

Western Australian Onshore Gas

Code of Practice for Hydraulic Fracturing

Background

APPEA has facilitated the preparation of this Code of Practice to demonstrate what the gas industry is doing to successfully and responsibly develop significant onshore gas reservoirs in Western Australia.

The Code has been developed by a working group of industry operators based on established operating principles and leading practices in other jurisdictions that are relevant to local conditions.

Onshore gas reservoirs in Western Australia typically occur in tight sandstone and shale formations at depths of between two to four kilometres and in geological formations that are isolated from surface aquifers by significant barriers. Developing these resources can potentially deliver major environmental and economic benefits.

The shale and tight gas industry aims to assess and if feasible develop these reservoirs in a safe and environmentally responsible way consistent with regulatory requirements.

This Code was developed as part of industry input to an independent review of the regulation of these activities in WA which was released on 31 October 2011: http://www.dmp.wa.gov.au/7105_14068.aspx Western Australia's shale and tight gas industry will support these regulatory reforms to help ensure safe natural gas development, responsible water management and enhanced transparency. In addition, the industry commits to the guiding principles set out in this operating framework.

Legislation

In Western Australia, the Department of Mines and Petroleum (DMP) is the lead agency responsible for regulating unconventional gas activities. Shale, tight and coal seam gas are regulated using a similar process to conventional oil and gas activities under the Petroleum and Geothermal Energy Resources Act 1967, Petroleum Pipelines Act 1969, and the Schedule of Onshore Petroleum Exploration and Production Requirements 1991.

Proponents intending to carry out drilling and hydraulic fracturing operations must submit a number of applications to DMP, including:

- a drilling application;
- an environmental management plan; and
- a safety management plan.

This Code of Practice has a particular focus on well stimulation given that requirements for drilling and well integrity in the broader oil and gas industry are well developed and dealt with in detail in the Schedule of Onshore Petroleum Exploration and Production Requirements 1991.



Guideline 1– Community, landholder and stakeholder interaction

The aim of this guideline is to ensure operators communicate openly and as early as practicable with landholders, local communities and other stakeholders. This communication includes explaining how risks are being managed to minimise any potential unwanted or adverse impacts.

For example:

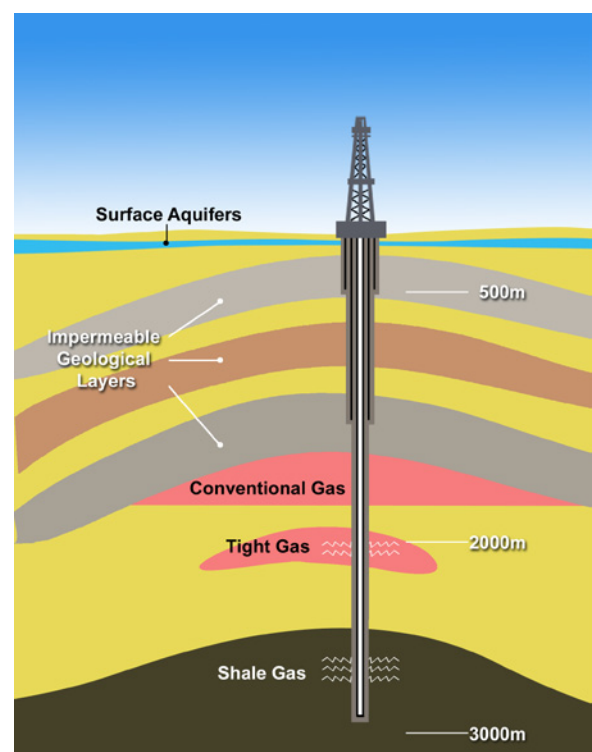
- Operators will work to understand and minimise potential impact of hydraulic fracturing on existing land users, the natural environment and local communities. This includes keeping activities away from dwellings or environmentally sensitive areas as per regulatory requirements.
- Operators will ensure contractors are fully informed as to the potential environmental and occupational health and safety impacts of hydraulic fracturing operations and that they comply with this Code of Practice as part of contractual arrangements.
- Operators will provide accurate, timely and current information about their hydraulic fracturing activities, including how risks are identified, assessed and managed, prior to undertaking the activity, and will provide additional significant information as it becomes available. This information will include publicly released environmental management plans.
- Landholders or occupiers of the land where hydraulic fracturing operations take place will be entitled to fair and reasonable compensation which will be arrived at by negotiation.

