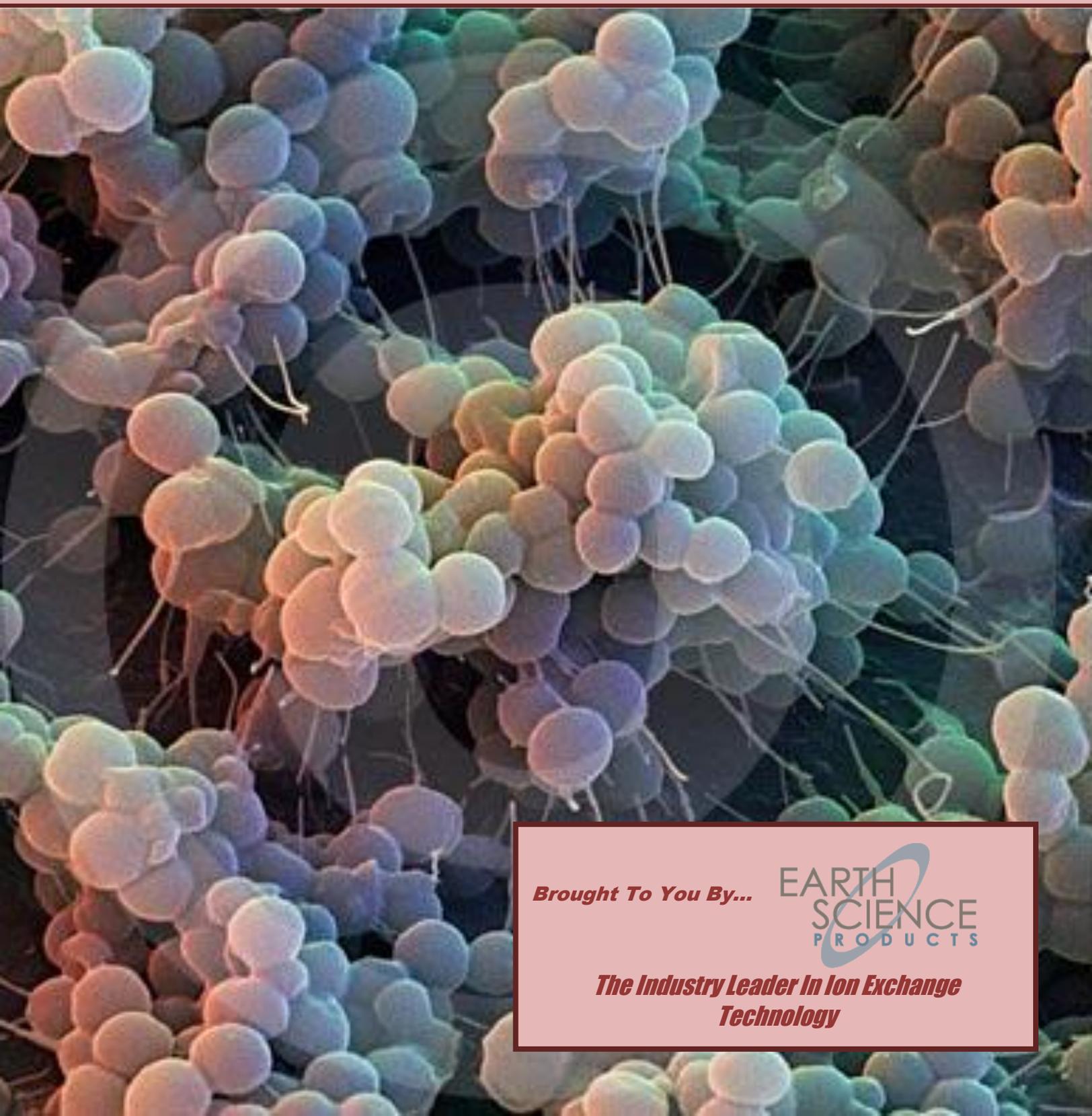


# ***CONDOR<sup>®</sup> DIGESTER***

***Keep Your Septic System Healthy,  
With The Power of Ion Exchange***



***Brought To You By...***



***The Industry Leader In Ion Exchange  
Technology***

# WHO IS EARTH SCIENCE PRODUCTS?

## A BIT OF HISTORY.....

Earth Science products Corp was formed in 1972 by Edsal "Ed" Wood and Dick Gearhardt. Dick Gearhardt served his country in the military before working for the forestry service. While at the forestry service, he was placed in road development which exposed him to soil mechanics and the severe and recurring damage caused by expansive clay soils. Dick began to utilize his background in chemistry to combat the problem. It was then that he realized the true nature of the issue....the imbalance of ionic charge in the clay soil. This led him to develop a partnership with the late great Lee G. Reynolds who also understood the nature of the clay soil. Together they developed ion exchange technology, introducing the first two predecessors to modern ion exchange resins (IERS) and eventually the third generation product CONDOR SS was born. CONDOR SS is still used in the perfected formula today.

ESP was the first to mass produce a high quality, consistently performing product. Over the years, there have been many copies of the CONDOR SS product, though none have been able to achieve its success rate of 100%.

After Dick Gearhardt started his own company, he partnered with Mr Ed Wood, a well-known, highly respected botanist and nurseryman hall of fame inductee. Together, they developed several complimentary products to CONDOR SS. One of the first, Wood's Rooting Compound, was used effectively to reforest the scorched earth surrounding the 1981 Mt St Helens eruption. CONDOR AG LandLife was also used in that project, and has since become one of the most successful products in the company line. The same clay that holds onto water and swells beneath roads and buildings, also holds onto water containing un-dissolved salts, making fertilizer uptake by plants very difficult, requiring more water and nutrients than usual. CONDOR AG Landlife reduces the amount of water required, the amount of fertilizer required and, with repeated use, brings the soil back to a pristine 'virgin' state, able to support repeated commercial cultivation.

CONDOR AG LandLife is now used in over 20 countries throughout the world. Although it is marketed under different names, it is the same consistent, high quality product formulated, tested, and perfected decades ago. ESP takes great care to ensure that the CONDOR AG LandLife you apply to your land is the very best we can produce.

Today, ESP is still a family operation. President Shane Kennedy and his Mother Sandra Kennedy still run the business with the same care and eye for quality that started it all back in 1972. Ask them today and they will tell you "the sky is the limit!"

From the early struggles of Mr Gearhardt to convince critics of the efficacy and overall benefit to the planet from the use of the products, to the ongoing efforts today of Shane and Sandra Kennedy to produce products that enhance and compliment the planet we inhabit...ESP is a company that cares about the earth. The earth is in our name, because it is in our care.

Earth Science Products....people *you* can believe in.....  
people who believe in *you*.



# CONDOR® DIGESTER

What It is and How It Works

## WHAT IT IS USED FOR...

CONDOR DIGESTER is manufactured by earth Science Products Corporation, Wilsonville, Oregon, U.S.A. The product has been produced and distributed for over 15 years to chemically 'pre-digest' organic wastes and maintain a healthy, odor free environment in septic tanks, vault toilets, sludge pits, hog farms and even sewage treatment facilities.

