A Screening-Level Assessment System for Classifying Hydraulic Fracturing Fluid Additives

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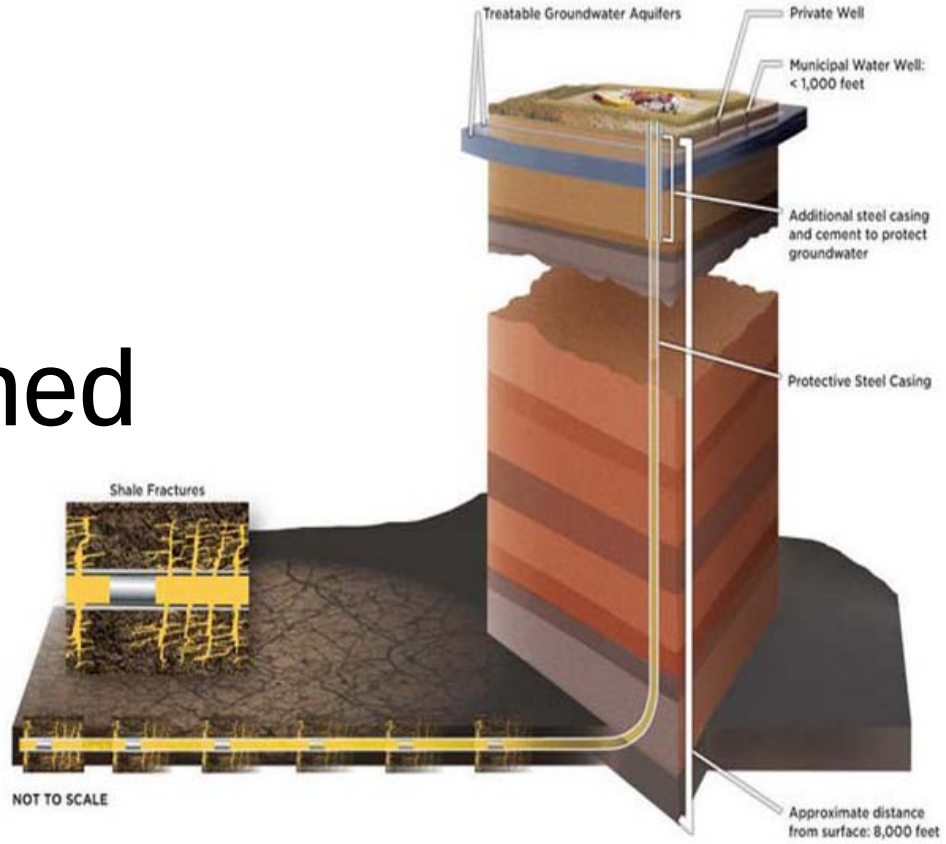
Topics

- Background
- The SYSTEM
- Lessons learned
- Next steps



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Acknowledgements

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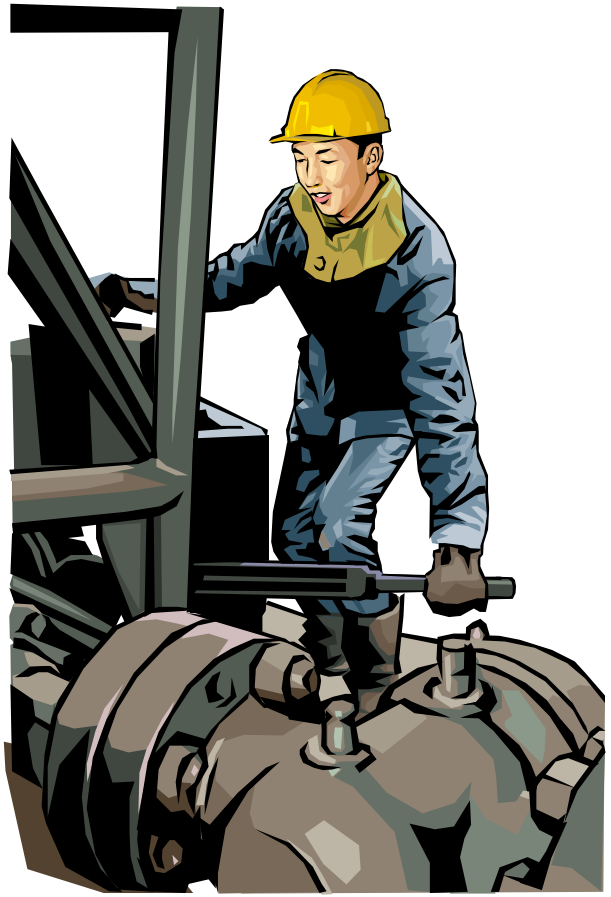
Shale Gas – Tight Gas

- The new oil & gas frontier. Global in scope.
- Driven by advances in drilling /completions technology.
- Typical plays involve multi-well pads, extended-reach horizontal wells, and multiple fracks along each horizontal leg.
- Fracking involves pressurized injection of water, proppants, and chemical additives into shale formations to stimulate the flow of gas and increase recovery.
- “New” technology has spawned a host of issues and concerns.



