

ARPEL REFERENCE MANUAL FOR MANAGEMENT OF PIPELINE INTEGRITY

*2009 ARPEL Conference
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ARPEL Pipelines and Terminals Committee was created




ARPEL Pipelines and Terminals Committee (PiTeCo) was formally created on **December 5 and 6, 2006**. The Managers of 10 Member Companies of ARPEL presented a global view of their main operations and issues and then focused on the prioritization of the main lines of action to be considered by the PiTeCo. They also defined their Mission and Objectives and considered the key issues relating the implementation of the Strategic Plan of ARPEL as part of the Work Plan of the PiTeCo.


Companies and Institutions:
 ANCAP ; ECOPETROL; ENAP;
 IBP; PCJ; PEMEX; PETROBRAS;
 PETROPERU; RECOPE;
 RepsolYPF





Total length by Country (2006)

	Gasoducto		Oleoducto		Poliducto		Total	
	Longitud [km]	% total	Longitud [km]	% total	Longitud [km]	% total	Longitud [km]	% total
Argentina	22385	39,2%	4994	13,9%	3808	13,2%	31186	25,6%
Mexico	11696	20,5%	9172	25,5%	12827	44,6%	33695	27,6%
Colombia	5312	9,3%	5197	14,4%	4462	15,5%	14971	12,3%
Venezuela	3297	5,8%	5882	16,3%	1949	6,8%	11128	9,1%
Brazil	4337	7,6%	3273	9,1%	3271	11,4%	10881	8,9%
Bolivia	5214	9,1%	2384	6,6%	0	0,0%	7598	6,2%
Chile	4468	7,8%	0	0,0%	272	0,9%	4740	3,9%
Ecuador	0	0,0%	2813	7,8%	1440	5,0%	4253	3,5%
Peru	0	0,0%	1106	3,1%	0	0,0%	1106	0,9%
Trinidad & Tobago	399	0,7%	115	0,3%	144	0,5%	657	0,5%
Costa Rica	0	0,0%	7	0,0%	517	1,8%	524	0,4%
Guatemala	3	0,0%	423	1,2%	6	0,0%	433	0,4%
Cuba	0	0,0%	187	0,5%	27	0,1%	214	0,2%
Uruguay	7	0,0%	180	0,5%	7	0,0%	194	0,2%
Panama	0	0,0%	130	0,4%	0	0,0%	130	0,1%
Nicaragua	0	0,0%	62	0,2%	0	0,0%	62	0,1%
El Salvador	3	0,0%	1	0,0%	23	0,1%	27	0,0%
Barbados	26	0,0%	0	0,0%	0	0,0%	26	0,0%
Suriname	0	0,0%	55	0,2%	22	0,1%	77	0,1%
Total	57.147		35.981		28.774		121.902	



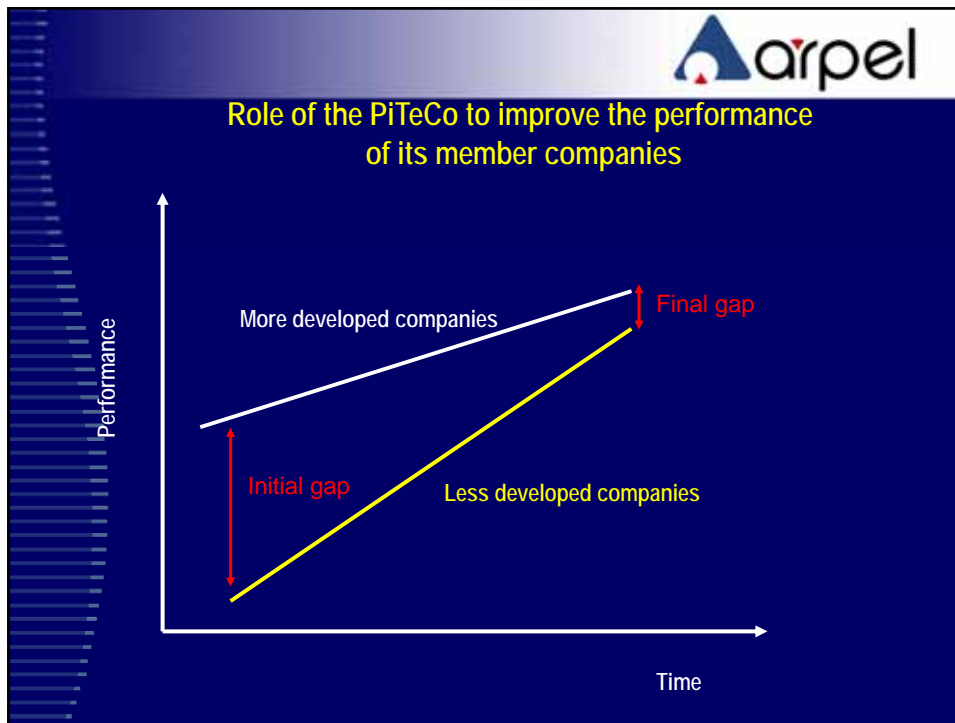
Vision, Mission and Objectives of the PiTeCo

