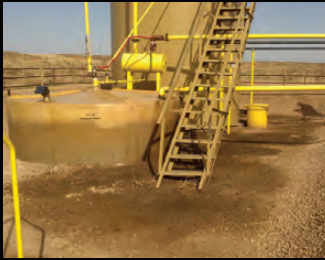




ACT
BioRemediation Products®
Revolutionary Cleaning Products for a Green World.

Terra Firma



- EPA | NCP- National Product Listing B-71
- Continues To Remediate In Sub-zero Temperatures
- Works On Anti-freeze, Glycol, Acids And Other Chemicals
- Penetrates Up To 12" To 14" Without Tilling
- No Shelf Life
- Apply And Walk Away, No Clean Up!!
- 60% To 80% Remediation Within 7 To 15 Days

Changing the Way the World Cleans using MICROBES!
Apply and Walk Away!



Apply To:

- Soil
- Drop Spreader
- Water
- Broadcasting via Scoop





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Introduction

ACT Terra Firma Cleaner is a special proprietary formulation which capitalizes on a well established remediation process which uses living organisms that “eat” petroleum hydrocarbons (PHCs). Since this remediation process uses living organisms, it is referred to as “bioremediation.” As the living organisms eat the PHCs, they convert the PHCs into smaller compounds that are themselves degraded further, or volatilized into the atmosphere, or rendered into non-organic materials.

Studies have shown that under ideal aerobic conditions, up to 80% of the non-volatile components found in a petroleum mix are oxidized by Bacteria within 6 to 12 months of application. (Brock, 1994).

Due to the fact that specific living organisms have special needs to grow, and those needs must be provided by man, there is no danger of a colony of the living organisms infecting an oil supply in a refinery, since the conditions required for growth and hydrocarbon degradation do not exist in pipes, tanks, deposits, shale or refinery processes.

History

Bioremediation, as an accepted practice, has been used in the US since the 1960's. As the field of microbiology began to flourish in the early part of this century, scientists began to realize that the normal biological processes of common, ordinary microbes could be harnessed in ways heretofore never dreamed.

For example, as industry entered the 20th Century, normal Bacteria were being used to manufacture drugs, insulin, antibiotics, and a host of products that benefited man. In the 1960's the social conscience was redirected from unbridled industrialism to ecologically sensible industrial growth.

This new conscience raised the profile of environmental contamination, and demanded that industry find new ways to prevent environmental pollution and remediate areas where pollution occurred.

Enter the new age of “bugs.”

When microbiologists began to use microbes in unusual situations, it wasn't that the organisms were new, rather, it was that the existing organisms were becoming better understood, and new ways to apply their living traits to man's benefit began to emerge.

Natural Remediators

Bacteria abound in normal healthy soils. Every gram of normal everyday soil may contain between ten million and 1 billion Colony Forming Units (CFU) of heterotrophic Bacteria per gram of soil (Bess, 1999). A single gram of dirt may contain over 10,000 different species of Bacteria (Turco, 1995). At least 30 different Bacterial genera containing over 100 species of microbes are capable of degrading PHCs (Arthur, 1991)

The organisms that are used in the ACT bioremediation formulae have been on the Earth for millions of years; they are not genetically altered organisms. The organisms are naturally occurring, normal Bacteria, created by Nature herself. At ACT, we have specially formulated our products to use these naturally occurring organisms, in their natural state, to facilitate the reduction of PHCs in soils.

Acceptability and Safety

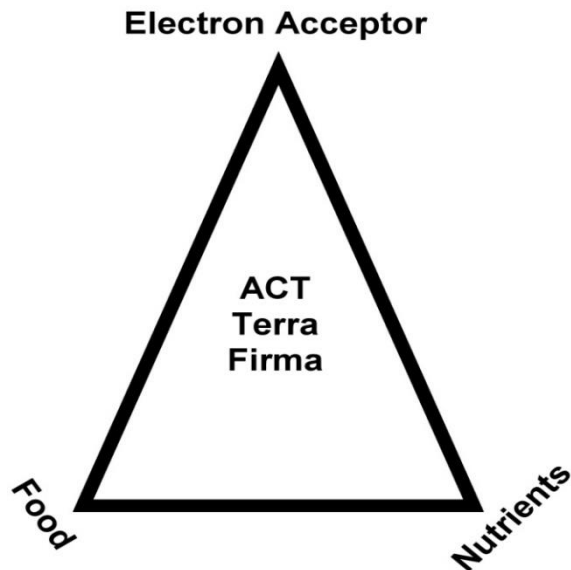
Generally speaking, PHCs with carbon lengths of C9 to C22 are most readily degraded, as well as single and polycyclic aromatics. The United States Environmental Protection Agency states: *In-situ groundwater bioremediation can be effective for the full range of petroleum hydrocarbons.* (USEPA, 1995)

For optimum growth and PHCs to take place, microorganisms require specific conditions of nutrients and electron acceptors to be present. The optimum conditions don't exist in natural oil deposits or in refineries or systems that use the PHCs as fuel. It is for these reasons that, although the microbes are always present, petroleum products are not in danger of being degraded. For biodegradation to occur, the conditions for optimal growth must be established and maintained to ensure that the conditions continue to be favorable for growth.

The organisms used in the ACT formulations have been specially prepared by a nationally recognized microbiologist with over 20 years experience in microbial applications of PHC bioremediation. Furthermore, in the interests of safety and product stewardship, ACT funded an independent review of our microbial profile by a Professor of Microbiology at a leading University. Finally, an independent Industrial Hygienist with 20 year's experience reviews our formulations for occupational health compliance and human exposure issues.

Mechanisms

Every batch of petroleum differs slightly. Petroleum is like a soup, whose recipe is just slightly different from batch to batch, or moment to moment, in a continuous processes. Therefore each spill or release, or any patch of ground or water contaminated with PHCs contains a different chemical profile, and different environmental conditions. For this reason, no one product or process can be guaranteed to take care of all remediation needs. However, bench testing a microbial profile and formula to meet the specific needs of a specific spill typically cost between \$10,000 and \$20,000.



Terra Firma

ACT's Terra Firma Cleaner has been designed for use under the widest possible of applications; from spill clean-up in soils, or on concrete, to preventative maintenance on high spill potential areas, such as dyked tank farms.

