



**Running High**  
A Propsector's Perspective

by Kelly Bushing

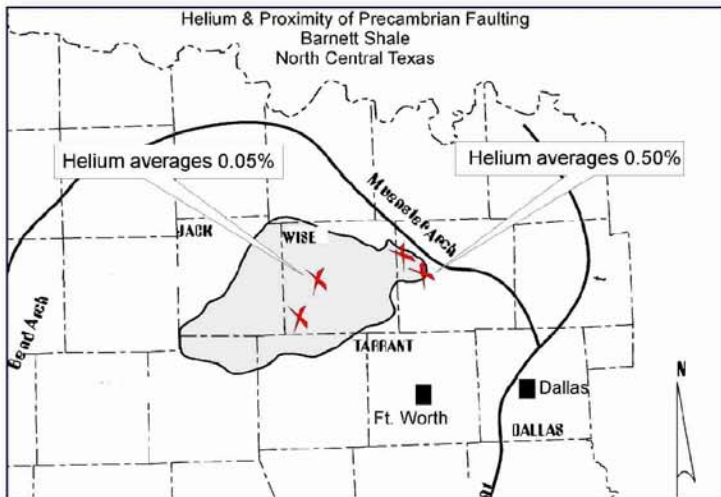
**Tax Time, Chewing Tobacco and Helium Sniffers**

Hello Prospectors! I have been busy dealing with my tax man debating what exactly a business deduction is. He doesn't seem to think willow witchers, chewing tobacco and coffee should be included in this "sacred" category even though I assured him that I, as a **BUSINESS MAN**, don't function, **AT ALL**, without them. I think he suffers from a polluted mind borne of a "formal" education, something I've never been burdened with – thanks be to God. In years past, he didn't give me too much rub about deducting such things as my mass spectrometer, a device I use for measuring helium seepage from soil to the parts-per-billion. After persuading

him that I use this device for hydrocarbon exploration purposes, he relented and allowed it (the ironed-vice headlock I put him in didn't hurt this matter – though the subsequent restraining order was a bit embarrassing).

Yes, that's right, prospectors, I like to measure helium seepage in soil sampling as an indicator of deep faulting events as well as prospective hydrocarbon trapping. As you know, helium is an atom that is the second lightest on the molecular scale, right behind hydrogen (H<sub>2</sub>). Unlike hydrogen, however, helium is a Noble gas and does not react with other elements as it bounces up through thousands upon thousands of feet of sedimentary rock from deep within the earth's basement. Every breath you take has 5 parts per million of helium in it, and all of this helium comes from the basement rock deep below your feet!

So what's this got to do with hydrocarbon exploration? Many things! As helium does not seep up through the earth's strata uniformly, certain reasonable deductions can be made in areas where anomalously high helium-gas anomalies are encountered. To better make this point, consider the following illustration:



I went out and caught some gas samples from four Barnett Shale wells in Denton and Wise Counties, Texas. Two of these samples were caught in the middle of the basin "soup bowl" (western most) while two were caught on the flank of the shale, nestled up to the Muenster Arch (eastern most). As you would expect, the helium percentage from these wells jumps considerably the closer you get to the Precambrian uplifting event. Now the soil testing: along these areas, I took soil gas samples and fed them through my mass spectrometer, and wouldn't you know it, in areas along the Muenster Arch, I gathered high readings of helium

while in the middle of the play, I received very low readings. The basis for this determination is premised on how far

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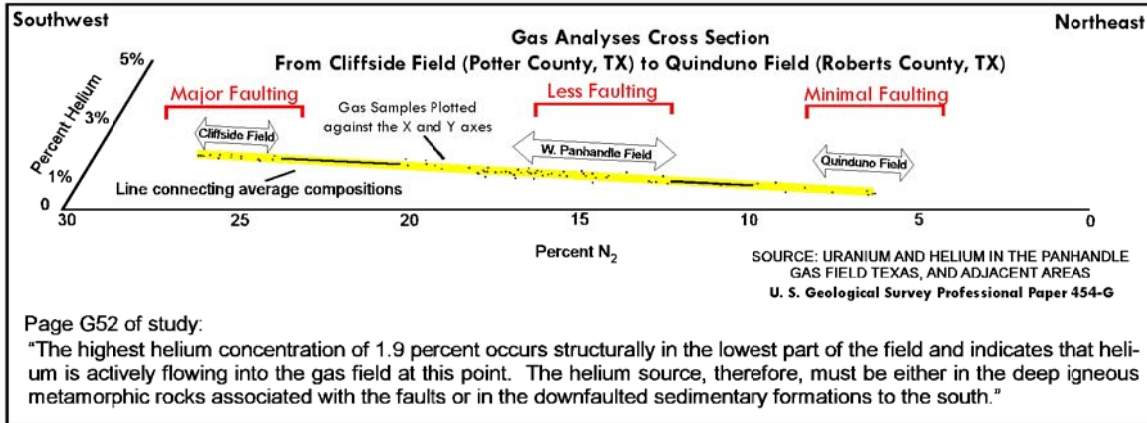
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above or below ambient, atmospheric helium a particular sample resides. More specifically, there are 5,240 parts per billion floating around in the atmosphere - always. If a soil reading is below this ambient point, it can be considered a low reading and if the reading is above this (and sometimes it's very much above it), you can assume that there is something going on below your feet that is giving out this high reading. In this case, it would be the proximity of the faulting event (Muenster Arch).

Here is another illustration that buttresses this assertion:



In the Bush Dome area of the Panhandle Field (left side above), there are significant faulting events that have provided many of the complexities that have yielded robust exploration and exploitation targets for years. The further you move from the complex faulting events, the lower your incidences of helium in natural gas samples. The conclusion is evident: deep faulting events provide a conduit for basement derived helium.

OK, so helium analysis from soil gas helps to tell me where the faults are hiding, what's that got to do with exploration? Well, in my years utilizing this mode of prospect review, I have noticed that not only are anomalies of soil helium associated with faulting, but they are also associated with hydrocarbon traps. Clearly, hydrocarbon traps sequester helium for a long enough period of time for it be manifested in high helium gas samples (above). Eventually, however, the helium squeezes through the trap (remember, it's a very small and very round atom) and makes its way to the surface (pretty close to a straight line, as far as I can gather) and a soil-helium anomaly is observed. A helium-gas anomaly *can* help point you into the direction of hydrocarbon trapping!

Of course, no one should depend on any one method of exploration as being their silver bullet to great wealth. Use area well logs, seismic, soil gas, etc. to buttress your soil-helium lead. In short, do your homework.

Now I have to get my tax return finalized and postmarked. I'll let you know how I make out on my "critical" deductions. Kelly ☀

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