



## EnviroClean®

### Degassing/Hydrocarbon Removal/Remediation Chemistry

# TECHNICAL DATA SHEET

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## PHYSICAL PROPERTIES

Product Name	EnviroClean®
Physical Form	Clear Liquid
Color	Colorless unless dyed
Specific Gravity (Water = 1)	1.028 +/- .01
Solubility in Water	100%
Freezing/Melting Point	NE
Flash Point (°F)	>200° F
pH	8.5 +/- .25
Reportable Quantity (RQ)	None

Complete information on health hazards, protective equipment, handling precautions, environmental hazards and disposal is listed in the current EnviroClean® Safety Data Sheet (SDS) for this product.

## SUMMARY

EnviroClean® is a non-flammable, non-toxic, water-based, proprietary blend of non-ionic ethoxylated octylphenolic surfactants that has been specifically engineered as a cleanup/mitigation agent for a wide range of hydrocarbon products. EnviroClean® has been shown to be effective for quickly and effectively suppressing or completely eliminating VOCs, LEL's, benzene and low levels of H<sub>2</sub>S and mercaptans in open or confined spaces.

EnviroClean® has been used for cleanup of hydrocarbon spills and soil remediation. In these applications, EnviroClean® effectively conditions (physically) the hydrocarbon such that the microbes that naturally occur can more readily consume it. It turns hydrocarbons into a nutrient source for the microbes. When sufficiently mixed with hydrocarbon and water, the EnviroClean® forms a homogeneous solution of hydrocarbon, EnviroClean® and water, which is very stable.

EnviroClean® is a concentrated product that readily biodegrades.

EnviroClean® is commercially available in 5-gallon units, 55-gallon drums, 330-gallon totes and bulk from Oklahoma City, Oklahoma.

## FLUID DESIGN

EnviroClean® is a proprietary blend of surfactants that needs to be diluted to be effective and it is very safe to workers and the environment. EnviroClean® does **not** contain caustic, therefore does not have the common harmful side effects associated with caustic based products. The product is designed for use as a degassing agent and a cleaner/degreaser for remediation. The product does not contain any enzymes or biomass itself. It works by conditioning the hydrocarbon so that the naturally occurring microbes (bacteria) are able to readily consume

it. Through the application of the appropriate dilution and mixing, the EnviroClean® will capture the hydrocarbon and tie it up in a solution that is very stable. The formation of this solution results in extremely small particles that will not recoalesce. It is important to note that if EnviroClean® reaches its saturation point the oversaturated hydrocarbon will breakout of solution very quickly. This will allow for easy removal or reclamation of any hydrocarbon that is not preconditioned for remediation.

In addition to tying up the hydrocarbon in solution, the product is very effective when contacted with hydrocarbon vapors at suppressing volatile organic vapors, gases, and odors. Once combustible and flammable hydrocarbon vapors are tied up in the resultant solution, the solution will be very difficult to ignite. It also accelerates the biodegradation process of the hydrocarbon, thereby enhancing recycling or reclamation of water.

EnviroClean® has been demonstrated to be effective on gas, oil, lube oil, hydraulic oil, most petroleum-based products, animal and vegetable oils, fats, and tallow oils. EnviroClean® cleans the heavy tar build-up, asphaltenes or oily residue from inside of tanks and vessels. Furthermore, once a surface has been cleaned with EnviroClean®, the cleaned surface will resist the deposition of oily materials.

EnviroClean® can be used to cleanup oil spills whether in/on soil or hard surfaces. The first step in this process is to remove as much of the free oil as possible. This step is followed by contacting the contaminated surface appropriately with the proper dilution of EnviroClean® and water. The treatment solution will contact the hydrocarbon molecules and change their behavior such that they are now essentially water soluble. The large increase in interfacial surface area creates conditions that are favorable to degradation and consumption by bacteria and microbes. The product converts hydrocarbons into a very good nutrient source for bacteria and microbes.