Bioremediation generally requires a "kick-start" for stimulating the organisms, and some attention to maintain optimal activity. The kick-start is usually a delivery system for satisfying the "ACT Triangle,"™ at the center of which is Terra Firma, In the ACT Triangle™, three conditions must be met for optimal degradation:

Oxygen One of the main reasons that microbes do not proliferate and consume the world's petroleum supplies is that the petroleum is in an environment deficient in electron acceptors (oxygen or nitrates). PHCs are the "food" of microbes. The PHC molecules are highly reduced and unless there is a way to strip electrons from the molecule and pass those electrons on to other kinds of molecule willing to accept the electron, there is no way to oxidize (degrade) the PHCs. Even where large open containers of petroleum are found, only the surface is in contact with the oxygen, lower depths do not contain sufficient oxygen to permit the microbes to oxidize (eat) the petroleum product. One of the easiest ways to provide an electron acceptor is to increase the oxygen in the microbe's environment.

The customer can increase degradation time by ensuring sufficient oxygen (or nitrates) are available for oxidation to take place. This can be done by tilling the soils following application, applying normal agricultural nitrogen fertilizers, or by injecting the oxygen along with the ACT Terra Firma (such as in an aerated water slurry of Terra Firma) into a series of wells that have been drilled into the land to be remediated.

Nutrients

In the presence of a food source (the PHCs) and oxygen, the organisms will need nutrients (such as nitrogen and phosphorus) to grow. The nutrient content of soils vary widely, and as a result, the speed of degradation can also vary. For small scale operations, such as small spills, the soils may contain sufficient nutrients to support the growth of the microbes. For larger scale operations, additional nutrients in the form of common fertilizers may help to speed up the degradation process. Generally, electron acceptors and nutrients are the two most critical components of any delivery system. (EPA, 1995).

How Do We Know?

How do we know the optimal balance between nutrients and electron acceptors? For over 20 years it has been commonly accepted that assessing the efficacy of any particular microbial formula in any particular patch of ground for any one particular hydrocarbon spill is extremely difficult to assess (Grubbs, 1986). This difficulty arises from the fact that small changes in the composition of the soils can result in profound changes in the response of any particular organism. Furthermore, if the PHC contamination layer is migrating through the vadose zone, the microbes may be encountering different environmental conditions every few feet.

The ACT Terra Firma formulation does not rely on using any one single organism, but rather, we use a blend of different organisms; each with its own biological needs and adaptive potentials which can take advantage of widely changing conditions. The selected organisms are designed to take advantage of as many possible environmental conditions as reasonably possible.

Applications

Terra Firma can be applied in a variety of ways depending on the nature of the material to be cleaned. The product can be applied directly to soils, concrete pads, or other surfaces. If the contamination has leached to greater depths, Terra Firma can be applied to the soils and tilled to increase aeration and contaminant contact.

If contaminants have leached into even deeper soils and vadose zone water, the product can be slurried with or without additional electron acceptors and injected directly into the vadose zone via a sampling well. If the material is aerated during slurry production, the oxygen and nutrients will be depleted as the organisms consume the PHCs. Re-aeration and replenishment of nutrients can be performed at additional wells.

Since the microenvironment can change with every remediation project (and the cost for determining the ideal conditions for each site can be prohibitively expensive), the aeration needs, nutrient needs, and assessments of efficacy can be performed by sampling the vadose water, and, through standard Kriging techniques, adjusting the underground environment accordingly.

Bioremediation through bioaugmentation is a process with four decades of a proven track record for cleaning up contaminated soils and surfaces in a safe, environmentally friendly manner.

Please contact us for information regarding specialty formulae customized to meet your needs.

References

Brock TD, Madigan MT, Martinko JM, Parker J *Biology of Microorganisms*, Seventh Ed. Prentice Hall Pub. 1994, ISBN 0-13-042169-3

Bess VH, BBC Laboratories, Inc., *Functional Groups A Summary Guide For The Microbiological Analysis Of Soil And Compost*, 1999

Turco, R.F. and Sadowski, M.J. 1995. The Microflora of Bioremediation. H.D. Skipper and R.F. Turco (ed), Bioremediation, Science and Applications. 87-103. Soil Science Society of America Special Publication 43.

Arthur, M.F., Zwick T.C., O'Brien, G.K., and Marsh, S.S.. 1991. Evaluation of Aeration Methods to Bioremediate Fuel-Contaminated Soils. Innovative Hazardous Waste Treatment Technology Series. Volume 3: Biological Processes. Lancaster, Pennsylvania. 185-196. Technomic Publishing Co., Inc.

USEPA Chapter X, *In-Situ Groundwater Bioremediation*, OUST: How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites: A Guide for Corrective Action Plan Reviewers. (EPA 510-B-95-007).

Grubbs, RB *Enhanced Biodegradation of Aliphatic and Aromatic Hydrocarbons Through Bioaugmentation*, Presented at the 4th Annual Hazardous Materials Management Conference, Atlantic City, NJ, 1986.



BioRemediation Products®

Changing the Way the World Cleans using MICROBES



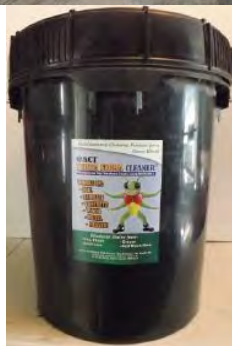
ACT Terra Firma

ACT Terra Firma has been widely used by the oil, gas and petrochemical industries. It provides a new and innovative way to decontaminate harmful waste from soil. Our safe and effective cleaning product helps companies avoid warnings and fines from the EPA while supporting them in their efforts to become a **GREENER** force in our world.



ACT Terra Firma Formulations are used for spill containment, troubleshooting leaky pipelines and bioremediation programs.

This has proven to be a very effective means of dealing with several environmental problems. A special note is the increasing use of our formulations for onsite soil contamination involving diesel fuel and other petrochemical products.





Todd,

As I told you, I am updating you on the side by side test being conducted at our facility. I am sure you will be happy to learn that not only is your product less expensive, it is hands down out-performing the competition. We are very pleased with your product and I am passing your product (and contact) information on to our corporate office in Canada, and all of the camps here in the United States. I will be placing an order as soon as I have approval from camp management, which shouldn't take long as they are impressed too.

Regards,

Testing and certification

USDA: Bio-based Certification

Dear Todd Franssen,

Your company, American Cleaning Technologies, Inc., has been identified as a source for products made from biorenewable resource. The product listed below is now eligible to be included in the USDA BioPreferred program catalog. *Terri-Firma Cleaner*. With some exceptions, federal law requires government agencies to give preference to purchasing products that the USDA has designated as biobased.

Government purchasing agents rely on the BioPreferred catalog to purchase biobased products, giving an important market advantage to those biobased manufacturers listed.