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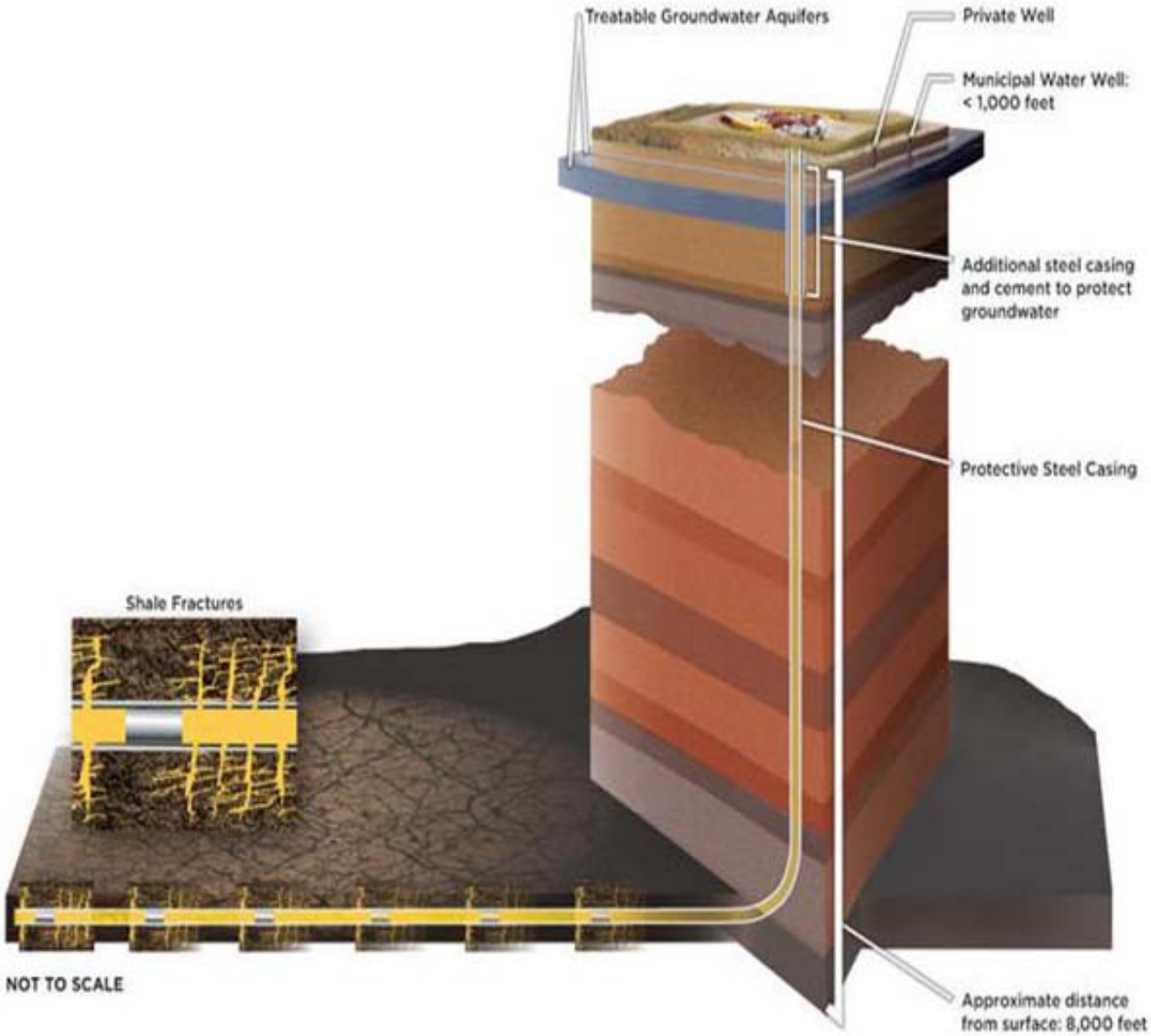

