

SLUDGE AND FUEL OIL TREATMENTS



In Oil Tanks, Tank Farms and Pipe Lines, Oil Exploration, Crude Oil / Petroleum Storage and Transportation, Crude Oil Carrying Vessels, Refineries, Power Plants, Ships and Industries is now easier and simple even in extreme climates, with

EILTM
The World's Wonder

We invite you to experience like our regular users, world wide ...



E-OIL , A LONG TERM ANSWER TO INDUSTRY CHALLENGES

To compete in today's production, environment and operation, need lower operating cost, increased production rates and over all recovery from each dollar spent. There are many quick fixes, but proven technology is the only long term answer. Although evolutionary technologies can improve performance or reduce cost, but not enough to be effective. "E-Oil" technology provide a dramatic effect with product performance and experience offering unbelievable benefits and savings.

SLUDGE WORLD OVER...

Tanks bottom sludge is a perennial problem leading to corrosion, algae formation, shortage of crude and fuel oil storing capacity. Dumping or throwing sludge on land, pits and ponds is a serious offence and considered as a Global environmental hazard, leading to earth poisoning. Yet, sludge has a significant value.

INTEREST IN E-OIL TREATMENT HAS INCREASED, TREMENDOUSLY...

Sludge treatment with "E-Oil" is cost effective, easier and simple answer for converting the sludge into usable fuel oil, avoiding further formation, even in extreme climates, leading to mind boggling savings in foreign exchange, time and efforts in tanks cleaning, conservation of environment etc.,

The users are glad and satisfied that E-OIL is the ultimate answer to sludge dispersal in a cost effective manner. The search for a simple and guaranteed sludge treatment additive ends with E-OIL . Our experience and track confirms, truly the fuel oil users never had such an eco-friendly, non toxic, cost effective, proven and regularly used multi functional sludge treatment additive so good, so far. The interest in E-OIL treatment is increasing, tremendously.

OUR REACH IS GLOBAL, COMMITMENT TOTAL...

World wide our clients demand excellence, by putting our clients first by providing the full capabilities of a global organization, with quality people who offer value added solution, un-paralleled research and commitment to the market. In all markets and market conditions, we offer 24 hours service over the phone or electronically, the clients choose. By investing the strengths in our on going investments, in our infrastructure, in our people and product delivery, we provide technology, quality products, on-dot delivery to all our clients advantage.

Some say it's magical, some say it's mystical, we invite you to experience like our regular users, Worldwide...

K.J.Kumar
President



THE QUALITY OF FUEL OIL

It is difficult to define, what may be good for one consumer is unsuitable for another. We should keep this fact in mind, since the quality and condition of many heavy fuel oils produced by the refinery are changed before they are ultimately burned. This is primarily due to the handling, use, operation and type of equipment used, since the advent of the petroleum refining, the refining processes have changed considerably. Today, there are many variations in residuals owing to the methods of refining and blending that create problems for the consumer and equipment manufacturers.



FORMATION OF SLUDGE

The formation of sludge is due to the blending of fuel oils in the refinery which tend to coagulate forming large particles of solids which settle down faster. Organic precipitation of solids from the liquid oil is due to the heavy liquid, high-molecular weight compounds present in the residual which may be insoluble during blending. In general, sludge contains emulsions found in tank bottoms, suspended heavy chemical compounds, insoluble solid oxidation products, organic products of precipitation, dirt, rust and scale. Major refineries, power plants and all industries in the world are having sludge accumulation in the order of hundreds of thousands tonnes, whose value run into several million of dollars.



The coagulating nature of the sludge makes combustion of the large particles a difficult job for a liquid burner. Sludge gets carried into the fuel lines, leading to fouling of filters, strainers and burners tips, making it difficult to maintain stable flame conditions, resulting in build up of carbon-rich deposits. These deposits often deflect the flame against the refractory walls or water tubes, causing unnecessary outages. Cleaning out sludge from tank bottom, requires extensive maintenance cost and down time.

Sludge formed by the peroxide free radical chain reaction will be very thick and hard at the bottom and very gummy as the sludge layer ascends. Sludge consists of high molecular weight carbon compounds, metals and oxides like Vanadium (from the catalytic cracking of petroleum) and its ferrous oxide (usually as rust), water molecules, some halogens, dirt, scales etc. Usually the sludge will be negatively charged, because the metal ions present in the sludge is positive and the polymerase gum, which has some free radicals, forms a mesh surrounding the metal ions, along with water molecules and dirt.

