RemScan®

RemScan + TPH in Soil App

Measures TPH in soil and is used for oil spill assessment, delineation, remediation and monitoring

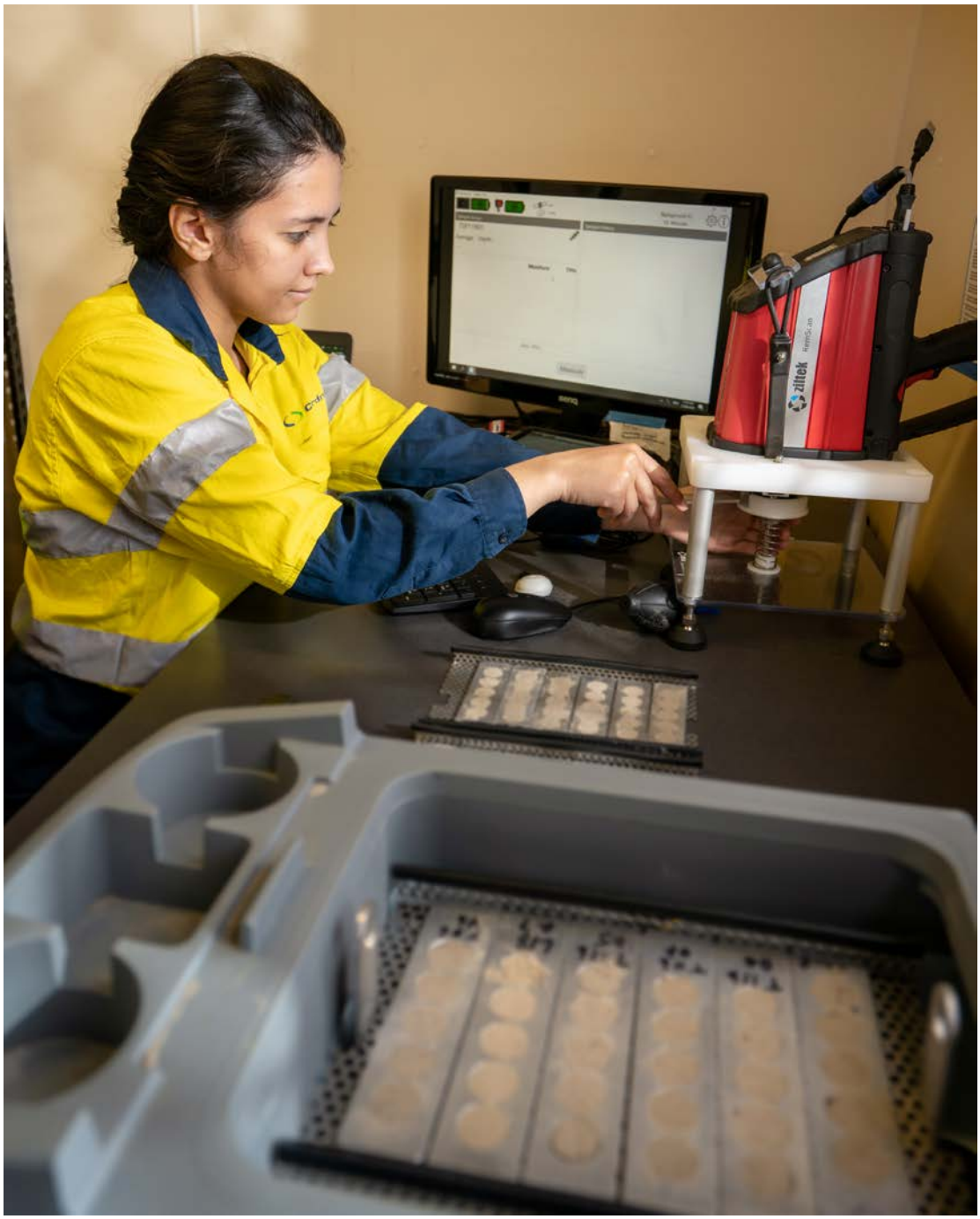

Photo courtesy of Cardno

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FEATURES AND BENEFITS

RemScan is a portable hand-held instrument for rapid measurement of oil in soil. The user simply pulls the trigger for an accurate measurement in less than 20 seconds. The data is recorded automatically on a tablet for easy download.