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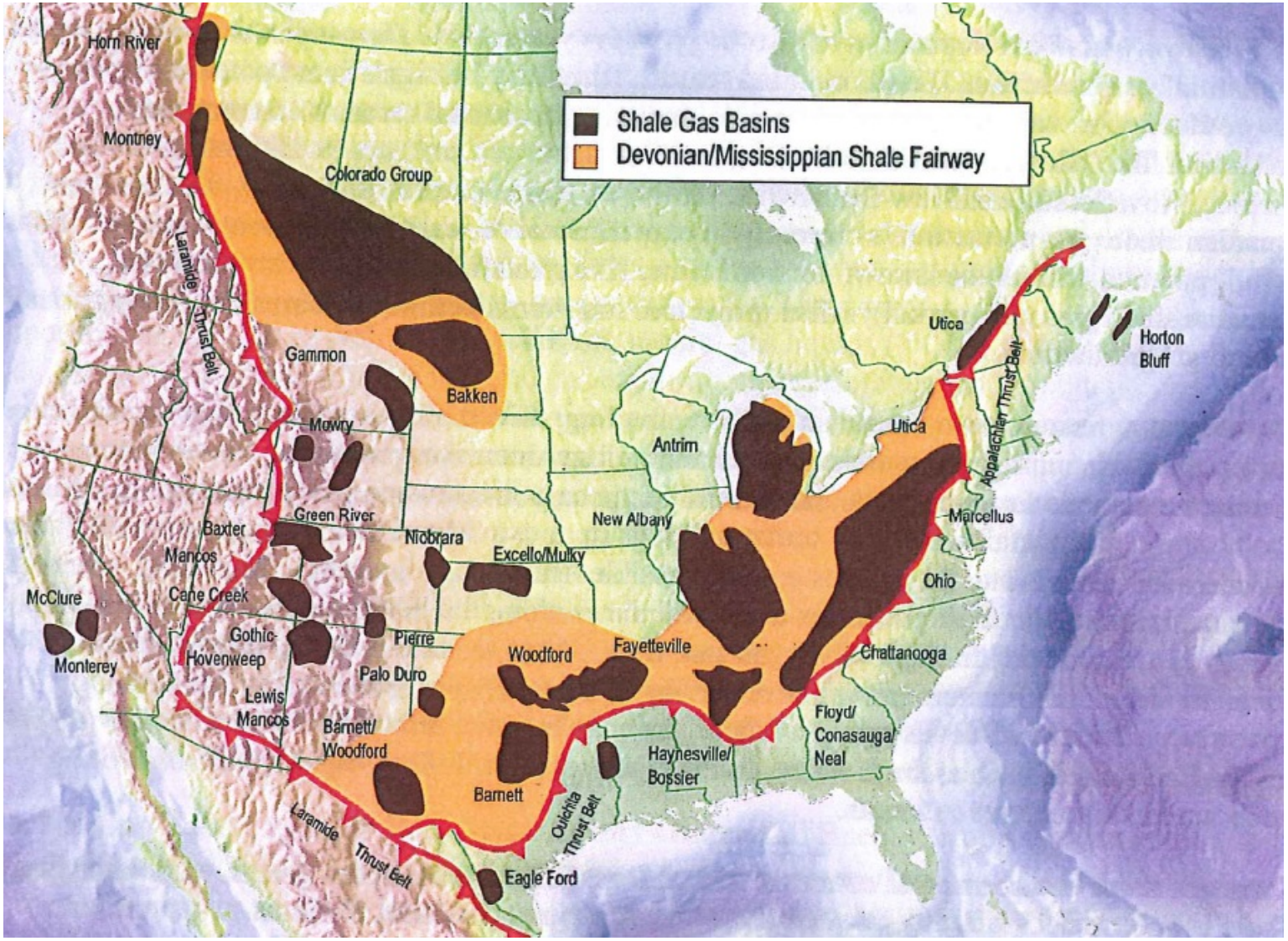

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62%

of Canadians support a moratorium on all fracking for natural gas until all federal and provincial environmental reviews are complete

Environics Research Poll – January 2012

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Region	% Opposed to Fracking
Alberta	57
Atlantic provinces	66
BC	67
Manitoba/Saskatchewan	64
Ontario	65
Quebec	55

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Public perceptions regarding hydraulic fracturing

%	Very concerned	Somewhat concerned	Not very concerned
Impacts on the environment	40	44	16
Impacts on water quality	35	40	25
Lack of disclosure	56	32	12

