

Integrated, Health, Safety and Environmental Management System. Case Study of Power Plant

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A modern business politic foresees the adoption and the management of procedures and standards finalized to the guardianship of the health and safety of the workers and to the defense of the environment as well as the community of which the industrial plant is integral part. To effect the above, it is necessary to operate through the management of the risk and particularly to implement methodic of risk analysis. Today the governance of an industrial plant, and particularly of a thermoelectric plant, defines the politics for Safety and Environment in integrated way with the purpose to allow the continuous improvement in a working context.

1. Introduction

Operate according to procedures allows the growth and the sensitization of every workers, to underline possible anomalies and to codify the trials.

The objective is to grow the business culture of "work in safety respecting the environment in which he lives" through the implementation of the normative ISO 14001/EMAS Regulation and OHSAS 18001.

In general terms we can define four key steps in any assessment: issue-framing, design, execution and appraisal.

Issue framing is done to define clearly what is to be assessed, and who should be involved.

Design consists of deciding how the assessment will be done - including the data and methods that will be used.

Execution is the stage of actually doing the assessment - collecting the data and running the models to determine health impacts.

Appraisal involves reviewing and interpreting the results of the assessment, and communicating these to the end-users.

This paper describes the experiences matured in the sector of the production of electric energy, where the environmental impact and the safety of workers find different factors of overlap and therefore it assumes a strategic value the integration of the aforesaid standards.

The experience matured until today has underlined different aspects and problems that, through a systemic management, have been object of plans of improvement and consequent advantage in optics of efficiency and effectiveness.

Meaningful synergies are the following: register of the legal prescriptions and the expirations of law, the workers' formation-information on the use of the chemical substances, management accidents and near accidents, indicative of trial, management of the emergencies, sensitization of the suppliers, etc.

Different factors of risk as noise, asbestos, electro magnetic fields and chemical agents have been valued and managed in an integrated way allowing unique and effective recordings for both the systems.

2. Features of the Integrated System Environmental / Safety

The effective application of ISO 14001/ EMAS Regulation and OHSAS 18001 permit a proper operational framework allowing the thermoelectric power station (TPS) of San Filippo del Mela a constant awareness to the issues of all employees and a schedule for their monitoring and improvement.

With the introduction at Community level of the so-called New Approach directives ("new approach"), the legislature sought to revolutionize the method of management of the obligations in the field of safety and health of workers.

We have gone from a system of type "command & control" system to a "risk assessment and "risk management".

The current legal system, unlike in the past, does not require the employer to comply with specific provisions for precise work activities but requires a dedicated and accurate assessment of the risks to customize on your own site.

This evaluation should take into account the actual and specific factors that affect the safety and health of workers. In this new perspective, the following is a table that allows you to highlight the integration between the common aspects between the different management systems and legislative requirements tend account of the new method of type "new approach":

Table 1: Interaction of risk assessment / risk management regulations and voluntary / mandatory

	ISO 14001	OHSAS 18001
RISK ASSESSMENT		
Hazards identification	4.3.1	4.3.1
Risk assessment	4.3.1	4.3.1
RISK MANAGEMENT		
Management legal requirements	4.2 – 4.3.2 – 4.5.1	4.2 – 4.3.2 – 4.5.2
Improvement objectives and policy	4.2 – 4.3.3	4.2 – 4.3.3
improvement programs	4.3.4	4.3.3
Structure, resources and organization	4.4.1	4.4.1
Documentation and records management	4.4.4 – 4.5.3	4.4.4 – 4.5.4
Audit, Non-Conformity, Corrective Actions	4.5.2 – 4.5.4	4.5.2 – 4.5.5
Measurement and Monitoring	4.5.1	4.5.1
Review of top management	4.6	4.6

3. Case Study: Power Plant

Following examine, with a view of an Integrated Environment & Safety, what are the procedures that allow a single management. To do this, we consider the system of Edipower TPS.