RemScan is used for oil spill assessment, delineation, remediation and monitoring.

RemScan can be used *in-situ* to measure directly in the field, or *ex-situ* in a site hut or lab.

The **TPH in Soil App** is one of a number of Apps for RemScan. Other Apps include Oil on Metal and Agriculture.

Key Benefits

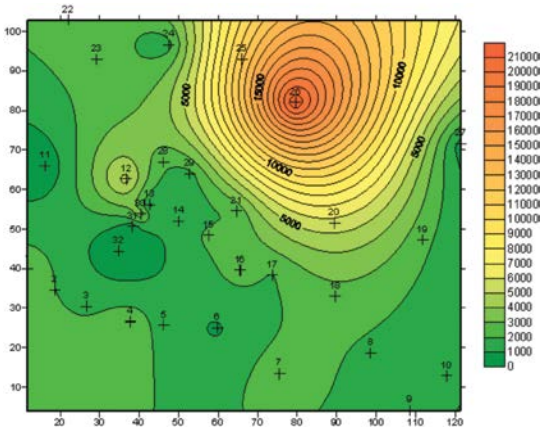
- Accurate and repeatable
- More data
- Make real-time decisions with confidence
- Accelerate project closure

Key Features

- Measures TPH in soil (C_{10} to C_{40} and above)
- Measures soil particle size distribution and the Soil Texture Class (IUSS)
- Results in less than 20 seconds
- Accuracy comparable to laboratory
- Direct infield measurement or in on-site lab
- Sample ID, GPS, depth, photo and notes logged with each measurement
- No incremental costs
- No sample extraction required
- No chemicals
- No licensing requirements
- Non-destructive

USE CASES

Site Assessment / Delineation



RemScan is used to measure the concentration of oil on the surface of the soil and this enables the user to quickly delineate the contaminated area. Depth profiles can be measured by taking a drill core, laying the core out and using RemScan to directly measure the hydrocarbon concentration at various points (depths) along core.

Some examples:

1. Site Clean-up. RemScan is used to determine the edge of the contaminated zone which can be marked out prior to excavation of the contaminated soil.
2. Emergency Spill response. RemScan is used firstly to delineate the spill and then, during excavation, to chase the spill and then validate that all of the contaminated soil has been removed.
3. Wash bay fines. RemScan can measure the fines which wash off vehicles in a wash bay. Hydrocarbon contaminated fines can be sent for remediation while clean fines can be dumped.

Chasing / Validation

While excavation work is being performed, RemScan can measure the remaining soil to check whether all of the contaminated soil has been removed and whether the remaining soil is clean. Once all contaminated soil has been removed, samples can be sent to the laboratory for final auditing and statutory signoff.

USE CASES

Sorting

RemScan is used to sort clean soil from contaminated, thereby minimising the amount of soil to remediate.

When soil is being sent to different remediation processes depending on the level of contamination, RemScan can be used to sort the soil to ensure the most efficient processing. For example, highly contaminated soil may be sent to a Thermal Desorption Unit (TDU) while lower concentrations may be sent to bioremediation. Each process works most efficiently when fed with a relatively consistent concentration and RemScan can be used to achieve this objective.

Monitoring

RemScan is used to monitor the soil after remediation to ensure that it complies with site requirements. For bioremediation processes, RemScan can monitor the decrease in the concentration of the contamination over time to determine the end point. Once the soil is "clean", it can be removed from the bioremediation pad, thereby increasing the utilisation and throughput of the bioremediation facility.