Guideline 2 - Protection of Aquifers

The aim of this guideline is to ensure that well design and implementation practices include protection of aquifers or groundwater that may be accessed for commercial or residential water supply ("Production Aquifers").

For example:

- During the well design and planning process, operators will identify any Production Aquifers at significant risk of being impacted by hydraulic fracturing fluids. This will include the identification of critical aquitards that protect such Production Aquifers from contamination.
- If any such aquitards have been identified, fracture stimulation activities will be designed to not breach these aquitards. As far as is reasonably practicable, monitoring will be carried out during operations with the aim of ensuring this is not occurring.
- Well design will ensure protection of all Production Aquifers from exposure to stimulation and/or resultant reservoir fluids by ensuring two independent and verified barriers in all wells.



Guideline 3 – Sourcing and Use of Water

The aim of this guideline is to protect and, where required, effectively and responsibly use groundwater resources.

For example:

- All water used in hydraulic fracturing operations will be captured and recycled for reuse as much as practical.
- Taking water from aquifers will be subject to Department of Water licence requirements. This includes demonstrating as far as reasonably practicable that the volume of water extracted will not have unacceptable impacts on aquifers, the environment or other water users.

Guideline 4 – Use of Chemicals in Hydraulic Fracturing

The aim of this guideline is to minimise the use of chemicals in hydraulic fracturing operations, provide clear and accurate information on any chemicals that may be used, and promote the safe and responsible use of chemicals.

For example:

- As far as practicable, fluids with the lowest toxicity will be used in hydraulic fracturing, and the concentrations used will be the minimum required to facilitate effective operations. Chemical suppliers will be required to meet these guidelines.
- Details of all fluids to be used during hydraulic fracturing operations, including information on actual usage and fluid recovery will be provided to DMP.
- The information will include relevant Material Safety Data Sheets (MSDS) and National Industrial Chemical Notification and Assessment Scheme (NICNAC) registration details and will be subject to the protections of proprietary or commercially sensitive information available under these schemes.
- Operators will support the public release of this information. This will include working with DMP through APPEA to develop a standard process including consideration of a website service such as FracFocus Chemical Disclosure
- All chemicals used for hydraulic fracturing operations will be handled and stored in accordance with appropriate International Standards Organisation standards, relevant Material Safety Data Sheets and State regulatory requirements.

Guideline 5 – Fluid flowback and produced fluids containment

The aim of this guideline is to ensure that post-fracture stimulation clean-up flowback or produced fluids cannot come into contact with Production Aquifers or pollute soil or soil substrate.

For example:

- All recovered hydraulic fracturing fluids will be isolated in sealed storage areas designed to prevent leakage.
- Recovered fluids will be recycled or disposed of through flaring, sale, evaporation or removal to an approved disposal site consistent with regulatory conditions.

Produced hydraulic fracturing fluids may be reinjected into a suitable formation isolated from Production Aquifers in accordance with regulatory requirements.

- When no longer required for use, all sites, including any sealed storage areas, will be rehabilitated to meet regulatory or any other agreed requirements.
- Operators will comply with any legislative requirement to report any known or suspected contamination to the Departments of Environment and Conservation, Department of Health and Department of Mines and Petroleum.



Guideline 6 – Fugitive Emissions

The aim of this guideline is to ensure the fugitive emissions from stimulated wells during flowback and testing activities are minimised.

For example:

- Venting of gas to the atmosphere is to be avoided and when this is not possible for operational or safety reasons it should be kept to a minimum.
- During flowback of hydraulic fracturing fluids and extended well testing periods, gas will be separated from liquids and either be put into a pipeline for sale or when this is not possible, flared such that fugitive emissions are minimised.

Guideline 7 – Continuous improvement

The aim of this guideline is to ensure continuous performance improvement and the sharing of information with regulators and other stakeholders to reduce potential risks of hydraulic fracturing.