Thank you, Jessica Riedl, Project Manager Iowa State University Extension, CI 2272 Howe Hall, Suite 2620 Ames, I





ACT TERRA FIRMA

TECHNICAL PRODUCT BULLETIN: B-71

USEPA, OEM REGULATION AND POLICY DEVELOPMENT DIVISION

LISTING DATE: APRIL 7, 2014

"ACT TERRA FIRMA"

(aka, ACT-TF)

VII. TOXICITY AND EFFECTIVENESS

a. Effectiveness:

Bioremediation Agent Effectiveness Test (40 CFR 300.900), Federal Register September 15, 1994:

Summary Data Table

DAYS	ACT Terra Firma 3 REPS/PROD	TOTAL MEAN	RED%	TOTAL MEAN	RED%
		ALKANES (ppm)	28 DAYS	AROMATICS (ppm)	28 DAYS
0	CONTROL	29,969	0	9,018	0
	NUTRIENT	29,102	0	8,582	0
	ACT TERRA FIRMA	27,685	0	8,240	0
7	CONTROL	24,289	0	6,974	0
	NUTRIENT	18,132	0	6,377	0
	ACT TERRA FIRMA	2,614	0	3,306	0
28	CONTROL	18,909	36.9	4,426	50.8
	NUTRIENT	1,465	94.9	5,609	34.6
	ACT TERRA FIRMA	113	99.6	475	94.2

Results of Gravimetric Analysis:

Percentage (%) Decrease in Weight of Oil on Day 28

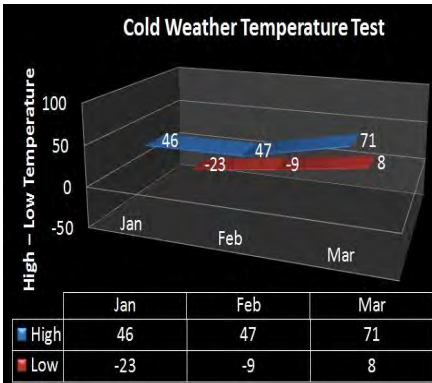
Control Nutrient ACT Terra Firma

0.0% 17.0% 9.7%

b. Toxicity:

Material Tested	Species	LC50 (ppm)
ACT TERRA FIRMA	Menidia beryllina	223.60 96-hr
	Mysidopsis bahia	74.10 48-hr
No. 2 Fuel Oil	Menidia beryllina	4.24 96-hr
	Mysidopsis bahia	1.99 48-hr
ACT TERRA FIRMA & No. 2 Fuel Oil (1:10)	Menidia beryllina	2.61 96-hr
	Mysidopsis bahia	1.19 48-hr
Reference Toxicant (SLS)	Menidia beryllina	12.25 96-hr
	Mysidopsis bahia	12.27 48-hr

Cold Weather Testing



Temperature in Fahrenheit

FAX MEMO:

TO: Mr. Todd Franssen

FROM: P. Brock Williams, Ph.D.

RE: Testing of bacterial survival with composition under simulated conditions

Dear Mr. Franssen:

As you are aware we have been examining the survival of bacteria with your composition under a number of different conditions. In brief, we have sterilized soil, made it 26% moisture content added crude oil, and your composition at 16mg/gm of dirt. This was then incubated at various temperatures for two days and the mixtures were plated out and enumerated. Our preliminary results indicated no difference in the number of bacteria recovered when the mixture was incubated at room temperature and at 4 degrees centigrade for two days. When this experience was repeated at **minus -20 degrees** Celsius the number of bacteria was significantly diminished but still plentiful. These experiments were performed in duplicate with similar results. In addition, the material with the added bacteria again had very **good survival at -20° C** but were **destroyed at -70° C**. The survival under these later conditions was quite surprising to us and is our first indication that your composition may be responsible for this enhanced survival. There are of course a number of different controls and further experiments to verify these findings but the preliminary experiments are quite promising for your proposed application. Best regards,

P. Brock Williams, Ph.D.

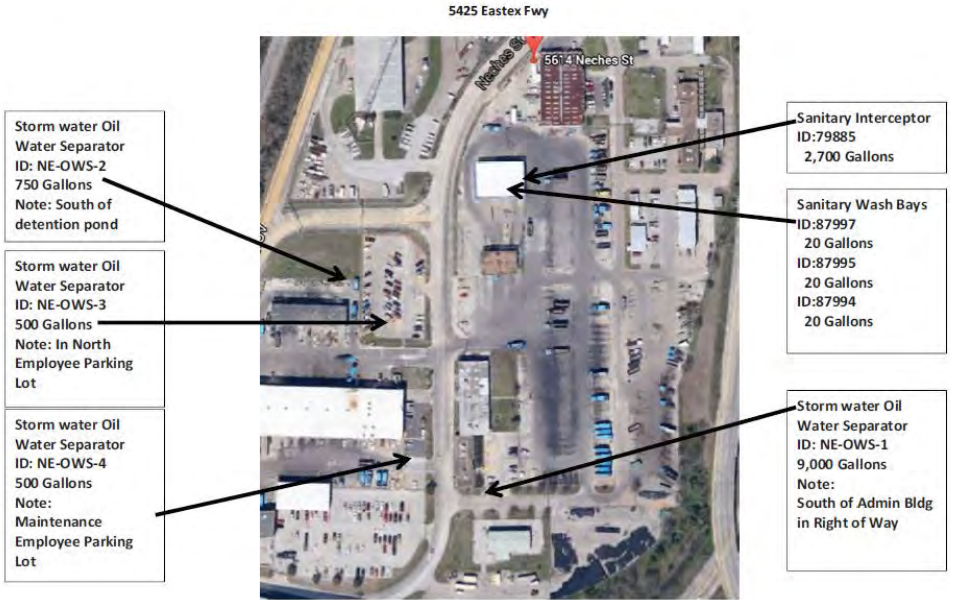
I was hoping to have some pictures of the Blackjack 30 - 11 pit before we dug out he contaminated soil but I do not have them. The 30-11 pit was lined but we always thought that it had holes in it because it would never increase it's level. We consistently blew this well to the pit, it would unload water and a yellow oil. We knew that we were going to remove this pit this spring, so I had my operator put 50 pounds of Terra Firma Cleaner in the pit back in the first part of January. After the frost was out of the ground we started digging out the soil from the pit and was going to start a farm to recondition the soil. We never took samples of the pit before adding the Terra Firma but I'm sure it was pretty contaminated with hydrocarbons. Attached is the soil analysis results with only adding the Terra Firms back in January. The 2 low readings are from the bottom of the pit after digging the soil out. The 2 higher readings are from the soil that was taken out of the pit. As you can see we are well under the 10,000/ppm that we are required to have the soil for reuse If you have any questions please contact me.