For thermal desorption or soil washing processes, RemScan can measure the product to ensure that the process has been working efficiently and correctly.

"The level of customer service provided by Ziltek during this project was outstanding. Ziltek provided excellent support and worked patiently with Cardno through the various issues that inevitably arose over the lifetime of the project".

Danny McDonald, Principal Environmental Geoscientist, Cardno

OPERATION MODES

RemScan is supplied with two modes of operation. The operator can switch between modes, depending on the application.

Spill Response

Spill Response mode is used for rapid measurements of a new site (like responding to an oil spill at a new site).

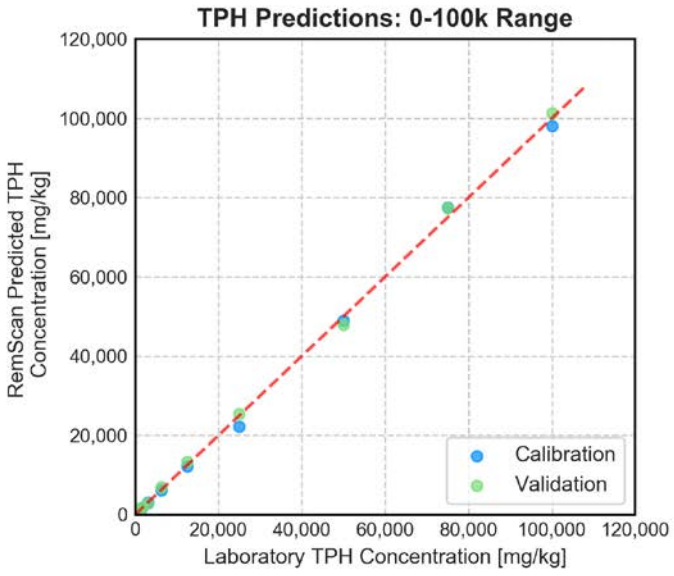
Prior to measurement of soil in the spill zone, the operator simply measures some clean soil to zero the calibration.

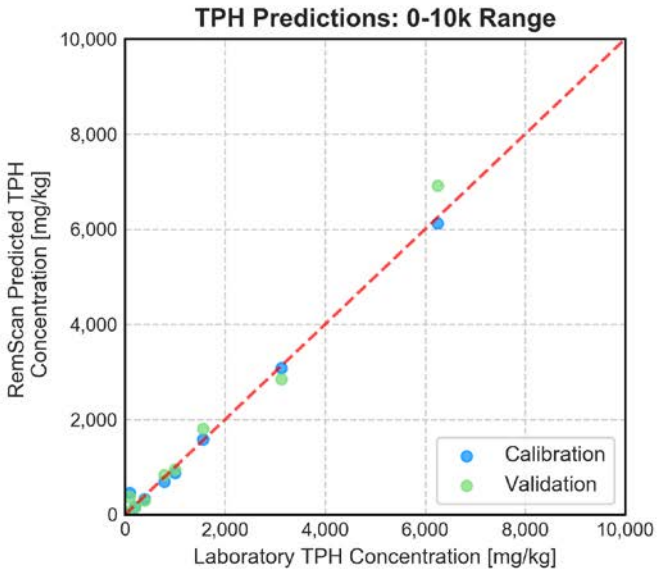
RemScan provides results in terms of green/orange/red to indicate whether the soil is clean or contaminated.

Site Specific

Site Specific mode is used for large sites and/or where highly accurate measurements are required. RemScan measurements are provided in numerical values in units of mg/kg. Prior to making measurements, RemScan is specifically calibrated for the site by spiking the soil with different concentrations of TPH and measuring with RemScan.

The graph below shows the comparison between RemScan readings and laboratory assays of TPH for a set of samples. Each point represents one sample. The closeness of the points to the diagonal line demonstrates the accuracy of the RemScan.





