
REFERENCE GUIDE BILGE WATER TREATMENT (BWT)

ACCEPTED, EFFECTIVE, SAFE METHOD FOR
ELIMINATION OF HYDROCARBON CONTAMINANTS

FAST ACTING
CONTAINS NO BACTERIA
NON-TOXIC
NON-CORROSIVE
NON-FLAMMABLE

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BILGE WATER TREATMENT

General Description

BILGE WATER TREATMENT:

- Is a biocatalytic system of preformed enzymes in a liquid concentrate form which stimulates and accelerates natural biological reactions. When combined with fresh or salt water and oxygen, the product will cause crude oil, jet fuel, diesel oil and other organic substances to rapidly decompose, eventually biodegrading them to carbon dioxide and water as end products .
- Is stable and non-toxic to humans, animals, marine life and plant life. It is 100% biodegradable.
- Works in concert with indigenous bacteria. No cultured or foreign bacteria are introduced into the ecosystem.
- Is non-flammable. It will reduce fire hazards by increasing flash points and auto ignition threshold points in substances such as gasoline or fuel oil.
- Eliminates obnoxious odors associated with crude oil, petroleum derivatives and other organic molecules that are proceeding through the natural decomposing process.
- Is fully compatible with most types of application equipment now in use. The product may be easily applied by hand or power sprayers, helicopter, airplane or floating equipment. Its application requires no special safety equipment.

BILGE WATER TREATMENT FORMULATION RATIONALE

Bilge Water Treatment is a member of the Neozyme family of enzyme products which has been formulated to specifically catabolize hydrocarbon molecules and the fat, oil and grease (FOG) features of such molecules.



Bilge Water Treatment is a natural product based on fermentation chemistry and includes additional components formulated for specific molecular, biochemical roles. The product, in itself, has been designed to be fully biodegradable.

The completed formulation utilizes several families or classes of enzymes among which are:

Amylase	Catalase
Esterase	Hydrolase
Isomerase	Ligase
Lipase	Lyase
Oxidoreductase	Protease
Transferase	

REACTION TYPE

1. Oxidation	$RO(CH_2)_nCH_2CH_2$ $COOH--RO(CH_2)_nCOOH$
2. Dealmination	RNH_2--ROH
3. Dehalogenation	$RX--ROH$ or $RX--RH$ (where X=F, Cl, Br, I)
4. Decarboxylation	$RCOOH--RH$
5. Hydroxylation	$RH--ROH$
6. Reduction of Unsaturation	$RC=CH--RCH=CH_2$
7. Hydration	$R_2C=CH_2--R_2CHCH_2OH$
8. Methyl Oxidation	$RCH_3--RCOOH$

TARGETED HYDROCARBON CONTAMINANTS

In this case, the hydrocarbon compounds found in water, soil and air are the selected targets of Bilge Water Treatment. This would include such petroleum derived products as crude oil, drilling muds, creosote, kerosene, coal tars, gasoline, diesel, bunker fuels, lubricating and hydraulic fluids. Other contaminant groups would include aliphatic and aromatic hydrocarbons, polynuclear aromatic hydrocarbons, chlorinated aliphatic compounds, chlorinated aromatic compounds and chlorinated and non-chlorinated phenols.

It has been shown that the product has unique features in odor elimination of such gases as hydrogen sulfide, ammonia, mercaptan and other noxious odors emanating from anaerobic decomposition. The odor degradation activity happens in a very short period of time and effectively eliminates volatilization of light chain organic molecules, such as the BTEX group of petrochemicals, into the atmosphere.

TREATMENT METHODOLOGY

Bilge Treatment

The product is fully compatible with most types of application equipment now in use. Bilge Water Treatment may be easily applied with hand or power sprayers, standard eductor tubes, helicopters, airplane or floating equipment. No special nozzles or hoses are required.

In general, an application rate of 1 gallon of Bilge Water Treatment for each gallon of petroleum contaminant (a 1:1 ratio) is required to treat lightly contaminated bilges. A heavily contaminated bilge might require a stronger dosage. Contact your representative for specific custom application rates for first time users and for heavily contaminated bilges.