Vision:
To be the group of reference for excellence in management, integrity and operational security of pipelines and terminals

Mission:
To promote and facilitate the management development in the operation of pipelines in the oil and natural gas industry

Objetives:
In the context of the pipelines and terminals management, the objectives are:

- ✦ To share and develop best practices to accomplish excellence in operational, social and environmentally responsible management
- ✦ To foster training and the implementation of new technologies
- ✦ To exchange experiences and information among Member Companies and with other relevant institutions



Creation of the PIPT

- Pipelines Integrity Project Team (PIPT)
- Objectives established by the PiTeCo for the PIPT
 - *To create a reference manual to develop Integrity Management Programs.*
 - *To facilitate the exchange of experiences and common criteria on Pipelines Integrity among ARPEL member companies.*
 - *To promote the reduction of the pipeline integrity management gaps among different companies.*
 - *To share and develop best practices for excellence in operational integrity management.*
 - *To adopt the best practices as established by international standards.*



The image shows the cover of a manual titled "Manual de referencia ARPEL para la gestión de la integridad de ductos". The cover features the ARPEL logo and the text "ASOCIACION REGIONAL DE EMPRESAS DE PETROLEO Y GAS NATURAL EN LATINOAMERICA Y EL CARIBE".

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ASOCIACION REGIONAL DE EMPRESAS DE PETROLEO Y GAS NATURAL EN LATINOAMERICA Y EL CARIBE


Manual de referencia ARPEL
para la gestión de la
integridad de ductos

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PIPT Companies

- ANCAP
- ECOPETROL*
- PEMEX
- PETROBRAS
- PETROPERU
- RECOPE
- Repsol YPF

DEFINITIONS



INTEGRITY:

The integrity of an equipment or facility is its ability to perform the function for which it was designed safely and reliably, without affecting the security of people or the environment.

INTEGRITY MANAGEMENT:

Set of coordinated actions to ensure integrity by efficiently managing risk, the probability of occurrence of a failure, and its consequences.

MANUAL OVERVIEW



- The Manual was developed entirely by experts of ARPEL Member Companies.
- It contains the joint knowledge of our members about the subject matter.
- The guidelines and practices established in the Manual are indicative and not mandatory.

MANUAL OVERVIEW



- This is the first management Manual published by ARPEL.
- It was written before the development ARPEL's integral environment, health and safety management program

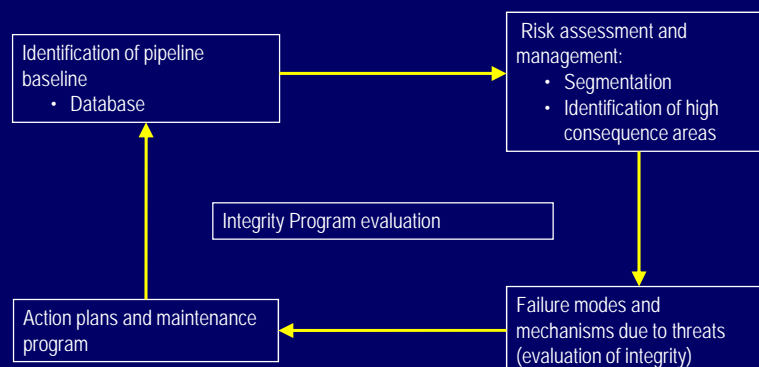
MANUAL OVERVIEW




- The Manual will allow the companies to be compared under similar management criteria in the Region.
- At first it will be for the exclusive use of our members. During this period the member companies will apply it to internalize the concepts and initiate the gaps closing process.
- After a three-year period when management and operation criteria are adjusted through the comments of other experts who have not participated in its development, the Manual will be made public to other stakeholders.