Source: Energy Institute, Univ. of Texas at Austin, Feb,. 2012

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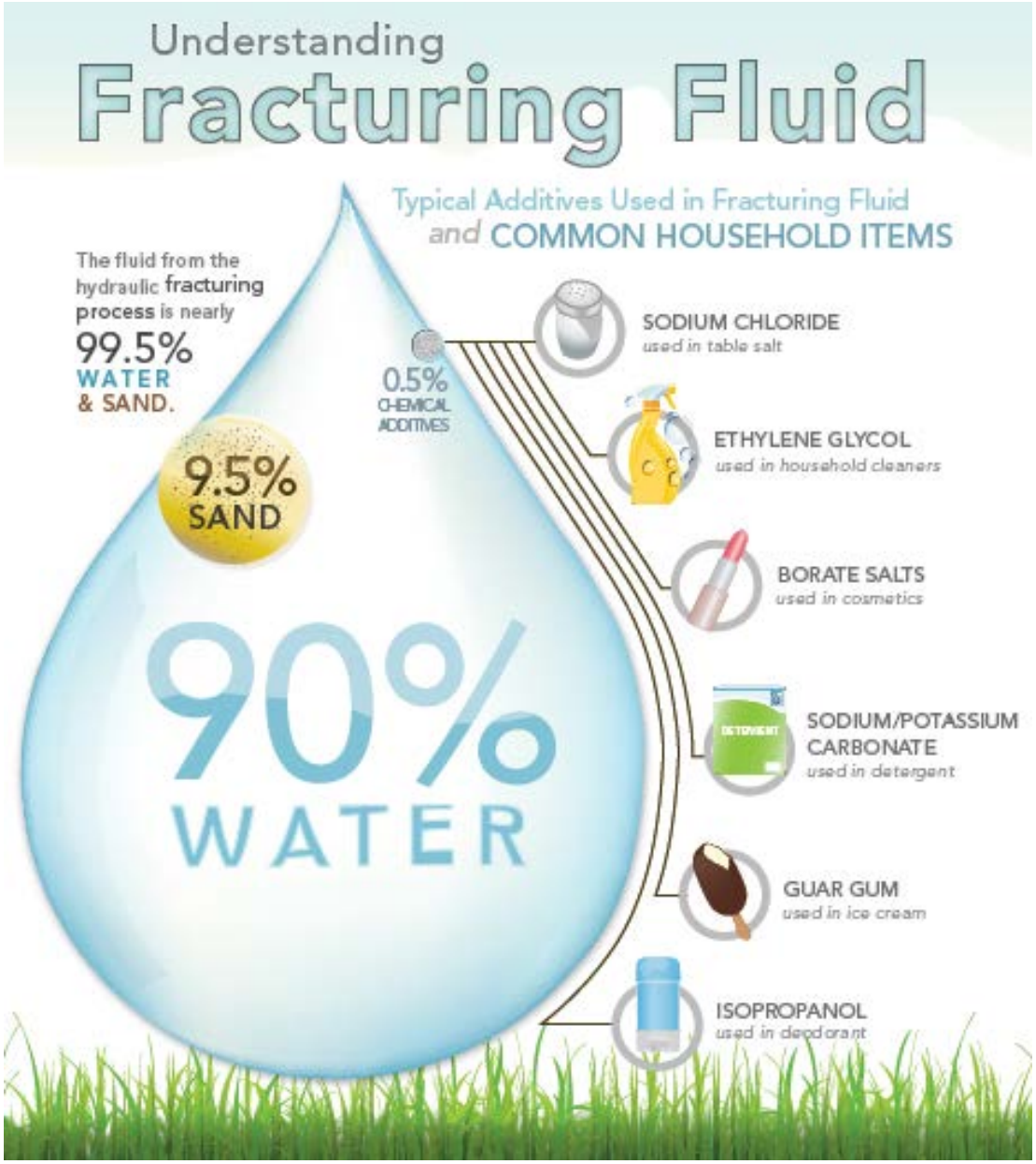

Source: American Petroleum Institute 2012

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CAPP Hydraulic Fracturing Guiding Principles and Operating Practices

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CAPP Guiding Principles ...

- We will support the development of fracturing fluid additives with the least environmental risks
- We will continue to advance, collaborate on and communicate technologies and best practices that reduce the potential environmental risks of hydraulic fracturing

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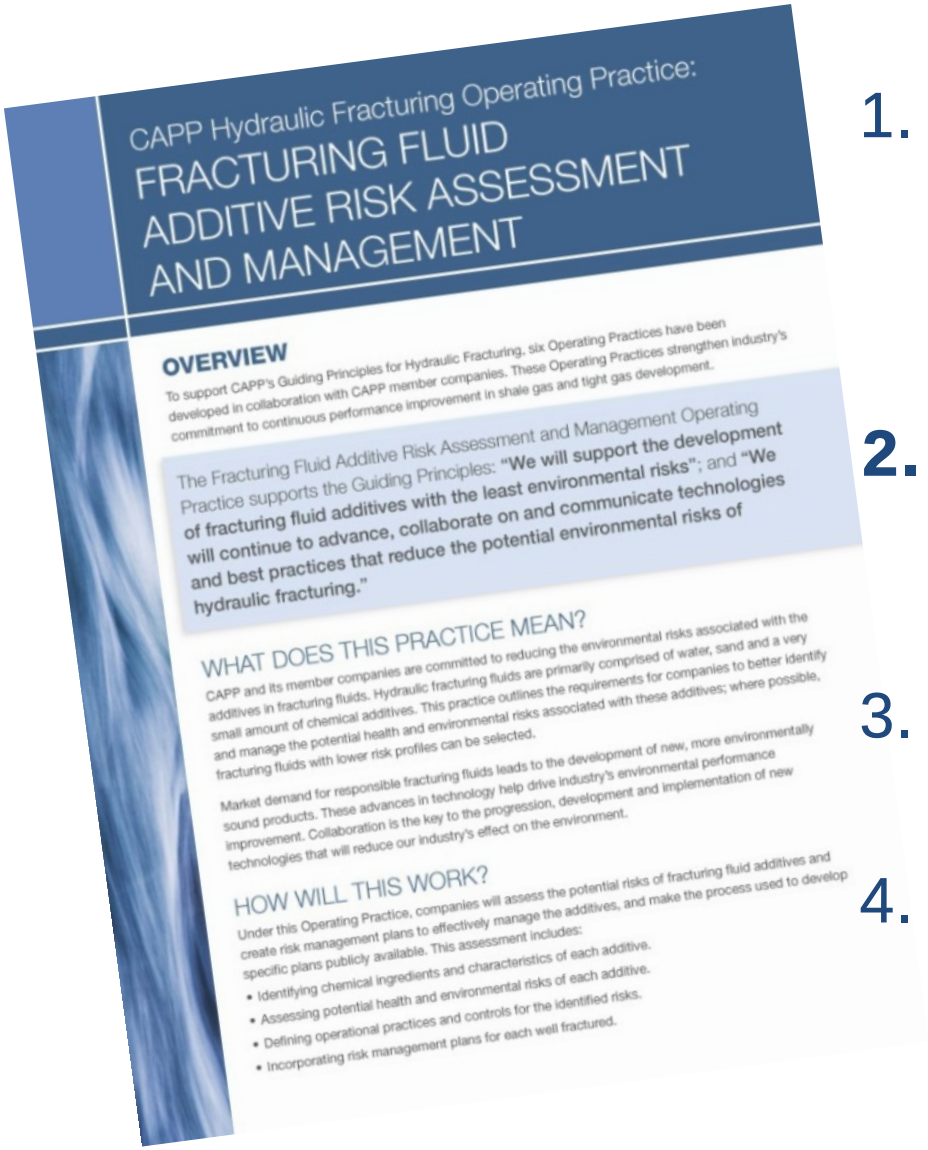