## WHAT IT IS MADE OF...

CONDOR DIGESTER is a sulfonated petroleum product, ("sulfonated" means it is blended with a mild acid so that it consumes dead proteins), that is used for the deodorization and digestion of organic solid wastes.

## HOW IT WORKS...

The application of CONDOR DIGESTER breaks out oxygen molecules from water in huge quantities. So, what happens with all this oxygen available? Aerobic bacteria, (the 'good' bacteria), begin to grow and multiply at incredible rates. These 'good' bacteria produce enzymes, (enzymes are just biomolecules that 'catalyze' or speed up a given chemical reaction). These enzymes then begin to break down the solid wastes and the anaerobic bacteria (these are the 'bad' bacteria that produce the bad smells). Once broken down, the good (aerobic) bacteria now begin to consume the remains of the bad (anaerobic) bacteria. With all of this newfound energy, the good (aerobic) bacteria now produce more enzymes, which further break down bad bacteria...and so on and so on. Once started, this chain reaction feeds itself and expands exponentially (at an ever-increasing rate). As an added bonus, the only by-products of this intense activity is the release of carbon dioxide (CO2) and water (H2O).

The only thing that can easily derail this process is the introduction of "phenols" or "formaldehyde" products into the system. These products kill the good (aerobic) bacteria, and stop the chain reaction. Here are some examples of phenol and formaldehyde containing products...

	Lysol	Particle Board
	Spic & Span	Plywood
	Pine Sol	Paneling
PHENOL	Acne Medications	Pressed Wood
	Baking Powder	Permanent Press Fabrics
	Mouthwash	Shampoos
	Sugar Substitutes	Cosmetics
		FORMALDEHYDE

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## REGARDING SAFETY...

Since anything placed in a septic system or sewage treatment facility will ultimately end up in the soil, or adjacent water, it is important to understand the potential impact on our environment, including critical watersheds. As a responsible company, Earth Science Products has submitted **CONDOR DIGESTER** to dozens of agencies for batteries of tests over the years.

All of the testing has served to confirm two facts...

**CONDOR DIGESTER** is an extremely effective degrader of waste build-up and odor controller.

**CONDOR DIGESTER** produces no harmful by-products as a result of its function.

## PEOPLE and AGENCIES PROVIDING ANALYSIS...

A partial listing of these agencies and their analysis of **CONDOR DIGESTER**...

**Studies** conducted by Logan A. Norris PhD, Director of Forest Sciences Laboratory, Oregon State University, Corvallis, Oregon, U.S.A. Officials of the U.S. Forestry service have determined that **CONDOR DIGESTER** presents no environmental problems. In fact, **CONDOR DIGESTER** has been cleared for use, as prescribed by the manufacturer, on the Bull Run watershed, which serves drinking water to the entire city of Portland, Oregon, U.S.A., the 25<sup>th</sup> largest city in the United States.

**Based** on scientifically-controlled studies performed by the U.S.A. Forest Department, and the Oregon Department of Transportation, **CONDOR DIGESTER** proved to be an extremely effective method of reducing waste build-up and odor control in safety rest area buildings and corresponding drain fields. In the study produced by the Materials and Research Section of the Oregon Department of Transportation, U.S.A., it was noted that during the test period the response of the drain field to the septic tank effluent was "excellent". During the test period, the system would normally have been pumped 2 to 3 times but, because of the use of **CONDOR DIGESTER**, was only pumped once. This represents a reduction in the pumpable solids of up to 70%. From an economic standpoint, it was stated that the use of **CONDOR DIGESTER** was economically cost effective because it alleviates the necessity of periodic rodding and occasional building of new drain fields.

**Lieutenant** Colonel Jon C. Hill, Inspector-Instructor, United States Marine Corps, has submitted a recommendation to the Commandant of the Marine Corps, Washington, D.C., U.S.A., to use **CONDOR DIGESTER** in the field to provide the Marine Corps with a substantially better procedure than is presently available for treatment of human waste, grease, fats and cooking oils in field kitchens and messes. LtCol Hill felt the flies that move from the 'heads' (field restroom facilities) to the food preparation and eating areas spread disease and are a constant concern. The present method of burning the human waste generated from a field 'head' produces horrific odors and a threat to marines who have suffered countless burns over the years. LtCol Hill feels the use of **CONDOR DIGESTER** is an effective means to eradicate these problems, thereby increasing the general health and well-being of our forces.



**The** California State University at Fresno, California, U.S.A., School of Agricultural Sciences and Technology, conducted tests of CONDOR DIGESTER starting in 1988, for the purpose of controlling and enhancing the air quality of the Swine Unit of the University.

After extensive testing, Mr. Kevin M. Schreder, Swine Technician, has concluded;

“the air quality is considerably better and more pleasant when treated with **CONDOR DIGESTER**.

**Secondly**, by having an improvement in the air quality, this would then help reduce the incidence of Atrophic Rhinitis. Atrophic Rhinitis is a minor disease in hogs that is a disturbance of the nasal passages, which can lead to other health disease. By breathing better air, it would help reduce the incidence or severity of Atrophic vaccines, medications and feed costs caused by retarded growth.

**Finally**, a third benefit would be the water savings and cost, which over a long period of time could be dramatic.”

These are just a few examples of the uses and benefits of using CONDOR DIGESTER to alleviate the problems associated with proper treatment and disposal of solid wastes. Additional agencies that have used and trusted CONDOR DIGESTER also include;

**U.S.A. Government Service Award  
U.S.A. Contract To Supply The U.S. Army Corps of Engineers  
U.S.A. Marine Corps  
U.S.A. Park Service  
Bureau of Indian Affairs  
U.S.A. Embassy Corps**



# CONDOR® DIGESTER

## GENERAL DIRECTIONS FOR USE

### *Designed To Remedy;*

Viscosity Too High For Pumping

Excess Solids In Tank

Plugging Of Leach Lines

Dead or Dying Grass Around Leach Field

Poorly Draining Leach Field

Foul Odor

Backing Up

Plugging

Clogging

Grease and/or Fats Buildup

# CONDOR

### *For These Types of Systems;*

Residential

Commercial

Gravity System

Aerobic System (ATU)

Engineered Textile System

Pressure Distribution System (Pumped)

Mound Systems

Sand Filter Type Leach Field

Bio-Filter Systems

Drip Irrigation Type Systems



### *Step One – ‘Charge’ the System...*

Since you are likely experiencing one of the issues listed above, it is possible that the level of “good” bacteria in your system has fallen to very low levels. To deal with this, and to jump-start the process of getting the system back to optimum health as soon as possible, as a first step we recommend “charging” the system. This is a very simple process.

The “charging” solution is created by adding one (1) gallon of **CONDOR DIGESTER** to ten (10) gallons of water. Mix it up a bit (it will mix very easily) and dump into your system through a toilet or other drain. The toilet is the preferred place for two reasons...1) the piping is a bit larger, 2) you can flush the toilet afterwards to push the charging solution all the way to the septic tank. There is no benefit obtained if the solution is lying in a pipe...we need it to make it all the way to the septic tank.