Each treatment site may differ in its requirements and modality of treatment. Factors that can influence the tactical use of BWT are:

Redox Potential	Temperature
Availability of Nutrients	Nature and Concentration of Contaminants
Ph	Heavy Metals

Should these variables complicate the application and treatment procedures, the Bilge Water Treatment works well with other commonly accepted treatment modalities such as venting, injection aeration, aeration lagoons and flocculants for removal of heavy metals.

A suggested field use protocol may be found at the end of this reference guide.

Water or Beach Spills

Reducing the danger of oil reaching beaches and shore structures is best achieved by spraying the oil slick perimeter with a diluted solution of 10 gallons of Bilge Water Treatment mixed with 150 gallons of seawater or fresh water for each 10,000 square feet of surface area to be treated. If the slick has a heavy consistency, it is recommended that the 1:15 diluted Bilge Water Treatment solution be applied over a three day period, using one-third of the mixed solution each day. For best results the product should be applied at a high pressure - generally above 500psi. Following is a suggested protocol for field use of the product.

SAFETY PROFILE

Extensive independent laboratory testing utilizing accepted standards for dermal and ocular effects on animal and human subjects have been performed. Phytotoxicity, bacteria community and internal aquatic organism safety studies are well documented. Please see the MSDS that has been developed for Bilge Water Treatment at the end of this guide.

TECHNICAL DATA

BACTERIAL PROLIFERATION

The successful biodegradation of petroleum is dependent on two factors: 1) having the enzymes and coenzymes reduce the petroleum to a form which can be readily assimilated by bacteria; and, 2) stimulating the proliferation of naturally occurring non-pathogenic heterotrophic bacteria. *FIGURE 1* demonstrates the ability of Bilge Water Treatment to significantly increase bacterial activity in bay water by 12,857%, and ocean water by 14,333%.

