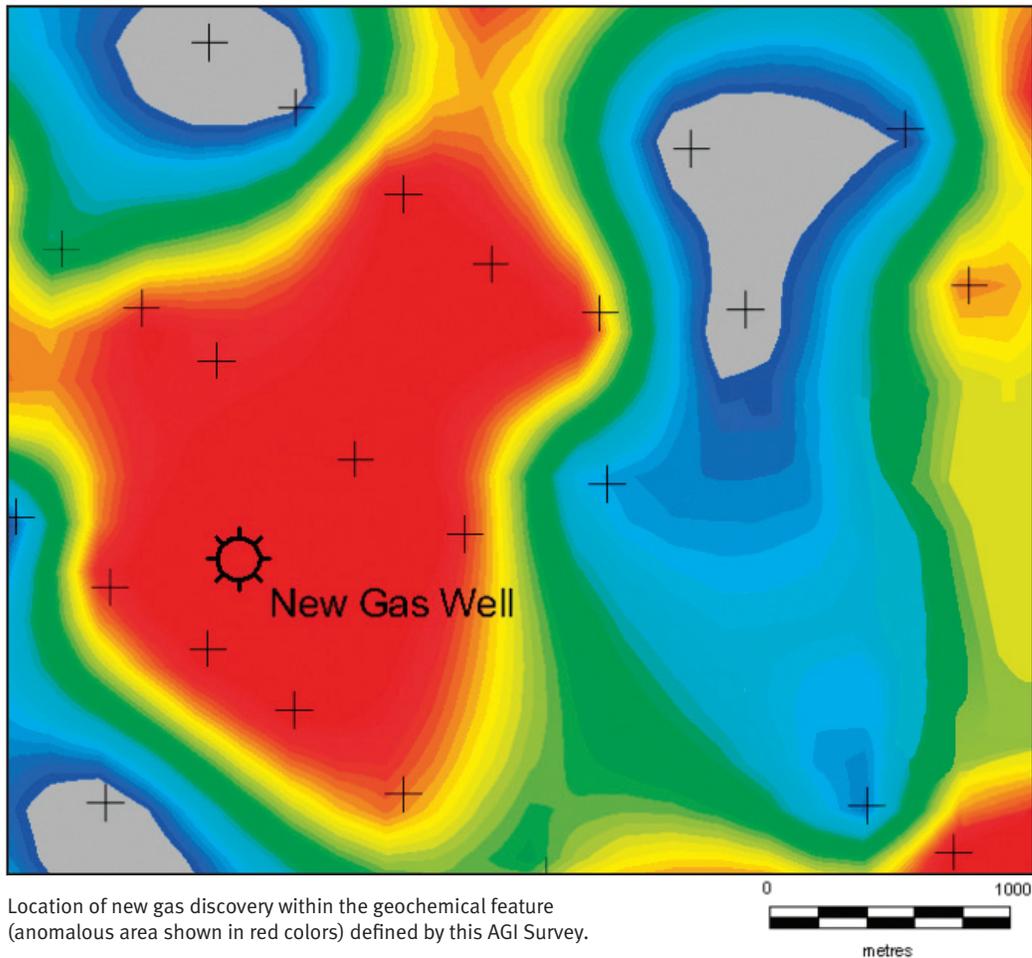


PERMAFROST – ARCTIC NORTH AMERICA



Survey Summary

- Arctic North America
- Permafrost – 100 km²
- 200 AGI passive samplers installed
- Sample spacing 500 - 1,000 m, semi-regular grid
- Well site drilled in a geochemical feature predicted positive for gas
- Gas discovery with >250 Bcf estimated potential recoverable reserves
- AGI Survey correctly predicted the selected well site to be a gas discovery

Introduction

- Survey area in permafrost region between 69° and 70° N latitude
- Northeast to southwest trending rift basin initiated during Upper Paleozoic, with Lower Cretaceous sandstone reservoirs, and Upper Jurassic and Upper Cretaceous source rock sequences
- Several producing gas and oil wells existing in the region, completed in the 1970s and 1980s
- Survey objective was to identify areas of hydrocarbon emanation (oil and gas) related to Lower Cretaceous reservoirs

AGI Survey

- Survey included 200 grid samples and 55 model samples, with exposure time of ~21 days
- Semi-regular grid sample pattern (~100 km² area) with peripheral transect lines (40 km) along seismic lines, roads, and along creeks, with sample spacing between 500 and 1,000 meters
- Survey conducted from mid-February to mid-March, temperatures range from -26 to -40 °C, high winds and very low wind chill factors (-58°C)
- Field crews moved using snowmobile and “snowcat”
- Average sample installation rate was 23 samples/day, samples were installed using a battery-powered auger with a 45 cm auger bit

For statistical modeling purposes additional samples were collected at existing wells, known to be dry wells or producers of oil.

Sample analysis was performed using gas chromatography and mass selective detection. An analysis for more than 80 target compounds was performed. Compounds observed included N-alkanes ranging from ethane through octadecane. By comparing the field samples against the modeled oil signatures, the similarities of each sample’s signature to the local oil were established in terms of probability. The probabilities were contoured revealing surface geochemical anomalies.

Survey Results

- Good geochemical data obtained for typical thermogenic compounds (Figure 1)
- Well site drilled in a geochemical feature predicted positive for gas
- Gas discovery with >250 Bcf estimated potential recoverable reserves
- AGI Survey correctly predicted the selected well site to be a gas discovery
- Well encountered significant gas flow rates (>50 MMcf/d)

Surface Geochemical Signature measured through Permafrost during Winter Production and Background Sites against instrument Blank

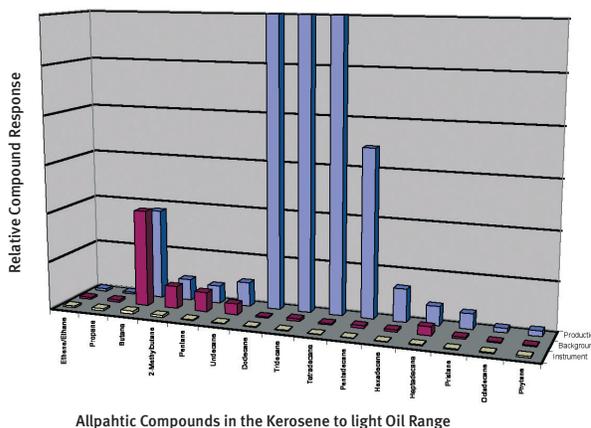


Figure 1: Comparison of average geochemical signatures of oil production site, background site, and instrumental control blank. Saturated hydrocarbons from undecane (C₁₁) to phytane (C₂₀) only.