



Document No.	GP 10-80
Applicability	Group
Date	11 June 2008

GP 10-80

Well Testing

Group Practice

**BP GROUP
ENGINEERING TECHNICAL PRACTICES**

Foreword

This is the first issue of Engineering Technical Practice (ETP) BP GP 10-80 for Well Testing and Clean Up Operations. This Group Practice (GP) has been developed to provide the basic framework outlining how BP operations will manage Well Testing and Clean Up activities using temporary surface process facilities and /or well completion installations.

DWOP Section 29 Well Testing

All well testing and clean up operations shall be designed to conform with GP 10-80 (Well Testing ETP)

- 29.1 The equipment programmed for the Well Testing or Clean Up operations shall be designed to be able to safely control the maximum potential pressures that the reservoirs may be able to generate.
- 29.2 Timely HAZOP/HAZID reviews shall be conducted covering the Well Testing/Clean Up equipment and operations plans for all newly programmed activities. A process safety specialist should be involved in this review. However a generalised review covering a programme of similar operations on multiple wells is acceptable as long as an appropriate MOC programme addresses potential variations.
- 29.3 A detailed programme for Well Testing or Clean up operations shall be prepared for each well.
- 29.4 All installed Temporary Process Equipment shall be checked to confirm compliance with the relevant documented P&ID (Process and Instrumentation Diagram).
- 29.5 BOP's and associated equipment shall be tested immediately prior to running the test string.
- 29.6 All connections within test strings or completion strings with packers shall be tested to the maximum anticipated pressure, plus a safety margin, prior to flowing the well.
- 29.7 The test string shall be designed to allow effective well kill in the event of any potential failed closed valve within the string. The test string shall include the facility to allow the string contents to be circulated or bullheaded prior to pulling out of hole.
- 29.8 All surface well testing or completion equipment potentially exposed to high operating pressures shall be pressure tested to the maximum anticipated pressure, plus an acceptable safety margin, prior to flowing the well.
- 29.9 All other process equipment shall be tested to its rated working pressure or to an appropriate test pressure that will not actuate installed relief valves.
- 29.10 Test lines, relief lines, process equipment and all relevant temporary fittings shall be securely anchored. Particular attention shall be given to line fixing at each end and along their length.
- 29.11 Relief lines shall be designed to accommodate the maximum potential fault flow rate without exceeding their own pressure rating.
- 29.12 Emergency Shut Down systems shall be function tested and confirmed operational prior to the start of well flowing.



- 29.13 The air supply to burners shall be independent of the rig air supply. Non return valves should be fitted between the compressors and burner head.
- 29.14 Unlatch equipment deployed for floating rig operations shall be function tested prior to running tools into the well.
- 29.15 Subsea test trees and test string deployed safety valves shall be capable of shearing all coiled tubing and wireline to be run through the test string.
- 29.16 The capability of the BOP's to shear the Sub Sea tree slick joint shall be determined and suitable safeguards installed to prevent the test string being pulled to position non shear-able assemblies across the shear rams.
- 29.17 During testing sufficient main power, well control and installation services shall be available and on line to service unplanned or emergency conditions that may occur during the test.
- 29.18 Nitrogen used to pre-charge DST tools or samplers shall be certified oxygen free or analysed on site to confirm quality before use.
- 29.19 All rig installed and temporary gas detection systems and safety equipment shall be certified fit for use prior to the start of flow.
- 29.20 After completing well testing or clean up operations reasonable steps shall be taken to ensure that the well conditions are safe to allow tripping out of the hole to commence.