Thanks

REPORT OF ANALYSIS

Lab Number	Sample ID	Total Petroleum Hydrocarbons, mg/kg
E5056	BJ 30-11 #1 4-18-13 10AM	2,043
E5057	BJ 30-11 #2 4-18-13 10AM	497
E5058	BJ 30-11 #3 4-18-13 10AM	56
E5059	BJ 30-11 #4 4-18-13 10AM	2,435

Sampling Event	Date Collected	TPH Concentration (ppm)	Benzene Concentration (ppm)
1 st	7/13/2018	298.0	<0.00250
2 nd	7/16/2018	34.9	<0.00050
3 rd	7/20/2018	11.0	<0.00050
4 th	7/28/2018	20.0	<0.00050
5 th	8/3/2018	<0.0935	<0.00050



Location:

Oil Water Separator #1, Northeast Service Center – OWS-1 Capacity of Oil Water Separator: 9000 Gallons

Charlie Lee
 Project Manager, PMP
 SWMD, City of Houston





**SYNOPSIS OF TESTING
EFFICACY OF DEGRADATION OF
TOTAL PETROLEUM HYDROCARBONS BY
TERRA FIRMA®**

Forensic Applications Consulting Technologies, Inc. (FACTs) brokered an independent evaluation of the American Cleaning Technologies, Inc. product known as Terra Firma.®

The testing was performed by Huffman Laboratories of Golden, Colorado. Huffman Laboratory has been providing independent analytical and testing services since 1936. During the evaluation process, to ensure the integrity of an objective evaluation, American Cleaning Technologies was prohibited from communicating with Huffman Laboratories, and all technical aspects of the test were exclusively determined by FACTs and Huffman Laboratories. American Cleaning Technologies, Inc. was only permitted to provide instructions on the recommended field application quantities of Terra Firma.® Terra Firma® was applied to a soil obtained by American Cleaning Technologies from the oil fields of Kuwait. The soil was extremely heavily contaminated with crude oil, containing approximately 24% crude oil by weight. The multiple batch samples were simultaneously incubated, and later, pair matched based on original weight. The test ensemble included controls and blanks, and all results were blank corrected and control corrected to eliminate any statistical artifacts.

The tests were conducted in an environmental test chamber designed to maintain steady-state conditions. The environmental test parameters were established to mimic daytime Kuwaiti outdoor temperatures and humidities. The environmental test chamber was maintained at 52°C (+/- 2°C) and 48% RH.

Degradation was determined on an absolute blank/control corrected loss-of-mass basis during the 46 day test period and was control-corrected with matched controls and laboratory blanks.

A typical remediation time would be measured in years; however, this test period was restricted to a matter of only 46 days. Therefore, to account for the very short time period available for the test, the application rate was increased to an equivalent of three and one half tons of product per acre of contaminated soils. The product was applied dry and no water was used in the application.

After 24 days of incubation, American Cleaning Technologies stated that the application of the product would include some kind of surface agitation and addition of a second application of product. Therefore, tare-controlled and humidity conditioned Teflon® stir rods were used to stir in the second application which doubled the product quantity.

Over the course of the test period, a statistically significant difference emerged in the loss of mass between the treated and untreated soils. FACTs matched the samples into

control and treated pairs based on original sample weights. In the chart below, the cumulative average loss between the two data sets (treated and untreated) is presented.

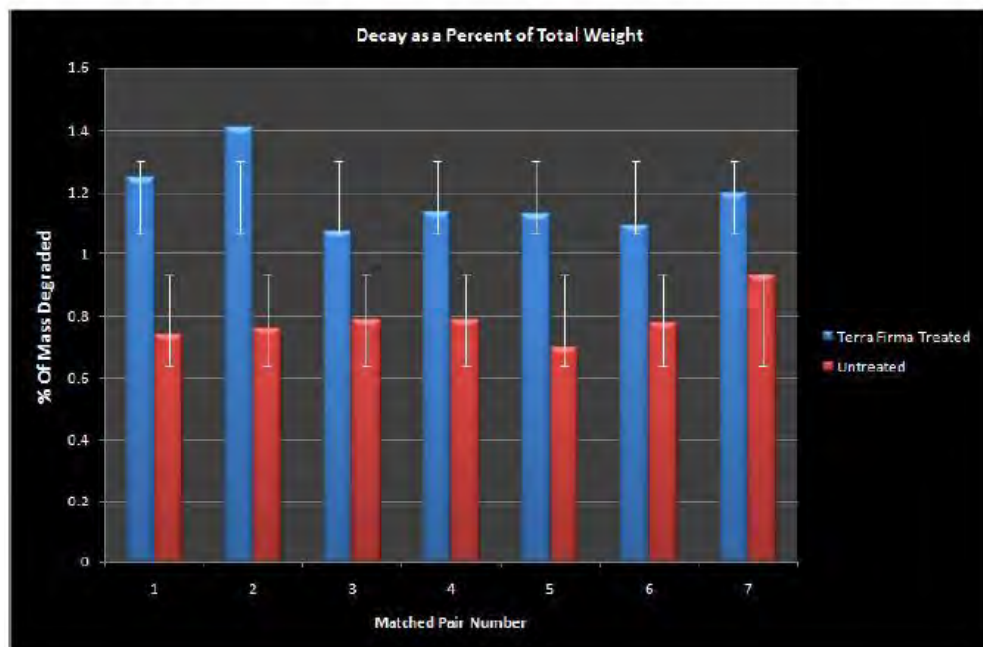


Chart 1
Total Cumulative Percent Weight Loss
Matched Pair Side-by-side Comparison

A statistically significant difference between the matched pairs emerges when the decay is expressed as a percent of weight loss, (the lower confidence interval of the treated samples is greater than the upper confidence intervals of the untreated sample.) The error bars represent 2 standard deviations of the Gaussian distribution of the cumulative loss. An ANOVA analysis indicated that the mean equality is rejected, and the observed differences are not likely to be due to chance alone.

The rate of loss over time exhibits a trend expected of other microbiological systems wherein there is a "lag phase" (a genetic response to a new environmental condition), and a "growth phase" (wherein the microorganism has adapted to the new environment).

It is possible that once the culture becomes accustomed to the new environment, a "cryptic growth" phase would be observed wherein the culture would be in dynamic equilibrium between death of organisms and new growth.

Agitation on the 24th day appears to have "kick started" the organisms or promoted some other mechanism to greatly speed up decay of total petroleum hydrocarbons.

Given the environmental conditions, the crude contaminated soils appear to be in a rate limited decay (presumably due to photodegradation and gross volatilization) and loses about 16 pounds of total petroleum hydrocarbons per acre per day (equivalent to about 17 kg TPH/hectare/day).