PROLIFERATION OF SEA WATER BACTERIA 24-HOUR PERIOD

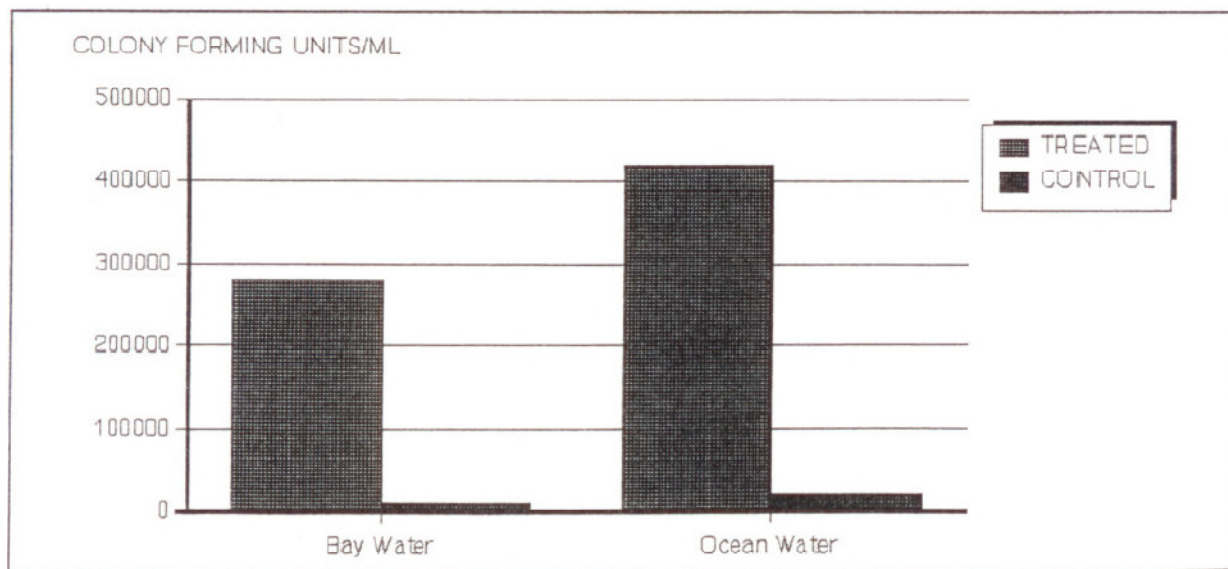


FIGURE 1

Independent laboratory studies from specialists in petroleum technology have quantified the ability of Bilge Water Treatment to dramatically reduce petroleum contaminants. *FIGURE 2* shows a 98% reduction in Jet-A, Diesel-2 and Heavy Duty Lube Oil within 96-hours. While treatment time required may vary dependent on conditions previously noted, the mode of action is the same. Bilge Water Treatment is a unique biocatalytic system which accelerates natural biological reactions with hydrocarbon products in water.

PETROLEUM REDUCTION

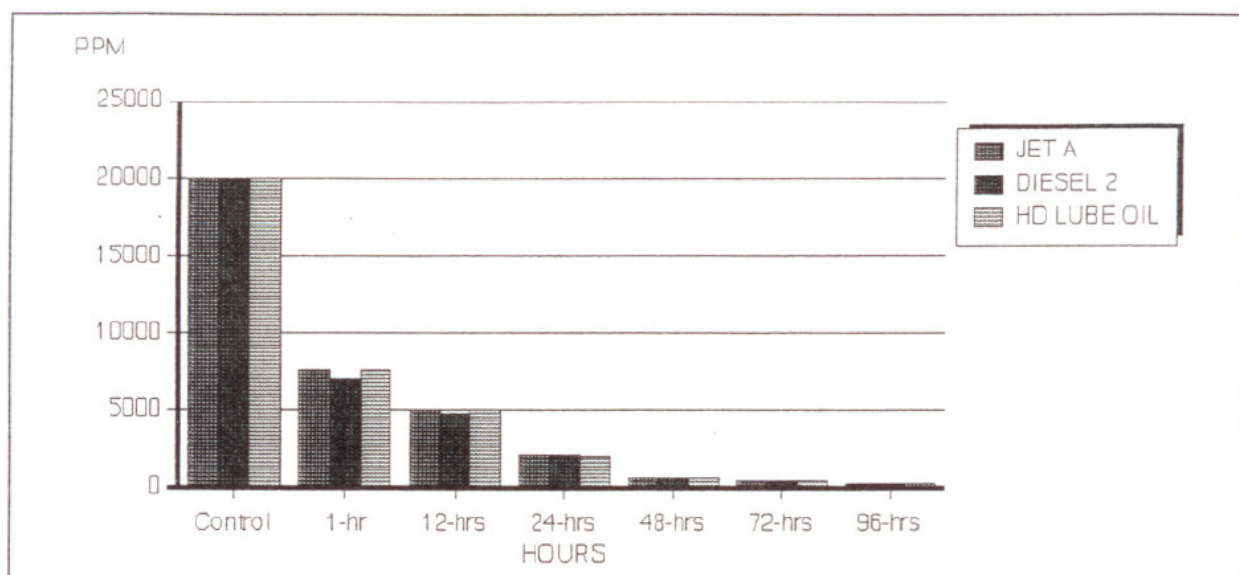


FIGURE 2



METAL CONTAMINANT PRECIPITATION

Another benefit of Bilge Water Treatment use is its ability to break the matrix which suspends metals. *FIGURE 3* quantifies metal precipitation from effluent of a metal fabrication company.