MOISTURE CONDITIONS

RemScan is sensitive to high soil moisture. Accuracy of the instrument declines above 5% free moisture content so soils should be air-dried for best results. The RemScan software will inform the user of the soil moisture content upon scanning and provides a warning if samples are too damp.

In warmer conditions, the required drying can be achieved by simply letting the soil surface air dry for 15 to 30 minutes before scanning. In colder or wetter conditions, the soil can be dried sufficiently by placing a thin layer in a shallow sampling cup and leaving for a few hours or overnight, still saving significant laboratory analysis turnaround time and costs.

For high moisture applications, Ziltek can provide a Portable Drying Unit as an optional extra as pictured below. This unit dries batches of 35 soil samples in 30-60 minutes, depending on initial water content and soil type.

SPECIFICATIONS

RemScan is a hand-held instrument for the rapid measurement of various parameters in soil, on metal and other substrates.

No other field instrument provides the same level of accuracy, repeatability and ease of use.

RemScan is a unique leading technology which is patented worldwide.

Measures TPH (C_{10} - C_{40} and above) in soils and gives a single output in mg/kg.

Measures Granulometry in terms of [%] Sand, [%] Silt, [%] Clay and the Texture Class according to the International Union of Soil Science (IUSS).

Easy to standardise in the field – 1 minute background cap, 1 minute reference cap (both are inert materials so no need to carry calibration gases or hazardous chemicals).

Results in less than 20 seconds.

Throughput - high rate of up to 120 measurements/hour can be achieved but typically about 60 measurements/hour.

Measures directly on the soil – no solvent extraction of the soil is required.

Minimal soil preparation required – requires a flat compacted soil face of around 10mm diameter (trowel and tamp normally sufficient) with an air dried surface.

Measures the soil surface only – anywhere you can collect a soil sample, you can take a scan (including along soil cores).

Truly portable and rugged – built for field use.

Intrinsic Safety - Not Intrinsically Safe (non-explosion proof).

Operated through a purpose-designed user interface on a wireless Tablet.

Battery life – 8 hours for Tablet and 4 hours per battery for instrument (supplied including 3 batteries) for full day field usage.

Data accessible as a .csv file.

Typical accuracy for clay or sandy soils:

TPH (C_{10}-C_{40}) Concentration (mg/kg)	RSD* (%)
10,000	6
2,500	7
1,000	16

*RSD is the relative error at one standard deviation

Detection limit typically 68 mg/kg TPH (at one standard deviation) for clay or sandy soils.

Operating temperature: 0 to 50 °C (32 to 120 °F).

Storage temperature: -25 to 75 °C (-13 to 167 °F).

Humidity: 95% non-condensing.

Power Supply: 100-240 VAC 47-63 Hz.

Wavelength /Wavenumber range: 2.2 µm to 4 µm (4500 cm^{-1} to 2500 $cm^{-1)}$.

Measurement Range for soil: 0 – 100,000 mg/kg.

SOFTWARE ADD-ONS

Oil on Metal App

RemScan measures the amount of oil on bare metal surfaces in tank cleaning and salvage operations.

HARDWARE ACCESSORIES

Bench Stand

The bench stand is useful when:

- Many samples are to be measured in a site hut (as opposed to in the field). This may be because the soil samples are very wet and need air drying in the hut or because conditions are too inhospitable in the field (too hot or too cold) for personnel to work for long periods.
- If RemScan is going to be recalibrated for different soil types.

Field Tripod

The Field Tripod has been specifically designed to free-hold the RemScan Tablet.

It is lightweight and fully adjustable.

Specifically designed for field use, but can be utilised in any work environment.

Backpack

This is used to transport RemScan around the field and enables operator to carry RemScan around a large site. It has cut-outs for all equipment that may be required in the field.

Portable Drying Unit

Used for rapid in-field drying of samples and can dry 35 samples at a time within a maximum time period of 30 minutes. Supplied with all accessories. Extra accessories for higher throughput available upon request.