EnviroClean® is typically fed at concentrations between 1% and 6%, depending on the nature of the hydrocarbon contamination problem. It can be diluted with most types of water – hard, soft or brackish water. The product has an unlimited shelf life when unopened. EnviroClean® is effective at ambient temperatures. However, the **effectiveness will increase as the temperature of the application is increased.** EnviroClean® does not require the use of steam, but has been

shown to be very effective when injected into the steam (vapor) phase.

## FIELD MIXING PROCEDURES

### Mixing Concentrates

EnviroClean® is usually delivered as a concentrate and **must** be diluted with water to work properly. Cleaning solutions can be formulated by premixing or eduction. It is not necessary to provide high shear agitation when preparing a batch of cleaning solution since EnviroClean® is 100% soluble in water. It is recommended that when preparing the cleaning solution you first add the water into the mix container and then follow by the addition of EnviroClean®. This will minimize foaming as the EnviroClean® and water form a homogeneous solution.

For premixing, the following procedure may be used:

1. Add the correct amount of water to the container.
2. Depending on the desired strength, add the correct amount of EnviroClean® to the container.
3. If the final solution is not a consistent pink color, mild agitation may be required until a consistent pink color is achieved.

### Quality Control Testing

There is no easy field testing procedure to monitor the concentration of active ingredients in the EnviroClean® formulation. Visually the color changes from rose color to lighter pink as the product is further diluted. Effectiveness can also be predicted by quantifying the amount of hydrocarbon that is to be picked up. By observing the effluent from the use of EnviroClean®, an adjustment in the cleaning solution concentration can be made. If it is observed that free oil is floating on the effluent solution, then the concentration should be increased.

## MATERIAL REQUIREMENTS

For specific protocols and application rates, please refer to the available **Product Usage Guide**, product label, or consult with the manufacturer or authorized distributor for additional guidance.

## Equipment Cleaning & Parts Washing

EnviroClean® is very effective for equipment cleaning applications. EnviroClean® is used at light dilutions and has a significant "life of batch" as well as low foaming tendencies. The surfactants in EnviroClean® desorb and micro-emulsify grease and oil contamination and separate it from solids (metal shavings, grit, etc.) allowing them to settle without accumulating oily sludges. These factors make EnviroClean® ideal for spray wash systems as well as dip/agitating equipment. Some agitation or circulation of the fluid is required for thorough cleaning. For equipment cleaning applications, EnviroClean® is normally diluted to a 3% - 6% solution with water.

## Soil Remediation

Calculate the volume of hydrocarbon contained in the contaminated area. It is important to determine accurately the depth of oil penetration into the soil. It will be important to agitate the soil to just below the depth of penetration. Once the estimate of hydrocarbon is known, the amount of the normal dilution of EnviroClean® for soil remediation is 32 parts water to 1 part EnviroClean® (3% solution). The EnviroClean® solution will use the naturally occurring bacteria in the soil and begin to consume the hydrocarbon, which has been put into a form that can be quickly consumed. The remediation process normally occurs over 4 to 12 weeks.

**The following step-by-step procedure can be used for soil remediation using EnviroClean®:**

1. If contaminated soil is deeper than 12" excavate the soil and spread it on the surface to a depth of 10" - 12" and then proceed with this protocol. If contaminated soil is 12" in depth or less, thoroughly mix and aerate the soil in place utilizing a roto-tiller or similar equipment. If soil is extremely oily or gummy, mix clean soil with oily soil to expedite clean up and to make it easier to work with.
2. Utilizing local soil or rock, build a small berm surrounding the treatment area to prevent rain water run off from the site.
3. To determine treatment volumes of EnviroClean®, measure the square footage area of the treatment cell and divide that number by 27 to find cubic yards per foot of

depth (i.e. treatment area is 100' x 50':  $100 \times 50 \div 27 = 185$ ). Multiply that number x .06 to determine the amount of EnviroClean® to utilize in the treatment (i.e.  $185 \times .06 = 11$  gallons EnviroClean®). Dilute the EnviroClean® to approximately a 3% solution (32 to 1 or 352 gallons water to 11 gallons EnviroClean®). Spray the 3% EnviroClean® solution over the entire treatment cell.