METALS PRECIPITATION

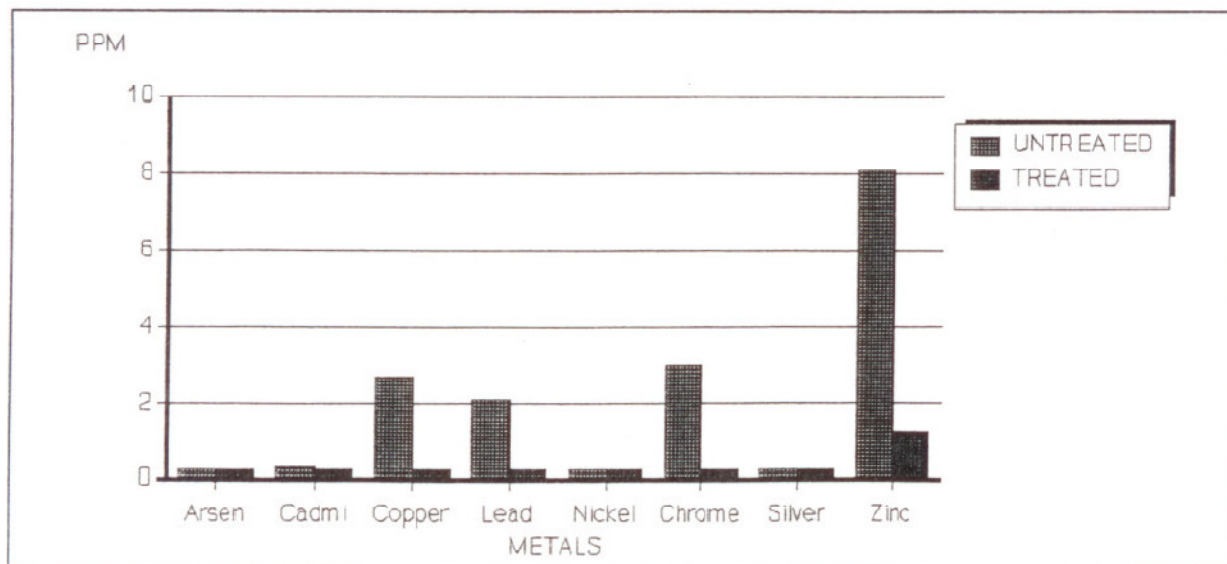


FIGURE 3

FLAMMABILITY REDUCTION

Open cup flash points and auto ignition temperature tests quantify the ability of Bilge Water Treatment to render petroleum products non-flammable and dramatically increase their auto ignition temperatures (see *FIGURES 4* and *5*). Bilge Water Treatment alters the molecular structure which dramatically reduces flammability and the elimination of volatile organic compounds (VOC's) and their odors. The importance of this feature cannot be overstated in terms of shipboard safety and survivability. In addition, the use of other ecologically incompatible materials, such as AFFF Foam may be significantly reduced.