For example, well operators should:

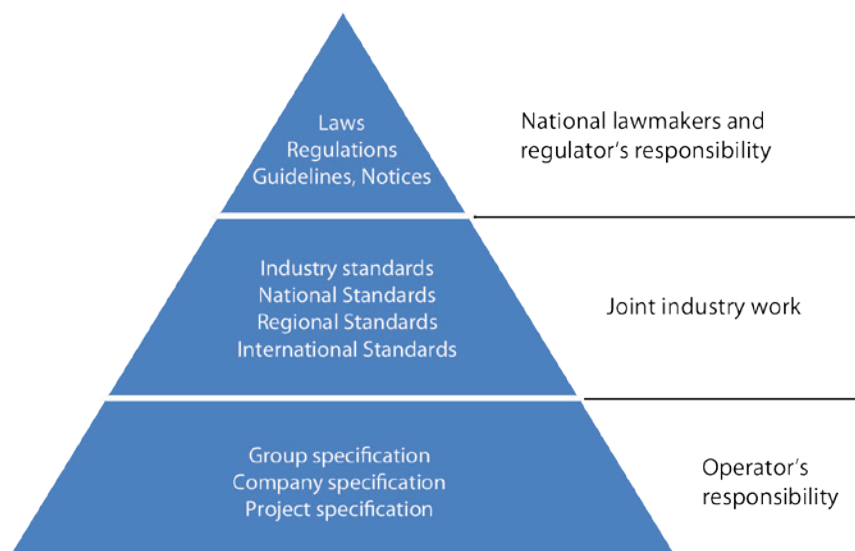
- Develop well construction procedures, environmental management plans and safety management plans consistent with regulatory requirements and the Code of Practice principles.

- Ensure full and open communication with regulatory authorities and other stakeholders in relation to industry activities and the processes of continuous improvement, including through supporting the public release of approved management plans.
- Collate and share information among the operating and services community on knowledge and experience to continuously improve operating practices.
- Contribute to building the body of knowledge within government on the appropriate management and regulation of the industry.

Industry standards and guidance, and the regulatory framework

The oil and gas industry operates under regulatory frameworks supported by many international and national standards relevant to exploration, development and operation as shown in figure 1. Further details on the standards identified in regulation and those that relate specifically to hydraulic fracturing are provided at Attachment 1.

This WA Code is a contribution to this guidance within the category of joint industry work.



Source: International Association of Oil and Gas Producers, Regulators' use of standards, Report No. 426, March 2010

Next steps

APPEA welcomes your views on the guiding principles and suggested actions in this Code of Practice. It is anticipated that a final version of the document will be issued after further consultation with regulators in relation to the regulatory reforms announced on 31 October 2011.

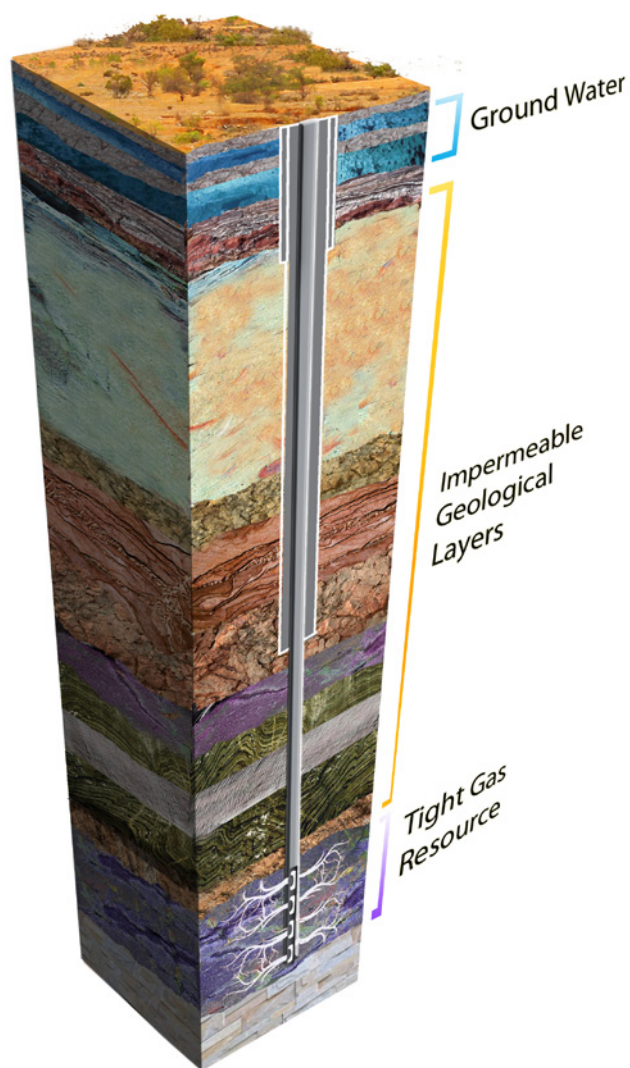
APPEA is also working with onshore gas operators in other States and Territories to consider a nationally consistent approach to a Code. This could define best practice operating principles for all onshore gas activities while also recognising that the different geology and regulatory frameworks must be considered in deciding which actions are best for local conditions.