CAPP Hydraulic Fracturing Operating Practice:

FRACTURING FLUID ADDITIVE RISK ASSESSMENT AND MANAGEMENT

OVERVIEW

To support CAPP's Guiding Principles for Hydraulic Fracturing, six Operating Practices have been developed in collaboration with CAPP member companies. These Operating Practices strengthen industry's commitment to continuous performance improvement in shale gas and tight gas development.

The Fracturing Fluid Additive Risk Assessment and Management Operating Practice supports the Guiding Principles: **"We will support the development of fracturing fluid additives with the least environmental risks"**; and **"We will continue to advance, collaborate on and communicate technologies and best practices that reduce the potential environmental risks of hydraulic fracturing."**

WHAT DOES THIS PRACTICE MEAN?

CAPP and its member companies are committed to reducing the environmental risks associated with the additives in fracturing fluids. Hydraulic fracturing fluids are primarily comprised of water, sand and a very small amount of chemical additives. This practice outlines the requirements for companies to better identify and manage the potential health and environmental risks associated with these additives; where possible, fracturing fluids with lower risk profiles can be selected.

Market demand for responsible fracturing fluids leads to the development of new, more environmentally sound products. These advances in technology help drive industry's environmental performance improvement. Collaboration is the key to the progression, development and implementation of new technologies that will reduce our industry's effect on the environment.

HOW WILL THIS WORK?

Under this Operating Practice, companies will assess the potential risks of fracturing fluid additives and create risk management plans to effectively manage the additives, and make the process used to develop specific plans publicly available. This assessment includes:

- Identifying chemical ingredients and characteristics of each additive.
- Assessing potential health and environmental risks of each additive.
- Defining operational practices and controls for the identified risks.
- Incorporating risk management plans for each well fractured.

1. Identify chemical ingredients and characteristics of each additive.
2. **Assess potential health and environmental risks of each additive.**
3. Define operational practices and controls.
4. Develop and implement risk management plans.

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The SYSTEM

What it does ...

- Increases awareness and understanding ...
- Provides early warning ...
- Helps guide decision-making ...
- Identifies additives with lowest risk profiles.

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Non-judgemental

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- What's captured ...
  - Additive-based
  - **Chemical ingredient-driven**
  - Operates at a screening level
  - Emphasis on public health and the environment
  - Focus on HFF additives ... but can be applied to other products
- What isn't ...
  - Compliance with regulations
  - Degradation products
  - Worker hazards

