



Beta Analytic
TESTING LABORATORY

BETA is celebrating **40** years of testing

- Radiocarbon age/activity in archaeological, geological, and water samples
- **Stable isotope ratios** of carbon, deuterium, nitrogen, and oxygen in organic and carbonate materials and water via IRMS

BETA is the certifying body for bio-based testing for the following certifications

- Bio-based testing measures a carbon-containing solid, liquid, or gaseous materials for contamination and/or adulteration.

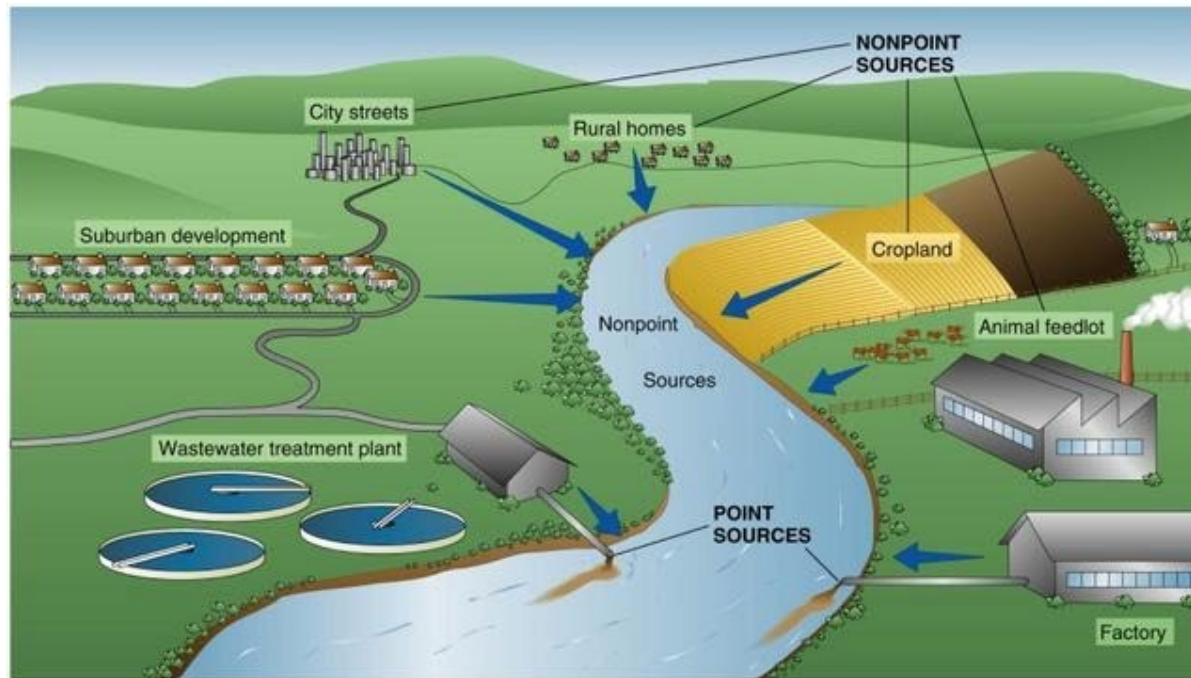
- The **ISO/IEC 17025:2005 accreditation** is the highest level of recognized quality any testing or calibration laboratory can attain.



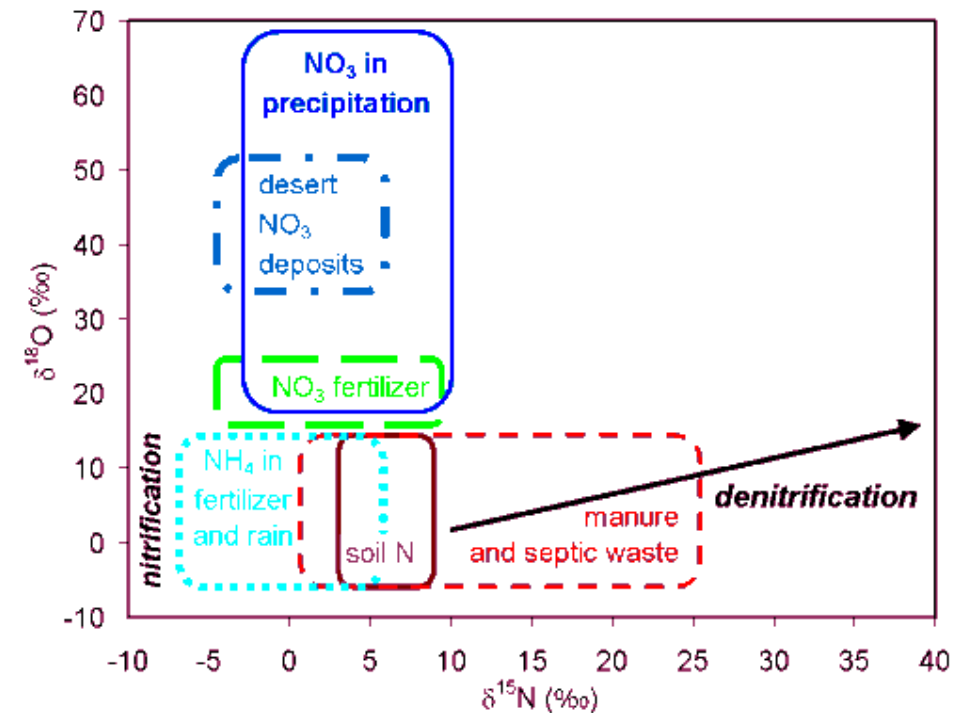
Nutrient Source Tracking using $\delta^{15}\text{N}$ and $\delta^{18}\text{O}$

- Nitrate in surface waters originate both from natural and artificial sources.
- Natural variations in nitrate isotopic composition has been used in a wide variety of studies ranging from the understanding of NO_3^- sources to the impacted environments.

$$\delta^{15}\text{N} = \left(\frac{\left(\frac{^{15}\text{N}}{^{14}\text{N}} \right)_{\text{Probe}}}{\left(\frac{^{15}\text{N}}{^{14}\text{N}} \right)_{\text{Standard}}} - 1 \right) * 1000 \text{ ‰}$$



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Li, S. L., Liu, C. Q., Li, J., Xue, Z., Guan, J., Lang, Y., ... & Li, L. (2013). Evaluation of nitrate source in surface water of southwestern China based on stable isotopes. *Environmental earth sciences*, 68(1), 219-228.

Isotope Tracers in Catchment Hydrology (1998), C. Kendall and J. J. McDonnell (Eds.). Elsevier Science B.V., Amsterdam. pp. 519-576.