



# ISOBRINE

s o l u t i o n s

solutions in water

Isobrine Solutions has the ability and experience to solve a wide range of problems related to formation-water and natural gas characterization

# How Can Isotopic Fingerprinting Help Your Company?

Isobrine Solutions Inc. specializes in isotopic fingerprinting, a relatively novel technique that offers unique solutions to many water- and gas-related problems in the O&G industry. For example:

- 1. Determination of fluid sources in leaky wells** - Various factors (e.g., hydraulic fracturing into adjacent units, poor cement jobs, natural faults and fractures) can introduce out-of-zone fluids into your target formation, resulting in higher-than-normal water cuts. Isotopic fingerprinting is a reliable tool for determining the source(s) of those fluids, allowing companies to identify potential problems, determine remediation options, and to avoid issues in the future.
- 2. Monitoring frac flowback progress** - The isotopic composition of frac fluid usually differs significantly from that of formation water, allowing precise tracking of the progress of frac fluid recovery via time-series sampling.
- 3. Verification of formation water “purity”** - Water saturation calculations require accurate estimates of the resistivity ( $R_w$ ) of pure formation water. Traditional hydrochemistry often fails to differentiate pure formation waters from those contaminated with drilling or frac fluids, resulting in significant errors in saturation calculations. Stable isotopes are conservative tracers that allow a decisive evaluation of the nature of the formation fluids. Thus, companies may establish, with certainty, the reliability of their reservoirs' potential reserves.

## Isotopic Fingerprinting vs. Standard Hydrochemistry

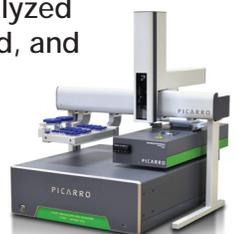
Standard hydrochemistry that uses industry “water catalogs” of dissolved ions for formation water fingerprinting has been in practice for years. However this “conventional” technique has several inherent differences and shortfalls compared to isotopic fingerprinting. For example:

- 1. What if there is no “catalog” for the formation waters available in the area?** In most cases, isotopes can differentiate surface waters from formation waters without a catalog. Furthermore, Isobrine maintains a large proprietary database of isotope and ion compositions of formation waters throughout the WCSB and beyond. If data are lacking in your area, we will work with you to create a catalog to address your needs.
- 2. Most ions exhibit non-conservative behavior.** Ion concentrations and ratios may change as minerals dissolve or precipitate in the formation or wellbore. Stable isotopes are a fundamental property of the water molecules, and are thus conservative tracers that are immune to these problems. They can be used to trace the origin and evolution of the water.
- 3. What if a well contains residual drilling/completion fluids with similar salinity to the formation water?** Formation waters generally have isotopic compositions distinctly different from drilling or completion fluids, making differentiation simple. Stable isotopes are unaffected by salinity issues, and conservatively evaluate the nature of the sample.
- 4. Ions are often insufficiently diagnostic.** Due to similarities in ion compositions sometimes found between formation waters, combined with large intra-formation variations and significant analytical errors ( $\pm 5$  to 20%), traditional hydrochemical fingerprinting can often be imprecise. However, formations typically display significant differences in isotopic composition, which, combined with the extreme precision of the analytical techniques ( $\pm 0.1$  to 2 parts per thousand), allow accurate differentiation of various formation waters.

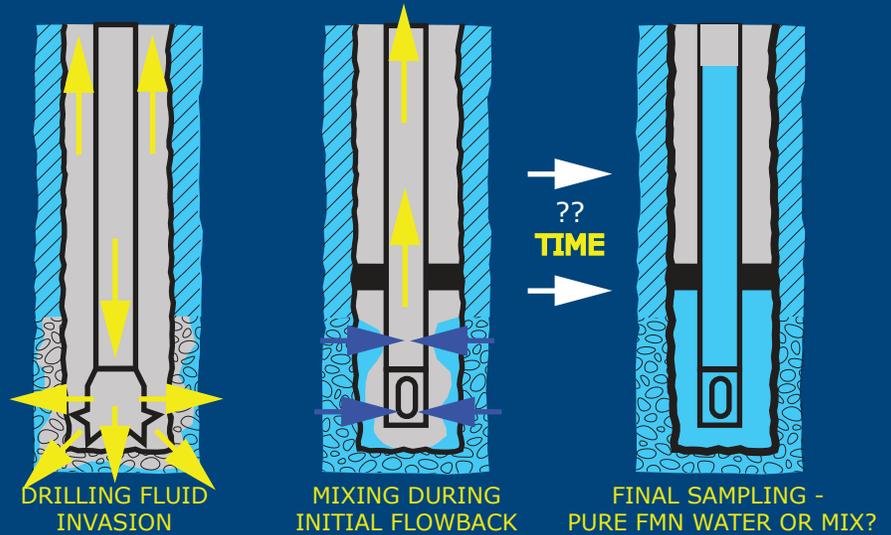
## Analytical Expertise

At Isobrine Solutions, we use proprietary sampling techniques designed to ensure proper collection and preservation of water and natural gas samples. These samples are analyzed in-house using state-of-the-art analytical instruments which allow for rapid turnaround, and all data are run through a rigorous quality-control program.