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Table of Contents

	Page
Foreword	2
Introduction	5
1. Scope	6
2. Normative references.....	6
3. Terms and definitions.....	7
4. Symbols and abbreviations	7
5. Objectives of this document	9
6. Organisation and competencies.....	9
6.1. Management accountability	9
6.2. Management delegation.....	9
6.3. Organisational structure	10
6.4. Senior Petroleum Engineer responsibilities	10
6.5. SPE and Testing support staffing requirements	10
6.6. Testing Contractor support requirements	11
6.7. Specialist services and other support requirements	11
6.8. POB Management	11
6.9. Training Expectations	12
7. Well Test Planning and Design Concepts	12
7.1. Introduction	12
7.2. Test Basis of Design	13
7.3. Equipment Selection and Design Fundamentals	15
7.4. Programme Generation.....	23
7.5. Equipment and Process Plant Commissioning	24
7.6. Start Up Limitations.....	28
7.7. Performance Indicators	29

List of Tables

Table 1 – Pressure Test Duration and Acceptance Criteria.....	28
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Introduction

Well Testing and Clean-up operations involve flowing significant quantities of flammable and potentially explosive hydrocarbons. Safely conducting these operations, on installations primarily designed for drilling, can be consistently achieved with correctly prepared, installed and commissioned temporary process equipment.

This GP provides direction on the minimum standards required to design and manage these operations whilst keeping within the spirit of the BP Group HSE Standard for "Process Safety/Integrity Management", as follows: *"Mechanical and structural systems shall be operated, inspected, tested and maintained, consistent with accepted standards to ensure that equipment is fit for service, so as to avoid loss of containment and structural integrity"*.

Good design and operating procedures are essential to deliver safe operations. All equipment installed in any temporary process system needs to meet the correct design, maintenance, and inspection standards and be certified as fit for use.

It should be noted that no specific reference is made in this document to any additional or special procedures that relate to managing HPHT Well Testing or Clean-up operations. It is recognised that all Testing and Clean Up operations introduce significant risk and the same demanding requirements that are routinely placed on HPHT operations should be delivered consistently to all test operations.



1. Scope

This GP provides critical guidance on the design, planning, commissioning and operation of temporary Well Testing and Clean Up operations.

The GP will not cover the following subject matter and these will need to be addressed by referring to the relevant safety and operational standards:

- a. Equipment mobilisation and lifting management.
- b. Handling and installation of completion equipment
- c. Data acquisition requirements with the exception of relevant safety critical data systems.

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. Requirements in these documents not referenced are not requirements of this technical practice

BP

GP 10-01	Casing & Tubing Design
BPA-D-003	Casing Design Manual
TS-D-007	Completion Design Manual
GP 04-30	Guidance on Practice for Design and Location of Occupied Permanent Buildings Subject to Blast Fire and Gas Hazards on Onshore Facilities
GP 24-10	Guidance on Practice for Fire Protection Onshore
GP 24-20	Guidance on Practice for Offshore Fire & Explosion Hazard Management
GP 24-21	Guidance on Practice for Fire Hazard Analysis
GP 24-22	Guidance on Practice for Gas Explosion Hazard Analysis
GP 48-02	Guidance on Practice for Hazard and Operability Studies
GP 48-50	Guidance on Practice for Major Accident Risk Process

Industry Standards

API Spec 5CT	Specification for casing and tubing
API RP 7G	Recommended practice for drill stem design and operating limits
API Spec 6A	Specification for valves and wellhead equipment
API Spec 14A	Specification for sub surface safety valve equipment
API RP 14C	Recommended practice for analysis design installation and testing of basic surface safety systems on offshore production platforms
API RP 14E	Recommended practice for design and installation of offshore production platform piping systems



API 17B	Recommended practice for flexible pipes
API RP 44	Recommended practice for sampling petroleum reservoir fluids
API RP 520	Recommended practice for sizing selection and installation of pressure relieving devices in refineries.
API RP 521	Recommended practice for pressure relieving and depressurising systems
ASME Section VIII	Div 1 Rules for construction of pressure vessels
ANSI/ASME B31.3	Chemical plant and petroleum refinery piping
NACE MR-01-75	Sulphide stress cracking resistant metallic materials for oilfield equipment
ISO 1368	Part 7

3. Terms and definitions

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

Shall

Shall defines a requirement that needs to be followed to be in compliance with the standard.