To download the Code of Practice document or request a copy visit: www.appea.com.au

Post your comments to Onshore Gas Code of Practice, APPEA, Level 1, 190 St Georges Terrace, Perth WA 6000 or email your comments to ataylor@appea.com.au

Definitions

- Aquitard: A confining or impermeable layer that overlays or underlays an aquifer
- Coal seam gas: Gas derived from coal beds, typically at depths of between 300 and 600 metres.
- Hydraulic fracturing: Hydraulic fracturing (known in the industry as fraccing) is a process that uses the hydraulic pressure of fluid pumped into gas wells to open fractures in target formations and help increase gas production.
- MSDS: Material Safety Data Sheets provides details of the properties of a substance. They also provide details of actions that should be taken if a person comes into contact with the product.
- NICNAS: National Industrial Chemicals Notification and Assessment Scheme. NICNAS assesses all new chemicals to Australia and those already used on health, safety and environmental grounds.
- Production aquifer: Aquifers or groundwater which may be accessed for commercial or residential water supply.
- Shale gas: Gas derived from shale rock formations, typically at depths of below 2500 metres in Western Australia.
- Tight gas: Gas derived from low porosity or low permeability rock, typically at depths of below 2500 metres in Western Australia.



International Standards Employed in Western Australia for Onshore Petroleum Activities

Standards Identified in Regulation

Detailed below is a list of standards cited in Western Australia's Schedule of Onshore Petroleum Exploration and Production Requirements 1991 that relate to onshore petroleum activities under the Petroleum and Geothermal Energy Act 1967. A copy of the regulations is available on the Department of Mines and Petroleum's website at <http://www.dmp.wa.gov.au/documents/PD-PTLA-TGR-248D.pdf>.

Reference in Regulations	Reference	Title	Purpose
See http://www.osha.gov/SLTC/etools/oilandgas/glossary_of_terms/glossary_of_terms_a.html for a description of the typical components of a petroleum well.			
503 (a) – Equipment to conform to certain standards	API Std 4A	Specification for Steel Derricks (including Standard Rigs)	Sets standard for drilling and workover equipment
503 (a)	API Std 4D	Specification for Steel Derricks (including Standard Rigs)	This specification covers any mast structure suitable for oil-well or gas-well drilling or servicing
503 (a)	API Std 4D,	Specification of Portable Masts	
503 (a)	API Std 4E;	Specification for Drilling and Well Servicing Structures	This specification covers steel derricks, portable masts, and substructures i.e. structures suitable for drilling or well servicing
503 (b)	API Spec 7	Specification for Rotary Drilling Equipment	Sets standard for drilling and workover equipment
503 (c)	API Spec 5CT	Specification for Casing, Tubing and Drill Pipe	Specifies the technical delivery conditions for steel pipes (casing, tubing and pup joints), coupling stock, coupling material and accessory material
503 (d)	API Spec 6A	Specification for Wellhead and Christmas Tree Equipment	Specifies requirements and gives recommendations in relation to wellhead and christmas tree equipment for use in the petroleum and natural gas industries.
503 (e)	API Spec 16A	Specification for Drill Through Equipment	Includes blowout preventers, drilling spools and adapters
503 (f)	API Std 8A	Specification for Drilling and Production Hoisting Equipment	Establishes ratings for certain hoisting equipment used in drilling and producing operations
503 (g)	API Spec 9A / AS 1656	Specifications for Wire Rope	Specifies the minimum requirements and terms of acceptance for the manufacture and testing of steel wire ropes.
503 (h)	API Spec 10	Specification for Materials and Testing of Well Cements	Requirements for manufacturing eight classes of well cements and application of the API monogram, including chemical and physical testing requirements.
506 (1) - Casing	API Bull. 5C2	Bulletin on Performance Properties of Casing Tubing and Drill Pipe	Sets standard for design and placement of casing strings
506 (5)	API RP 5C1	Recommended Practice for Care and Use of Casing and Tubing	Sets standard for re-use of casing strings
508 (1) - Blow out prevention control	API RP 53	Recommended Practices for Blow-out Prevention Equipment Systems for Drilling Wells	Sets standard for installation, operation, maintenance and testing of blow out preventers.
515 (4) - Drilling fluid	API RP 13B	Recommended Practice for Standard Procedure for Testing Drilling Fluids	Sets standard for design of tests of drilling fluids
523 (1) - Fluid samples	API RP 44	Recommended Practice for Sampling Petroleum Reservoir Fluids	Sets standard for testing of recovered fluids from formation tests or non-routine production tests