Figure 1: View factory San Filippo del Mela

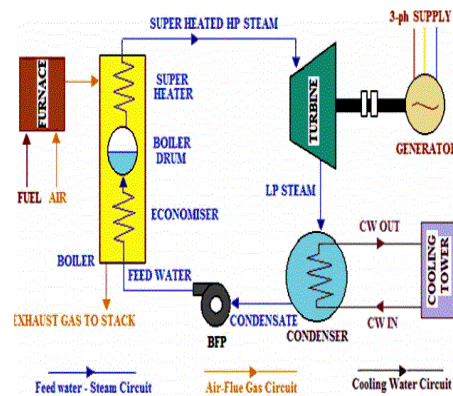


Figure 2: Scheme thermoelectric power station (TPS)

The consistency between the two systems is evident in the identification of environmental aspects and impacts.

For environmental aspect is an "element of the activities or the products or services that can interact with the environment."

A significant environmental aspect is an aspect that has or can have a significant environmental impact (ISO 14001:2004 3.6).

For monitoring systems were appropriate definitive management indicators that allow you to control performance over time and to quantify the improvements. The following are considered those who have influence on both systems:

- % of achievement of the objectives on time and targets implemented in the program for the implementation of improvement measures (procedure: Identification and Risk Assessment);
- Number of NC legal or regulatory identified during audits or inspections by the competent authority (procedure: Management of legal requirements and other);
- Number of environmental objectives achieved / total targets (procedure: Defining objectives and improvement programs);
- Number of emergency situations reported in the year (procedure: Management, preparedness and response to emergencies);
- Number of emergency situations that required the evacuation of the site (procedure: Management, preparedness and response to emergencies);
- Number of emergency drills held during the year (procedure: Management, preparedness and response to emergencies);
- Number of meetings per year to Review (procedure: Management review);
- Number of regular meetings on the analysis of accidents (procedure: Accident management);
- Number of NC found on environmental issues and on issues HSE (procedure: Management of non-conformity, corrective action and preventive);
- NC resolved on time / total open NC (procedure: Management of non-conformity, corrective action and preventive);
- Number of NC emerged during Audit / Number of NC emerged during the ordinary (procedure: audit management).

During the identification of environmental aspects are taken into account even those "indirect" for which the Central does not have full management control but only influence.

classification of activities / processes depending on the level of risk:

High Risk:

- Fire
- Equipment / Components Electric HV and MV
- Works provisional (eg scaffolding)
- Handling and storing chemicals
- Remediation and / or industrial cleaning
- Lifting
- Washing chemical
- Welding processes (in the field)
- Interference in maintenance shutdowns

Middle Risk:

- Non-destructive testing (X-ray)
- Services of gardening, weed control, rodent control, etc ...
- Waste Management
- Installation of insulation and refractory
- Support system (Activities of field)
- Welding Processes

low Risk

- Technical Services administrative (office work)
- Cleaning Services Civil and surveillance
- Canteen

In order to identify activities that could lead to interference with the environment, is applied a methodology of analysis called "Structural Analysis".

The method is based on the division of the plants in the "Systems" (eg.: Steam generators, turbines, water treatment, etc.), Which are further divided into smaller entities, called "functional unit" (eg cycle condensed food, high and low pressure heaters, deaerator, etc.).

For each functional unit, identified aspects, describes the modes of interaction (influencing factors) with the funds listed in the following table.

The funds are analyzed taking into account the different operating conditions:

- normal operating conditions;
- Operating conditions extraordinary or non-normal (but unusual events planned, including those in the stop and start-up of equipment);
- Operating conditions of maintenance (including in this both the ordinary and extraordinary maintenance);
- Operating conditions incidental damages, accidents and potential emergency situations (in this case the initial analysis will assess, together with the probability that the event occurs, the possible consequences and the measures taken to avoid them).