Should

Should defined as a preference that is expected to meet the spirit of the standard

May

Indicates a course of action that is permissible

Can

Can requirements are defined as “having the ability to” under the terms of the standard

Accountable

Person who has authority to approve or disapprove.

Responsible

Person who is responsible for carrying out the requirement

Technical Authority

Person(s) responsible for guiding safe and consistent application of regulatory, BP, and industry codes and standards, and good engineering practices.

4. Symbols and abbreviations

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

BOP	Blow Out Preventor.
CGR	Condensate Gas Ratio
DP	Dynamic Positioning.
DST	Drill Stem Test.
EPTG	Exploration Production Technology Group



ESD	Emergency Shut Down.
ETP	Engineering Technical Practice.
Ex d	Flameproof Electrical Fitting Specification
gHSEr	Getting health, safety and environment right.
GP	Group Practice
HAZID	Hazard Identification.
HAZOP	Hazard and Operability study.
HP	High Pressure
HPHT	High Pressure High Temperature
HSSE	Health, Safety, Security, and Environment.
ITT	Invitation To Tender
IA	Inspection Authority.
MOC	Management of Change
MDT	Modular Dynamics Tester – Logging tool provided by Schlumberger
NACE	National Association of Corrosion Engineers
NDE	Non-destructive Examination
NPT	National Pipe Thread designed to American National Pipe Tapered Thread specification
OMS	BP's Operations Management System
POB	Personnel on Board (reference to manning levels for offshore installations or camps)
P&ID	Piping and Instrumentation Diagram.
PE	Petroleum Engineer.
psi	Pounds force per square inch Customary Oilfield Unit of Pressure
PBU	Pressure Build Up
PSV	Pressure activated Safety Valve
RCI	Reservoir Characterisation Instrument – Logging tool, provided by Baker Atlas
RDT	Reservoir Description Tool – Logging tool provided by Halliburton
SCBA	Self Contained Breathing Apparatus
SG	Specific Gravity – ratio of liquid or gas density, relative to water or air
SME	Subject Matter Expert.



SPE	Senior Petroleum Engineer or Well Testing Engineer.
STX	Steam Exchanger
SSTT	Sub Sea Test Tree.
TA	Technical Authority
WP	Working Pressure – maximum safe operating pressure for equipment

5. Objectives of this document

The objectives of this document are to promote the safe and efficient well testing operations through the application of consistently high standards in technical design, planning and operational procedures

6. Organisation and competencies

6.1. Management accountability

- a. The management of Well Testing and Clean Up operations will normally be covered within the wells management structure and accountability for delivery of safe operations will reside at the Wells Director or Wells Manager level. Technical support from specialist Well Testing or Petroleum Engineers will normally be embedded within the appropriate Wells team and these will normally be assigned responsibility for ensuring that the planned activities meet the requirements of this GP. In some locations the assignment of a local Well Testing Technical Authority, or Subject Matter Expert, may be appropriate to provide more focused technical support for the Wells Director.
- b. Site Management (i.e. the Senior accountable BP leader at site) shall be accountable for ensuring that:
 1. Well test equipment is installed and commissioned in accordance with the standards referenced in this document.
 2. Operating boundaries are defined in the Well Test Programme and adhered to during the test.
 3. Equipment is installed in accordance with the relevant P&ID
 4. Local regulations over and above those identified in this document are adhered to
 5. Economic constraints shall not affect the above requirements – these being essential for safe operations.
 6. Well Control requirements to ensure safe operations are effectively prioritised and managed during all testing and clean up related activities.
 7. Local and BP HSSE regulations and expectations are met for all site based operations.

6.2. Management delegation

The management of each BU shall delegate the responsibility and authority for the correct application of this GP to an appropriately qualified Senior Petroleum (SPE) or Well Testing Engineer. This delegation of responsibility and definition of appropriate authorities shall be documented

