

Overview of API's Guidance Documents on Hydraulic Fracturing

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API Structure

Staff of 200 Led by Board of Directors Made Up of Member Company CEO's.

Over 400 Member Companies Involved in all Aspects of the Oil and Natural Gas Industry.

Over 700 Committees and Task Forces Covering Various Advocacy and Technical Issues.

API Mission

- Influence Public Policy in Support of Strong US Oil and Natural Gas Industry.
- Engage in Legislative and Regulatory Advocacy.
- Provide a Forum to Develop Consensus Industry Policies.
- Work Collaboratively with Other Associations.
- Develop Industry Standards that Ensure Safety, Reliability, and Codify Best Practices.

Background on API Standards Program

The API Standardization Department was Formed In 1923, and the First API Standard was Published the Following Year on Drilling Threads.

All Industry Segments Now Active in Standardization:

- Exploration and Production
- Refining
- Marketing
- Pipeline Transportation

API Standards

- API Now Publishes ~500 Technical Standards Covering all Aspects of the Oil and Natural Gas Industry.
- Foundation Of Self Supporting Programs.
- Basis For Worldwide Operations.
- Core Of Institute's Technical Authority.

Standards Development Process

- API is Accredited by the American National Standards Institute (ANSI).
 - Accreditation, Balance, Consensus, Due Process
 - Regular Program Audits (Conducted By ANSI).
- Transparent Process (Anyone can Comment on any Document).
 - All Comments Must be Considered.

Standards Development Process

- Developed by Consensus (Does Not Mean Unanimity).
- Committee Balance Between Users, Manufacturers/Service-supply and General Interest Categories.
- General Interest Category Includes Government, Academia, And Engineering Consultants.
- Standards Developed Using ANSI Approved API Standards Development Procedures (available on-line at www.api.org)

3 GROUPINGS OF API STANDARDS

- **Specifications:** Provide the Detailed Dimensions, Tolerances, and Testing Needed to Produce Equipment that will be Interchangeable Throughout the World.
- **Recommended Practices:** Highlight Field Operating Practices that are Proven to Work in the Majority of Situations.
- **Guidance Documents:** Intended to Promote the Broad Availability of Technical Information and Collective Industry Knowledge to the Entire Industry, Regulators, and the Public.

Hydraulic Fracturing Guidance Document Series

HF1, *Hydraulic Fracturing Operations – Well Construction and Integrity Guidelines*, 1st Edition, October 2009

- Highlights Industry Practices for Well Construction and Integrity for Wells that will be Hydraulically Fractured.
- The Guidance will Help Ensure that Shallow Groundwater Aquifers Will be Protected, While Also Enabling Economically Viable Development of Oil and Natural Gas Resources.
- Intended to Apply Equally to Wells in Either Vertical, Directional, or Horizontal Configurations.

HF1, Hydraulic Fracturing Operations – Well Construction and Integrity Guidelines, 1st Edition, October 2009

Guidance Document contains 10 sections:

- Scope, References, General Principles, Casing Guidance, Cementing the Casing.
- Well Logging and Other Testing, Well Construction Guidelines, Perforating, Hydraulic Fracturing.
- Data Collection, Analysis, and Monitoring.

HF1, Hydraulic Fracturing Operations – Well Construction and Integrity Guidelines, 1st Edition, October 2009