There is a general notion that no solvent can dissolve fuel oil sludge once it has formed and unless excessive quantities of solvents are used, as several times the quantity of sludge present, would be necessary. E-OIL comes in to play a very vital role in sludge management to save valuable money.



BSW CONTENTS OF FUEL OILS

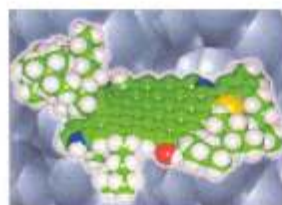
The water and sediment, also called BSW (Bottom Sediment and Water), found in fuel oils vary greatly in amount and composition. Light fuel oils, such as diesel are usually not contaminated, except for a little water or a small amount of fine sediment.

The greatest amounts are found in Heavier fuel oils, the reasons being that the BSW found in crude oil will become concentrated in the final products, such as the residuals. As the light fuel oils have a high gravity and heavier oils have a low gravity, the BSW is more liable to remain suspended in the heavier fuels owing to the density as well as the high viscosity of the material. The amount of BSW will vary in different grades of oil, as shown in the table here opposite.

TYPE OF FUEL	BSW %
Light Fuel No.2	None to 0.20%
Light Fuel No.4	0.10% to 0.50%
Heavier Fuel No.3	0.20% to 1.00%
Heavier Fuel No.5	1.00% to 2.00%

Heavier oils may have a BSW content as high as 10% if badly contaminated. When the percentage is over 2.00%, the oil usually has become contaminated by outside sources. Referring to the table of specifications for various fuel oils, the water and sediment content of No.5 fuel oil is 1.00% maximum, while with No.6 oil, the maximum is 2.00%.

Technically, there is a difference between BSW and sludge. The BSW is the water and sediment, usually inorganic in nature, such as dirt, grit, tank rust, scale and similar materials.



SLUDGE, FREE-RADICAL MECHANISM

Due to improper blending of light fraction and heavy fraction compound, some amount of unsaturation will be realized in the fuel oil. These unsaturated compounds form free radicals. These free radicals come into contact with the moisture and air in the fuel oil and forms peroxide radicals. This is a high energy radical and rapidly reacts with other saturates and unsaturates to form thick polymer gums. These gums along with the metal ions, rust, dirt and water molecules form thick sludge. Sludge formation is a chain reaction and takes in 3 stages as explained below..

Chain Initiation, Chain Propagation, Chain Termination

CHAIN INITIATION

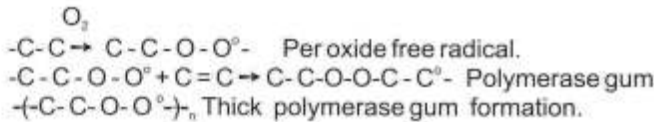
Chain initiation is the process in which the unsaturated compounds disintegrate to form free radicals. These free radicals react with the near appearing unsaturates and saturates.





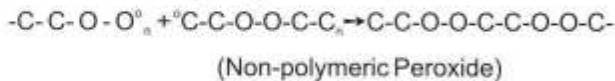
CHAIN PROPAGATION

After initiation, the free radical chain reaction mechanism continues either vigorously or slowly depending upon the energy of the free radical. In this sludge formation the energy level mainly depends upon the amount of contamination and moisture present in the storage tank.



CHAIN TERMINATION

When the chain reaction proceeds, one end of the polymerase gum meets another free radical and a bond is established by two valence electrons. Thus the chain reaction stops and a thick, highly viscous polymerase gum will be formed engulfing the metals, dirt, moisture and other contaminants.



This is the basic mechanism which is responsible for sludge formation in any hydrocarbon fuel oil which has to be understood by all fuel oil users before tackling the problem of sludge accumulation and its dispersal with E-OIL.

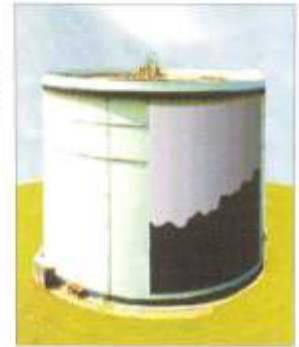
OIL SLUDGE ?