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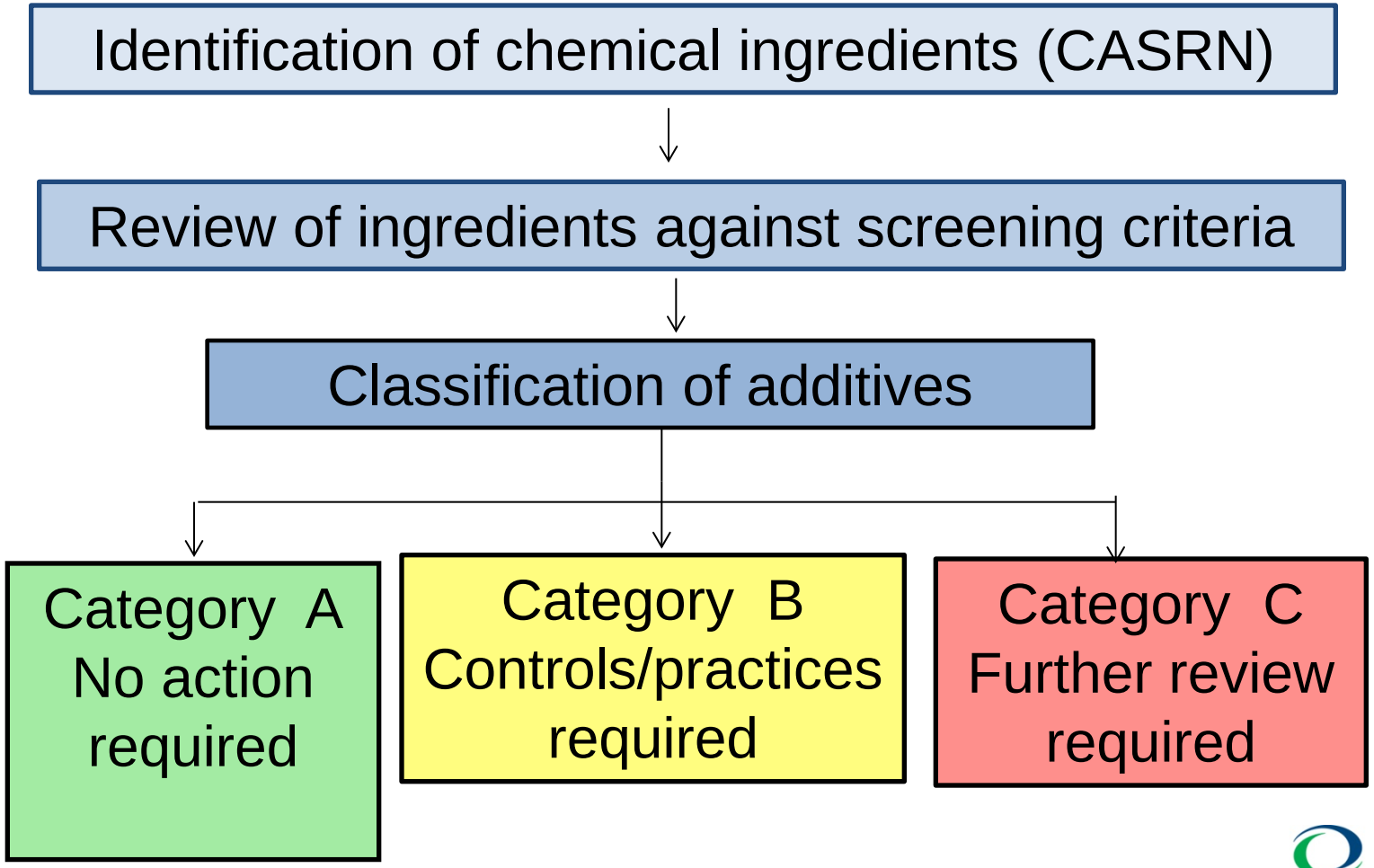
The SYSTEM …



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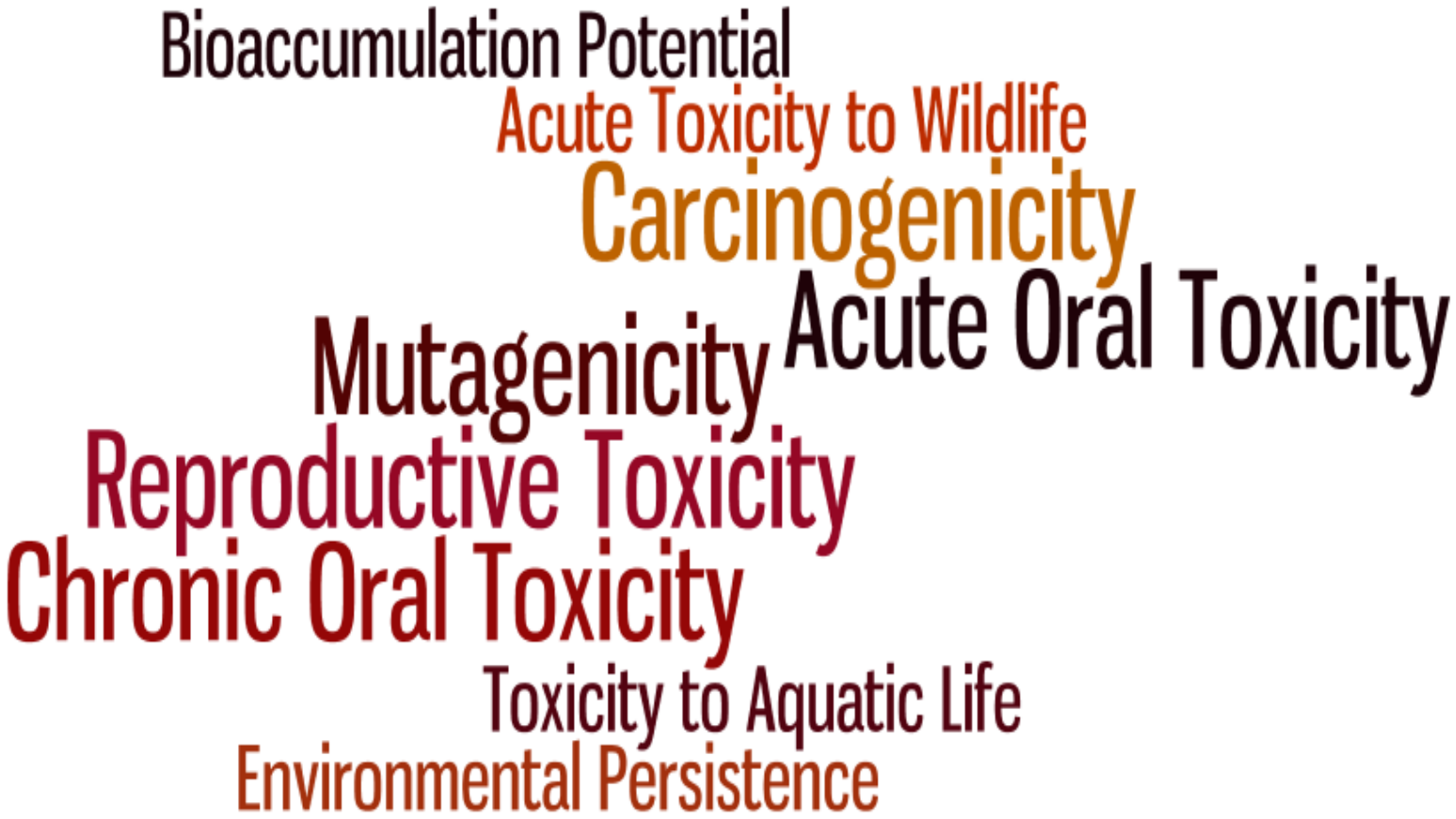