Section 7 – Well Construction Guidelines – Key To Environmental Protection

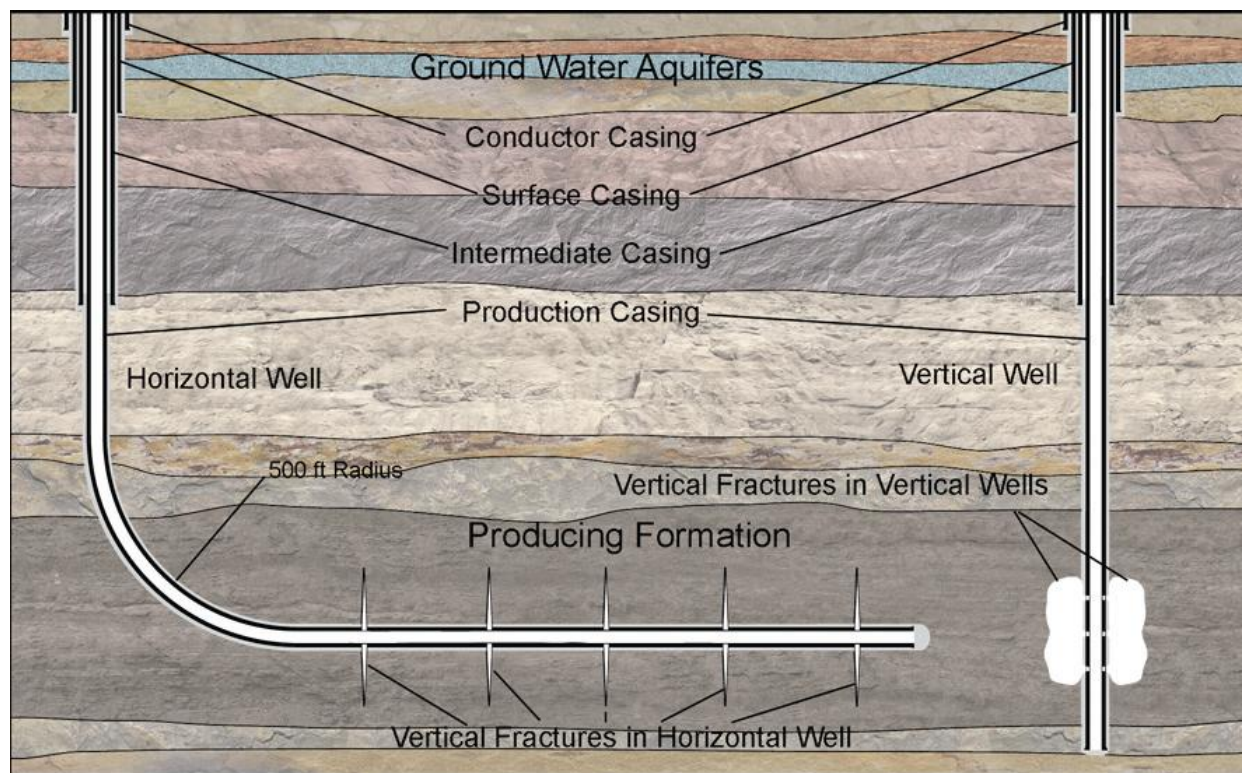
- Covers the Four Main Components of Conductor, Surface, Intermediate, and Production Casing.
 - ✓ Various Casing Strings are Used to Ensure Groundwater Protection.
- Section Notes That in Addition to the Recommendations, Operators Must be Aware of Local Geological Conditions and State Regulations.
- Casing Depths are Determined in Advance as Part of the Drilling Plan:
 - ✓ Assure Isolation, Meet Regulatory Requirements, Achieve Well Integrity, Contain Well Pressure.

HF1, Hydraulic Fracturing Operations – Well Construction and Integrity Guidelines, 1st Edition, October 2009

Section 7 – Well Construction Guidelines - Key Environmental Protection

- Actual Length Of Casing String is Adjusted Based on Well Logs, Drill Cutting Analysis, and Pressure and Drilling Loads.
- Cement may be Required Back to Surface on each String Based on Well Design and State Regulations.
- Cement Should Have a Compressive Strength of at Least 500 PSI at the Casing Shoe and Achieve 1200 PSI at Bottomhole Conditions.
- Production Casing Must Withstand the Anticipated Fracturing Pressure.
- Each Casing String (Except for the Conductor Casing) Should be Pressure Tested Prior to “Drill Out”.

Hydraulic Fracturing Guidance Document - HF1 diagram



Hydraulic Fracturing Guidance Document Series

HF2, *Water Management Associated with Hydraulic Fracturing*, 1st Edition, June 2010

- 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.

HF2, Water Management Associated with Hydraulic Fracturing, 1st Edition, June 2010

Guidance Document contains 7 sections:

- Scope, Definitions, Introduction and Overview, Hydraulic Fracturing Process.
- Water Use and Management Associated with Hydraulic Fracturing, Obtaining Water Supply for Fracturing, Water Management and Disposal Associated with Hydraulic Fracturing.