OPEN CUP FLASH POINT TESTS

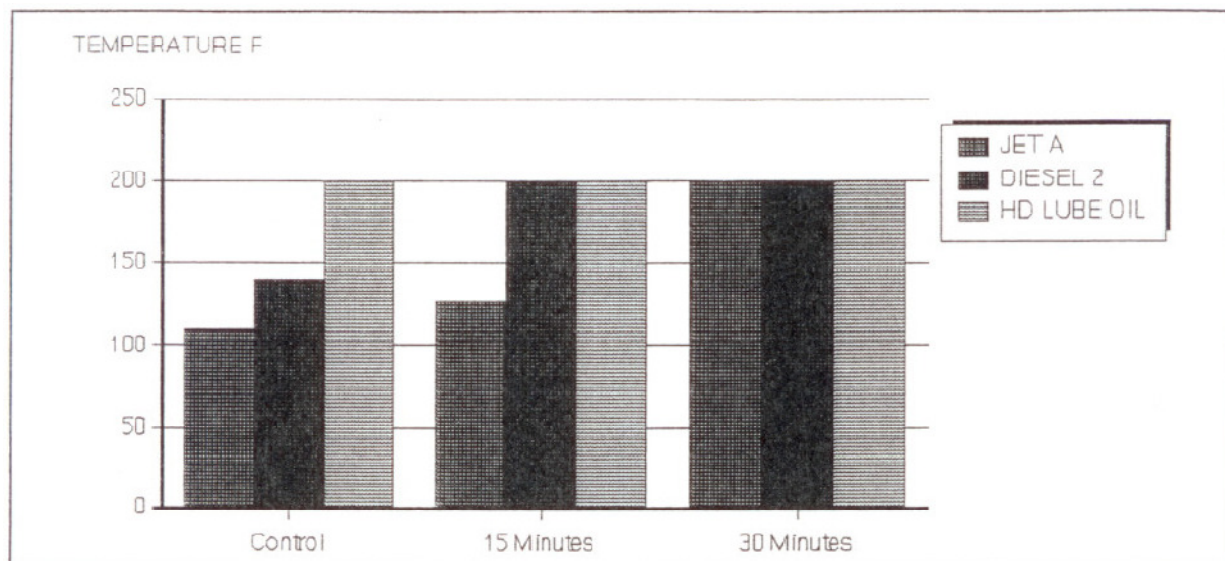


FIGURE 4

AUTO IGNITION TESTS

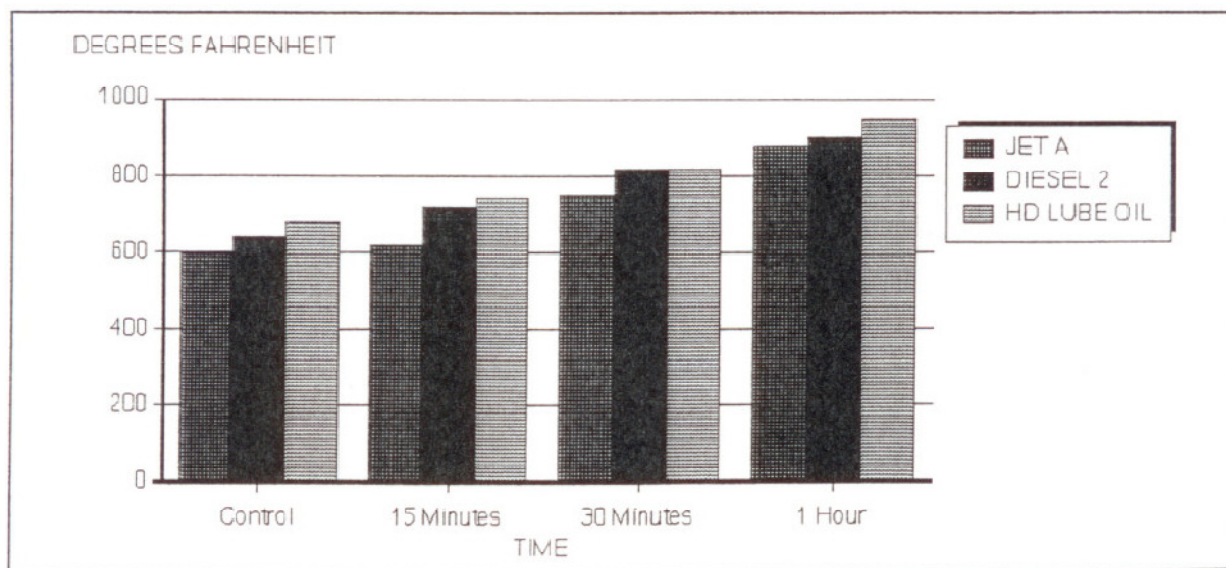


FIGURE 5

OTHER POSSIBLE APPLICATIONS

Initial Actions for Fire Fighting. i.e .. cover the fire hazard with a layer of AFFF and flash point reducing product.

- Fuel or Oil Tank Cleaning
- Engine / Generator Wipe Down
- Galley Drain Line Unclogging
- CHT Tank Cleaning / Degreasing
- Flight Deck Cleaning (should be able to hose it over the side)
- Catapult Trough Cleaning

CONCLUSION

Bilge Water Treatment is the leader in bilge maintenance technology due to its new, safe, fast-acting, and cost effective formulation. Your bilges can be oil free, VOC free, noxious odor free, and have increased non-flammability. Bilge Water Treatment and the whole Neozyme family of products are serviced by skilled representatives. Our customer satisfaction has been earned through excellent service, continuous custom formulation and a commitment to ongoing research.