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Guidance on Practice for Principles of Offshore Pipeline Design and Project Execution

GP 43-02

**BP GROUP
ENGINEERING TECHNICAL PRACTICES**

Foreword

This is the first issue of Engineering Technical Practice (ETP) BP GP 43-02. This Guidance on Practice (GP) is based on parts of heritage documents from the merged BP companies as follows:

Amoco

A PN-PL-5L-G	Piping—Pipeline—API 5L Steel Line Pipe—Guide.
A PN-PLD-00-G	Piping—Pipeline Design—Guide.

BP Amoco Exploration Ltd.

S/UTG1173/00	Design Guidelines for Steel Catenary Risers; Deepwater Developments, Upstream Technology Group, BP Exploration; Revision 3, December, 2000, H-1284.03-10.05-NID-001.
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This Guidance on Practice (GP) is not a stand alone document. It shall be used in accordance with other ETP Documents Series 43 for pipelines, which provide further detail necessary to undertake and execute a pipeline project.

This document is intended to provide an understanding of the key features, requirements, and issues relating to an offshore pipeline system in terms of design and project execution. It uses reference material available in BP and Amoco heritage documents.

GP 43-00 stands above GP 43-02 to provide a foundation high level overview for a pipeline system, giving technical project definition.

In undertaking a pipeline project the MPCP shall be adopted to ensure that the elements and requirements of the CVP are followed as applicable to the scale of the project.

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1. Scope

This GP provides guidance on the principles of the design and project execution phases for offshore pipeline systems transporting both hydrocarbons and associated fluids. It is applicable to offshore pipelines, flowlines, injection lines, and risers. Where appropriate, a pipeline system herein includes the pipeline and pump/compressor facilities and terminal(s) when, for example, identifying an optimum pipeline system design. More detailed guidance on the design of the pipeline, pump/compressor facilities and terminals is covered elsewhere by more specific GPs.

The applicability of this document starts at the Access phase of CVP and continues through to Operations.

The Business Unit Leader, Project Manager, and EA have responsibility to ensure that this GP is followed. This document, whilst designed for BP as Operator, is also applicable, as far as practical, for non-operated undertakings.

2. Normative references

The following normative documents contain requirements that, through reference in this text, constitute requirements of this technical practice. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this technical practice are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

BP

GP 43-00	Guidance on Practice for Pipeline Systems (Overview Document).
GP 43-05	Guidance on Practice for Environmental and Social Impact Assessment of Pipelines.
GP 43-08	Guidance on Practice for Selection and Use of Industry Codes and Standards.
GP 43-10	Guidance on Practice for Route Data Acquisition and Route Selection for Pipelines.
GP 43-20	Guidance on Practice for Onshore Pipeline Design Details.
GP 43-21	Guidance on Practice for Offshore Pipeline Design Details.
GP 43-31	Guidance on Practice for Linepipe Procurement.
GP 43-50	Guidance on Practice for Guidance on Practice for Pigging, Pig Launchers, and Receivers.
CVP	Capital Value Process
gHSEr	Getting Health Safety (Security) and Environment right
GOC	Guidance on Certification
IM	Integrity Management
MPCP	Major Projects Common Process (mandatory for E&P)

US/British/International Codes and Standards

3. Terms and definitions

For the purposes of this GP, the following terms and definitions apply:



Design Life

Period selected for the purpose of verifying by design that a replaceable or permanent component is suitable for the anticipated duty.

Design Pressure

The Design Pressure selected as the maximum sustained pressure exerted by the pipeline contents to which a pipeline is to be designed. This pressure is normally determined by a combination of the pipe wall thickness, diameter, material grade and design factor ultimately selected.

Flowline

A pipeline rigid or flexible that transports unprocessed fluids, typically at high pressure and temperature, from the wellhead to the first downstream process or collector component.

Injection line

A pipeline rigid or flexible that directs processed liquids or gases into a formation, wellhead, or riser to support hydrocarbon production activity.

MAOP

Maximum Allowable Operating Pressure or internal sustained pressure at which a pipeline system, or parts thereof, is allowed to be operated - This pressure is determined (i.e., qualified) by the hydrotest (i.e. hydrotest pressure/1.25 or 72% of SMYS, whichever is the lesser), taking into account any elevation effects. Note: MAOP $\leq$ the Design Pressure.

MATP

Maximum Allowable Transient Pressure or internal transient pressure at which a pipeline system or parts thereof is allowed to be operated - This pressure is limited to 10% above the MAOP.

MOP

Maximum Operating Pressure at which the system is normally required or set to operate (e.g. taking into account any margins required between the operating set points and the MAOP). Note: MOP $\leq$ MAOP.

Offshore Export line

A pipeline that transports oil and gas fluids, normally processed, between offshore platforms or between an offshore platform and a shore facility.

Offshore pipeline

Piping that transports fluids between offshore production facilities or between a platform and a shore facility. Pipelines can be classified into three categories, flowlines, injection lines, and export lines. The use of the word 'pipeline' in this GP applies to all three categories.

Pipeline

The installation through which fluids or gases are conveyed, including pipe, pig trap, components and appurtenances up to and including the isolation valve(s) at the boundary limits.

Pipeline System

The pipeline(s) including flow control, metering, tankage, pumping and compression, control and data acquisition, communications, and associated buildings.

SMYS

Specified Minimum Yield Strength required by the specification or standard under which the material is purchased.



Definitions relating to CVP are given in MPCP.

