



# **Soil Vapor Sampling Standard Operating Procedures for Vapor Intrusion Applications Oxygen Profiling in the Vadose Zone**

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# Soil Vapor Sample Collection

## Manual (Hand) Driven-Rod Probes

A hardened SS soil vapor probe of 0.625 inch OD and equipped with a hardened steel tip is driven to the target depth with an electric rota-hammer. Inert 1/8" OD nylon tubing runs down the center of the probe rod and is connected to a sampling port just above the tip. This internal sample tubing design eliminates any contact between the soil vapor sample and the steel rod. Once at the target depth, the probe rod is rotated exposing a sampling port at the tip.

## Direct-Push Driven-Rod Probes

A 1.25 or 1.5 inch outside diameter steel rod equipped with a hardened drop-off steel tip is driven into the subsurface with a direct-push system. Once inserted to the desired depth, the probe is retracted slightly to expose the vapor sampling port. Inert 1/8" or 1/4" OD nylon tubing runs down the center of threaded into a gas-tight fitting just above the tip. After a sample is obtained, the probe is advanced to the next depth or removed. This design prevents clogging of the sampling port and cross-contamination from soils during insertion.

## Surface Seals

The probe rods are sealed at the ground surface with granular and hydrated bentonite.

## **Probe Purging & Analysis**

If the soil vapor is being measured by portable field meters, the meter is directly connected to the nylon tubing. Initial oxygen values are recorded. Then the soil gas is purged until a stable reading is observed and the stable value recorded also.

## **Field Records**

The field technician maintains a logsheet summarizing:

- Sample identification
- Probe location
- Date and time of sample collection
- Sampling depth
- Identity of samplers
- Weather conditions
- Sampling methods and devices
- Soil gas purge volumes
- Volume of soil gas extracted
- Initial and final vacuum readings of canisters if used.
- Observation of soil or subsurface characteristics (any condition that affects sample integrity)
- Apparent moisture content (dry, moist or saturated etc.) of the sampling zone
- Chain of custody protocols and records used to track samples from sampling point to analysis.

## ANALYTICAL METHODOLOGY

### Oxygen Concentrations in Soil Vapor

***Instrument:***

LandTech GEM 2000 Infrared Analyzer or Bascom Turner GasExplorer

***Instrument Initial Multipoint Calibration***

The instrument is factory calibrated by the manufacturer annually and a certificate of calibration is provided.

***Daily Continuing Calibration***

Continuing Calibration is performed at the start of each day and end of each day by measuring outside air and a low oxygen standard (~4%). Acceptable continuing calibration agreement: +/- 20% to the actual values.

***Analysis of Soil Vapor Samples***

The instruments are equipped with an internal pump that draws the soil vapor into the instrument. The inlet is directly connected to the nylon tubing.

***Blanks***

Pure nitrogen (oxygen free) is analyzed at the start of each day and during the day as appropriate depending upon the measured concentrations.