4. If, after a week, little to no rainfall has fallen, water the site thoroughly.
5. Wait another week and repeat steps 1 and 3, if needed.
6. Monitor and continue the treatment protocol until desired clean up levels are reached.

Samples can be taken and analyzed for Total Petroleum Hydrocarbons (TPH) to track the progress of the remediation. If the TPH were to appear to stabilize and not continue to decline, a second application of EnviroClean® may be required.

**Note:** It can be helpful, but not required, to add a highly soluble, high nitrogen fertilizer such as Miracle Grow or Sam's Choice to the first 3% EnviroClean® solution.

The addition of bacteria is not typically required. The EnviroClean® solution will stimulate the activity level of the naturally occurring bacteria.

In the fall and winter, it helps to expedite the job if the treatment cell is covered with plastic between treatments. This tends to hold in heat and generate additional moisture.

Keeping the soil moist is an integral part of the clean up.

## Emergency Response & Spill Cleanup

**Small Spill Cleanup:** Dilute EnviroClean® to a 10% solution. On small spills apply with 2 ½ gallon pressure sprayer or similar device. Cover the entire spill working in a circular motion from outside perimeter toward the center of the spill. After application of EnviroClean® has been completed, agitate spill area with forcible stream of water or broom and rinse thoroughly. EnviroClean® helps to reduce or eliminate any VOC concerns associated with the cleanup by micro-emulsifying the hydrocarbon on contact drastically reducing the LEL levels in a very short time frame. EnviroClean® also eliminates sheens.

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**On Roadways & Pavement:** EnviroClean® can be applied with a pressure sprayer or applied through a foam eductor at a 6% setting. EnviroClean® will instantly stop the deterioration of asphalt by diesel or gas and eliminate slippery conditions. Dispose in accordance with local rules and regulations.

**Note:** For use with absorbents, EnviroClean® will increase effectiveness by allowing the contaminate to more easily penetrate into the absorbent.

## Degassing & Cleaning of Tanks & Equipment

EnviroClean® is effective for the degassing and cleaning of all types of petroleum storage tanks. For small tanks of less than 50,000 gallons, EnviroClean® should be utilized through a power washer at dilutions between 2% and 6% depending on the type of product within the vessel and the degree of contamination. Typically for flammables, a 6% solution is utilized to completely agitate the tank residue and to scour the wall of the vessel prior to and during pump out. Lower dilutions may be utilized for products not representing a vapor hazard. EnviroClean® is also effective for reducing H<sub>2</sub>S, Benzene and other VOC's.

## Tank Bed Remediation

A common and effective means of mitigating the vapor hazard and remediating the tank bedding is to utilize a "flushing and recovery" technique with a diluted solution of EnviroClean®. Typically a 3% to 6% solution of EnviroClean® and water is utilized in a batch process to treat the impacted portions of the tank floor area. Simply perforating the affected area with a "buster" or hole saw and allowing the EnviroClean® solution to flood the affected bedding will eliminate immediate, and future, recurrences of vapor generation. The process also serves to remediate the contamination by flushing entrained hydrocarbon out of the bedding for recovery and disposal, or re-processing. If necessary, the entire sub-floor area may be treated by saturating the zone of contamination and flushing the fluid to the sump, or other collection point, and recovering the rinsate for disposal. Depending upon the severity of the leak, and the resultant degree of subfloor contamination, the EnviroClean® solution can be applied so as to simply saturate the bedding material, or it can be injected so as to flush and recover gross quantities of hydrocarbon.

## Chemical Pipeline Pigging

As a general guideline, pump a slug of 3% to 6% solution and chase with water.

## VOC Vapor Mitigation & Odor Control

EnviroClean® is typically applied at a concentration of 3 – 6% for vapor and/or odor control. Circulate the solution through a manway cannon or other device in order to provide sufficient saturation of the vapor space of the vessel that is being degassed. Check the vapor level of the tank before circulation begins. Circulate for about 2 hours and let the tank settle for about 2 hours. Check the vapor level in the tank. More than one circulation may be required for complete vapor suppression. The holding capacity of EnviroClean® may require sweetening or circulation with a fresh batch of product, depending on the amount of hydrocarbon vapors originally contained in the vessel.