Table 2 - Direct aspects safety/environment

Compartments	Activities	Parameters and indicators to be recording	Main reference management	Environmental impact
Use of substances and materials	Cooling alternators. Waste water treatment, cooling sea water, water services. Operation of fire protection systems; ordinary and extraordinary maintenance.	Recording of the quantities. Reports of any emergency situations relating to the handling of hazardous substances.	Purchase, possession and use of potentially hazardous substances Handling of plant chemical reagents Use and possession of substances potentially damaging to the ozone.	Consumption of industrial chemicals. Consumption of products for construction Consumption greenhouse gases.
Electromagnetic fields	Use of electrical equipment	Results measurement campaigns.	Risk Assessment Report Measurement campaigns	Development of electromagnetic fields within the site
Hazardous waste	Operation of the plants and their normal maintenance and / or extraordinary resulting in the production of hazardous waste.	Quantities produced and disposed and indication of origin. Registration of extraordinary events and / or incidental damages.	Waste Management	Use of special landfills for the disposal of hazardous waste. Handling risk. Risk of soil contamination during handling operations.
Noise	Normal operation and / or extraordinary installations or sites. Operation of plants with intervention of safety valves and use of ejectors.	Maps and measurements of sound levels indoors and outdoors. Record of any complaints	Internal and external communications. Opinion of the adequacy of the immission limits and eligibility criteria provided by the Italian laws.	Emission of noise inside and outside the site.

For all Environmental/Health aspects, identified are attributed "codes of relevance", which allow you to highlight the most "important."

The codes of relevance (CR) are determined from the number of application of the following factors of significance:

- The aspect is subject to authorization requirements, applicable laws or regulations of prospective;
- Generate environmental/safety impacts objectively ascertainable, with special attention to any critical components and / or sensitive;
- Concerns strategic objectives of the company policy and can have economic consequences;
- Is the subject of social sensitivity.

Table 3: Safety & environment - interactions

Compartments	Environmental compartment	Interaction with safety (*)
Dust	Recycling, reuse, transportation and disposal of:	
	- not hazardous dust - hazardous dust	O X
Consumption of resources	Energy consumption	X
	Use of water and other natural resources	X
	Use of substances and materials	O
Water discharge	Controlled discharges	O
	Uncontrolled discharges	X
Atmosphere emission	Controlled emissions	O
	Uncontrolled emissions	X
Other components	Visual impact	O
	Noise	X
	Odors	X
	Ionizing radiation	X
	Electromagnetic fields	X
	Risk of environmental accident	X
Indirect aspects	All funds and Transport.	X

(*) X: strong interaction; O: weak interaction

Table 4: Application of the code of incidence

Encoding	Compartments							
	Noise	Water discharge	Vibration	Ionizing radiation	Atmosphere emission	Odours	Electromagnetic fields	Dust
A	X	X	X	X	X	X	X	X
B	X	X			X		X	X
C		X			X	X	X	X
D		X			X	X		X
Codes of relevance	2	4	1	1	4	3	3	4

4. Conclusions

The thermoelectric power plant in San Filippo del Mela has recently implemented an integrated Safety / Environment system with the aim of creating a single instrument capable of enhancing document management procedures and resources. In particular:

- Management Review, Programs and improvement objectives integrated with valid actions for multiple schemas;
- Enhancement of internal expertise on all management systems (eg , internal auditors);
- Unique business management system with greater organizational efficiency (eg integrated approach for risk assessment and risk management);
- Improved communication in the organization (eg , procedures and documentation of integrated work , the only company policy , etc.);
- Increased effectiveness in the maintenance and verification of compliance with the law.

The following synergies are very significant: the register of legal requirements and law deadlines, information and workers training about the use of chemicals, management of accidents and near misses, process indicators, emergency management, awareness of suppliers, etc. .

Several risk factors, like noise, asbestos, EMF and chemicals have been assessed and managed in an integrated way allowing unique and effective recordings for both systems.

The integration of the two systems of environmental and safety management led to, in a significantly way, both the simplification of the system from the point of view of organization, documentation and avoid redundancies and inconsistencies at the operational level.

It can also include the improvement of the relationship between the company with its key stakeholders (suppliers, employees, institutional bodies and the community in general) thanks to better performance, greater visibility, application of an effective environmental policy and safer working conditions.

The design of an integrated system of safety - environment allows the thermoelectric power plant of San Filippo del Mela to join, through the implementation of a systemic management logic, the innovative requirements introduced in the art. 30 of Legislative Decree 81/08 of Italian law.

Concluding, the introduction in the company of models of organization and internal management, ensures not only the compliance with legal obligations but also the direction commitments aimed to achieving the objectives of improvement.

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