The term oil sludge is often somewhat loosely used to denote all the material, which may settle out as bottom settlings when a tank of crude oil stands stagnant for some time. In your storage tank you have two materials to contact, water and particles of solid chemical compounds, commonly called sludge. This is collectively referred to as Bottom Sediment and Water (BSW) which varies greatly in amount and composition.

Sludge is an oxidized product, or chemical compounds resulting from the oxidation of the hydrocarbons in the oil, forming insoluble materials, mostly organic in nature, such as dirt, grit, tank rust-scale and similar material. The term sludge is used quite loosely and is generally understood to mean a combination of BSW and sludge.

HANDLING OF SLUDGE

One of the main reasons why there is a build-up of sediment and sludge in many storage tanks is that it is permitted to settle and accumulate. If the bottom of the suction and return lines is too high in the tank, most of the oil below the lines remains stationary, resulting in an accumulation of sludge due to undisturbed settling. Also in some installations portions of the oil in the tank are never activated, the fill line is at one end of the tank and the suction line is in the middle, leaving the other end practically undisturbed for long periods of time. This permits the sediment to accumulate instead of being





Swelling Fuel Oil Problems

kept in suspension by circulation of excess oil returning from the burners as well as when fresh oil is received. When there is a large amount of sediment on the bottom, one or other problem arises. When a load of oil is pumped into a storage tank, it causes the oil and sludge present to become agitated and leaves the sediments in suspension. This mixture is then pulled through the lines, blocking strainers and either cutting off the burner completely causing erratic combustion.

Also if the waxy sludge deposit is allowed to build up to any great extent it becomes thicker and more compacted and much more difficult to remove. This eventually necessitates the opening of a side door of the tank and manually digging several feet of sludge, with its attendant problems such as disposal as discussed earlier.

SYMPTOMS OF SLUDGE FORMATION

Fouling of suction heaters, Frequent chocking and cleaning of pre-heaters, filters, strainers, burners, nozzles, Fall in temperature at burners, Increase in pumping pressures, Algae formation at the tanks bottom etc.



Soot

SOOT, ASH AND DEPOSITS

Soot is formed as a result of poor combustion, in powdery form of carbon and combustible with sufficient air. The impurities or foreign materials are noticeable. These organic and inorganic substances are non-combustible and after the combustion of fuel oil residue is called ash.

CORROSION DUE TO SLUDGE

Sediment and sludge are formed in oil tanks and fuel lines due to water separation from the fuel oil and when asphaltenes, waxes and other materials flocculate (stick together) and ultimately settle to the bottom. A certain amount of water is always found in fuel oil and additional water can come from condensation in the storage tank and during tank filling. The water normally separates out and remains at the bottom of the fuel tank in direct contact with the metal surface, leading to corrosion and E-OIL prevents corrosion.



Corrosion

ALGAE FORMATION

Under the right conditions, micro-organisms can grow at the water/oil interface and contribute to an increase in the amount of sediment in the tank. The by-products of the micro- biological degradation cause corrosion of metal surfaces and E-OIL prevents Algae formation.

EMISSIONS AND HARMFUL POLLUTANTS

One of the critical problem caused by the sulfur contained in fuel oils is the lowering of the ambient air quality by pollution. The combustion converts sulfur to sulfur dioxide (SO_2) a stringent, irritation gas, which is emitted from the smoke stack, contaminating the atmosphere. Harmful pollutants are SO_2 , CO, HC, Nox and SPM.



Pollutants



What is E-OIL??

E-OIL is a bio-emulsifier, which contains active ingredients and proteinaceous substances blended in a petroleum base. The hydrophilic nature of E-OIL surrounds the sludge molecules and a vanderwaals force of attraction is established between E-OIL molecules and the sludge particle. Due to the external mechanical agitation, the entire sludge particles will be dismantled and the viscosity of sludge will be greatly reduced and the sludge will be converted back in to usable fuel oil.

EMULSIFIER

Water is usually present in residuals in two conditions, in bulk form or free form, stratified and mixed in the oil in the form of large drops of water side by side with large drops of oil, which is not an emulsion. This is due to the surface tensions between the oil and water.

