Nitor Technologies

PROWLER

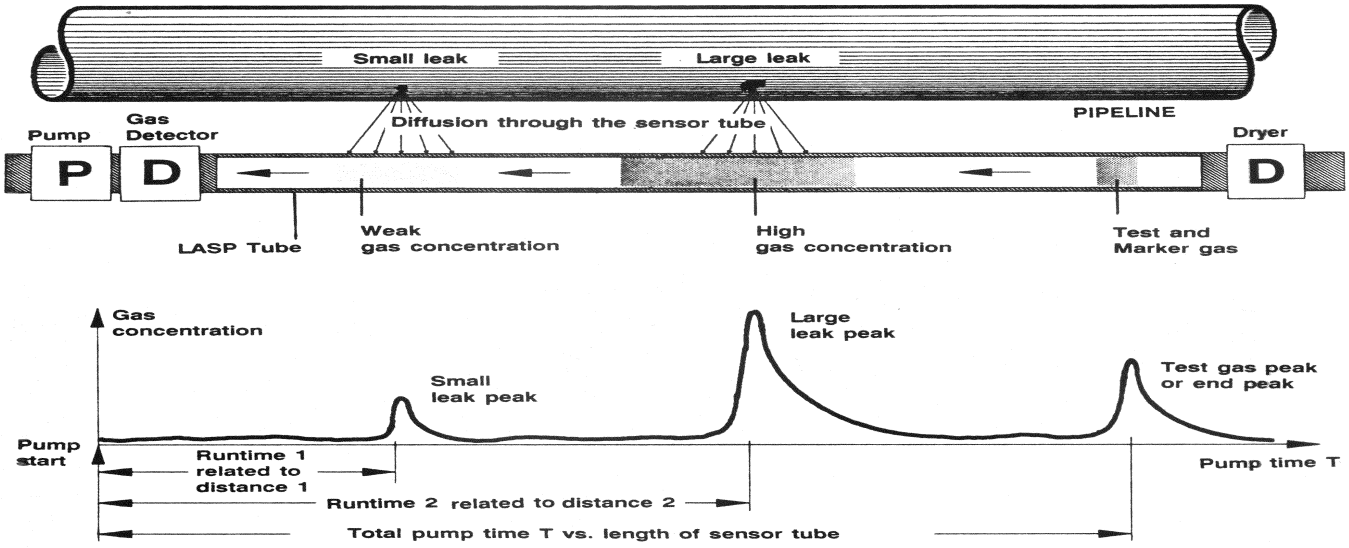
Protect and **Reclaim**
Our Water, Land, Environmental Resources patented leak-detection and location system.

THE PROWLER LEAK-DETECTION SYSTEM OFFERS QUICK AND ACCURATE LOCATION OF A LEAK. CLEAN UP IS FASTER AND CAN BE STARTED SOONER.

Unique Features of the PROWLER SYSTEM include:

- **Ability to detect a leak as small as 0.04 gallons per hour to within 10 feet of its location.**
- **Uses the principle of diffusion to detect vapors which travel 50 times faster than liquids in the subsurface.**
- **Its ability to provide complete coverage of a pipeline.**
- **Its adaptability to other vapors in other applications.**
- **Its ability to be easily calibrated for existing subsurface conditions.**
- **Its capability to operate in the presence of water (where the water table is high.)**
- **Its ability to analyze the background environment.**

Principle of Operation



The illustration above shows the diffusion of gas vapors through the PROWLER Sensor Tube.