Standards Specific to Hydraulic Fracturing

In relation to hydraulic fracturing, alignment with the following API standards would be considered good practice. Similar standards are also available from other jurisdictions.

API Reference	Title	Purpose
API HF1	Hydraulic Fracturing Operations – Well Construction and Integrity Guidelines, 1st Edition, October 2009	<ul style="list-style-type: none"> Highlights industry practices for well construction and integrity for wells that will be hydraulically fractured. The guidance identifies actions to protect shallow groundwater aquifers, while also enabling economically viable development of oil and natural gas resources.
API HF2	Water Management Associated with Hydraulic Fracturing, 1st Edition, June 2010, (API)	<ul style="list-style-type: none"> Identifies best practices used to minimize environmental and societal impacts associated with the acquisition, use, management, treatment, and disposal of water and other fluids associated with the process of hydraulic fracturing. Focuses primarily on issues associated with hydraulic fracturing pursued in deep shale gas development, but also describes the important distinctions related to hydraulic fracturing in other applications.
API HF3	Practices for Mitigating Surface Impacts Associated with Hydraulic Fracturing, 1st Edition, February 2011, (API)	<ul style="list-style-type: none"> Identifies the best practices for minimizing surface Environmental impacts associated with hydraulic fracturing operations. Focused on protecting surface water, soils, wildlife, other surface ecosystems, and nearby communities. Includes API's policy on chemical disclosure: <ul style="list-style-type: none"> - API supports transparency regarding the disclosure of the chemical ingredients;
		<ul style="list-style-type: none"> - States are the proper authority to determine reporting requirements and formatting of reporting and public disclosure; - Proprietary information should be protected; and - Hydraulic fracturing is effectively regulated by numerous federal, state and local requirements. Hydraulic fracturing should not be placed exclusively under the purview of the Safe Drinking Water Act (SDWA) or any other federal statute.
API Std 65 Part 2	Isolating Potential Flow Zones During Well Construction, 2nd Edition, December 2010, (API)	<ul style="list-style-type: none"> Identifies best practices used to minimize environmental and societal impacts associated with the acquisition, use, management, treatment, and disposal of water and other fluids associated with the process of hydraulic fracturing. Focuses primarily on issues associated with hydraulic fracturing pursued in deep shale gas development, but also describes the important distinctions related to hydraulic fracturing in other applications.
API RP 51R	Environmental Protection for Onshore Oil and Gas Production Operations and Leases, 1st Edition, July 2009, (API)	<ul style="list-style-type: none"> Provides environmentally sound practices for domestic onshore oil and gas production operations, including fracturing. Applies to all production facilities, including produced water handling facilities. Operational coverage begins with the design and construction of access roads and well locations, and includes reclamation, abandonment, and restoration operations.

Source: http://www.api.org/policy/exploration/hydraulicfracturing/upload/Hydraulic_Fracturing_InfoSheet.pdf

Abbreviations

API	-	American Petroleum Institute
Bull	-	Bulletin
RP	-	Recommended Practice
Spec	-	Specification