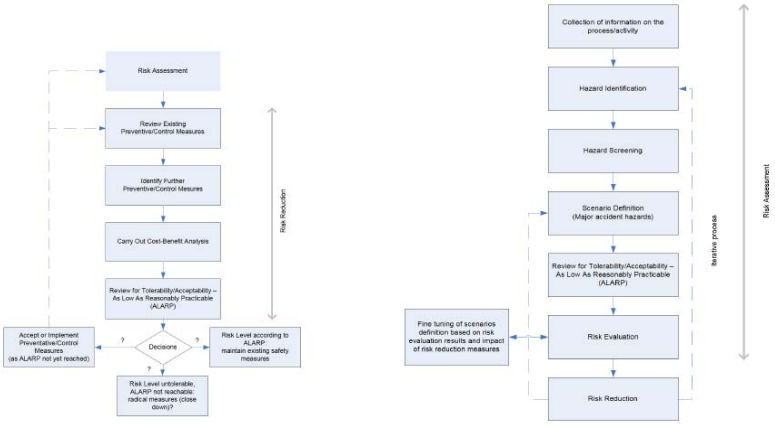

Figure 1.Risk assessment

Risk assessment Collection of information on the process/activity Hazard Identification Hazard Screening Scenario Definition (Major accident hazards) Review for Tolerability/Acceptability – As Low As Reasonably Practicable (ALARP) Risk Evaluation Risk Reduction Fine tuning of scenarios definition based on risk evaluation results and impact of risk reduction measures.

2. RISK-BASED INSPECTION PROGRAMS-LEADING EDGE TECHNOLOGY

Chemical, petrochemical, oil &gas, and refinery sectors facing touher safety, environmental and mechanical integrity regulations as well as challenges associated with the need for both cost and leak reduction to improve safety and availability. Under these circumstances, it has become crucial to manage operational risk through the use of effective technology and best practices for inspection and maintenance methodologies planning. One of the highest benefit maintenance methodololgies is Risk

Based Inspection (RBI). RBI signifantly reduces maintenance efforts and increases plant reliability and availability at the same time. This correlation results from shifting inspection efforts from "over inspection" of uncritical equipment to an increase in inspection cost spending on components with potentially higher probability of failure and consequence.

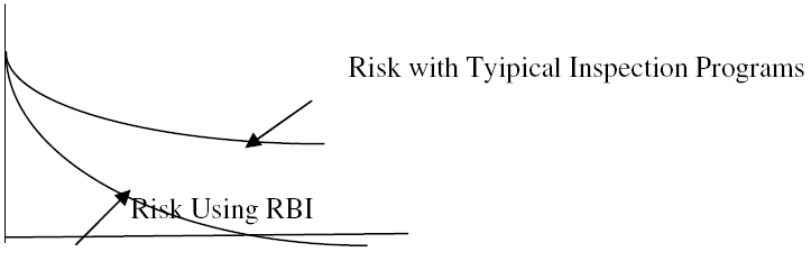

Figure 2:Inspection/Maintenance cost

3. RBI METHODOLOGY OVERVIEW

It is commonly accepted that some inspection on the equipment and piping is necessary to validate the expected condition of the items as well as to assure the integrity of the plant. However it is difficult to determine exactly how much inspection effort is required. An RBI analysis assists to determine the required ffort by providing three key parameters, the likelihood of failure of the item, the consequence of failure of the item and the risk from the combination of likelihood and consequence of failure. The purpose of a RBI analysis is to focus inspection activities on those pieces of equipment where failure risks associated with an active damage mechanism are highest. The term risk is a combination of the likelihood of failure and the consequence of failure. It should be noted that releases have two main causes, one is failure due to material degradation, which can be inspected for and the other is a system error, e.g. an operator error where inspection cannot assist. Risk based inspection planning is a methodology which prioritizes inspection activities on the basis of the actual risk reduction associated with each specific activity. It does this through the following steps: Prepare a suitable database, Identify the main active damage mechanisms and possible scenaria
– HAZOP analysis, Perform qualitative Risk-based assessment according to the CEN CWA 15740., Performed detailed analysis i.e. based on API RP BRD 581:2000, Calculate the likelihood of failure for each piece of equipment as function of the different damage mechanisms, the rate of degradation and time in service, Calculate the consequence of failure associated with each piece of equipment, Combine the likelihood and the consequence numbers to calculate the risk associated with each piece of equipment and rank the equipment according to the risk results, Calculate the reductions achievable in the likelihood of failure through a suitable inspection program (This is achieved by removing the uncertainty in the actual rate of degradation or condition of the item and thus reducing the chance of failure), Develop the inspection program based on the inspection costs versus the inspection benefits. The result is an overall risk reduction and increase in plant safety and reliability while constraining costs.Let me assist you in developing a leading edge RBI program which: Is a consequent development of traditional maintenance strategies that minimizes maintenance expenses, Belongs to the knowledge based methodologies focussing on safety and plant availability on demand by increasing on-stream time due to less turn-around time and a consequent reduction of unexpected failures, Is a systematic tool that helps users to make informed business decisions regarding inspection and maintenance expenses, Identifies "Weak Points" and "Bad Actors", Enables evolution from a "Bandage Approach" to a sustaining reliability culture, Is a recognized way towards "Best in Class Performance" and "Operational Excellence", Means fostering replacement strategy, Implies prioritization in maintenance efforts, Extends inspection intervals where local authorities recognize RBI, and Allows determination of alternative inspection methods to avoid internal entry

4. CONCLUSION

RBI technology and tools empower owners and other users to manage risk associated with operating

equipment, thus assuring maximum return on investment and optimal use of resources. This is accomplished by considering the likelihood of an undesirable event as well as the potential consequences. RBI represents the high-end side of modem development of maintenance methodologies and in consequence our development of a Risk-Based Asset Integrity Management. Risk-Based Asset Integrity Management is a consequent development of traditional maintenance strategies and belongs to the knowledge based methodologies. If focuses on safety and plant availability on demand by increasing on-stream time due to less turnaround time and a consequent reduction of unexpected failures due to our world wide acknowledge corrosion expertise.

5. REFERENCE

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