4. Symbols and abbreviations

For the purpose of this GP, the following symbols and abbreviations apply:

BoD	Basis of Design
BU	Business Unit
CP	Cathodic protection
DSP	Decision Support Package
EA	Engineering Authority
ESIA	Environmental and Social Impact Assessment
FEED	Front End Engineering Design
FM	Finance Memorandum
HSSE	Health, Safety, Security, and Environment
MoC	Management of Change
O&M	Operations and Maintenance philosophy
PEP	Project Execution Plan
PHSER	Project Health, Safety, and Environmental Review
SoR	Statement of Requirements
SPU	Strategic Performance Unit
TI	Technical Integrity

5. Offshore pipeline project overview

5.1. Third party Interfaces and reputation

5.1.1. General

- a. The contact with third parties, e.g. central, regional and local authorities, land owners and users, field operators, public utilities, non governmental organisations (NGOs), special interest groups, financial institutions (lenders), upstream suppliers, downstream customers, contractors, etc., which is an integral part of an offshore pipeline, should not be underestimated.

Offshore pipelines have a major impact on the environment and bring BP closer to the public.

In carrying out the pipeline design, construction, and conducting ESIA's, the required interface and liaison with government, regulatory authorities, and the public is intense. From the Access and Appraise phases, understanding the regulatory 'playing field' early to determine what is needed and how to resource the



project contributes to success. Once in Execute, regulatory matters that require interface and interaction with government authorities can begin to dominate resources and should always receive the maximum attention for a successful project.

- b. GP 43-05 provides detailed guidance for conducting ESIA's, a subject that importantly shall receive management and team attention from Access and on throughout the subsequent project phases.
- c. Accordingly, there are significant reputation issues that should be considered and addressed at an early stage.
- d. To ensure that consultations commence early, appropriate specialists shall be involved for BP from the start.
- e. Integration of the "reputation" team with project management to prepare an explicit action and monitoring plan is essential.

Many large scale sensitive projects involve funds being borrowed from financial institutions.

- f. Hence the potential involvement of infrastructure leaders shall be recognised.
- g. These issues shall be addressed by the BU/project management at Access for implementation of a plan within Appraise.
- h. Such a plan shall be integrated and updated with the ESIA activities.

These issues impact on various stages of the project from Appraise through to Operate and may drive many technical and commercial decisions.

5.1.2. Commercial

- a. Commercial internal liaison shall be considered as a key matter for attention from Access.
- b. The project team should have a commercial/business lead to ensure that business understanding is related throughout the team, linking across the BU to achieve a two way flow of information.
- c. Ensure the commercial and technical teams meet together sufficiently to avoid regulatory misunderstanding.

Avoid cutting corners and reaching commercial agreements that create regulatory conflict.

5.1.3. Regulatory approvals

- a. Depending on the pipeline location, where national and local requirements may dictate, the pipeline design and construction shall follow US and/or British codes and standards.
- b. GP 43-00 shall be met, including the local and national regulations.
- c. In Appraise the regulatory requirements shall be thoroughly determined to form the basis for regulatory compliance throughout the project.

It is essential that there are no later surprises as the project progresses. If operating outside the UK and USA, codes, standards, and regulatory practice that we have normally come to expect shall not be assumed to rule.

- d. The following outline shall be followed to protect BP when undertaking a pipeline project:
 - 1. Appoint a Regulatory Interface lead who reports to the EA of the project.

The EA is to take overall responsibility for the regulatory technical interface, reporting to the Project Manager and the BU management. Note that the Regulatory Interface may not be purely technical and therefore be prepared to build a License



to Operate (LTO) team for reputation, environment and regulatory interfaces to be properly managed.

2. Assign responsibility within each project discipline for regulatory interface and compliance.
3. Follow GPs 43-00, 43-08, 43-20, and 43-21 (GIS 43-211/212) to ensure BP's requirements in design and construction are met. BP shall go beyond national and local requirements to meet these GPs.
4. Ascertain in Appraise the codes, standards, and regulatory approval process in place for the country of operation for design and on through all project phases.

In some developing countries it is possible that such standards and regulatory processes may not exist. In such a circumstance adoption of the higher of UK or USA regulatory processes would be relevant, bearing in mind that BP is seen to be acting professionally, not taking advantage, and always protecting BP's reputation.

5. If design and operating conditions go beyond country standards and regulatory processes, e.g., extreme operating pressures, then a risk based approach to design to demonstrate fully a safe system rather than a code compliant system shall be adopted.

This requires in depth involvement of the regulatory authority to ensure understanding and acceptance.

6. Review the regulatory requirements with the planned codes and standards to resolve conflicts.
7. Determine differences and plan forward to ensure the project satisfies requirements. This approach shall be adopted for all project disciplines.
8. Establish a strong relationship with all authorities to establish confidence and mutual understanding. Be prepared for difficult relationships and confusing advice. Have a strategy to manage for success.

The ability to influence regulatory implementation and change is important.

9. Prepare a regulatory approvals plan and incorporate it in the suite of key project plans.
10. Conduct regular reviews of the plan and ensure the project team is fully aware of the plan and all implications.
11. Review the plan at progress meetings and at stage gate reviews. Involve senior project management beyond the EA.
12. Meet with the regulatory authorities frequently.
13. Do not make assumptions, seek clarification and resolution.
14. Be prepared to assist the authority in their thinking and understanding.
15. When conflict arises, ensure BP senior personnel are involved to provide guidance and if necessary, resolve differences, both internally and externally.
16. Ensure that the EA builds a strong link with the authorities and provides management control in the project to expedite resolution.
17. Allow sufficient time for regulatory approvals and processes. Consider the risk potential to the project.

Understand what is involved, be realistic and include contingency in the plan. This may be critical when BP is involved in assisting a developing country to update or initiate regulatory approval requirements. Be sure to manage the risk and highlight at CVP gate reviews. It may even need to be explained in the stage gate FM.