### *Step Two – Getting Control...*

Getting your system under control, especially if it has not been pumped recently, or if there is an extremely low volume of Aerobic (“good”) bacteria in your system, can be a challenge depending on how poorly your system is doing.

*If your system is backed up...* Charge it as described above, then add one (1) gallon of **CONDOR DIGESTER** each day for one week. After one week, reduce to one (1) gallon every other day for another week.

*If system is working poorly but not backed up...* Charge it as described above and then add one (1) gallon of **CONDOR DIGESTER** every other day for a week to 10 days.



### *Step Three – Maintenance...*

Once positive results are observed, such as: better flow, reduced odor, positive changes to grass above leach field, etc...You may safely reduce usage of the product to a maintenance level. Usually, one (1) to two (2) gallons per month of CONDOR DIGESTER is sufficient to keep an average-sized system healthy and functioning properly. If you have a larger system, or your soil is particularly poor-draining, you may need a bit more.

So, you've charged your system, gotten it under control and averted further problems. A vital part of your maintenance program is the ability to spot when something is beginning to go wrong, so you can quickly apply what you learned in "*Step 2 - getting control*". Learning to spot a problem down the road will save you time, money and potential backups or pumping out. Here are some of the most common symptoms of a system that is close to, or in the early stages of failing;

Slow Draining	Bad Odors Around Septic Tank
Leach Lines Plugging	Smelly Drainfield
Dark Green and/or Rank Grass Over Drainfield	
Saturated Soil Over Drainfield or Tank	

---

### *Lastly – If You Have Poor Clay Soil...*

Earth Science Products manufactures a soil amendment, *CONDOR AG* designed for clay soils. This product is specially formulated to allow clay soils to drain properly, thereby allowing your drainfield to function as it should.

The product is applied over your drainfield by using a standard hose-end sprayer. If you know you have 'fat' clay on your property, this could be the answer! Give us a call if you suspect poor drainage because of clay.



The information below is re-printed from a document sent to a Distributor for Earth Science Products Corp. in February of 1989.

From: California State University  
School of Agricultural Sciences  
and Technology

Department of Animal Science  
and Agricultural Education

Swine Unit  
Fresno, CA. 93740

To: Johnny Evans  
Earth Recon Corporation

February 13, 1989

Dear Mr. Evans:

In response to our earlier conversation regarding the odor control study conducted at the California State University, Fresno, Swine Unit, please see the following report which gives an account of the findings of the study.

The study included treating six manure pits, with an approximate capacity of 500 gallons each, located in a totally environmentally controlled farrowing house. The pits were drained, recharged with fresh water and treated with Condor on a weekly basis for a four-week period.

During this time period several odor tests were performed using unbiased observers who were asked to determine any difference in the air quality within the farrowing house. Students and staff who work at the swine unit also noticed a reduction in odor and a pleasant residual smell in the air following the use of the Condor product.

Following the initial trial with the Condor product we have undertaken an additional treatment trial whose early results are reaching twelve-days intervals between the use of the product while maintaining good air quality.

If you have any further questions please contact me at the Swine Unit at 294-2805.

Sincerely,

Kevin M. Sohreder  
Swine Technician



The information below is re-printed from a document submitted to Earth Science Products Corp. in May of 1989.

From: **United States**                      **Forest**                      **Zone II Engineering**  
**Department of**                      **Service**                      **Cook, WA. 98605**  
**Agriculture**

To: **Earth Science Products Corporation**                      **May 23, 1989**

On March 7, 1989, at approximately 2:00 p.m., I went to the Meadow Creek and Old man Pass Snow Parks and treated the restrooms with Condor Digester.

When I arrived at these sites, the odor was fairly strong at both restrooms. Each of these sites contain two vault toilets with a 1,000 gallon capacity in each vault.

At Meadow Creek, I dumped one gallon in each of the vaults. Initially, the odor increased.

In order for Condor Digester to work properly, the solids have got to be covered with liquid, which was the case at both sites.

At Old Man Pass, I dumped one-half gallon in each of the vaults. Initially, I did not notice much change in the odor at this site.

On March 8<sup>th</sup>, 1989 I went to the Meadow Creek and Old man Pass sites. The odor had subsided somewhat from when I was there on March 7<sup>th</sup>. However, the weather was much colder also. The solids were still covered with liquids.

On March 14<sup>th</sup>, 1989 I returned to meadow Creek and Old Man Pass sites. There was no noticeable odor. Meadow creek appears to be a thinner slurry than before. At Old man Pass the liquid appears to have dropped below the level of the solids. However, there was no noticeable odor. I will continue to monitor these sites. At this time, Condor Digester appears to have done away with the odor at these sites.

On March 17<sup>th</sup>, 1989 I returned to Meadow Creek and Old man Pass. There was no noticeable odor today. Meadow Creek still appears to be a thin slurry. At Old man Pass, the level of the liquids remains below the level of the solids. However, there is still no noticeable odor at this site.

On May 22<sup>nd</sup>, 1989 I was by Meadow Creek. There still is no noticeable odor. The level of liquids is above the solids at this time.

These tests were done under limited conditions for a limited amount of time. At this time of year, the temperatures have been extremely low. I am concerned with the reoccurrence of the odor at higher temperatures as we do have during the summer months. Therefore, I do believe the product should be tested further.

Sincerely,

Ron Squires



The information below is re-printed from a document sent to a Distributor for Earth Science Products Corp. in April of 1990.

From: California State University  
School of Agricultural Sciences  
and Technology

Department of Animal Science  
and Agricultural Education

Swine Unit  
Fresno, CA. 93740

To: Leonard Reinertsen  
Earth Science Products Corporation

April 13, 1989

Dear Mr. Reinertsen:

In regards to our previous conversations, I have compiled the results of our tests with the "Condor Digester". I am sorry for the delay; however, I hope it has been worth the wait.

We have six manure pits that each hold approximately 500 gallons. These manure pits are inside an environmentally controlled farrowing house. On February 21<sup>st</sup> of this year, we charged each pit with fresh water and then treated them with the Condor Digester at a rate of 1000:1. During the first six weeks, we changed the water at 14 day intervals and the air quality was still very good. Then we tried a 28 day interval and found that the air quality was below acceptable comfortable breathing levels. Finally, we used a 14 day interval and found very good air quality. The next step was to go to a 21 day interval and we found the air quality was starting to become marginal in its acceptability. A final treatment period of 17 days was used and we found that this was an acceptable time period. Since the final treatments, we went for four weeks without treatment and had to change the water at seven day intervals, as the air quality was deteriorating. Now I have retreated the pits to do some continual work with the product.

In conclusion, the air quality is considerably better and more pleasant when the water was treated with the Condor Digester. Using the Condor Digester for an extended period of time could prove to have several advantages:

First, there is a considerable improvement in the air quality.

Secondly, by having an improvement in the air quality, this could then help reduce the incidence of Atrophic Rhinitis. Atrophic Rhinitis is a minor disease in hogs that is a disturbance in the nasal passages which can lead to other health disease. By having improved air quality, this would mean that the hogs would be breathing better air and this would help to reduce the incidence or severity of Atrophic Rhinitis, which then could help reduce other costs in vaccines, medications, and feed costs caused by retarded growth.