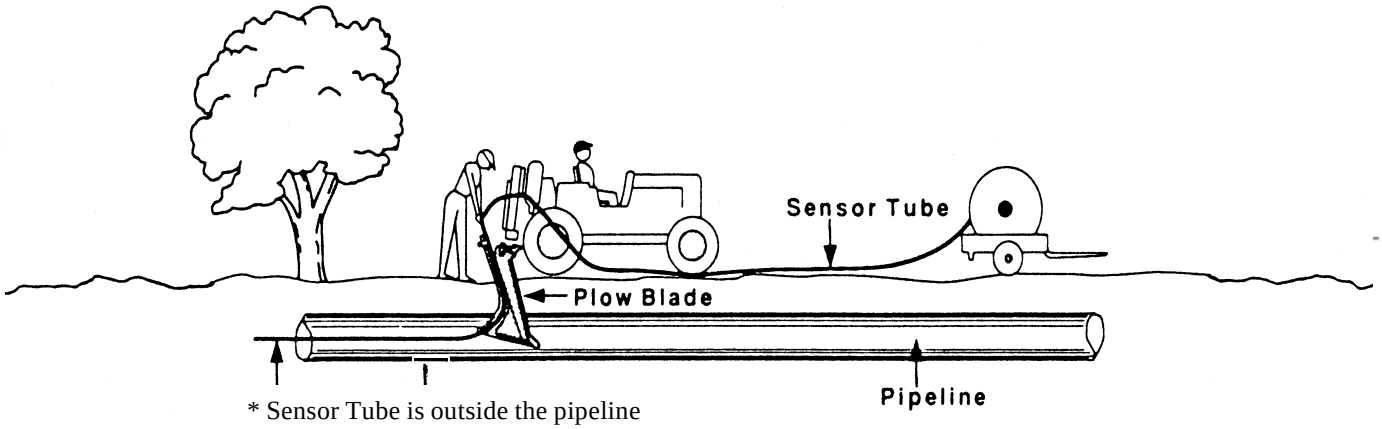
The sensor tube filled with standing air is placed near a pipeline or storage tank. The sensor tube allows for rapid wall diffusion. After a time interval that is a function of substance volatility, diffusion through the sensor tube wall will yield equilibrium of vapor concentration. The distribution of substances inside the sensor tube represents a real image of substances occurring outside the tube. At the leak site vapors from the pipelines can be found mixed with the air inside the sensor tube.

The established concentration profile is made visible when the air column inside the sensor tube is pumped through a detector unit at one end of the tube. The concentration profile is not destroyed by this movement; however, some observable smoothing is caused by the non-uniform velocity profile across the tube and by re-absorption in the tube.

Gas concentrations will show up on the input to the internal computer system as a "leakage peak". The figure above shows a graphic representation of how the voltage signal appears to the computer. The peak height is proportional to substance concentration and, therefore, is a measure of the size of the leak (small leak = low peak, large leak = high peak). The detector outputs vs. pumping time gives a complete concentration profile of the sensor tube.

The location of a leak can be calculated by accurately timing the arrival of the leakage peak. If a small quantity of gas (H2 or propane) is injected near the dryer unit, the gas will be transported with the air through the total length of the sensor tube. When passing the detector, an "end peak" characterizing the total length of the pipe is created. The location can be precisely calculated from the ratio of the running time of the leakage peak to that of the end peak.

Easy to Install on Existing Piping Systems



* Sensor Tube is outside the pipeline

PROWLER Pump/ Detector Unit

The Prowler Pump/ Detector Unit provides the necessary mechanical components to sample the sensor tube contents. This includes the vacuum pump, safety monitors, filters, flash arrestors, valves, electronic components for gas detection, and various system alarms, electrical power control, translation of sensor outputs to usable data and the communications link to the computer-based control system.

The PDU vacuum pump pulls the air column in the sensor tube past the PDU sensor(s).

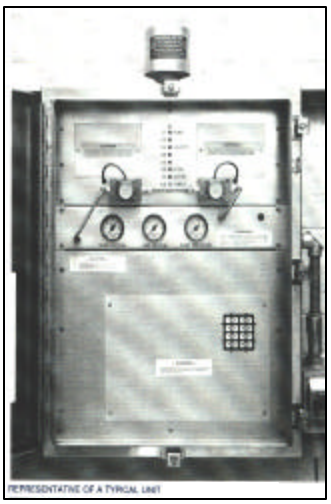
The output voltage of the sensor is compared to the configured background or threshold set point voltage. If the output exceeds the limits, the system alarms that a leak condition has occurred. The system automatically locates the leak by calculating the time it takes the leak peak to reach the sensor and by controlling the flow rate (velocity) of the air column.

The input and output connections to the PDU consist of one or two sensor tube lines (depending on the system configuration), electrical power and high speed data transmission to the computer control system, and exhausted air output from the sensor tube lines.

The unit is housed in a stainless steel enclosure for long life in severe environments.

In addition to the leak alarms, the PDU provides various system alarms that can be used to trouble shoot problems with system operation. Included are alarms for high temperature and or low end peak, high or low vacuum, tamper alarm, calibration failure and computer failure. With these indications and guidance in the O&M manuals, faults, such as cuts in the tubing, can be located and repaired.

Most of the hardware differences between the long-line and short-line systems occur in the PDU. The short-line system will utilize a smaller capacity vacuum pump which reduces the length of tube which can be used to less than or equal to 1 mile. The short-line PDU is contained in an explosion-proof enclosure rated NEMA 4 and made from aluminum.



