



# iSOC<sup>®</sup> Technology

## What is iSOC<sup>®</sup>?

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iSOC<sup>®</sup> is an oxygen delivery technology called in-situ Submerged Oxygen Curtain (iSOC<sup>®</sup>) that when suspended in existing monitoring wells infuses high levels of oxygen into groundwater. The proprietary structured polymer used in iSOC<sup>®</sup> contains hydrophobic microporous hollow fiber. These fibers provide approximately 7,000 square meters of interface area per cubic meter of fiber for the mass transfer of oxygen into groundwater.

iSOC<sup>®</sup> is owned and manufactured by inVentures Technology incorporated (iT<sub>i</sub>) in Fredericton, New Brunswick and Oakville, Ontario, Canada.

### How does iSOC<sup>®</sup> work?

Oxygen is infused into the water in such a way that large quantities of dissolved oxygen (DO) are created (without sparging), and with a very low decay rate at atmospheric pressure. Once equilibrium is achieved, this process "idles" (no additional oxygen added), until there is a demand for oxygen—either through biomass utilization, or through DO migration and groundwater movement through the well. iSOC<sup>®</sup> then continues to maintain equilibrium, generating more dissolved oxygen as required.

The use of dissolved oxygen in hydrocarbon-contaminated groundwater to enhance natural attenuation of MTBE and BTEX has been growing as a remediation technology since the mid-1990s. Most conventional technologies, however, waste most of their oxygen because the bubbles rise to the top of the groundwater table and escape before they have a chance to dissolve or to be utilized by naturally occurring hydrocarbon degraders. The result is an inadequate biodegradation response in aquifers with high ferrous iron, moderate BOD, and/or high concentrations of hydrocarbon constituents.

### What is Gas inFusion Technology?

The patented Gas inFusion technology is a unique method of infusing gas into liquids. The underlying scientific principle for the iSOC<sup>®</sup> is the equilibrium that exists between the dissolved concentration of a gas in a liquid and the partial pressure of the gas above the liquid. Henry's Law states: the weight of any gas that will dissolve in a given volume of liquid, at constant temperature, is directly proportional to the pressure that the gas exerts above the liquid.

### Where has iSOC<sup>®</sup> been approved?

iSOC<sup>®</sup> has been approved for remediation use in most states. iSOC<sup>®</sup> is now operating on hundreds of sites in North America, Europe and Asia.

## iSOC<sup>®</sup> Construction

- Stainless Steel unit -1.62" Diameter, 13" long (41 x 330 mm) with a drain fitting.
- Stainless Steel barb fitting connects to 0.25" or 6 mm OD polyurethane tubing.
- Lifting /security eye for connecting to a suspension line.
- Gas inFusion module using microporous hollow fiber & PVC shell.
- High tolerance to most pure gas & contaminant environments.

## iSOC<sup>®</sup> Remediation Approach

- **Creation of oxygen barrier** at leading edge of contaminant plume—avoids boundary litigation; protects off-site receptors.
- **Source treatment**—reduces contamination levels with supersaturated oxygen at heart of the plume.
- **Rapid, localized remediation** of low-level contamination in existing monitoring wells—cost effective, passive enhancement of natural bioremediation.
- **Accelerates site closure** through natural attenuation as a primary remediation strategy or as a polisher

## iSOC<sup>®</sup> Remediation Enhancement

- Supersaturates monitoring well with low decay DO—typically 40-200 PPM depending on depth.
- Natural convection current fills well with uniform DO curtain.
- DO floods downstream groundwater and/or fractured bedrock.
- Enhanced bioremediation removes organics.
- Placement of injection wells depends on site-specific conditions.
- Installed in a few hours; easily moved to optimize performance.

## iSOC<sup>®</sup> Oxygen Distribution

- Mass transport laws govern oxygen distribution.
- Supplies oxygen according to demand.
- Down-gradient DO depends on groundwater velocity & O<sub>2</sub> demand.
- Case studies show the typical radius of influence to be 10-30 feet.
- One iSOC<sup>®</sup> unit will use 1 cu ft (28 l) of oxygen per day.

## iSOC<sup>®</sup> Advantages

- Infuses 4 to 10 times more DO than any competitive technology.
- Delivers 40-200 PPM DO depending on groundwater characteristics & iSOC<sup>®</sup> depth.
- Uses existing 2-inch monitoring wells for installation.
- Infusion results in half to two-thirds less time than competitive technologies.
- Connects to standard oxygen cylinder.
- No power, off-gases, pumps, hazardous by-products, or permits.
- Small, simple, efficient, predictable, easy to use, & very low maintenance.

## **What are remediation consultants saying about iSOC®?**

In the past few months, several leading environmental firms have achieved significant reductions in MTBE, BTEX, and TBA, and have commented:

- "In less than 3 months since iSOC® installation, MTBE & TBA have decreased by an order of magnitude, DO has increased in monitoring wells 30' away, and ferrous iron and BOD have dropped."
- "Since installation of iSOC®, MTBE has been reduced from 3500 to under 200 PPM in fractured bedrock in about 4 weeks."
- "We established an effective barrier of DO in ~3 months with reductions of 84% MTBE, 31% TBA, 73% benzene down gradient of O<sub>2</sub> barrier."

## **Who do I contact for iSOC® sales and Information?**

Click onto [www.isocinfo.com](http://www.isocinfo.com) to locate the iSOC® Representative nearest you.

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