Finally, a third benefit would be the water savings and cost, which over a long period of time could be dramatic.

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To: Leonard Reinertsen  
Earth Science Products Corporation  
April 13, 1989  
Page 2

The results from our tests with the Condor Digester look very promising. I still have some product and will continue to do some testing.

On April 8<sup>th</sup> of this year, I also completed another six weeks of testing and the 14 day interval with a dilution of 1000:1 is working very well.

I will keep in touch and forward the results as we get them. Please call if there are any questions.

Sincerely,

Kevin M. Sohreder  
Swine Technician



The information below is re-printed from a study performed by the Materials and Research Section of the Oregon Department of Transportation and presented to Earth Science Products Corp. in 1994.

## **Chemical Treatment of Septic Tank – Drain Field Systems At a Safety Rest Area**

**Lab No. 78-3194**

### **Abstract**

In an effort to find methods for reviving drain fields in safety rest areas, a program was conceived to investigate the behavior of a class of chemicals in the septic tank – drain field system of a safety rest area that had undersized tankage and drain field problems. The results after 20 months indicate a significant reduction in pumpable solids and that odor control is possible. The ability to revive and maintain an ailing drain field was also realized. The application of these products is economically cost effective when alternatives are considered. Further investigation of the properties, methods and applications is warranted.

### **Preface**

The following article is an interim report on the use of chemicals to extend the life of septic tank – drain field systems in older safety rest areas. It was prepared by the Materials and Research Section of the Oregon Department of Transportation.

(1)

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## Introduction

Many Oregon safety rest area waste disposal systems are supported by conventional septic tank – leach line systems. The older rest areas in Oregon that have this system often experience difficulty since the current load exceeds the original design criteria.

A typical installation is a type 8 toilet building (6 water closets, 2 urinals, 5 lavatories, 1 drinking fountain and floor drains) supported by a 4000 gallon septic tank and approximately 900 linear feet of leach line.

The estimated <sup>(1)</sup> average daily water demand for a typical type 8 toilet building is 6600 gallons per day. The recommended retention time for a septic tank is 24 hours and our present design standards call for a 7500 gallon tank. Therefore, the existing facility is undersized by a factor of nearly 2 during peak periods.

Buildup of partially digest solids in the septic tank has made it necessary to pump as often as three times a year. The impact of solids on the leach line has, in some cases, made it necessary to install new drain fields. It is not uncommon to have a field break out (waste water coming to the surface of the field) during heavy use periods causing health and odor problems.

Complete clogging of the system sometimes occurs. This results in raw sewage coming up through the floor drains and urinals. When this occurs the rest area is closed until cleanup is completed, the septic tank pumped and, occasionally, the leach line is rodded.

In May of 1976, an investigation of materials that might improve soil permeability in drain fields was underway. During this period a formulation was worked out based on the soil conditioner raw materials that showed promise for controlling odor, aiding digestion, and increasing solids solubility in septic tanks and helping maintain a free-draining field.

## Materials

The drain field and septic tank materials are formulated around a sulfonated hydrocarbon that is a by-product of petroleum cracking. The concentrated base material is a surfactant and ion-exchanger. The concentrated base has a Ph of 1.25, specific gravity of 1.19 and has the characteristics of highly buffered sulfuric acid.

The drain field material "Condor AG" is a dilution of the concentrate with other additives. The formulation presently marketed is designed to increase the water penetrability and lower the capillarity and plasticity of the soil. The septic tank material "Condor Digester" is similar to the AG product but formulated to be economically cost effective and safe for use by maintenance personnel in a safety rest area.

1) *Johnson, R. L.*  
*Water Systems For Interstate Safety Rest Areas,*  
*Quantity and Quality Aspects.*  
Engineering Research Institute,  
Iowa State University, Ames, Iowa, 1968



(cont'd)

Based on studies supervised by Logan A. Norris PhD, Director of Forest Sciences Laboratory (OSU) in Corvallis, Oregon, officials of the U.S. Forest Service have determined that there are no environmental problems involved with the use of any of this family of ion exchangers. In fact, they have been cleared for use as prescribed by the manufacturer on the Bull Run water shed serving Portland (2).

### Survey of Test Site

The Santiam River Safety Rest Area is located on interstate 5 approximately 15 miles south of Salem, Oregon, and is adjacent to the Santiam River. The northbound and southbound sides are essentially identical with respect to the physical facilities and soil types. Average daily traffic on interstate 5, for 1977, at the rest area was 25,800 vehicles per day. The water use estimate, per side, was 8350 gallons (3). Applying the ratio of water demand to sewage flow (4) yields 6850 gallons of sewage per side, per day, which is in good agreement with the Iowa study. The South Santiam Safety rest Area was selected because of its proximity to Salem and its history of problems with the septic tank – drain field systems.

The southbound side, the test site, has one type 8 toilet building serviced by a 4000 gallon tank and approximately 880 linear feet of leach line. This field is the second one to be placed since the original field failed and could not be revived. Prior to starting the program, we reviewed the available records and found that:

1. This side supported the heavier traffic load.
2. This side was operating off a newer drain field.
3. The septic tank required pumping approximately 2 to 3 times per year (approximately 6000 gallons per pump).
4. The rest area would occasionally have an odor problem in the building.
5. In late summer the drain field would fail and septic tank effluent would break through to the surface of the drain field and create a health and odor problem.

2) *In a private conversation between Richard Arney, District Ranger, U.S. Forest Service, Maupin, Oregon, and Richard Gearhart of Earth Science Products Corp. of Wilsonville, Oregon.*

3) *Oregon Department of Transportation Highway Division Design Guide For Interstate Safety Rest Areas*

4) *FHWA Technical Advisory, Values of Design Parameters for Water Supply and sewage Treatment Facilities at safety Rest Areas, #5140.01, February 15, 1978.*

(3)



(cont'd)

The conditions of the southbound side prior to initialization of the program were:

1. The septic tank had a heavy blanket and was due to be pumped.
2. There was some solid material in the distribution box.
3. Effluent in the distribution box was up to a level of about 1 ½ inches in the 4-inch line leading to the field.
4. Both the septic tank and the distribution box had a strong odor.
5. The lawn area over the drain field was a mottled green and yellow.

The northbound side, the control side, is similar except that it operates on the original drain field satisfactorily. The leach line is approximately 910 linear feet and pumping is required 2 or 3 times per year.

The conditions of the northbound side were:

1. Less blanket in the septic tank and had been pumped more recently than the southbound side.
2. The distribution box was relatively free of solids.
3. The water in the line from the distribution box to the drain field was not backed up.
4. Both the septic tank and distribution box had a strong odor.
5. The lawn area over the drain field was a mottled green and yellow.

## Treatment Program

In July of 1976 the test program was begun. It was decided that the northbound side not be touched until distress was evident.