E-OIL precisely reduces or breaks the surface tensions with the result that oil and water gets closer. Due to this action of E-OIL, the water drop is completely surrounded by a film of oil, instead of separate drops of oil and water. In the above stated condition, E-OIL reduces the percentage of water compared to the amount of oil, which helps in flame stabilization and combustion. This results in "E-OIL- Fuel oil" emulsion to remain stable, as there will be no free water to cause the burner flame to fluctuate or go out completely.

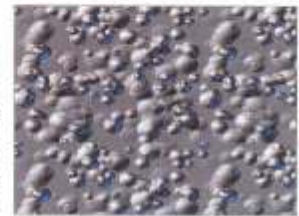
E-OIL which acts as surface active agents must also be present which will act on the surface tension of the fuel to improve atomization and combustion, thus making the treatment complete and giving benefits from the tank through the burner. There may be some sparking due to this emulsified water, but not enough to reduce the efficiency of the combustion.

VISCOSITY REDUCTION

E-OIL has the ability to reduce the viscosity of the sludge by breaking / reducing surface tension, interfacial tensions between the oil molecules adhered to the wax, sediments and other impurities.

CORROSION INHIBITOR

E-OIL addition helps in reducing the problem of multiple ash melting point to a greater due to complete combustion of the organic vanadium compounds in the oil. Sulphur being one of the major offender responsible for corrosion, is being completely converted to Sulphur-di-oxide (SO₂) and totally eliminate the possibility of Sulphur Trioxide (SO₃) formation under certain conditions like improper air to fuel ratio, incomplete combustion etc. SO₃ is very harmful especially when present at lower stagnating temperatures. At, Dew Point temperature the condensed water vapor will react with SO₃ leading to Sulphuric Acid formation, which is highly corrosive and shall damage metallic parts like chimney, flue gas ducts etc.



Irregularly formed Oil molecules adhering to each other forming chunks / sludge before E-OIL addition



Viscosity reduced, emulsified and homogenized Micro Molecules are formed after E-OIL addition for better exposure to oxygen



Water in oil



Corrosion



Material Identification

Material Name	: E-OIL, Multi functional Fuel Oil Additive
Use	: Good for conservation of fuel oil, sludge dispersal, reducing pollution, maintenance, down time & costs
Manufacturer	: OSTEN ENZYME INDIA (P) LTD.,
Head Office	: 2D, "Eldorado", 112, N.H. Road, Chennai - 600 034,
Country of Origin	: INDIA
Telephone Nos.	: +91-44-2825 3337 / 2820 6085 / 2820 6845
Fax Nos.	: +91-44-2824 1411
E-mail	: sales@e-oil.com
Website	: www.e-oil.com

Composition of E-OIL

Dispersants	: 00.999%
Carbon	: 85.000%
Hydrogen	: 14.000%
Sulfur	: 00.001%

Reactivity Data

Chemical Stability	: Stable
Compatibility	: Compatible to all hydrocarbon fuel oils and sludge
Solubility in Water	: Insoluble

Physical Data

Physical Form	: Liquid
Odour	: Non-pungent
Appearance	: Bluish Green
Specific Gravity, @ 30°C	: 0.7819
Freezing Point	: - 48°C
Vapour Pressure, @ 30°C	: 0.50 mm Hg
pH	: Neutral
Flash Point	: 50°C / 60°C
Auto Ignition	: 210°C
Handling	: Non Hazardous
Shelf life	: 5 years (Longer if stored as below)
Storing Conditions	: Store E-Oil, (in HDPE containers) in a cool, dry place away from sunlight, fire and hazardous materials.

Fire and Explosion Hazard

Flammability	: Flammable
Means of Extinguishing	: Dry Chemical, Foam or Co,
Special Procedure	: Not Pertinent

First Aid Measures

Eyes	: Rinse with Clean Water, not hazardous
Lungs	: Not hazardous
Skin	: Wash with soap water, not hazardous
Mouth	: Wash with soap water, not hazardous