Synopsis of Efficacy of Terra Firma

By comparison, the Terra Firma[®] treated soils lost approximately 24 pounds of total petroleum hydrocarbons per acre per day (27 kg TPH/hectare/day).

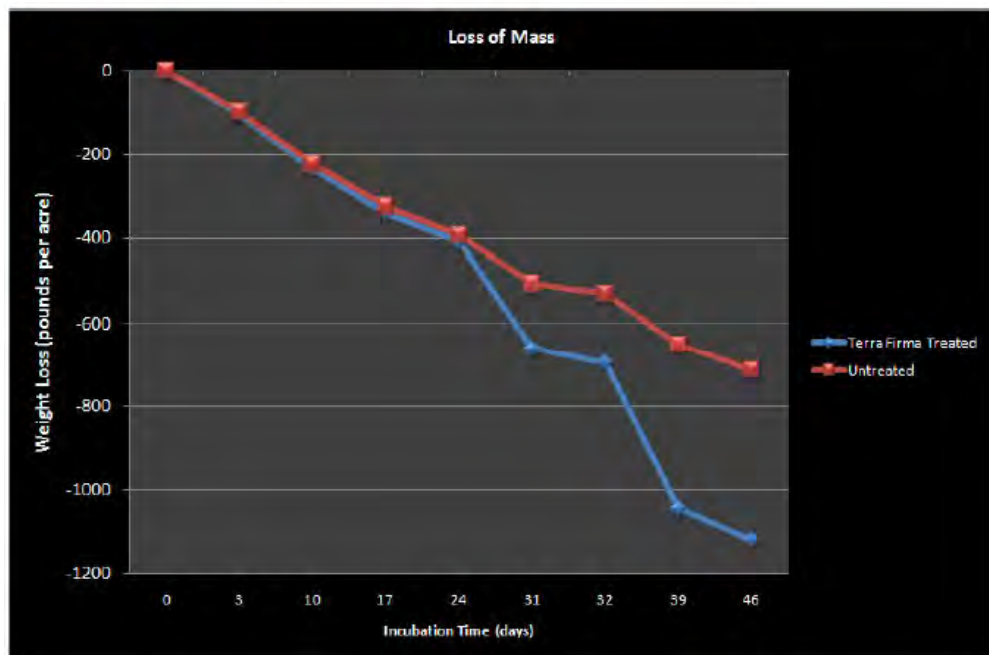


Chart 2
Total Cumulative Weight Loss in Pounds Per Acre Per Day

The trend lines indicate that the *rate* of loss in the untreated soils remains the same (the slope is the same at all points t), whereas the *rate* of loss in the treated soils is *increasing* with time (the degradation slope is steeper with increasing t). The data suggest that after 46 days, the process had not yet reached its maximum rate of loss, and that as time increases, the rate of loss will similarly increase.

This test was performed under specific, controlled conditions using a specific and single formulation. Each remediation site presents its own unique environment and contaminant profile. The results observed during this test may not be indicative of all locations and contaminants.

Sincerely,

Caoimhin P. Connell
Forensic Industrial Hygienist

185 BOUNTY HUNTER'S LANE, BAILEY, COLORADO 80421
PHONE: 303-903-7494 www.forensic-applications.com

ACT Terra Firma On Concrete

ACT Terra Firma® has made concrete cleanup quick and cost effective. **USING NO WATER**, simply apply and walk away. ACT's **revolutionary** Terra Firma Cleaner uses bioremediation to effectively and efficiently cleanup oil, grease, soda pop, gum, bird droppings, blood, antifreeze at the same time controlling odors. Helps prevent contaminants from entering storm drains and fresh water and ground water supplies. Will not remove paint safe to use around plants, animals, humans.



ACT Terra Firma Cleaner On Asphalt

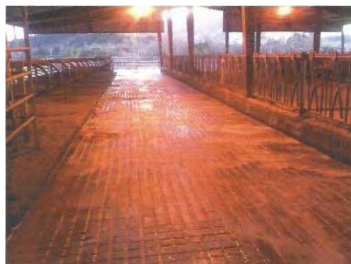
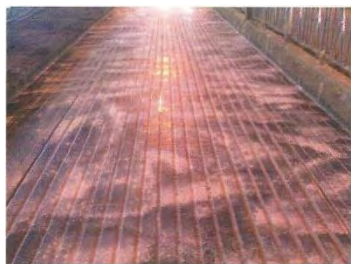
ACT Terra Firma cleaner offers you a superior, cost effective and safe alternative to other products on the market today. ACT Terra Firma Cleaner is a waterless cleaner that removes oil buildup and stains. The cleaner strengthens the integrity of the asphalt by decomposing the detergent in motor oil that breaks down the surface of the asphalt.



Effectiveness of Terra Firma Cleaner on Free Stall Lanes at the Cal Poly Dairy

By: Andrew Sherman : Faculty Advisor: Stan Henderson

This study was conducted in order to find a more cost effective and environmentally friendly method for cleaning the free-stalls at the Cal Poly dairy. Four separate products, Terra-Firma, bleach, Wash Safe Stable & Kennel and a power washer, were tested on lanes at the Cal Poly dairy and observed for effectiveness. These tests helped to better evaluate which product may be a better suited process for the Cal Poly dairy. Testing and examination proved that Terra-Firma, a microbial based product, was by far the most effective product as well as the longest lasting. Although the product itself was considerably more expensive than the others, Terra-Firma was the most effective and easiest product to apply. With all considerations taken into account the Terra-Firma product will be environmentally and economically a sound option for the Cal Poly dairy. Cow comfort and foot health are vitally important to maintaining high milk production on any dairy (Warnick et al.). Maintaining cleanliness off-free-stall lanes has long been a struggle for many dairymen, ineffective or overpriced methods have been used on the Cal Poly dairy. Products tested in this experiment were from a variety of different chemicals and even microbes. Made by ACT Bioremediation Products the Terra-Firma cleaner uses living microbes to break down any protein based substance, no water is needed in this process due to the unique ability of the microbes to draw moisture from the atmosphere (ACT Bioremediation Products). Application of this product is as simple as hand tossing it on affected area. By easing the stress of water demands on a dairy a simple cleaning product like this may benefit not only in the dairy financially but also holistically by improving resources to the dairy. By not using any hazardous chemicals this product is able to remove all organic matter without causing damage to the concrete or to the cows. **Materials and Methods:** Three products were tested on separate lanes in the free-stalls at the dairy and a fourth lane was pressure washed to remove visible filth as a control to better visually understand the abilities of each product to keep the concrete clean. The first product, a microbial based product, made by ACT Bioremediation Products, was unique in its application in that it was put on dry and left dry for 12 hours. The product required no biohazard equipment and was rather simple in its application no tools required, simply a bucket and one employee to hand toss the product on. The product works by accumulating moisture from the surrounding atmosphere encouraging the microbes to break down any protein substance such as animal waste.