The program for the southbound side was in 3 parts. The initial treatment was to get the system under control. The second part was to treat the drainfield. The final part was to put the septic system on a maintenance schedule. Periodic monitoring by Materials & Research laboratory personnel was planned for the duration of the project. The treatment designed to get the system under control was to add 4 gallons (1 gallon per 1000 gallons of capacity) of Condor Digester for 7 days. After 4 days, 5 gallons of the straight concentrate was added.

(4)

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(cont'd)

On the fifth day of the program the drain field was treated. One gallon of Condor AG was diluted to 200 gallons and spray-applied to cover 1000 square feet. When this was completed, the area was saturated with water from sprinklers. Before the topical application there should be at least one week of good weather to insure that the ground was dry.

The maintenance program was initially set up to add one half gallon of Condor Digester per day. Periodic observations were planned to assess the program and determine if the daily dosages need to be changed.

## Results

During the topical application, the tank and distribution box were inspected. The distribution box was free of solids and the odor was reduced.

One month after completion of the topical application, the area was inspected and the conditions were:

1. The septic tank had a heavy blanket.
2. There was no solid material in the distribution box.
3. Effluent in the distribution box had dropped so that the level in the line was about  $\frac{3}{4}$ " in the 4-inch line leading to the field and the water was freely flowing to the field.
4. Both the septic tank and distribution box were odor-free.
5. The lawn area over the drain field was green and growing well.

The conditions on the northbound side were virtually unchanged. The grass was still a mottled green and brown. It was determined that each side had received the same care during the month.

In mid June of 1977 the site was inspected and the decision was made to increase the daily dosage to one gallon per day.

The septic system on the untreated northbound side failed in August of 1977. The failure resulted in raw sewage coming up through the floor drains and urinals. The failure occurred over a week and closure of the building was required. Before the facility could be reopened, the septic tank was pumped, (in excess of 6000 gallons), the drain field rodded and the building cleaned.

The decision was made to put the northbound side on the same daily program as the southbound except that no topical application would be made. This was done to see if the drain field efficiency could be improved using the Condor Digester product only, from within the system.

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(cont'd)

In February of 1978 an odor was noticed in the building on the southbound side. The septic tank had some odor as well as the distribution box. There were minor solids in the distribution box, but the effluent was in virtually the same condition as it was in August of 1976. No apparent impact to the drain field was noted.

The blanket in the septic tank was measured and found to be approximately 3 feet deep. In an attempt to regain control, the daily dosage was raised to 2 gallons per day until arrangements for pumping could be made. One week elapsed before pumping was accomplished. During that time there was no odor problem.

The pumpout revealed that the blanket had been reduced to approximately 14" and consisted primarily of paper products. The material under the blanket was very fluid and pumping was easily accomplished. It appeared that the odor was primarily due to the material in the blanket. The walls of the tank cleaned easily and did not require the normal amount of scaling.

It appears that if the increased dosage had been continued, the blanket would have been reduced further and adequate control would have been accomplished. Once the system is under control, reduced dosages should be expected. Because of the rapid response of the system to increased dosage, laxity of application was suspected. This was confirmed in reviewing the purchase records and the recommended dosage rates. This was probably the principal contributing factor in the system getting out of control.

To alleviate the problem of inconsistent application, chemical solution-pumps are going to be installed. The pumps will operate from 24-hour programmable timers. The program for the timers is based on the average hourly use curves published in the Iowa study <sup>(5)</sup>. This is being done to attempt to get more efficient utilization of the chemical and attempt to reduce chemical cost.

## Conclusion

The septic tank material, Condor Digester, offers a method of controlling odor and solids build-up in septic systems. The reduction of blanket with increased dosage indicates that the system has flexibility and could be controlled for varying loads. The response of the drain field to the septic tank effluent is excellent.

During the test period the system would normally have been pumped 2 or 3 times instead of once. This is a reduction in pumpable solids of up to 70 percent. A desirable economic feature of this approach is that construction of new and larger tankage may be put off indefinitely.

The odor control feature is unique. The U. S. Forest service in separate testing with the same material has maintained odor control in vault toilets. There are other more sophisticated applications that might be tried such as odor control in lagoons and sludge drying beds.

*(5) Ibid - Johnson*



(cont'd)

The success with the topical application to the drain field makes the package complete for rest area applications. The ability to maintain a functioning field or upgrade a failing field is economically desirable if it alleviates the necessity of periodic rodding and the occasional building of new fields. The test period was not of long enough duration to determine when another topical application would be required, but experience in other areas indicates a 3 to 5 year interval may be realizable.

The use of Condor AG or similar materials should be investigated for application in areas where the soil is marginal or unsuitable for drain fields. If it is possible to upgrade existing marginal or unsuitable soils to a point where a drain field would function, the need for expensive pumping facilities, pipelines, lagoons or miniature treatment plants could be reduced.

End Of Report

(7)

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The information below is re-printed from a document submitted to Earth Science Products Corp. in September of 1982. Original is on file and available for inspection at manufacturer's facility.



## UNITED STATES MARINE CORPS

6<sup>TH</sup> ENGINEER SUPPORT BATTALION  
4<sup>TH</sup> FORCE SERVICE SUPPORT GROUP, FMF, USMCR  
NAVAL AND MARINE CORPS RESERVE TRAINING CENTER  
6735 N. BASIN AVENUE  
PORTLAND, OREGON 97217

In Reply Refer To  
I: JCH: mlh  
1650  
29 Sept. 1982

From: **Inspector - Instructor**

To: **Commandant of the Marine Corps (Code MPC-30), Headquarters, U. S. Marine Corps, Washington, D. C. 20380**

Via: **(1) Commanding General, 4<sup>th</sup> Force Service Support Group  
(2) Commanding general, 4<sup>th</sup> Marine Division**

Subj: **Incentive Award; LtCol Jon C. Hill USMC\***

Ref: **(a) MCO 1650.17E**

Encl: **(1) HILL/GEARHART (H/G) FIELD HEAD**

1. A suggestion for a sanitary field head is submitted in enclosure (1). The concept and design for this innovation was developed by LtCol Jon C. Hill USMC. The savings to the United States Marine Corps if this concept is adopted is not accurately known. It is estimated that if this type of field head was adopted as a suitable replacement for chemical heads that are purchased or rented for use in the field by the Marine Corps that a savings of \$250,000.00 annually would be realized. The savings in terms of use for mobilization is unknown.
2. The advantages of this field head are explained in enclosure (1). The description of the chemical used in the field head was drawn from material supplied by Mr. Richard C. Gearhart, President of Earth Science Products 1960 S.W. 16<sup>th</sup> Avenue, Portland, Oregon 97201\*. The concept and use of this chemical as presented in enclosure (1) is to the best of my knowledge original in this application.
3. The basic reason for development of this field head is simply to provide the Marine Corps with a substantially better procedure than is presently available for treatment of human waste and grease, fats and cooking oils in field kitchens and messes.
4. The preferred format for submission of incentive awards is to submit NAVSO Form 5305/4 in accordance with reference (a) however this form is not available.

