

HSE Management in Natural Gas Distribution

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1. Background

In 2009 Petrobras had shareholdings through GASPETRO in 19 local distribution companies (LDC) that hold natural gas (NG) distribution concessions in Brazil, 12 of which already fully operational.

With the aim of minimizing the impacts and risks inherent to NG distribution activities, a management model was developed to enable these 12 companies to set up an integrated health, safety and environmental (HSE) system which is able to ensure the sustainability of their projects, taking into account the efficiency of the operations as well as economic environmental and social aspects.

Based on Petrobras' 15 Corporate HSE Guidelines, whose reference is ISO 14001 and OHSAS 18001, the model described above was divided into requirements and best practices representing items whose implementation must be prioritized and process improvement initiatives.

The methodology considered the business strategies adopted, the risks associated with the NG distribution activity, operational importance of processes, applicable laws and technical standards, alignment with the stakeholders, continuous improvement in performance and an estimate of the necessary resources.

Health and safety performance indicators have been developed for monitoring the work force. Environmental performance indicators been developed to monitor gas leaks, consumption of natural resources and responsiveness to emergencies. General performance indicators have also been developed for monitoring human resources training, customer satisfaction and equipment and installation maintenance.

2. Aims

The model developed aims to set up an integrated health, safety and environmental management system in local distribution companies (LDC) in order to identify aspects and hazards, minimize and control associated impacts and risks and mitigate losses, thus supporting the development of reliable decisions.

3. Methods

The model proposed the establishment of a plan that should be:

- appropriate for LCD activities and needs;
- structured to permit an easy setting up; and
- able to support action implementation jointly with NG companies.

Based on Petrobras's 15 Corporate HSE Guidelines and appropriate for LCD operational and economic realities, the plan established a sequence of activities aimed at enabling an HSE management integrated system. A manual was also prepared to facilitate action plan implementation.

The last step approves the HSE management integrated system model in each LCD and provides consulting support for its implementation.

3.1 Set up plan

Petrobras's 15 HSE Corporate Guidelines, composed of 79 requirements, were analyzed and divided into 37 priority items and 14 best practices to be applied in a continuous improvement process.

The analysis and characterization of priority items and best practices considered risks associated with NG distribution, operational and management importance, legal compliance and an estimate of necessary resources.

Two mechanisms were developed to evaluate implementation in LDCs: a structured questionnaire applied “in loco”, whose responses could indicate opportunities for improvement and LDC strengths, and a monthly report with a status index.

The questionnaire, which constitutes a powerful evaluation tool and was initially developed to perform diagnoses in LDC companies, is also able to identify each company’s level of HSE system development.

The establishment of the responsibility matrix identified ten distinct processes:

1	Commercialization	6	Marketing
2	Communication	7	Operation and Maintenance
3	Engineering	8	Human Resources
4	Legal Compliance	9	Health, Safety and Environment
5	Leadership	10	Acquisition

3.2. HSE guidelines

Petrobras’s 15 HSE Corporate Guidelines are described below:

Guideline 1 - Leadership and Responsibility

- the company should integrate health, safety and environmental into its business strategy, consolidating its commitment to the work force in a quest for excellence.

Guideline 2 - Legal Compliance

- all activities should comply with current legal requirements regarding health, safety and the environment.

Guideline 3 –Risk Assessment and Management

- to prevent accidents and incidents and ensure the minimization of their consequences, inherent risks should be identified, evaluated and managed.

Guideline 4 - New Projects

- new projects should comply with legal requirements and incorporate health, safety and environmental best practices during their whole life cycle.

Guideline 5 - Operation and Maintenance

- all operations should be carried out according to standards and established procedures, using proper equipment and facilities that are inspected and able to meet health, safety and environmental requirements.

Guideline 6 –Change Management

- temporary or permanent changes should be evaluated, in order to eliminate and/or minimize impacts and risks related to their implementation.

Guideline 7 - Procurement of Goods and Services

- contracted companies’, suppliers’ and partners’ performance in terms of health, safety and the environment should be compatible with guidelines.

Guideline 8 - Training, Education and Awareness Development

- to increase work force engagement with health, safety and environmental fulfillment, training, education and awareness should be continuously promoted.

Guideline 9 - Information Management

- to make its consultation and use easier, health, safety and environmental information should be accurate, updated and documented.

Guideline 10 – Communication

- health, safety and environmental information should be communicated clearly, objectively and speedily in order to achieve the desired effect.

Guideline 11 – Contingency

- emergency situations should be foreseen and quickly confronted in order to minimize all possible consequences.

Guideline 12 - Community Relations

- the company should be mindful of the safety of communities where it operates, as well as keeping them informed of the potential impacts and/or risks of its activities.

Guideline 13 - Analysis of Accidents and Incidents

- accidents and incidents resulting from the company's activities should be analyzed, investigated and documented in order to avoid their repetition and/or ensure that their consequences are minimized.

Guideline 14 – Product Management

- the health, safety and environmental requirements of products should be considered from the beginning of their production process to their final destination.

Guideline 15 - Continuous Process Improvement

- continuous improvement in health, safety and environmental performance should be promoted at all levels of the company to ensure progress in these areas.