HF2, Water Management Associated with Hydraulic Fracturing, 1st Edition, June 2010

Section 7 -- Water Management And Disposal Associated With Hydraulic Fracturing – Key to Environmental Protection

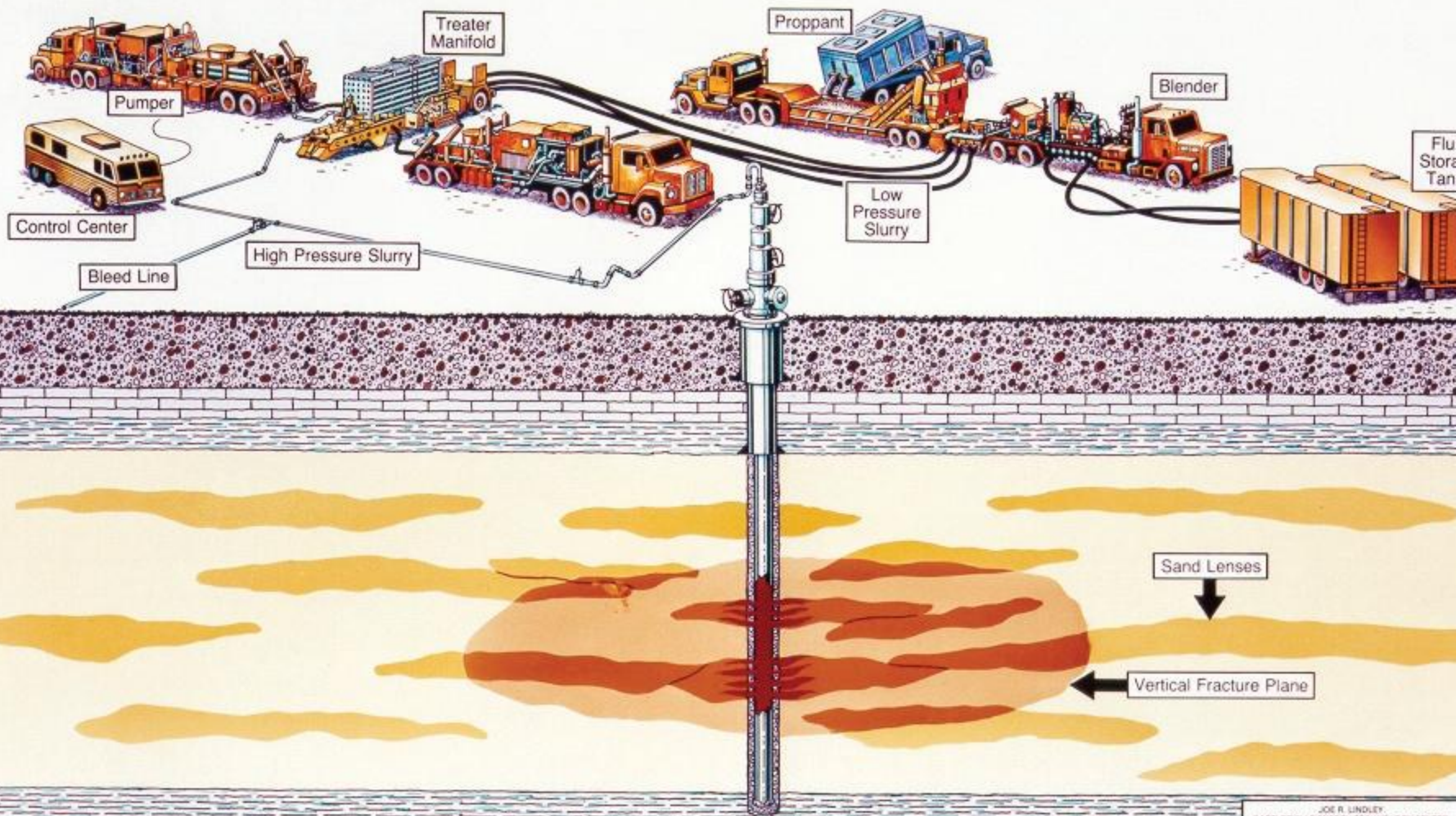
Well Permits Specify All Fluids, Including Fracturing Fluids and Flow Back Water, Must be Removed.

Disposal Options for Flow Back/Production Fluids Generally Include the Following:

- Injection Wells, Regulated Under Either a State or Federal UIC Program;
- Municipal Waste Water Treatment Facilities;
- Industrial Waste Treatment Facilities;
- Other Industrial Uses;
- Recycling/Reuse.