The application of the product took only half an hour, the shortest of all products, this lowered labor cost brings the overall cost of the product down. The greater time spent in lanes 2 and 3 by cows led to a greater buildup of filth and sludge and although no immediate changes were originally seen in these lanes, after 12 hours the lanes were flushed and it was clear that the product used in Lane 2 had a very drastic effect, visible in picture 9 we see a clear visible line on the concrete where we began application of the product and its reaction to the residue on the concrete. As each day progressed it was clear

through the turbidity sampling that of the three methods attempted to their fullest ability, the microbial based dry-application product performed the best. This lane was by far the most filth covered at the beginning of the test and saw the greatest recovery. Terra-Firma proved it could continue to keep the concrete clean long after these other methods stopped being effective. The safety of the product around the animals also sets it apart from many other methods of cleaning the concrete. Through my research and data collection it has become apparent that products like the microbial based Terra-Firma could prove extremely beneficial to many commercial dairy operations in their attempt to clean organic matter from the concrete free-stall lanes.

FORENSIC APPLICATIONS CONSULTING TECHNOLOGIES, INC.

August 2, 2004

Todd Franssen
Franssen Enterprises, Inc.
P.O. Box 386
Dacono, Colorado 80514-0386

Dear Mr. Franssen:

Thank you for allowing us to address your question regarding the use of dust masks while using the ACC concrete cleaning product. I reviewed the proprietary manufacturer's information for the ACC concrete cleaning product, and I have reviewed a detailed description of the ingredients of the product. I also reviewed the "General Distribution" MSDS. I believe the MSDS adequately addresses the product's hazards and handling.

Overall, it is very difficult to anticipate the exposure for any one single employee. This is because the conditions under which the product may be used will not only change from location to location, but also from employee to employee within the same location. Ultimately, the only way to definitively assess an employee's exposure would be for the employer to perform air monitoring for that employee according to OSHA standards. Therefore, we can't really predict whether any one single employee should wear a dust mask or not.

However, generally speaking, the precautions that one would exercise while using the product would be similar to those used when mixing Portland cement. If an employee normally choose to wear a dust mask while mixing Portland cement for an hour or two, then they may want to consider a dust mask while using the ACC product. However, if they would not normally use a dust mask while mixing Portland cement, then they probably would not be uncomfortable using the cleaner without a mask.

If the product is used as intended, it is not likely that employee exposures in excess of the OSHA permissible exposure limits would be encountered. However, if an employee was required to continuously use the material for eight hours, (non-stop) during a shift, then it is possible that the employee exposures may exceed the OSHA PEL for the constituents found in sand. Similarly, if the employee were to use the product for only 30 minutes, but that use was in a confined space with no ventilation, then respiratory equipment would be recommended. (Just as we would recommend respiratory protection for an employee mixing Portland cement in a confined space).

I think that using Portland cement as a guide, would provide the end-user with some perspective on the level of protection they may choose while using the product. If the employee experiences irritation, then, of course they should be free to wear a dust mask for their comfort.

I hope this information is useful and timely. If you, or any of your customers would like me to clarify any information, I would be happy to so do.

Sincerely,



Caoimhin P. Connell
Forensic Industrial Hygienist

185 BOUNTY HUNTER'S LANE BAILY, CO, 80421 PHONE 303-903-7494

FORENSIC APPLICATIONS CONSULTING TECHNOLOGIES, INC.

August 27, 2009

Mr. Todd Franssen
President
Franssen Enterprises
P.O. Box 386
Dacono, Colorado 80514-0386
Dear Mr. Franssen:

In the preparation of the MSDSs for your products identified as

- ACT Absorbent
- ACT Asphalt Cleaner
- ACT Concrete Cleaner
- ACT Corral Cleaner
- ACT Terra Firma Cleaner
- ACT Trash Container Cleaner

We have included language that mentions the evolution of heat when the product comes into contact with water and/or acids. Your product contains proprietary "calcined" ingredients (materials that have been heated to remove molecular water). When water contacts the final product, heat is generated called "heat of hydration." It is the same gentle heating that is seen with other compounds such as slaked lime, portland cement, plaster of paris, and other calcined products. Maximum temperature increases are very moderate and even under extreme conditions would not be expected to exceed 45°C (110°F).

The objective of the information found in the MSDSs is to alert the end users to observations they may have while handling the product. In this case, when just the right amount of water is added to the product, the end user may observe a gentle warming of the material.

There is no combustion or explosion hazard associated with the product as a result of the gentle heating reaction.

If you have any further questions, please do not hesitate to contact us.

Regards,



Caoimhín P. Connell

Forensic Industrial Hygienist

March 4, 2014

Justin Cockrell
Associate Safety Engineer

Dear Mr. Cockrell:

According to Title 29 of the Code of Federal Regulations, §1910.1000 (the so-called “Z-Tables”) the Permissible Exposure Limit to silica is expressed in slightly different ways. The actual numerical value of the permissible time weighted average exposure is a dynamic number based on the crystalline silica content. The two most common expressions of exposure are going to be “total dust” and “respirable fraction.” In turn, the calculation for the exposure is as follows:

$$\frac{10 \text{ mg/m}^3}{(\% \text{ SiO}_2 + 2)} = \text{Respirable PEL mg/m}^3$$

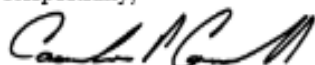
$$\frac{30 \text{ mg/m}^3}{(\% \text{ SiO}_2 + 2)} = \text{Total Dust PEL mg/m}^3$$

As you know, “sand” is not a definitive composition, but rather, the composition of sand is very different from location to location. Therefore, although it is impossible to predict what the silica content of any batch of sand may be and impossible to predict which morphs of silica may be in any batch of sand, it is possible to apply reasonable limits to those predictions. In our case to ensure employee safety, we assumed worst case scenarios in the exposure limits we developed for the ACT product.

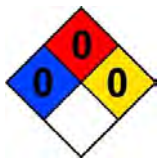
The product contains 11% sand and our best estimate for the silica in the sand is 0.6% quartz. We do not anticipate appreciable amounts of other morphs (tridymite, cristobalite, etc) . Bust instead of using this value, we looked at various sands from around the world, and the worst, reasonable case we found was 4.4% free silica. Therefore, we used that amount in our calculations and we presumed the product was 100% sand (instead of 11%). In this way, we can be sure that the suggested exposure is definitely conservative, and even if the estimate of silica is way off, we are still well within the PEL.