**Jon C. Hill**

\* Service Number Omitted For Privacy

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Enclosure (1)  
Page 1

### HILL/GEARHART (H/G) FIELD HEAD

Field heads in temporary camps and bivouacs present problems known all too well to Marines. The stench and odor, and filth have ensured that only the determined and most tenacious users of these facilities linger on to read or contemplate. The billowing clouds of suffocating pungent smoke of burning human waste and petroleum fuels that rise daily into the sky from Marine encampments are best forgotten although too easily remembered. The flies that move from the heads to food preparation and eating areas spreading disease are a constant concern. The countless burns suffered by Marines while "burning out the head" justify a safer procedure for disposing of human waste than burning it. Reminiscence of field head problems has engendered a determination to find a practical, safe, economical and logistically feasible solution for disposal and treatment of human waste in the field and that solution may well be at hand.

The H/G FIELD HEAD concept deals with elimination or minimizing the following problems endemic to open field heads:

1. They engender pathogens and can be a serious source for the spread of disease.
2. They are frequently the source of extremely bad odors, often hydrogen sulfide and marsh gas (methane), common products of anaerobic decomposition of organic wastes.
3. In normal use, the operation of these facilities can pose a serious source of contamination to the ground water and thus find a means of transmitting disease causing organisms into drinking water, food processing, laundry and wash water.
4. Problems numbered 1, 2, and 3, above, are usually persistent if not solved by cumbersome or complicated means.
5. The only procedure presently used for elimination of human waste disposal in facilities without septic systems or sewage treatment systems is by burning it using petroleum fuel.

The H/G Field Head is a system that uses Condor Digester, plastic bags and water. The excavation of the receptacle hole head can be accomplished manually or mechanically. The hole is excavated to accommodate the desired need in terms of camp population/daily use and a rectangular shaped heavy duty plastic bag with a flat bottom is inserted in the hole.



Enclosure (1)  
Page 2

### HILL/GEARHART (H/G) FIELD HEAD

The size of the head would be configured to support the environment. After the bag is placed in the hole it is secured to the side of the hole or fastened to the head structure. The field head structure is placed over the hole and a solution of Condor Digester and water is put into the plastic bag. Additional solution is added to the plastic bag as required to maintain liquid above the waste. After the plastic bag is full the field head structure is moved from the hole and the top of the plastic bag is closed in the same manner as a plastic trash can bag.

The toilet with Condor Digester following pumpout (one gallon of Condor Digester in 10 gallons of water) controls odor by establishing a Ph low enough to kill all bacteria and other simple life forms which normally feed on the organic wastes. This prevents anaerobic bacterial production of hydrogen sulfide, marsh gas or methane. It kills off the pathogenic organism which are the disease-causing varieties. If the ratio of liquid input falls proportionately low enough that solids float above the "wet" level, sometimes odors are formed, but by simply adding plain water and keeping the mass "wet", the antiseptic action continues. As a precaution, a small amount of Condor Digester can be added along with the plain water in the proportion of one part Condor Digester to ten parts of water.

During the "dwell time" of the organic wastes in the holding bag, because of the treatment of Condor Digester in water and in addition to keeping the mass bacterially "clean", there will be a complete and beneficial chemical digestion (corrosion, actually) of the organic material, and this includes the cellulose material in the toilet paper.

When the head is no longer needed, and is disposed of in the anticipated manner, the odor free and non-pathogenic state herein described will continue indefinitely. Even when the plastic ruptures or is purposely punctured, the contents will remain safe in the concentrated form. As dilution takes place, our experience shows that as soon as such dilution reaches a level when the Condor Digester lowered Ph is no longer inhibitive to bacterial forms, the environmental response is for a proliferation of aerobic bacterial production, a response unique to the presence of Condor Digester in the "wet" mass. The byproducts of aerobic digestion or organic waste material are merely carbon dioxide and water (plus any trace of mineral waste, equivalent to ash resulting from complete combustion).



Enclosure (1)  
Page 3

**HILL/GEARHART (H/G) FIELD HEAD**

Pathogens do not thrive in the oxygen rich environment, and because any present would have already been killed in the Condor Digester treated holding bag, the H/G Field Head effectively eliminates pathogens as a problem.

The structure for the head could be pre-cut and mounted for mount out using three different configurations to accommodate single, double, and quadruple occupancy. The quadruple head could be side by side to increase occupancy and use at a given location. Construction material of choice would include corrugated aluminum or reinforced fiberglass roofing, and siding to decrease cube and weight, and 2 x 4 inch studs and rafters with 2 x 6 inch reinforcement on floor joists. Seats for heads are commercially available. The materials for the head structure to include hardware, plastic bags, and Condor Digester could be pre-packed for mount out. The construction of heads of this type is within the capability of the engineer battalions and squadrons and they are not particularly innovative in design. As an added feature, the roofing and siding could be camouflage painted prior to packaging for mount out. Condor Digester has no flash point, is non-explosive and non-flammable, and has an indefinite shelf life. It is shipped and stored in DOT-approved heavy plastic semi-rigid drums which have been accepted for both ocean cargo vessels and for commercial air freight.

A field head package for mount-out would include the prefabricated head structure, and a thirty day supply of plastic bags and Condor Digester. Condor Digester is available in plastic or steel drums. The field head mobilization kits could include a thirty day supply of Condor Digester depending on the size of the prefabricated field head. As an economy measure, one and five gallon plastic containers could be procured, and filled for inclusion in the smaller field head kit.

Jon C. Hill  
LtCol USMC  
Inspector-Instructor  
6<sup>th</sup> EngSptBn, 4<sup>th</sup> FSSG  
6735 N. Basin Avenue  
Portland, Oregon 97217



The information below is re-printed from a document faxed to Earth Science Products Corp. in February of 1990.

From: Gary Nichols  
South Jetty  
Agriculture

To: Rob Linderman

February 6<sup>th</sup>, 1990

Dear Rob,

Enclosed you will find the information on a product that seems to be the panacea for septic systems. The name of the product is "Condor Digester" and is distributed by Ion Control in Sherwood, Oregon.\* The product is a liquid chemical that is added to a septic tank directly, or through a toilet or drain.

Although chemical in nature, the end result of application of this product is to break out oxygen molecules from the water in huge quantities, which in turn promotes extremely rapid reproduction of aerobic bacteria. The aerobic bacteria produce enzymes which break down the solids as well as the anaerobic bacteria, (anaerobic bacteria are the smell producers), into products which the bacteria consume, creating more enzymes and on and on...

In addition, the bacteria produce H<sub>2</sub>O and CO<sub>2</sub> as by-products. The increase in efficiency of the septic system is increased enormously. I have been conducting two tests here at South Jetty to determine the effectiveness of "Condor Digester".

Test #1. The sanitary station at the entrance to the park drains into a 1500 gallon septic tank, and from there to a distribution box and then on into a leach field. Last spring the tank would not drain and needed to be pumped. Within a week, it required pumping again. It became obvious the problem was either a clogged distribution box, or clogged leach lines, neither of which could be looked into, as a mobile home sits on top of those two areas. As a result, the sanitary station had to be closed for the summer. In October, I added 1 ½ cups of "Condor Digester" to the septic tank and reopened the sanitary dump station. To this date, the system appears to be working well and is showing no signs of stoppage. In addition, when opening the lid of the tank for inspection, little or no odor can be detected.