Toxicity Data

Parameters	Concentration	Results Obtained
Acute Oral LD 50	>5.0 g / Kg	59 Mg / Kg mouse, 60 Mg / Kg rat
Inhalation LC 50	Saturated vapour	252 ppm mouse, 750 ppm rat
Dermal LD 50	>2 g / Kg	-
Skin Irritation	-	Moderate
Eye Irritation	-	Practically, non-irritating
Sensitization	-	Skin sensitized
Mutagenicity	-	Negative (in 4 assays)
Inhalation 5 days / week 6 hrs / day	1552 ppm for 90 days	Squirrel, Monkey no effects
	0.02, 0.048, 0.10 mg / l for 67 days	Male rats - 2 deaths
Inhalation 5 days / week, 6 hrs / day	3866 ppm for 90 days	Male & Female rats no effect except for male specific renal lesion
	0.02, 0.048, 0.10 mg / L for 68 days	Male dogs no effects

Eco - Toxicity

Parameters	Value	Species	Duration	Temperature	End points
LC 50 (Fishes)	18 / 25 mg / l	Cladocera Ceriodaphnia Dubia	7 days	25°C	Survival Reproduction measured
LC 50 (Fishes)	18 / 25 mg / l	Amphipod Parasitopod	18 days	20°C	Survival, growth

Carcinogenicity

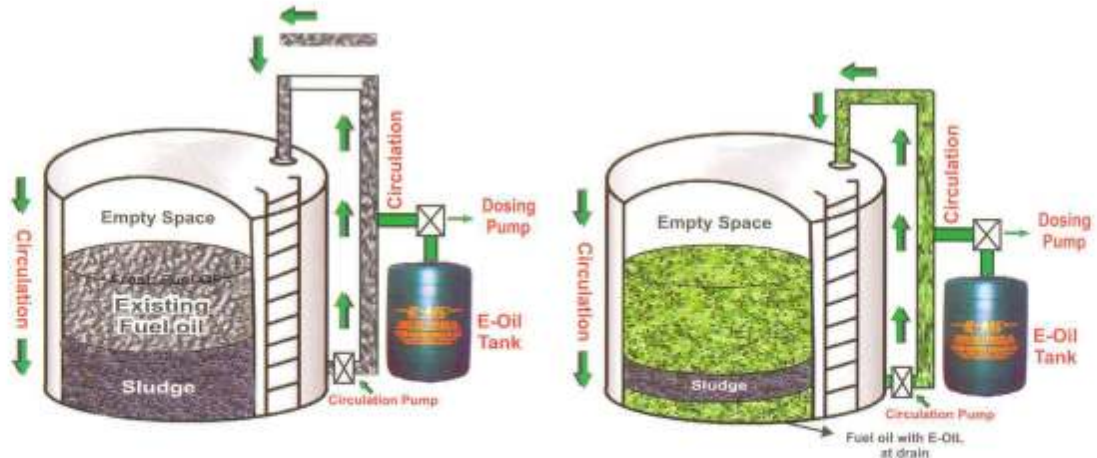
E-OIL is not considered as carcinogen for animals as well as human beings. The mechanism for carcinogenicity appears to be non-genotoxic. However the genotoxic potential of E-OIL is dependent upon direct contact with genetic material. Here, E-OIL application is limited to petroleum (sludge dispersal, combustion, pollution control, energy savings and maintenance) only.

In E-OIL, there is no compromise on quality ...

MATERIAL SAFETY DATA SHEET (MSDS)