Main Elements of the PDCA Cycle Manual





Manual Table of Contents

1. [Introduction and Purpose](#)
2. [Scope](#)
3. Background
4. Glossary of Terms
5. [Identification of pipeline baseline](#)
6. [Risk assessment and management](#)
7. [Failure modes and mechanisms due to threats](#)
8. [Action plans and maintenance program](#)
9. [Integrity Program evaluation](#)
10. Standards, regulations and technical documents



Next Steps

- Use the Manual as a reference for internal or external evaluation of the Integrity Management Systems of ARPEL member companies.
- Systematize technical exchanges to improve the level of knowledge for the application of the Manual - virtual networks of experts.

Next Steps




- Through ARPEL Portal - Initiate a forum for comments on the Manual for future review and clarifications.
- This forum and the next forums will provide a real motive to promote the virtual interaction among ARPEL Member Companies.





There are over 100,000 kilometers of pipelines in Latin America and the Caribbean

"The physical integrity of pipelines is vital to guarantee the safety of oil industry operations, ensuring the supply of our products to the society with minimum impact on the environment and neighboring communities"



1. Objective

This document aims at allowing ARPEL Member Companies to check their own management and/or apply the best practices to achieve excellence in their operational, and socially and environmentally responsible management in order to ensure the integrity of gas, liquid hydrocarbon and biofuel pipelines.



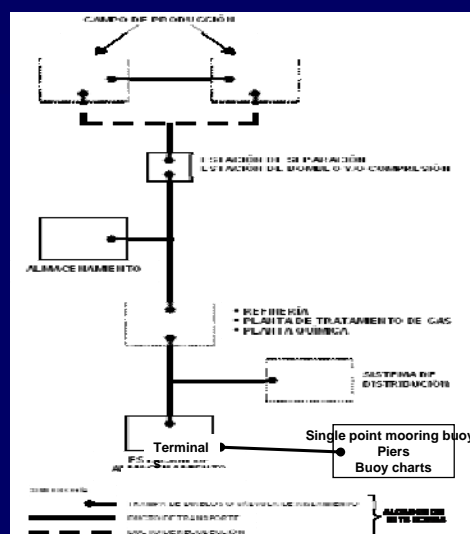
2. Scope


- **Reference guidelines** that **may be adapted** according to the specific situation of each company and the legal or corporate regulations in force.
- It covers the **main issues** to be included in a pipeline integrity management program.
- It includes the **pipelines in operation**, both buried and aerial.
- **Failure modes** and **risk assessment and management** are considered.

2. Scope

- The Guidelines provides **management indicators** to companies, which allow them to evaluate their pipelines integrity programs.
- It also provides the **main reference regulations and bibliography** to develop a pipeline integrity plan.
- This manual does not include the auxiliary pipelines, pipelines for internal refinery processes, natural gas pipelines and submarine pipelines of offshore facilities.

Facilities to which this Manual applies







5. Identification of Pipeline Baseline

Records related to:

- Pipeline material
- Pipeline welding, assembly and construction.
- Infrastructure
- Aggressiveness of the environment (Fluid and soil)
- Coating
- Cathodic Protection System
- Preventive Maintenance Programs implemented.
- The Operation
- Historical Information about Failures
- Corrective Maintenance
- High Consequence Areas and Mitigation of the Consequences

[Check list](#)



6. Risk Assessment and Management


6.1. Definition of Risk


6.2. Risk Assessment

6.2.1. Calculation of Probability of Failure (PoF)

6.2.2. Calculation of Consequence of Failure (CoF)



6.3. Information required for the risk assessment






7. Failure modes and mechanisms due to threats


- 7.1. [Internal corrosion](#)
- 7.2. [External corrosion](#)
- 7.3. [Forces of the elements](#)
- 7.4. [Third-party actions](#)
- 7.5. [Operational errors](#)



7.2. External Corrosion



- 7.2.1 Description of threats of damage due to external corrosion
- 7.2.2. Types of damage caused by external corrosion
- 7.2.3. [Check list for external corrosion](#)






8. Action plans and maintenance program

- 8.1. [Action plans to mitigate risks](#)
- 8.2. Re-assessment of risk and adjustment of the action plan
- 8.3. Management of change in a Pipelines Integrity Program.



9. Integrity Program Evaluation

- 9.1. [Performance Indicators](#)
- 9.2. [Auditing](#)
- 9.3. Continuous Performance Improvement





Thank you!

For further information: contact

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