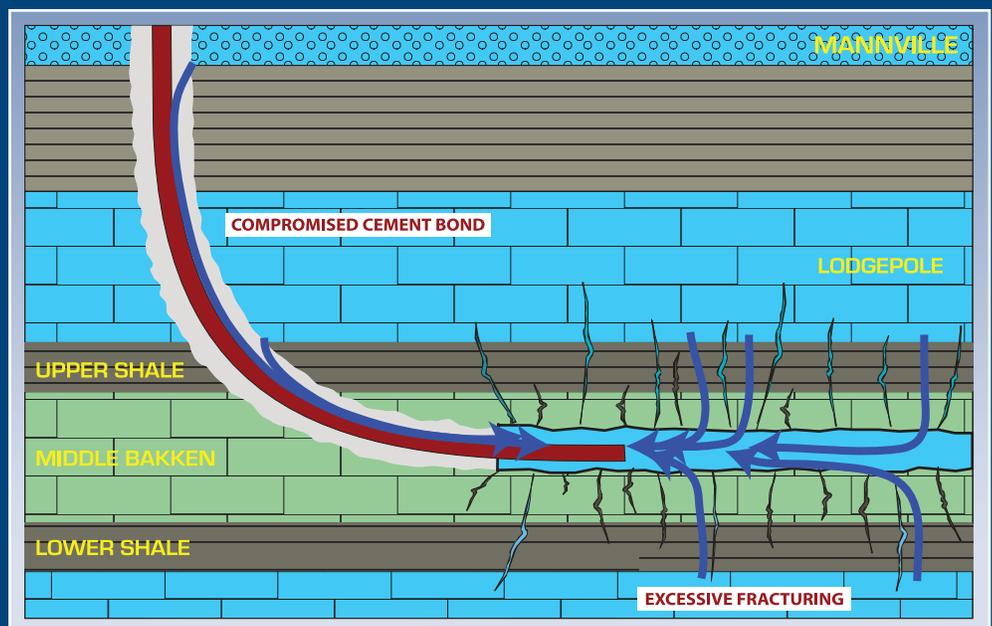
Our 20+ years of experience enables us to provide highly accurate analytical results and expert scientific interpretations for a wide range of water sources, from shallow groundwaters and lakes, through to extremely saline oil-field brines.



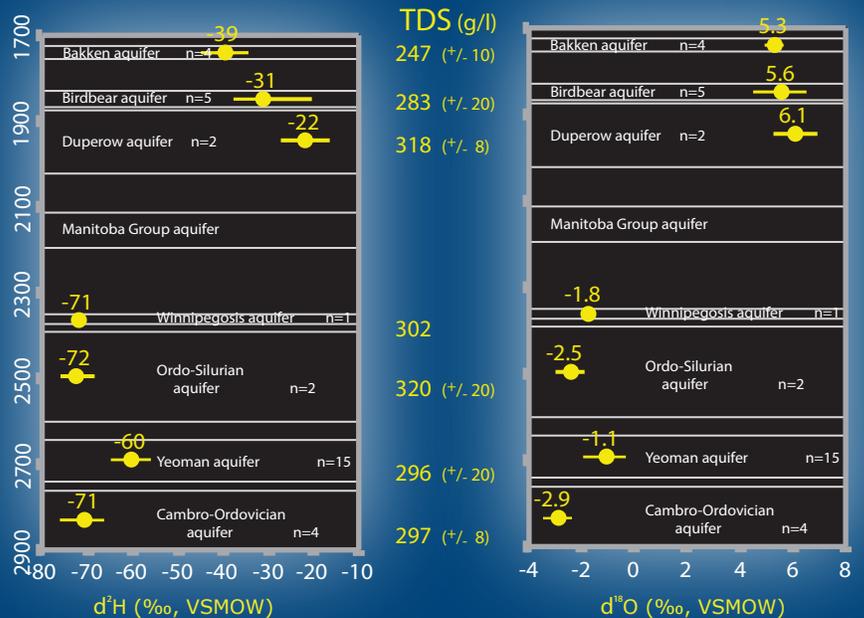
# FORMATION TEST CONFIRMATION



# OUT-OF-ZONE FLUID TRACING



# FORMATION-WATER DIFFERENTIATION BY ISOTOPIC FINGERPRINTING



Salinities are similar, yet isotopes different!

## About Us

Isobrine Solutions was established in 2003 to commercialize research pioneered by Dr. B.J. Rostron on the isotopic composition of formation waters in the Williston Basin.

Today Isobrine has a database of over 6000 samples from oil and gas wells throughout Canada, the United States, and the Middle East. Our database and experience allow us to provide detailed interpretation of production samples and aid in solution of extraction problems.

## Team

Ben Rostron, PhD, PEng, PGeol • President

Mitchell Skuce, MSc, GIT • Isotope Geochemist

Catherine Rostron, BES, MRM • Accounting

## Contact Us

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