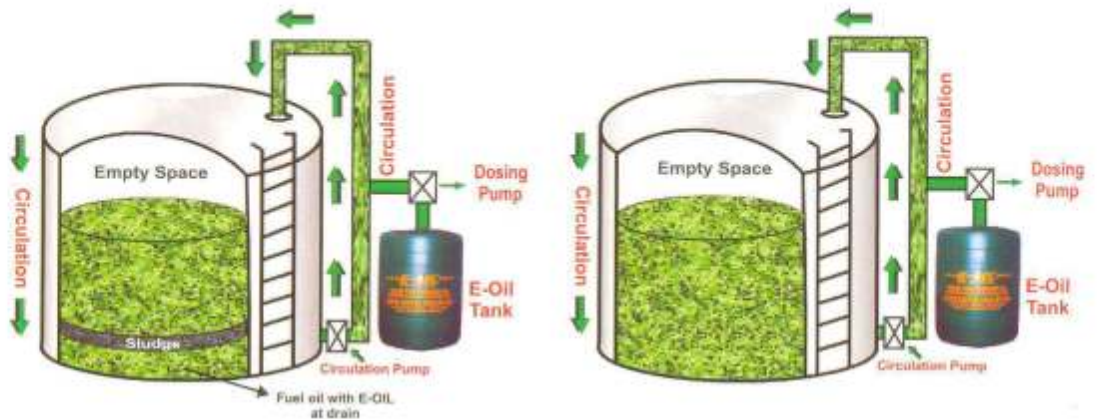


Procedures of sludge treatment with E-OIL is well explained in the illustration as shown here below, having three different portions in the storage tank such as sludge, fuel oil just above sludge, fuel oil from drain and empty space. The parameters of interest here would be the viscosity and density of sludge and oil, which will vary substantially due to the quality of the materials contained.



Stage 1
Without E-OIL Addition
Hard Oily Sludge at the bottom.
New E-OIL Tank and Dosing
Pump is Erected

Stage 2
By E-OIL addition and after
cycles of circulation,
Sludge is partially
Homogenized in fuel oil



Stage 3
By E-OIL addition and after
more cycles of circulation,
Further Homogenization
of sludge in fuel oil

Stage 4
By E-OIL addition and
further cycles of circulation,
Sludge is totally Dispersed
and Homogenized in fuel oil

Sludge Treatment, is easier and simple with E-OIL, by effective circulation and heating ...



- Limited dosage of E-OIL is enough to disperse sludge.
- Active ingredients in E-OIL penetrate deeply into the thick sludge layers.
- Improves calorific value and combustion characteristics.
- Reduces viscosity and enhances the flow properties.
- Compatible to any kind of fuel oil / sludge.
- Leaves no residue on combustion.
- Ensures stability of oil during transportation, storage and at end use.
- Reduces pumping cost and uniform supply of oil to the burners.
- Prevents clinker formation during combustion .
- Works as an effective scavenging agent for detaching the adhered oil molecules by waxy substances from the sediments, solid particles in fuel oil / sludge and keeps them in a suspended condition. This principle is applicable for sludge accumulation on suction heaters, pre-heaters, which is devoid of deposits leading to better rate of heat transfer.
- Prevents organic precipitation of solids, blocking of strainers, screens and filters due to the presence of waxy substances.
- Emulsifies water and oil, prevents growth of micro-organisms.
- Reduces exorbitant cost of handling sludge manually and prevents high risk of exposure to toxic gases formed in the tank.
- Higher heat realization.
- Works as a pour point dispersant, flash point improver and corrosion inhibitor etc.,
- Increases efficiency of the fuels and the equipment leading to direct, and indirect savings.
- Highly effective even in extreme climates.
- **E-OIL is a multi functional eco and user friendly product.**
- **Offers mind boggling savings & benefits to all its users world wide.**

Capitalize on E-OIL's capabilities...



FUEL OIL TREATMENT WITH E-OIL

Today E-Oil Treatment is accepted by many industries using heavy and lighter fuel Oils like HFO, diesel or Kerosene. E-Oil when thoroughly mixed increases the efficiency of the Fuel Oil. As there could be a quantum of sludge at the tank bottom, care has to be taken in quantifying the sludge and the quantity of E-Oil to be considered along with the quantity of E-Oil required for Fuel Oil according to the recommended dosage as below.

The modus operandi for mixing E-Oil in tanks, tankers etc., is very simple, yet has to be done meticulously as explained in the following manner. E-Oil is a safe, user and environment friendly product.

HOW TO MIX E-OIL ??

DOSAGE :

- 1 Litre of E-OIL for every 100 Kgs of hard sludge
- 1 Litre of E-OIL for every 1/2 Ton of normal sludge
- 1 Litre of E-OIL for every 2 Tons of HFO or Lighter Fuels

MIXING PROCEDURE

Pour E-OIL in the above dosage ratio injected directly on the sludge or mixed with the sludge for effective treatment of sludge at the tank bottom.

The fuel oil is pumped out of the tank and E-OIL is poured on to the sludge. E-OIL when introduced directly on to the sludge mass, is called tank bottom treatment.

The addition of E-OIL at the ratio of 1/2 litre to 1 ton of fuel oil duly mixed. Then pump neat fuel oil already mixed with E-OIL (at least at the rate of 2 Tons of neat fuel oil to 1 Ton of sludge), remember that E-OIL mixed neat oil is required to hold and suspend the treated sludge.