Endpoints

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Databases ...

- Developed/maintained by leading scientific/regulatory authorities
- Current
- Readily accessible
- Easily searchable

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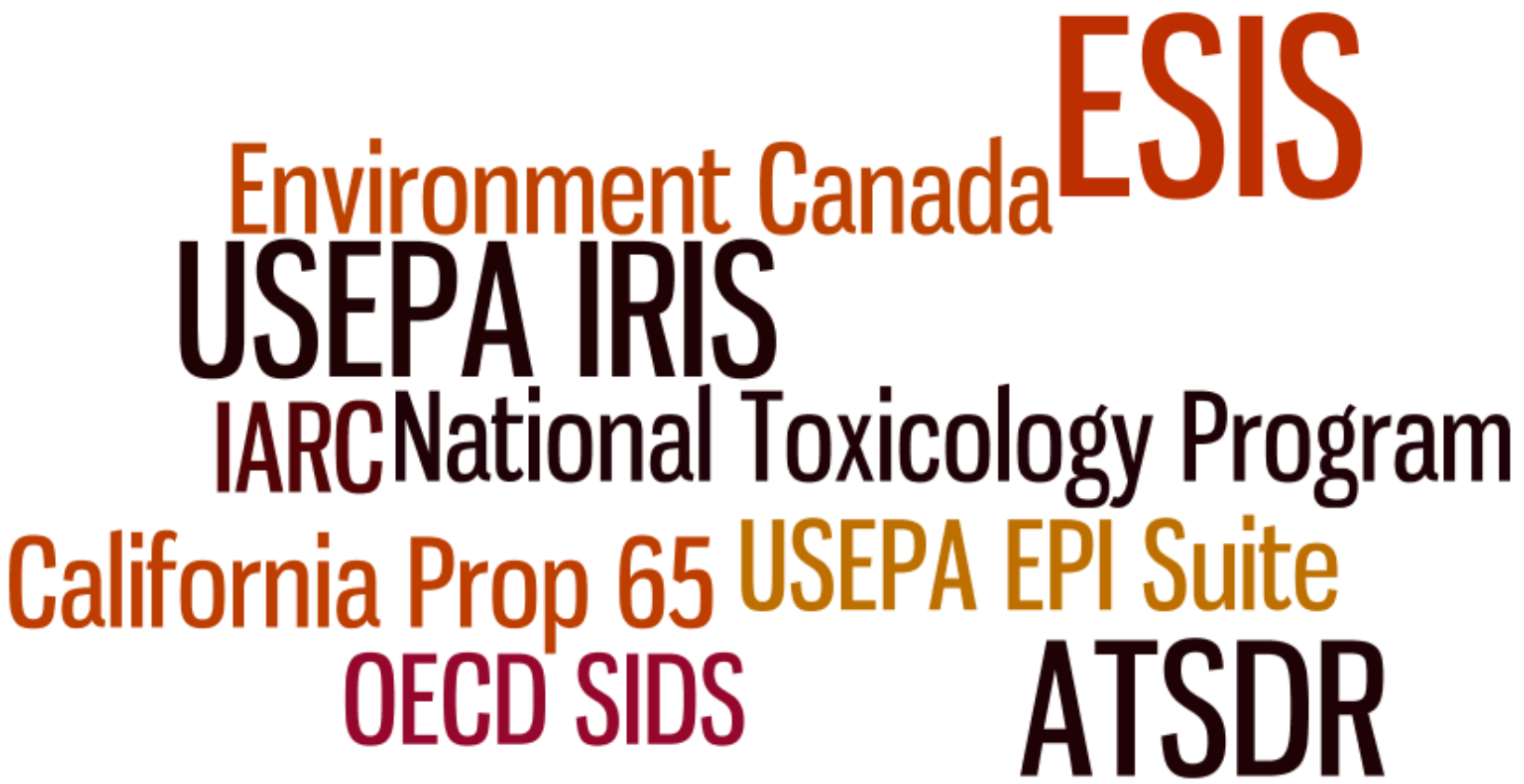

Databases

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Categories ...