Test #2. The relatively new system at our activity center is a 3000 gallon septic tank which is fed by the activity center and three rental trailers, (two of which are garden homes). After only 1 ½ years of operation, solids build up in the tank required it to be pumped early in 1989. In October I added two cups of "Condor Digester" to the tank, through a toilet in the activity center. At the time of treatment, there was approximately 2" to 3" of solids on the water surface and there was considerable odor emanating from the tank. Within a week after treatment, the odor was eliminated and I could actually see small bubbles on the surface, being created from the bacterial action in the tank. The solids level was still 2" to 3" in depth. As of February 1, the solids level in the tank has been reduced to about 1" thick and there is still no noticeable odor.

\*This distributor is no longer in business. Product can be purchased direct from manufacturer.

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From: Gary Nichols  
South Jetty  
Agriculture

To: Rob Linderman  
Page 2

February 6<sup>th</sup>, 1990

Please note that I have only applied this product one time to each system. The distributor recommends two to three applications, but I wanted to test it under worst case conditions.

I am convinced at this time that the product will do as claimed. I would highly recommend that use of this product be implemented at all preserves who operate on a septic system as a part of preventive maintenance, and particularly those which may be experiencing problems of some type. The cost is quite low and will reduce tank pumping in most cases and in some, may even eliminate it for long periods.

The few times that "Condor Digester" has not worked, has been because the systems had been "poisoned". In most cases this has been because phenol or formaldehyde products were introduced into the systems, thereby killing the bacteria that are there. Even though the oxygen content has been increased in the water, there are few, if any, bacteria to take advantage of the situation.

Another new product I have found, has just become available. Though not designated originally for this application, it works very well as a companion. The product is called SEA ZYME, and is a bacteria/enzyme combination that was designed for use in RV holding tanks. It is the only product on the market today that introduces bacteria and enzymes both, to the septic system or holding tank. In the case of a tank "poisoned" by phenols or formaldehyde products, SEA ZYME comes in an enhanced version, that has bacteria that have been specially engineered to break down formaldehyde and phenol substances, thereby creating a new, healthy atmosphere in which the bacteria may thrive in. The manufacturer has also been able to create special bacteria that have taken care of other products, such as methamphetamines, (that have been found in some pit toilets, in campgrounds).

SEA ZYME also seems to work extremely well in RV holding tanks. (An added benefit to us, is when they dump their tank into ours, we get the bacteria supplement for free in our systems). I intend to promote and sell this product in our country store.

Sincerely,  
Ron Squires



# Material Safety Data Sheet

## CONDOR Digester®

### A. GENERAL INFORMATION

**Trade Name:** CONDOR® Digester  
**Chemical name and/or Synonym:** Ion exchange resins and surfactants in sulfuric acid  
**Manufacturer:** Earth Science Products, Corporation  
23735 NE Airport Rd.  
Aurora, OR 97002 USA  
Mailing Address: PO BOX 327,  
Wilsonville, OR 97070

**Contact:** InfoTrac  
800-535-5053      Date of Issue: March 1996

### B. FIRST AID MEASURES

**Emergency Phone Number:** 800-535-5053  
**Skin or Eyes:** Immediately flush with plenty of water. For eyes continue for at least 15 minutes. If irritation continues get medical attention.  
**Ingestion:** Do not induce vomiting. If conscious, give several glasses of milk (preferred) or water.  
**Inhalation:** Remove to fresh air. If breathing has stopped, give artificial respiration. If breathing with difficulty, give oxygen, provided a qualified operator is available.  
*GET IMMEDIATE ASSISTANCE for ingestion, eye contact, or continued labored breathing.*

### C. HAZARD INFORMATION

**Health**  
**Inhalation:** Inhalation of fumes or acid mist can cause irritation or corrosive burns to the upper respiratory system, including nose, mouth and throat.  
**Ingestion:** Can cause irritation and corrosive burns to mouth, throat, and stomach.  
**Skin:** Can cause minor skin burns.  
**Eyes:** Liquid contact can cause eye irritation or corneal burns. Mist Contact may irritate or burn.  
**Permissible Concentration:** AIR 1mg/Cu. M. (as H2SO4) (OSHA)  
**Unusual Chronic Toxicity:**  
1. Erosion of Teeth  
2. Reddening of the Skin  
3. Conjunctivitis  
4. Gastritis

**Fire and Explosion:** Flash Point      Auto Ignition Temp.      Flammable in Air  
Not Flammable      N/A      N/A

#### D. PRECAUTIONS/PROCEDURES

**Fire Extinguishing Agents Recommended:**

If involved in a fire, use water. If only a small amount of combustibles are present, smother with dry chemical.

**Extinguishing Agents to Avoid:** Use water or other suitable agent for fires adjacent to non-leaking containers.

**Special Fire Fighting Precautions:** Avoid using solid water streams near ruptured tanks.

**Ventilation:** None required outside. May require mechanical exhaust system in closed storage area.

**Normal Handling:** Do not get in eyes, on skin, or on clothing. Do not breathe vapors or mist. When diluting always add to water. Use adequate ventilation. Use protective equipment as outlined in Section E.

**Storage:** Protect Containers from physical damage. Store under Cover. Protect container from direct sunlight. Protect from freezing.

**Spill or Leak:** ***(ALWAYS WEAR PERSONAL PROTECTIVE EQUIPMENT)***  
Dilute small spills or leaks with plenty of water. If in a confined area neutralize residue with alkali such as soda ash or lime. Adequate ventilation is required due to release of Carbon Dioxide. No smoking in spill area. Major spill must be handled by a predetermined plan.

**Special Precautions/Procedure/Label Instructions:**

Corrosive – See Reactivity Data

#### E. PERSONAL PROTECTIVE EQUIPMENT:

**Respiratory Protection:** Respiratory is required if mist is present.

**Eyes And Face:** Goggles or Full Face shield.

**Hands Arms and Body:** Rubber clothing is adequate.

**Other Clothing & Equipment:** Rubber

#### F. PHYSICAL DATA

**Material is: (at Normal Conditions):**

Liquid

**Appearance and Odor:** Oily, Dark Colored, with Characteristic Odor

**Boiling Point:** N/A

**Specific Gravity:** H<sub>2</sub>O – 1.0 1.15 Min

**Vapor Density:** N/A **Solubility In Water:** Completely

**PH:** Approximately 0.9

**Evaporation Rate:** N/A

**% Volatiles By Volume:** N/A

#### G. REACTIVITY DATA

**Stability:** Stable

**Conditions to Avoid:** Prolonged temperatures above 300 degrees C will eventually evaporate the water, and Sulfur Trioxide will be given off.