PROWLER Filter/Dryer Unit

The Prowler Filter / Dryer Unit provides the clean dry air that replaces the existing air inside the Prowler sensor tube. It also provides the end marker used by the Low Level Leak Detection Mode to mark the end of the Prowler sensor tube.

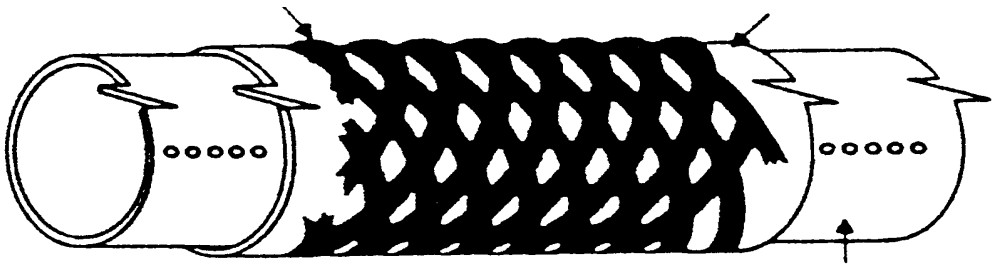
To operate with the highest sensitivity, air inside the Prowler sensor tube should be relatively dry and contain no materials that can be detected by the various gas sensors in the Prowler Pump/ Detector Unit.

To achieve the critical air condition, a large canister of silica gel dryer material is used to dry the air that passes through this unit. A smaller container filled with activated carbon removes any detectable materials. Both of these containers provide an easy method of removal and replacement of an exhausted dryer or carbon element.

Depending upon the particular model of Filter/Dryer, either an active or passive type end peak gas marker is used. In the active unit, a small electrolytic cell produces a small amount of hydrogen gas for use as the marker. This unit requires power and a time device to activate the gas generator and to control the amount of gas generated.

In the passive unit, a permeation cell provides a small amount of a selected gas that is pumped through the system marking the end of the sensor tube. It requires no power and is normally used in systems where this is a concern.

PROWLER SENSOR TUBING



Prowler Sensor Tubing specifications:

Physical Construction:
EVA LAYER
Diameter: 0.672" (+/- .030")
Thickness: 0.036" (+/- .007")
INNER PVC TUBE
Outer Diameter: 0.600" (+/- .020")
Inner Diameter: 0.470" (+/- .020")
General:
Specific Gravity: 1.35
Durometer Shore "D": 76
Mechanical:
Bend Radius (at 68 F): 15 in.
Maximum Operating Pressure: 15 psi.
Tensile Strength, psi: 6400
Tensile Modulus, psi: 355000
Gardner Impact, in.lb/mil: 5.00
Flexural Yield Strength, psi: 11440
Flexural Modulus, psi: 360000
Thermal:
Deflection temperature, degrees C: 65
Environmental:
Operating Temperature: 32 to 170 degrees F
Storage Temperature: -40 to 170 degrees F
Note: *Diffusion rate of the sensor tube is directly related to the operating temperature. The lower the temperature, the more reduced the diffusion. These factors need to be considered when determining the test interval used between tests.*

Detectable Gases

Hydrocarbons and their derivatives: Methane/ Ethane/ Propane/ Pentane/ Hexane/ Heptane/ Octane/ Decane/ Petroleum Ether/ Petroleum Benzene/ Gasoline/ Kerosene/ Petroleum Naphtha/ Acetylene/ Ethylene/ Propylene/ Butadiene/ Butylene/ Benzene/ Toluene/o-Xylene/ m-Xylene/ Ethylene Oxide

Halogenized Hydrocarbons: Methyl Chloride/ Methylene Chloride/ Ethyl Chloride/ Ethylene Chloride/ Ethylidene Chloride/ Trichloro Ethane/ Vinylidene Chloride/ Trichloro Ethylene/ Methyl Bromide/ Vinyl Chloride

Alcohols: Methanol/ Ethanol/ n-Propanol/ iso-Propanol/ n-Butanol/ iso-Butanol

Ethers: Methyl Ether/ Ethyl Ether

Ketones: Acetone/ Methyl Ethyl Ketone

Esters: Methyl Acetate/ Ethyl Acetate/ n-Propyl Acetate/ iso-Propyl Acetate/ n-Butyl Acetate

Nitrogen Compounds: Nitro Methane/ Mono Methyl Amine/ Dimethylamine/ Trimethyl Amine/ Mono Ethyl Amine/ Diethyl Amine

Inorganic Gases: Ammonia/ Carbon Monoxide/ Hydrogen Cyanide

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