EXECUTIVE SUMMARY

The new method is based on the thermo luminescence analysis allowing a researcher to quickly and precisely compare samples of soil by their "signatures", and to judge with a great accuracy on the similarities and/or differences between the analysed samples.

The new analysis method has numerous advantages over existing methods in sensitivity, precision, speed (test results in under 3 minutes), instrument portability, and its manufacturing cost.

The methodology of the search with the new instrument is based on the fact that the organic gases, seeping up from the oil or gas deposits over thousands of years, are triggering certain geo-chemical processes in the surface soil. The differences between the soil that is affected by these processes, and the unaffected soil, are detectable by the new analysis instrument.

The new method also permits, with a great accuracy, to establishing the boundaries of a petroleum or natural gas pool. This problem is especially well solved by the proposed method. Samples of soil from the surface above the known underground pool of petroleum or natural gas can be compared to the soil samples taken from surrounding areas in order to determine precisely the pool limits.

METHOD BACKGROUND

Many companies today use Geochemical and Geo-Biological methods to detect the presence of hydrocarbons in soil oil, or micro-organisms associated with the hydrocarbons. Our method is not Geochemical, but Geophysical. We are not trying to detect hydrocarbons, but the effects on the molecular and crystal structure of the near-surface soil, left by thousands years of exposure to highly dispersed hydrocarbons.

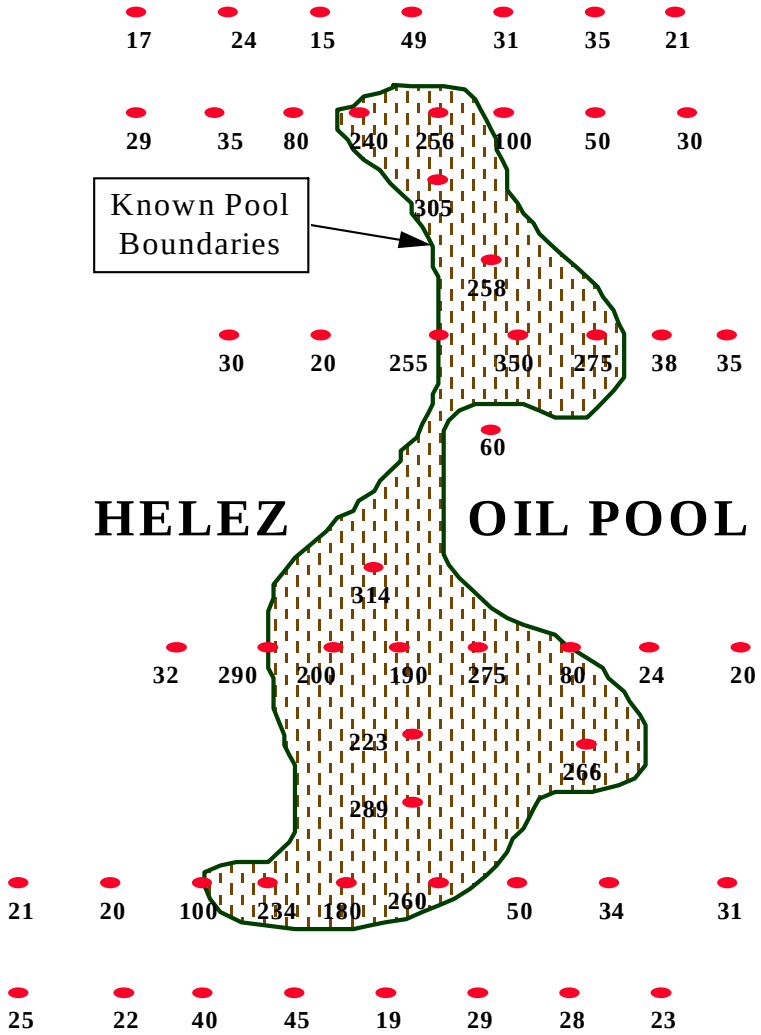
We settled on these Geophysical methods because, in the case of Geochemical or Geo-Biological methods of detection of a momentary presence of hydrocarbons in the soil, there could be a million reasons for such a presence, such as a rotting tree or an animal corpse, that could be misinterpreted as consequential to the oil or gas pool. On the other hand, we detect only those structural impurities, that occur on the atomic level as the result of a very prolonged (many thousands of years) exposure to the hydrocarbons.

After analysing thousands of near -surface soil samples taken in many regions representing various geological settings, and a great variety of

commercial oil and gas accumulations, we will design a set of test routines where one range of test result values clearly points at thousands of years of exposure to hydrocarbons, thus indicating to the presence of a gas/oil pool, and the other set of values to the absence of such exposure. Our custom designed system assigns to each tested sample an index that becomes a measure of a likelihood of the sample coming from the surface outside the boundaries of the petroleum/gas pool, or from the area directly above it. Though these indexes vary from one region to another, a three digit index is generally indicative of samples coming from above the oil pool, and a two-digit index is a clear sign of the absence of an oil/gas pool located beneath the sampled point. The distinction between the "positive" and "negative" sets of ranges is remarkable, and allows outlining the gas/oil anomaly with a great confidence.

APPENDIX: HELEZ OIL BASIN STUDY RESULTS

Each tested point carries an index - a measure of a likelihood of the sample coming from the surface outside the boundaries of the petroleum/gas pool, or from the area directly above it. A three -digit index is indicative of samples coming from above the oil pool and a two-digit index is a clear sign of the absence of an oil/gas pool located beneath the sampled point.



THERMOLUMINESCENCE BACKGROUND

Many crystalline materials exhibit the phenomenon of thermo luminescence. When such a material is irradiated (artificially or naturally), a fraction of the absorbed energy is stored in the crystal lattice. Some of this energy can be recovered later as visible light if the material is heated. This phenomenon of the release of visible photons by thermal means is known as thermo luminescence.

The chemical and physical theory of thermo luminescence is not exactly known because of its complication, but a simple model has been proposed to explain the phenomenon qualitatively. In an individual atom, electrons occupy discrete energy levels. In a crystal lattice electronic energy levels give rise to energy bands: Valence band, Forbidden band and Conduction band. In addition, the presence of impurities in the crystal creates energy traps in the forbidden region, providing metastable states for the electrons. When the material is irradiated, some of the electrons in the valence band (ground state) receive sufficient energy to be raised to the conduction band. The vacancy thus created in the valence band is called a positive hole. The electron and the hole move independently through their respective bands until they fall into a trap (metastable state). If an electron in the trap requires additional heating energy to get out of the trap and fall to the valence band by recombination with a hole, the emission of light in this case is called thermo luminescence.

A plot of thermo luminescence intensity against temperature is called a glow curve. As the temperature of the material is increased, the probability of releasing trapped electrons increases. The light emitted first increases, reaches a maximum value and falls again to zero. Since most materials contain a number of traps at various energy levels in the forbidden band, the glow curve may consist of a number of glow peaks. The different peaks correspond to different trap energy levels.

Form of the summary glow curve strictly depends on the materials physical and chemical history - radiation, temperature, pressure, impurities, heating procedure. Our method is based on the last experimental fact.

Additional information can be received from analysing the thermo luminescence spectra.