**Incompatibility**

**(Materials to Avoid):** Contact with reactive metals such as Zinc will result in the evolution of Hydrogen.

**Hazardous Decomposition or By-Products:**

Sulfur Trioxide - See Above

*Hazardous polymerization will not occur.*

**H. HAZARDOUS INGREDIENTS (Mixtures Only)**

**Material or Component/CAS #:** Sulfuric Acid/7664-93-9

**WT %:** 18

**Hazardous Data:** Section J

**I. ENVIRONMENTAL**

**Degradability/Aquatic Toxicity:** See waste disposal methods, this section, below.

**EPA Hazardous Substance**

**Waste Disposal Methods:** Dilute and waste irrigate as per the Manufacturer's instructions for applications.

**J. REFERENCES**

**Permissible Concentration References:**

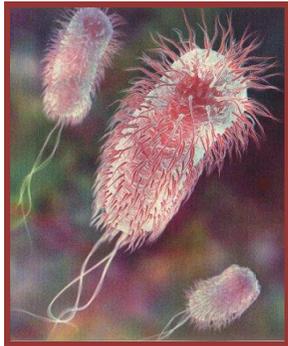
OSHA Standard (for H<sub>2</sub>SO<sub>4</sub>) at 29 CFR 1910.1000 (1981)

**Regulatory Standards:**

D.O.T. Classification – Corrosive Material



At right is a typical sewage treatment plant tank. CONDOR Digester is able to speed the process of returning this water to use as potable drinking water. It works much the same way to make swine breeding facilities cleaner and healthier.



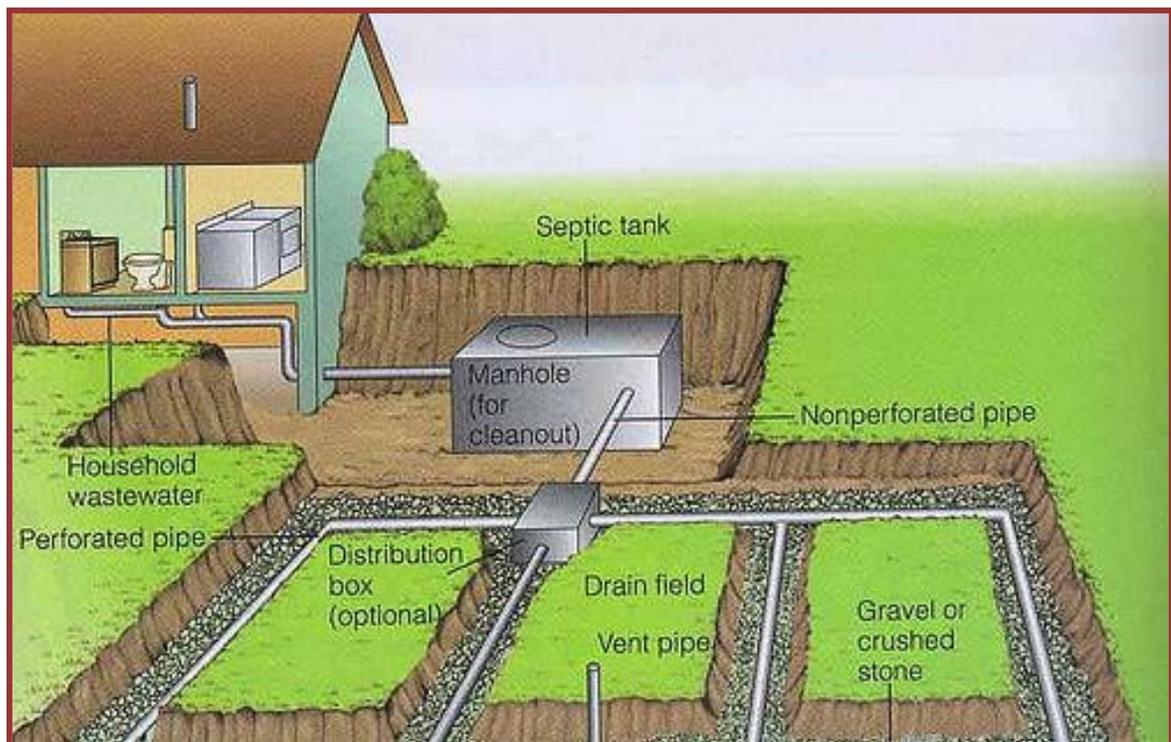
The dreaded E-coli bacteria strikes without warning and has been in the news many times recently. E-coli breeds at a very high rate once established.

At right is a photo of a typical airborne bacterium being carried along with dust particles.



# Residential Septic Systems

## *Construction*



*The illustration above shows construction of a typical residential septic system. Effluent (waste) flows through the drain pipes from the home to the (septic) tank. The tank is where the bacterial action takes place that converts the waste to gas and liquid. The liquid then flows into the distribution box (if equipped), and on into the drain field. The liquid then percolates down through the ground, which is what provides the final filtering. Bacterial action in the soil completes the process of 'cleaning' the waste water. **CONDOR Digester** works all the way through the system, including the drain field. If your drain field is built in clay soil, **CONDOR AG Landlife** can be used to increase the permeability of the clay, allowing normal drainage.*

# Residential Septic Systems

## *Spotting Problems*

### *Failing Drain Field...*

Here, the drain field has been overloaded or no longer has permeability sufficient to allow the liquid to drain. The result is flooded ground, very dark or dying grass accompanied by a pungent odor.



### *Clogged Lines...*

System may 'back up' into drains, usually floor drains first because they are the lowest. Adding Condor Digester immediately will help avoid the need to pump out the system. Adding Digester after pumping out is a great way to avoid future pumping.





# CONDOR®

## Digester

## *Features and Benefits;*

- *Cost Effective...Saves You Money*
- *Easy - Just Pour Into System*
- *Fast – Starts Working Immediately*
- *Promotes Healthy Bacterial Growth*
- *Eliminates Bad Odors*
- *Reduces Maintenance Costs – Fewer Pumpouts*
- *Improves Drain Field Health*
- *Solves Problems Like Dying Grass Over Drain Field*
- *Non-Toxic, Non-Flammable, Non-Corrosive*
- *Will Not Damage Pipes*
- *Guaranteed To Work*



# CONDOR<sup>®</sup> *Digester...*

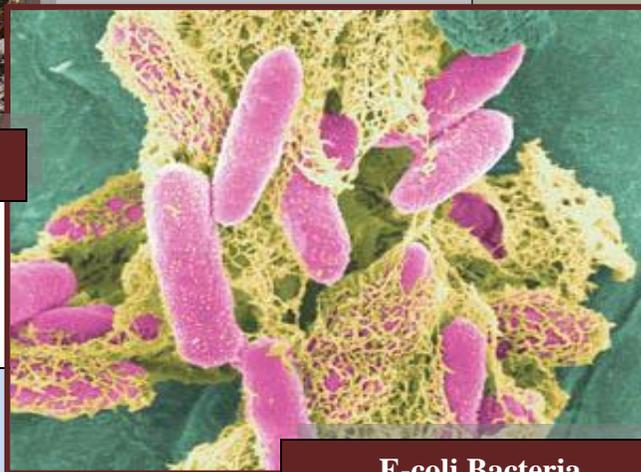
*The Need Is Real, The Time Is Now*



Oceanside Landfill  
Contaminates Sea Water



Open Landfill - China



E-coli Bacteria



Waste Contamination



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