SALAM ALEIKUM! GOOD MORNING!

Prepared by Dr. Jan Hedberg January 2013



TYPICAL WASTE TYPES

IN THE OIL INDUSTRY



HAZARDOUS WASTE:

> OIL/CHEMICAL CONTAMINATED SOLIDS AND LIQUIDS

> NUOMEROUS CHEMICALS & OIL PATCH MATERIALS

> SMOKE FROM FIRES; OPEN AIR BURNING OF WASTE!!!

DRILLING MUD

> NORM



NON-HAZARDOUS WASTE:

HOUSEHOLD WASTE

> OFFICE WASTE

> NORM-FREE & UNCONTAMINATED SCRAP

> NON-CONTAMINATED TIRES, PLASTIC, PAPER, WOOD

BUILDING MATERIAL EXCEPT ASBESTOS



BASIC RESPONSIBILITIES OF THE OIL INDUSTRY



EASIEST RESPONSIBILITIES:

- AVOID WASTE GENERATION OR PRODUCTION WHEREVER AND WHENEVER POSSIBLE. REMEMBER: GENERATOR RESPONSIBILITY!
- CONTAIN ALL GENERATED WASTE, PREVENTING IT FROM CONTAMINATING AIR, WATER OR SOIL. POLLUTER PAYS PRINCIPLE!!
- ALWAYS DEMAND A TREATMENT / DESTRUCTION / RECYCLING <u>CERTIFICATE</u> FROM <u>EGA LICENSED ENVIRONMENTAL COMPANY</u> WHEN WASTE TAKEN OFFSITE. LIABILITY STAYS WITH GENERATOR!
- TREAT GENERATED WASTE AT SOURCE IN THE LONG TERM, WHEN COST EFFECTIVE. TANK/CRUDE SLUDGE; COST SAVINGS!!



SOLID WASTE:

> OIL OR CHEMICAL CONTAMINATED SOLIDS & SOILS

> SLUDGES

> EVAPORATION PIT BOTTOMS & SHORES

NORM SCALES & BLACK DUST

> CHEMICALS



LIQUID WASTE:

> OIL-WATER MIXTURES

> DRILLING MUDS (OBM & WBM)

> WASH & WASTE WATER

> OIL LEAKS & SPILLS

> CHEMICALS



WASTE GASES:

STRANDED GAS (IS NEVER WASTE, ONLY TREATED SO)

> BONFIRES (NOx, SOx, CO2, DIOXINS & FURANS)

INDUSTRIAL GASES

PRODUCED CO2

FURNISSES (NOx, SOx, CO2)



ENVIRONMENTAL

IMPACTS

OF THE OIL INDUSTRY



IMPACT ON OUR AIR:

> FLARING OF STRANDED GAS (80 BB\$)

> GAS LEAKS FROM PRODUCTION SYSTEMS

> FIRES; OPEN AIR BURNING OF WASTE

FURNISSES; NOx, SOx, CO2

PRODUCED CO2



AIR POLLUTION SOLUTIONS:

> FLARING OF STRANDED GAS (80 BB\$) -GTL, REINJECT, PIPE

GAS LEAKS FROM PRODUCTION SYSTEMS - INSPECT & MAINTAIN

FIRES; OPEN AIR BURNING OF WASTE - STOP NOW!! Poly-Chlorinated-Di-Benzo-Dioxins / -Furans

> FURNISSES -LOW NOX BURNER, SOX SCRUBBER, GAS FUEL

> PRODUCED CO2 - REINJECT



IMPACT ON OUR SOIL & (GROUND) WATER: PIPELINE AND TANK LEAKS > OIL IN PRODUCED WATER > OIL SPILLS; LAND & SEA **DISCARDED OIL AND SLUDGES** > OIL PITS AND LAGOONS EVAPORATION PIT SHORES & BOTTOMS



SOIL & (GROUND) WATER POLLUTION SOLUTIONS:

> PIPELINE AND TANK LEAKS - FREQUENT INSPECTIONS

> OIL FROM PRODUCED WATER -SEPARATE FULLY & TREAT

> OIL SPILLS; LAND & SEA - PREVENTIVE MEASURES/CLEAN

> DISCARDED OIL AND SLUDGES - TREATMENT

> OIL PITS AND LAGOONS - PUMP OUT & TREAT

EVAPORATION PIT SHORES & BOTTOMS -BIOLOGICAL TREATMENT



IMPACT ON OUR FLORA & FAUNA:

> DISTURBING BIRDS & ANIMALS

> DESTROYING VEGETATION

> POISIONING ANIMALS & BIRDS

DESTROYING HABITATS





FLORA & FAUNA PROTECTION:

> DISTURBING BIRDS & ANIMALS -CAREFUL DURING WORKS

> DESTROYING VEGETATION - STAY ON ROADS

> POISIONING ANIMALS & BIRDS - AVOID OIL SPILLS & CHEMICALS

DESTROYING HABITATS - AVOID SENSITIVE AREAS

DEFORESTATION -CUT NO TREE DOWN!!