3.3. System set up plan structure

The actions required to set up the management system were defined according to a generic schedule, based on the following considerations:

- a sequence based on action restriction/priority;
- allocation of human resources and an estimate of duration;
- defined actions based on an on-site evaluation aimed at characterizing a typical LCD;
- estimated time of up to 300 hours; and
- a responsibility matrix defining processes and responsibilities related to action implementation.

3.4. Manual

Manual details the actions provided for in the set up plan. For an example:

• Guideline 1 - Leadership and Responsibility

The HSE policy approved by company leadership should be:

- appropriate for the NG distribution process, impacts and HSE activities, product and service risk;
- include HSE continuous process improvement engagement with injury, illness and pollution prevention;
- include a commitment to meet legal and other requirements;
- documented and communicated to the work force (including contractors);
- available to stakeholders; and
- reviewed periodically or when changes occur.

In the strategic plan the company should provide for the resources needed for HSE management system implementation and define its scope, include NG distribution facilities and interfaces with customers and suppliers.

HSE management performance indicators should be established:

- identity;
- form of collection;
- consolidation of results; and
- procedure for monitoring and analysis by leadership.

Health, safety and environmental aims should be recorded and, if applicable, divided into pertinent levels. When reviewing and defining aims the company should consider that:

- it is mandatory to meet legal requirements;
- environmental license requirements can be considered aims and goals;
- aims achieved compared with the current situation should be considered system improvements;
- technical, human and financial resources should be made available in order to attain these aims and goals;
- actions, responsibilities and durations should be recorded in action plans; and
- action plans should be formally monitored by leadership at defined intervals.

The role, responsibility and authority of people involved in the HSE system should be defined, recorded and communicated. This can be established in pay and business plans,

role descriptions, system documents and others. This definition of responsibilities and authority should cover:

- the Chief Executive Officer (CEO) and all managers;
- process operators and the work force in general;
- people involved with contractors' health and safety;
- those responsible for training;
- those responsible for critical equipment;
- employees and consultants with qualifications in the health and safety area; and
- employee representatives for health and safety matters.

4. Results

4.1. Definition of evaluation criteria

Evaluation criteria were formulated to assess the results of the HSE management system proposed. They are composed of performance health and safety, environmental, and generic indicators, which have proved useful to identify nonconformity levels as well as opportunities for improvements. They are also useful for revealing existing organizational strengths.

4.2. Performance Indicators

4.2.1. Health and safety indicators

Lost Work Case Injuries

- if an employee is unable to work on his next scheduled shift because of a work related injury / illness.

Restricted Work Day Cases

- injuries which are severe enough to prevent a person from performing normal duties but not so severe as to prevent the performance of lighter duties.

Medical Treatment Only Case

- is a work related case for which medical treatment is given, but which does not result in Lost Work Case Injuries or Restricted Work Day Case.

First Aid Case

- is a onetime treatment and subsequent observation of minor cuts, scratches, burns, and other similar injuries, which do not require medical treatment.

Severity of Work Losses

- total days away from work (Lost Work Case Injuries) in total man-hours worked by all employees.

Periodic Medical Examinations

- number of workers that have completed their regular medical examinations within established deadlines.

Maintenance Performed

- amount of preventive maintenance work performed compared to programmed actions.

4.2.3. Environmental indicators

Number of Leaks

- annual number of leaks in natural gas facilities per total distribution network length;

Emergency Service Readiness

- responsiveness to emergencies communications received from customers; and

Natural Resource Consumption

- monthly consumption of water and electricity per volume of gas distributed.

4.2.4. General indicators

HSE Training

- HSE training hours per number of employees; and

Customer Satisfaction

- should be defined by the companies according to their particularities.

5. Summary/Conclusions

The 'HSE Management Model' described here was implemented in 12 natural gas distribution companies. Monthly monitoring deployment started in September 2009 and was completed in the following year. In March 2011, a second cycle of assessments was initiated.

5.1 On-site assessment results 2009 – 2011

Company	2009 (%)	2011 (%)
A	38	39
B	33	52
C	43	59
D	39	94
E	38	78
F	86	100
G	48	82
H	81	70
I	80	65
J	79	83
K	42	87
L	53	87
Average	55 %	75 %

- 10 of the 12 LCDs assessed in 2011 achieved very positive results in relation to their 2009 assessments, as shown in the above table;
- the negative results observed in 2 of the companies (H and I) were mostly due to changes in leadership, organizational structure, processes and strategic aims;
 - 1 of the LCD (F) completed its management system implementation in January 2011;
- 6 of the companies will complete management system implementation during the first half of 2012. The others must complete the process by December 2012;
- Average adherence to the management system model rose from 55% to 75%; and
- it was observed that all companies had great difficulty in implementing Guideline 4- New Projects and Guideline 6- Change Management.

Another evaluation cycle will take place in 2013 to certify that all companies have completed the process. However, the current process will be monitored throughout 2012. Petrobras currently has shareholdings through GASPETRO in 20 LDCs in Brazil and the integrated health, safety and environmental management system will be set up in 2012 in the other 8 companies.