HYDRAULIC FRACTURING

Hydraulic fracturing is a means of creating fractures emanating from the well bore in a producing formation to provide increased flow channels for production. A viscous fluid containing a proppant such as sand is injected under high pressure until the desired fracturing is achieved. The pressure is then released allowing the fluid to return to the well. The proppant, however, remains in the fractures preventing them from closing.



Hydraulic Fracturing Guidance Document Series

HF3, *Practices for Mitigating Surface Impacts Associated with Hydraulic Fracturing, 1st Edition, February 2011.*

- Describes 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.

HF3, Practices for Mitigating Surface Impacts Associated with Hydraulic Fracturing, 1st Edition, February 2011

Guidance Document contains 15 Sections:

- Scope, Terms and Definitions, Introduction and Overview, Stakeholder Engagement, Wide-scale Development, Selection of Hydraulic Fracturing Fluids, Management of Chemicals and Materials, Pre-Job Planning, Water Management, Maintaining Equipment, Minimizing Surface Disturbances, Protecting Air Quality, Preserving Visual Resources, Mitigating Noise Impacts.

HF3, Practices for Mitigating Surface Impacts Associated with Hydraulic Fracturing, 1st Edition, February 2011

Section 7 -- Includes API's Position on Chemical Disclosure:

- API Supports Transparency Regarding the Disclosure of the Chemical Ingredients;
- States Should Control the Reporting Requirements and Formatting of Reporting and Public Disclosure;
- Proprietary Information Should be Protected; and
- Hydraulic Fracturing Should not be Regulated Under the Safe Drinking Water Act (SDWA) or any Other Federal Statute.

Hydraulic Fracturing Guidance Document Series

STD 65-2, *Isolating Potential Flow Zones During Well Construction*, 2nd Edition, December 2010

- Provides Best Practices for Isolating Potential Flow Zones, an Integral Element in Maintaining Well Integrity. Focus is the Prevention of Flow Through or Past Barriers that are Installed During Well Construction.
- Barriers that Seal Wellbore and Formation Pressures may Include Mechanical Barriers Such as Seals, Cement, or Hydrostatic Head Pressure or Operational Barriers such as Flow Detection Practices.

STD 65-2, Isolating Potential Flow Zones During Well Construction, 2nd Edition, December 2010

Standard 65-2 Contains 7 Sections:

- Scope, References, Definitions and Abbreviated Terms.
- Barriers, Cementing Practices and Factors Affecting Cementing Success, Casing Shoe Testing, Post-Cement Job Analysis and Evaluations.

STD 65-2, Isolating Potential Flow Zones During Well Construction, 2nd Edition, December 2010

Section 5 – Cementing Practices and Factors that Affect Cementing Success – Key Environmental Protection via Subsections:

- Hole Quality - Drilling Fluid (mud) Selection - Casing Hardware
- Close Tolerance and Flow Restrictions - Engineering Design – Slurry Design and Testing.
- Wellbore Preparation and Conditioning – Cement Job Execution – Post Cementing Operations.

Hydraulic Fracturing Guidance Document Series

51R, *Environmental Protection for Onshore Oil and Gas Production Operations and Leases*, 1st Edition, July 2009

- Provides Environmentally Sound Practices for Domestic Onshore Oil And Gas Production Operations. 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.
- Annex A Provides Guidance for a Company to Consider as a “Good Neighbor.”

51R, Environmental Protection for Onshore Oil and Gas Production Operations and Leases, 1st Edition, July 2009

- Recommended Practice Contains 8 Sections:
 - Scope, References, Acronyms and Abbreviations, Government Agencies.
 - Lease Roads, Production, Injection/Disposal Wells, Lease Gathering and System Lines, and Production and Water Handling Facilities.

51R, *Environmental Protection for Onshore Oil and Gas Production Operations and Leases*, 1st Edition, July 2009

- Companion Video on the API Website -- “***Video Tour of Drilling and Completion Operations.***”
- Second Video Under Development Depicting the Small Environmental Footprint for a Marcellus Shale Location.

Conclusions

- The HF Series Represents Industry's Collective Wisdom on Operational Practices, Developed and Refined Over Many Years.
- One Page Summary of Guidance Documents Available for Conference Participants.
- HF Series is Available On API Website in a Readable Format (Not Able to Print).
- API Standards Process Is Open – See [Http://Www.Api.Org/Standards/Standardsapplication](http://www.Api.Org/Standards/Standardsapplication) - So Get Involved!

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Thank you!

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