As such, plugging 4.4% silica into the above calculations and presuming the product is actually 100% sand, we calculated the Respirable Fraction as 1.56 mg/m³ and the total fraction as 4.6 mg/m³. I hope this answers your questions.

Respectfully,



Caoimhin P. Connell
Forensic Industrial Hygienist



MATERIAL SAFETY DATA SHEET
Terra Firma Cleaner
(General Distribution Version)
MSDS prepared by American Cleaning Technologies Inc.

Emergency First Aid Procedures are found in the last entry of Section Six

Section One: Name of the Product and of the Distributor

Product Name: Terra Firma

Distributed By:

American Cleaning Technologies Inc. P.O. Box 386

Synonyms: None

Dacono, Colorado 80514-0386

CAS Registration: None

303-833-5393

Section Two: Hazardous Ingredients/Identity Information

The constituents of this product are being withheld under the provisions of 29 CFR §1910.1200(i). A full disclosure MSDS is available to industrial hygienists, physicians and treating nurses.

The OSHA PEL for respirable quartz in this product is 0.67 mg/m³ of total product. The PEL for total quartz in this product is 2.0 mg/m³ of total product. The product has not been evaluated for the presence of other silica morphs such tripoli, tridymite and cristobalite.

According to the best information available to American Cleaning Technologies Inc, (ACT, Inc.) controlling exposures to 2.0 mg/m³ of total product will control exposure to the occupational limits for silica.

Nonhuman exposures are typically not within the realm of MSDSs. However, to ensure the highest degree of safety, ACT, Inc. has evaluated the potential impact the microbial component this product may have on agricultural stocks. In summary, normal, healthy animals should have no susceptibility to any of the microbial species in our product. There is no indication in the literature that the Bacterial component would pose any harm to animals or crops in contact with Terra Firma Cleaner. All of the species are common environmental Bacteria, and some species are common flora of animals.

Section Three: Physical and Chemical Characteristics

Boiling Point (°F):	>1000 °F(with significant weight loss at elevated temperatures)
Specific Gravity:	Approximately 2.0 g/cm ³ (estimated)
Melting Point:	>1000 °F
Vapor Density:	Will not form vapor at normal temperature and pressure.
Vapor Pressure:	Will not form vapor at normal temperature and pressure.
Molecular Weight:	Complex Mixture
Solubility(%v/v):	<5% (Estimated)
Photoreactive VOC's:	None
pH:	Not determined for the dry material
Evaporation Rate:	Will not evaporate
% Volatility:	<0.1%
Odor Threshold:	Not determined, anticipated to be greater than 7, less than 12

Odor:	Dry dusty odor
Appearance:	Gray powder

Section Four: Fire and Explosion Hazard Data

Flash Point	Auto ignition Temperature	L.E.L.
Will not flash	Will not autoignite	>10,000 mg/m ³ (estimated)

Extinguishing Media and Special Fire Fighting Procedure: In the event of a fire, fight the predominate fuel. The addition of acids to this product will result in the generation of CO₂, and heat. If acids are in contact with the product in a closed container, significant pressures may develop.

General Fire/Explosion Discussion: This product is non-flammable. The substance decomposes at high temperature producing carbon dioxide and carbon monoxide. Pyrolysis of vegetable matter may occur at high temperatures.

Section Five: Reactivity Data and Storage Information

Stability: Spontaneous polymerization or reactions will not occur.

Hazardous Decomposition Products: The addition of water will result in the generation of heat and pressure build up may occur in closed containers. Mineral acids (muriatic acid etc.) will result in violent effervescence and generation of copious amounts of CO₂.

Incompatibility: The presence of acids will generate some carbon dioxide

Handling: This material may irritate unprotected skin, eyes and mucus membranes.

Storage: Store in a sealed container in a dry location.

Section Six: Health Hazard Data

General Discussion: The primary adverse health concerns with the product are due to incidental silica content. Smokers who use our product will be at a greater risk of contracting adverse health problems.

Notes to Industrial Hygienist and Physician: ACT, Inc. highly recommends that exposures to people with TB, silicotics and others with interstitial lung diseases or fibrosis of the lung should be controlled to a conservative level.

Acute Health Effects: Dust from the product will irritate eyes, skin and mucus membranes. Ingestion may cause immediate CO₂ gas production in the stomach. Anaphylactic (allergic) reaction may occur in people sensitive to cotton-like dusts.

Chronic Health Effects: Silicosis and silicotic-like lung changes may be expected from chronic (long term) inhalation exposures (with concomitant increase in susceptibility to TB). Contact dermatitis may result.

Cancer Hazard: Various morphs of silica have different carcinogenic ratings. This product is considered to contain a carcinogen due to the silica content. In the table below, we have presented carcinogenic ratings for the most carcinogenic silica morphs (which may or may not be actually present in the product).

Organization	Carcinogenic Rating
IARC	1
NTP	2A and 2B
NIOSH	X

Reproductive Hazard: None expected.

EMERGENCY FIRST AID PROCEDURES

Inhalation Exposure: Remove the person to fresh air; avoid concentrations of greater than 0.67 mg/m³ of respirable product. Note to physician; respiratory distress may be due to an anaphylactic reaction to plant fibers, similar to byssinosis, and or (to a lesser extent) subtilisin exposures.

Eye Contact: Minor injury to the eyes may result if the powder contacts the eyes. In the event of contact, immediately flush with large amounts of isotonic eyewash. If eyewash is not available, flush eyes with lukewarm water. Seek medical evaluation.

Skin Contact: Wash exposed skin with warm water and soap.

Oral Ingestion: Following ingestion there will be a rapid effervescence with a moderate quantity of CO₂ being evolved. Release gas as needed by belching.

Section Seven: Precautions for Safe Handling and Use

Spills and Emergencies: Sweep the dry material and dispose of as non-hazardous material. If large quantities are spilled (greater than 10 pounds), ACT, Inc. recommends collection of the powder and disposal at an industrial landfill.

Waste Disposal: If this material is disposed of in its raw form, the product probably would not meet the definition of a hazardous waste as defined by RCRA. However, if large quantities are spilled (greater than 10 pounds), ACT, Inc. recommends collection of the powder and disposal at an industrial landfill.

Section Eight: Control Measures

Ventilation: Standard industrial hygiene ventilation practices should be used to control human exposures to this product.