A, B, or C

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Categories

Category	Basis	Recommended Action
A	None of the additive's ingredients "triggers" any of the screening endpoints. No obvious potential for additive to cause significant impacts to public health and/or the environment.	None

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Categories

Category	Basis	Recommended Action
B	One or more of the **environmental** screening endpoints triggered**.** Additive is potentially capable of causing adverse environmental impacts.	Determine appropriate operational practices and controls to be implemented to reduce identified risks.

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Categories

Category	Basis	Recommended Action
C	One or more of the **public health** screening endpoints triggered. Additive is potentially capable of causing adverse impacts on public health. One or more of the environmental screening endpoints also may be triggered.	Further review to determine measures needed to manage potential risks to public health as well as any potential environmental risks.

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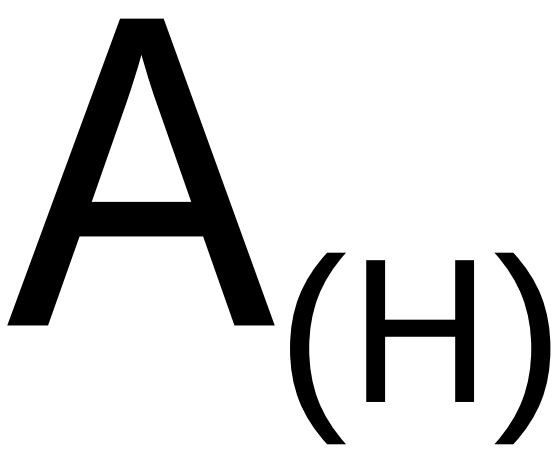
Data Availability Index

- Indication of extent of availability of information on an additive's ingredients in databases searched as part of screening process

- Four (4) levels:
  - High
  - Medium-High
  - Medium-Low
  - Low



SYSTEM User Guide

- Part One: Narrative
- Part Two: Detailed Instructions

Additive Details					Screening Criteria													
					1				2		3		4			5		
					Public Health Endpoints Does the ingredient meet the screening criteria for a:													
Additive Name	Current MSDS?	Ingredients	CAS #	% ingredient in product	Known or Presumed Human Carcinogen?				Known or Presumed Human Germ Cell Mutagen?		Known or Presumed Human Reproductive Toxicant?		Highly Toxic: By Acute Oral Exposure			Highly Toxic: By Chronic Oral Exposure		
					ESIS	IARC	NTP	NDS?	ESIS	NDS?	ESIS	NDS?	ESIS	OECD SIDS	NDS?	US EPA IRIS	ATSDR	NDS?
Additive 1	Y Dec 2011	Ingredient 1	111-111-1	60	NL	NL	NL	NDS	NL	NDS	NL	NDS	NL	N		NL	NL	NDS
		Ingredient 2	222-222-2	30	NL	NL	NL	NDS	NL	NDS	NL	NDS	NL	NL	NDS	NL	N	
		Ingredient 3	333-333-3	10	NL	NL	NL	NDS	NL	NDS	NL	NDS	NL	NL	NDS	N		
Additive 2	Y Jan 2012	Ingredient 1	444-444-4	8	(Y)				(Y)		N		N			N		
		Ingredient 2	555-555-5	90	NL	N			NL	NDS	NL	NDS	NL	NL	NDS	NL	NL	NDS
		Ingredient 3	666-666-6	2	NL	NL	N		NL	NDS	NL	NDS	NL	N		N		

A SCREENING-LEVEL ASSESSMENT SYSTEM FOR CATEGORIZING HYDRAULIC FRACTURING FLUID ADDITIVES ACCORDING TO POTENTIAL HUMAN HEALTH AND ENVIRONMENTAL RISKS

USER GUIDE
(VERSION 2.2)

Prepared for:
The Canadian Association of Petroleum Producers
2100, 350 – 7 Avenue SW
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Experience to date …

- More than 1,800 products classified … capturing more than 600 chemical ingredients
  - 10% assigned to Category C
  - 45% assigned Category B
  - Remainder assigned to Category A
- Tool has proven to be rapid, flexible, and transparent.
- Interest expressed by CAPP members, U.S. E&P companies, Canadian and U.S. fluid suppliers and regulatory authorities in using/learning more about the SYSTEM.

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Next steps

- Continued training of E&P companies and fluid suppliers on use of SYSTEM.
- Harmonization across North America(?)
- Development of OHS screening module.
- SYSTEM maintenance/updates.
- Development of WEB-based user platform(?)

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In summary ...

- Recent tremendous surge in unconventional oil and gas development has fuelled public concern.
- Early industry response was not especially effective in addressing concerns ... fuelling angst, confusion, outrage and distrust.
- Regulators are responding, with actions ranging from moratoriums to special reviews to tighter rules to stricter oversight.
- Industry now responding with awareness programs, codes-of-practice, and research initiatives.
- SYSTEM represents one initiative aimed at improving awareness of potential human health and environmental risks of HFF additives.

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For further information ...

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Questions?