

**Is your Diesel Fuel an  
ASSET or a LIABILITY ?**

# **ASSETS THAT REQUIRE EMERGENCY BACK UP POWER GENERATORS**

**Data Processing Centres**

**Prisons**

**Hospitals**

**Banks**

**Government Installations**

**Utility Companies**

**Commercial Buildings**

**Railroads**

**Waste Companies**

**Radio/TV**

**Retirement Homes**

**Police & Fire Stations**

*When the lights go out... ...It's too late to clean your fuel !!!*

# **EXTENDED POWER OUTAGES CAN BE DISASTEROUS**

**Cyclones**

**Tsunamis**

**Floods**

**Bush Fires**

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# GLOBAL PACE of BUSINESS

- Our society is now “ALWAYS ON”
- Everything is required to be **lightning fast**
- Switchgear on back up power systems can change from Utility Power to Emergency Power in NANOSECONDS

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# RISK MANAGEMENT

## **Diesel Generator Systems secure Assets**

### **Extended Power Outages cause;**

- Disruption of Business**
- Loss of Customers and \$\$\$\$**
- Loss of Life**

*When the lights go out... ...It's too late to clean your fuel !!!*

But only if it starts when required



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**Are you confident that your  
Diesel Fuel Generator  
will start when required?**

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# IDENTIFYING THE RISK



# STORED Diesel Fuel



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# CLEANER ENVIRONMENT

- **International Demand for Cleaner Air**
- **Reduced Sulphur Levels in Diesel Fuels**

1500 ppm down to 10 ppm

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# SULPHUR CONTENT of ULS DIESEL

Pre 2000 was around 1500ppm

## 2009

Australia - less than 10 ppm

Europe - less than 10 ppm

USA - less than 15 ppm

## 2013

China - less than 150 ppm

Beijing - less than 10 ppm

**Sweden - to be Zero (less than 1 ppm) by 2003**

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## REDUCED STABILITY of ULSD

- **Reduction in Sulphur levels (<10ppm)**
- **Reduction in Stability & Lubricity**
- **Increased Breakdown (< 6months)**
- **“Accelerated Ageing”**

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ACCELERATED AGEING

# ACCELERATED AGEING

- **Water**
- **Temperature**
- **Biological Matter**
- **Particulate Matter**
- **Agitation**
- **Oxygen**

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# WATER

- **Moisture, condensation, humidity, etc.**
- **Water allows growth of fungus & bacteria**
- **Organic acids as by-products**

**Most common cause of Accelerated Ageing**

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# TEMPERATURE

**Diesel Fuel at 30 C can hold 100 ppm of water**

**Diesel Fuel at 15 C can only hold 80 ppm of water**

**Eg. 20,000 L tank could collect 400 ml of water for each 15 C temperature drop.**

**More than enough to enable viable fungal growth.**

- **Remote Mining Sites (temperature range)**
- **Marinas (humidity)**

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# FUNGUS & BACTERIA

- **FUNGUS & BACTERIA – produce gummy deposits & particulate matter forming brown-black sludge in base of tanks of tanks.**
- **Most active between 20 and 30 C**
- **Adverse conditions can result in Accelerated Ageing in as little as 6 weeks.**

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# PARTICLES

- **Rust, Dust, Metals, Fungus,**
- **Suspended in Fuel, especially at fuel/water interface.**
- **Settle out to bottom of tank as a Sludge.**

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# Sludge inside bottom of tank



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# Bio Sludge from Filter



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# EXCESSIVE AGITATION

- **Poorly designed recycle pumps cause AGITATION**
- **Pump speed and duration are critical.**
- **Recycle 25% of Tank capacity, once a week.**

**Eg.  $40,000 \text{ L} \times 25\% = 10,000$  over 8 hours =  $1250 \text{ L/Hr.}$**

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# OXYGEN

- Diesel is a combustible Fuel (not flammable)
- Most tanks are vented to atmosphere
- Accelerated Ageing Increases with presence of Oxygen.

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# MANAGING THE RISK

## 4 STEPS FOR GOOD MAINTENANCE

1. **Sample Regularly**
2. **Add Biocide**
3. **Add Stabilizer**
4. **Remove Water & Sediment**

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# AUSTRALIAN STANDARDS FOR STORAGE, HANDLING AND DISTRIBUTION AND TESTING OF DIESEL FUELS

- **ASTM D4176 - Visual Rating**
- **ASTM D6304 (0.01% wt) - Water Content**
- **ASTM D6217 (1 micron) - Particulate Matter**
- **ASTM D2274 - Oxidation Stability Test**
- **NFPA-110 - Standard for Emergency and Standby Power Systems**

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# SAMPLING & ANALYSES

## Site Samples

- Visual Rating (ASTM D4176)
- Fungal Monitoring

## Laboratory Samples

- Water Content (ASTM D6304)
- Particulate Matter (ASTM D6217)
- Oxygen Stability (ASTM D2274)

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# Visual Rating >3



*When the lights go out... ..It's too late to clean your fuel !!!*

# Visual Rating < 1



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# Fungal Monitor & Bacon Bomb



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AVOID THE RISK

# EMERGENCY POWER SYSTEMS (EPS)

- **Valuable Asset (Switch Gear, Generator, Stored Diesel Tank)**
- **Should be managed correctly.**

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# EMERGENCY POWER SYSTEMS (EPS) FAILURE

**The two most common causes;**

**DIRTY FUEL**

**DEAD BATTERIES**

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# Dirty – Clean Diesel Fuel



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# **DIRTY FUEL & DEAD BATTERIES (EPS) FAILURE**

**Both are easy to eliminate**

**Both are inexpensive components**

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**ELIMINATE THE RISK**

**EMERGENCY POWER GENERATOR SYSTEMS  
should include an**

**AUTOMATIC DIESEL MAINTENANCE SYSTEM**

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# **AUTOMATIC DIESEL MAINTENANCE SYSTEMS**

- **Ensure Fuel is in Optimum condition 24/7/365**
- **Alert operator for attention**
- **Recycle from lowest point**
- **Include several stages of filtration & water separation**
- **Treat 25% of tank capacity once a week (slowly)**

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# Fuel Maintenance System – 1,000 L/Hr.



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# CONCLUSIONS

***Imagine*** - a power failure in a major hospital,  
emergency power generator starts up,  
power is quickly restored, but dirty fuel is  
feeding the generator.  
Very soon the generator coughs and stops!...

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## EXTENDED POWER OUTAGE

- **Operating Theatres,**
- **Life Support Machines,**
- **Lifts and Lighting,**
- **Communications & Computer Records**

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**THIS COULD HAVE BEEN PREVENTED**

**SIMPLY & ECONOMICALLY**

**By making sure your Diesel Fuel is  
CLEAN & DRY at all times.**

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## PARTING THOUGHT

**When does your ASSETT  
become a LIABILITY?**

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**You really do not know,  
until it is too late.....**

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