E-OIL can also be injected or pumped directly into the sludge mass at the bottom of tank. In the way, a more direct contact with sludge is obtained owing to the pressure of the injection. Further, a more uniform agitation and thorough mixing will be obtained by the use of the circulation pump. In addition, the tank need not be emptied and refilled, requiring no shutdown of operation. This method is more effective than simply pouring E-OIL into the tank.

Run the circulation pump at least for a number of cycles depending on the kind of sludge to obtain quicker homogeneous mix of E-OIL with sludge mass. Mechanical stirring or air agitation is recommended if available.

Add E-OIL (as shown in the picture) in dosage as stated here above, according to the quantity of fuel oil available in each tank of the rail rakes. Some mechanical stirring through the opening may be given. E-OIL will get mixed with the fuel oil, when the rakes move on the rails for a period of time.



Neat Fuel Oil Ready For E-Oil Treatment



Treated and Emulsified Fuel Oil



Neat Fuel Oil ready for E-Oil Treatment



Treated and Emulsified Fuel Oil



E-Oil Treatment in Rail Rakes



- Fuel Oil Savings,
- Compatible to all kinds of fuel oil,
- Better automatization,
- Viscosity reduction,
- Free flow oil,
- Emulsifies water present in fuel oils,
- Dispersion of the organic sediments,
- Prevention of organic precipitation or sludge,
- Reduced pollution,
- Reduction in pumping pressures,
- Free from carbon and deposits,
- Steadier flame,
- Less or no smoke,
- Reduction in gas emission,
- Substantial reduction in clinker, corrosion and soot formation,
- Better heat transfer throughout the flues,
- Reduced stack temperature,
- No side effect,
- No need to hire / buy special equipment for treatment,
- Safer to equipment and users,
- Environment friendly,
- Easy handling,
- Only a small dosage is required, means low cost for E-OIL,



E-OIL offers direct and indirect savings ...



LAB RESULTS OBTAINED ON INDIAN OIL CORPORATION FURNACE OIL SLUDGE

SL No	Analysis Carried Out	With Out E-OIL	With E-OIL	Result of E-OIL Addition	
1	Acidity as mg of KOH/gm	0.64	0.66	No change due to E-OIL	
2	Ash	0.88%	0.87 %		
3	Specific gravity @15° C	0.9859	0.9846		
4	Sulphur	1.26%	1.26 %		
5	Sediment (Toluene Insoluble)	1.03%	1.02%		
6	Pour Point	+45° C	+43° C		
7	Flash point By Pensky Martin CC Method	184 ° C	176° C	Ignition Commence at Lower temp	
8	Gross Calorific value	5739 Cal /gm	8500 Cal/gm	Higher realization of Energy	
9	By Dean & Stark Method Water Content	44.27%	17.45%	Improvement by + 65%	
10	Kinematic Viscosity By Red Wood No.1	@ 80° C	129.7CST	95.5 CST	Reduced by 26.40 %
		@ 90° C	90.1CST	65.0 CST	Reduced by 27.90 %
		@ 100° C	71.2 CST	46.1 CST	Reduced by 35.30 %

LAB RESULTS OBTAINED ON LSHS AND RESIDUAL OIL PITCH AT A DETERGENT PLANT

Analysis Carried out	LSHS Sludge		Remarks	Residual oil sludge		Remarks	Problems encountered without E-OIL	Results by E-OIL addition
	Without E-OIL	With E-OIL		Without E-OIL	With E-OIL			
Moisture (in %)	4.0	0.65	83.75% emulsification of moisture in LSHS	41.52	12.50	69.89% emulsification of moisture in Pitch	Frequent clinkering and choking of oil burners due to high moisture content	Total reduction of burner choking, clinkering problems leading to reduced frequency of cleaning and maintenance
Gross calorific Value cal / gm	8922	10072	11.4% improvement in heating value	4784	6646	28.01% improvement in heating value	Poor heat Realization per ton of fuel fired	Higher heat realization per tonne of fuel oil consumed indicating an improvement in specific fuel consumption
Flash Point °C	230	227	Reduction by 5° C	52	48.5	Reduction by 3.50° C	Extended pre heating time from cold startup Lower Ignition Quality	Pre-heating time reduced considerably effecting fuel conservation automatically Instantaneous and complete combustion
Kinematic viscosity Cst @70° C	125.80	98.40	Reduction in viscosity 21.70 %	86.50	64.80	Reduction in viscosity 25.05%	Pumping problems resulting in frequent tripping of pumps Increased Pumping pressures	Reduced viscosity leading to smooth operation of pumps without tripping
Kinematic viscosity Cst @80° C	75.60	59.80	20.80 %	75.80	56.85	25.00%		Reduction in pumping pressures leading to electrical/energy conservation
Kinematic viscosity Cst @90° C	56.40	44.20	22.00 %	66.50	50.54	24.00%		