Dilute EnviroClean® to a 3% to 6% solution. Coverage is normally at 3 to 4 square yards of surface area per gallon. Heavy contamination or mercaptan type odors may require a stronger solution of EnviroClean®.

Typically, 1 gallon of EnviroClean® concentrate diluted to a 3% to 6% solution will render up to 6 gallons of petroleum product nonflammable when properly applied.

## Hard Surface Cleaning & Decontamination

**For heavy soiled oil and grease on hard surfaces:** Mix a 6% solution of concentrate with clean water in quantity sufficient to cover contaminated area. Apply generous amounts with spray applicator, or equivalent and allow reasonable time for the surfactants in EnviroClean® to penetrate and break down the hydrocarbon and grime. Once applied, solution may be scrubbed or brushed in for stubborn soiling. Next, apply EnviroClean® at a 1% - 2% solution through a power washer (heated power wash system will expedite the process). Flush residue to containment and dispose of as local rules apply.

#### **For lightly soiled or freshly oiled surfaces:**

EnviroClean® may be used through any power washer or steam jenny currently available. Operating temperatures of 140 degrees F. will maximize effectiveness. Solution strengths of 1 – 2% may be used for lighter decontamination duties. For small applications, a 5% solution (16 oz. EnviroClean® concentrate to 2.5 gallons water) may be applied with a small pump sprayer and scrubbed or brushed into surface.

#### **Insitu Free Product Recovery Enhancement**

EnviroClean® is effective for the insitu solubilization and recovery enhancement of entrained Free Product Hydrocarbon in the subsurface to facilitate recovery or biodegradation. Dilutions of 2% v/v are typical for light ends (i.e. gasoline) while concentrations of 3% to 6% are effective for Diesel Range Organic (DRO's) and heavier oils. Applications vary, however the EnviroClean® solution is injected into the contaminated zone followed typically by a recovery event.

#### **Soil Flushing and Recovery**

EnviroClean® is effective for the insitu solubilization and recovery enhancement of entrained Free Product Hydrocarbon in surface and sub-surface soil to facilitate recovery or biodegradation. Dilutions of 2% v/v are typical for light ends (i.e. gasoline) while concentrations of 3% to 6% are effective for Diesel Range Organic (DRO's) and heavier oils. Applications vary, however the EnviroClean® solution is injected into or flushed through the contaminated zone.

#### **Surface Washing & Shoreline Cleanup**

Dilute EnviroClean® to a 2% solution. On small spills apply with 2.5 gallon pressure sprayer or similar device. Cover entire spill, working in a circular motion, from outside perimeter toward the center of the spill. After application of EnviroClean® has been completed, agitate spill area with forcible stream of water or broom and rinse thoroughly.

On larger spills, specific applications and protocols should be developed taking into account local risks and considerations.

**Note:** EnviroClean® is listed on the U.S. E.P.A. NCP Product Schedule as a Surface Washing Agent (listed SW #31). This listing does *not* mean that U.S. E.P.A. approves, licenses, certifies, or authorizes the use of EnviroClean® on an oil discharge. This listing means only that data have been submitted to EPA as required by subpart J of the National Contingency Plan § 300.915.

#### **Fire Fighting for Class A & B Fires**

Proportioning Rate:	6%
GPM Flow Rate:	95 – 110
PSI at Eductor:	200 or MFG's recommendations
Hose Length:	As per MFG's suggestion
Nozzle Type:	Standard adjustable or automatic
Coverage:	0.2 gpm per square foot
Nozzle Pattern:	Hard cone to coarse stream
Application:	Starting from the outside perimeter, using a stirring, mixing action.

#### **Contaminated Soil Excavation**

In most cases a 3% solution of EnviroClean® will be adequate to keep vapor emissions within acceptable limits. Dilute EnviroClean® concentrate with water at a ratio of 1 part EnviroClean® to 32 parts water to make a 3% solution. The EnviroClean® solution should be applied evenly to the soil surface in sufficient quantity to dampen the surface well. As a general rule, 1 gallon of solution will cover approximately 4 sq. yd. of soil surface area.