Personal Protective Equipment:

Clothing: Standard work clothing should provide adequate protection. The clothing should be removed at the end of the work shift and maintained at the work site.

Gloves: Standard nitrile or latex gloves will provide adequate protection.

Eye Protection: Standard safety glasses with side shields are recommended.

Respiratory Protection: Workplace controls and good work practices are better than personal protective equipment including the use of respirators. These recommendations are only guidelines and may not apply to every situation. Respiratory protection equivalent to either N100 or the older HEPA filter (APR with a DFM (purple) cartridge) will provide adequate protection. It is the opinion of ACT, Inc. that dust masks will not provide adequate protection.

Personal Decontamination: Good personal hygiene should be exercised by all users of our product.

Section Nine: Regulatory Issues

Environmental Regulations Resource Conservation and Recovery Act: If our product were discarded as purchased, the material would probably not be a hazardous waste as defined by RCRA. However, it remains the responsibility of the end user to determine compliance with RCRA and to perform testing as specified under 40 CFR §261.21 though §261.24. The following table addresses the expected listing for our product under RCRA.

§261.21 Ignitability	No
§261.22 Corrosivity	No
§261.23 Reactivity	No
§261.24 Toxicity (D Code)	None
F CODES	Unknown
K CODES	No
P CODES	No
U CODES	Unknown

Water Pollution Control Act: Not determined. This material should not be disposed of in municipal services or natural waters.

Community Right to Know (SARA III)

Spill Reportable Quantity (§302)	NA
SECTION 311(§370)	NA
SECTION 312(§370)	NA
SECTION 313(§372.65)	NA
EXTREMELY HAZARDOUS LIST(§355)	No

Toxic Substance Control Act: All of the constituents found in the product are believed to be on the TSCA inventory.

State Regulations: This MSDS has been prepared to comply with the provisions found in the Federal Department of Labor OSHA Hazard Communication Standard. Several states, most notably CA, PA, NJ and MA have independently promulgated regulations pertaining to MSDSs. ACT, Inc. has not specifically determined if this MSDS is in compliance with the provisions for any particular state. The information provided below is for general information

only and is not necessarily complete. It is possible that the product contains other compounds which appear on various state lists. California Proposition 65: Silica is included on the California "List of Chemicals Known to the State to Cause Cancer or Reproductive Toxicity." We believe that the information contained in this MSDS provides the information needed under Proposition 65 for the employer to inform the employee of the reproductive and carcinogenic hazards. Massachusetts, NJ, Pennsylvania This MSDS has not been prepared specifically to comply with these state regulations and may or may not contain compounds present at such levels which could require reporting as required by the state. **DISCLAIMER** The information contained in this MSDS relates specifically to the material and may not be valid if used in combination with other materials or in any unspecified process. The information on our product is accurate to the best of our knowledge but does not purport to be all inclusive and must only be used as a general guide. It is the user's responsibility to ensure that the product will be suitable for their particular use. The user assumes all responsibility for compliance with applicable Federal, State and Local Regulations. We do not accept liability for damage or loss that may occur from the use of this information.

REFERENCES

Frontier Refining: Scott Denton, Environmental Engineer 307- 771-8731, WY
Frontier Refining El Dorado: Paul Luck, Operations Superintendent 316-321-4279, KS
Holly Refining: Jerry Rose, Environmental Specialist 801-299-6635, UT
Sinclair Pipeline Company: Rex Well, Terminal Supervisor 303-287-0267, CO
Clean Harbors: Troy Greeno, Technical Service Specialist 720-891-3140, CO
Sterling Chemicals: Mike Kyle, FSO, VSO, CHSO 409-942-3779, TX
NCRA Refinery: Andy Vogelsberg, McPherson, KS
Kinder Morgan: Lance Wiley, TX
Schrader Oil: Ken Kline, District Manager 970-484-1225, CO
Sterling Crane: Roy Scanlan 970-244-8349, CO
Anadarko Gathering: Rob Smith Compression & Processing Manager 303-655-4306, CO
Anadarko: Manger of Maintenance 281-784-6719, TX
PSC Environmental Service: Tobi Simmons Operations Manager 303-321-9040, CO
Phillips 66: Natalie Bowen 303-427-3061, CO
Silco Oil: Scott Paulson District Manager 303-292-0501, CO
JPMorgan Chase: Sharon Goldade Property Maintenance 303-817-3985, CO
Service Master WRM: Chris 901-683-0092, TN
Boeing: Hope Gonzalez Environmental Engineer 210-932-6973, TX
John Slaughenhoup: Manager City of Aurora 303-326-8217, CO
Town of Breckenridge : Richard Newberger 970-453-3372, CO
City of Pueblo: Gene Michael 719-553-2298, CO
County of Pueblo
Handyman Production: Glen Haggie Host 248-589-8561, MI
RTC Racing: Ron Soul President 303-979-8287, CO
Praxair: Geismar, Port Arthur, Sulphur, LA
Motiva: Convent, LA
Citgo: Corpus Christi, TX
Lyondell Basell: West Lake, LA
CFIndustries: Donaldsnnville, LA
Sid Richardson: Fort, TX
Continental Carbon: Ponca City, OK
Chevron: Nederland, TX
ConocoPhillips: Westlake, LA
Agrium: Borger, TX
Williams: Cameron, LA
Total: Port Arthur, TX
Citgo: Corpus Christi, TX
Chick-fil-A Corporate Account USA 200 locations

**ACT BIOREMEDIATION
PRODUCTS® HAVE BEEN
WELL RECOGNIZED BY
NUMEROUS INDUSTRIES AND
COMPANIES ALL ACROSS THE
UNITED STATES, VARYING
FROM OIL & GAS,
PETROCHEMICAL TO
RESTAURANTS, BANKING,
REAL-ESTATE, AIRPORTS**

NOTES

NOTES

NOTES

Contaminated Areas Around And On Machinery



Troubleshooting To Find Underground Leaks



Chemical Spill Cleanup



Backed Up Sewer

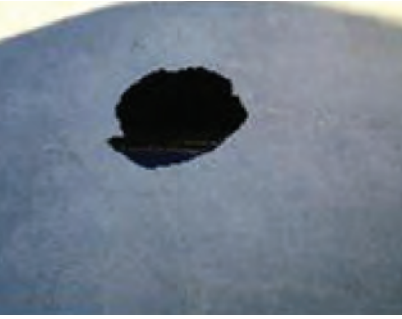


Ideal for scaffolding and cat walks & it provides a non-slick surface to help protect the safety of the worker



Liquefies Paraffin In Subzero Temperatures

Concrete Pad



BBQ Area



Sidewalks



Livestock Stalls