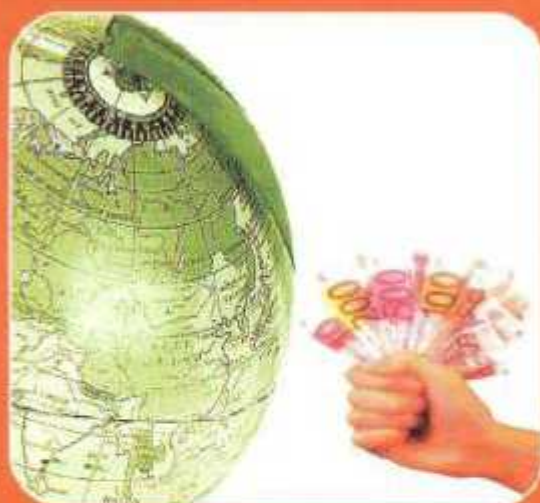
Sludge is valuable, treat it with E-OIL to save money and from problems of environment...



SAVINGS & BENEFITS OF E-OIL IN SLUDGE TREATMENT

LOCATION	TYPE OF INDUSTRY	
	Power Generation, Plant I (Fuel Oil Fired)	Power Generation, Plant II (Fuel Oil Fired)
Tank Specifications	Heavy Fuel Oil Tank 22,000 m ³ / Fixed Roof	Heavy Fuel Oil 10,000 m ³ / Fixed Roof
Type of Sludge	Flowable Sludge	Ultra Hard Sludge
Oil Specifications	Viscosity > 600 Cst @ 50°C Calorific value of Sludge 9300 cal/g Calorific value of fuel oil 10,072 cal/g	Viscosity 2000 cst @ 50° C Calorific value of sludge 9500 cal/g Calorific value of fuel oil 10,100 cal/g
Amount of Sludge dispersed with E-OIL + Amount of fuel OIL treated with E- OIL	1170 m ³ (Approx) + 7600 m ³	250 m ³ (approx) + 2000 m ³
Equipments used	Vertical circulation pump @ 120 T / hr	Vertical circulation pump 40 m ³ / hr Horizontal Circulation Pump 440 m ³ / hr
Total time taken for dispersal (hrs)	264 hrs	200 hrs
Tank out of service period (hrs)	NIL	NIL
E-OIL Consumed	9400 Litres	3500 Litres
Man hours	25 ½ hours	14 hours
End Results	<ul style="list-style-type: none"> ▶ 100% sludge dispersed with cost savings ▶ 3% improvement in boiler Efficiency ▶ 5 MW increase in Power Generation ▶ Savings in Diesel oil used for dilution earlier 	<ul style="list-style-type: none"> ▶ Sludge converted to combustible fuel oil within a very short duration of 148hrs ▶ Filter cleaning frequencies reduced from 3 times a week to only once in 30 days ▶ Reduction in pumping pressures observed ▶ Fuel oil homogenized with E-OIL due to uniform viscosity & density at every cross section from tank bottom to the top
Cost Savings	<ul style="list-style-type: none"> ▶ US\$ 117,000 savings by conversion of sludge into usable oil ▶ US\$25,600 by improvement in boiler efficiency to 3%min. ▶ US\$ 90720 cost of diesel fuel oil saved used for dilution earlier. 	<ul style="list-style-type: none"> ▶ Nett savings of US \$ 18940 to the Corporation ▶ Trouble free operation using simple circulation techniques ▶ No mechanical labour, No rental charges for cranes and other heavy equipments

SAVINGS & BENEFITS OF E-OIL



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