IMPACT ON OUR INHABITANTS & HERITAGE:

> DISRUPT VILLAGE WAY OF LIFE

> DEMONSTRATE INEQUALITIES

DAMAGE HISTORICAL SITES

> IMPACT GRAZING AND ANIMAL HUSBANDRY



PROTECTING OUR INHABITANTS & HERITAGE:

> DISRUPT VILLAGE WAY OF LIFE - PURCHASE LOCALLY

> DEMONSTRATE INEQUALITIES - EDUCATION

> DAMAGE HISTORICAL SITES -DIRECTIONAL DRILLING

IMPACT GRAZING AND ANIMAL HUSBANDRY -AVOID FAUNA



IMPACT OF NATURALLY OCCURING RADIOACTIVE MATERIAL:

> ACCOMPANYING PRODUCED WATER & GAS

> CANNOT BE SEEN OR SMELLED

> CAUSING CANCER

LAWSUITS BASED ON IGNORANCE

> EXPOSURE FROM IGNORANCE



AVOID NORM EXPOSURE (Naturally Occuring Radioactive Material):

- > ACCOMPANYING PRODUCED WATER CLEAN PIPES & TANKS
- > CANNOT BE SEEN OR SMELLED UNINTENDED EXPOSURE
 - > CAUSING CANCER VERY DANGEROUS
 - > LAWSUITS BASED ON IGNORANCE EDUCATE PUBLIC
 - > EXPOSURE FROM IGNORANCE EDUCATE WORKERS



ENVIRONMENTAL PROTECTION **TECHNOLOGIES & FACILITIES AVAILABLE TO LIBYA**

HIGH TEMPERATURE

HAZARDOUS WASTE

DESORPTION (INCINERATION)

& OXIDATION SYSTEM

THE SUSTAINABLE LIBYAN SOLUTION

GREEN OIL C. all

GREEN OIL LIBYA

SMOKE STACK SCRUBBER QUENCH SYSTEM OXIDIZER

FILTER BOX

DUAL CYCLONES

ROTARY KILN

CONTROL ROOM

OVERVIEW

GREEN OIL LIBYA's High Temperature Desorber and Oxidizer System is designed to remediate soil contaminated with oil and distillates, as well as incinerating and destroying sludge, PCBs, POPs, medical waste and hazardous organic chemicals.

This is achieved by rapidly volatizing (desorbing) or incinerating these wastes in the Rotary Kiln, then thermally destroying the resulting gases in the High Temperature Oxidizer, and finally quenching and cleaning the resulting combustion products in the Air Pollution Control System (APC). Water in the waste is recovered. Dust carried with the gases are removed in the Cyclones and Bag House Filter units.





WASTE FEEDING

Waste in need of treatment is transported to the Desorber/Oxidizer Plant. Soil is mixed, and with a front-end loader taken from the contaminated soil staging area into a hopper. The soil is conveyed to an inclined conveyor. Medical waste is placed directly onto the conveyor.

The belt scale provides soil feed rate and totalized weights to the unit's control system. The feed belt feeds the contaminated soil or waste to the Stainless Steel Counter Flow Rotary Kiln Desorber/Incinerator unit.

CONTROL HOUSE AND SOIL FEEDER

CONTROL HOUSE AND FEED UNIT

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CONTROL HOUSE, HOPPER, CONVEYOR SYSTEM & ROTARY KILN



THERMAL DESORBER

Soil or waste is fed into the primary treatment unit (THERMAL DESORBER ROTARY KILN) where the internal flights lift and veil the waste through the hot gas stream produced by the direct-fired primary burner. Waste flows counter-currently to the burner flame and airflow in the primary treatment unit.

The soil or waste ashes discharges the primary treatment unit at a temperature of 180 to 400° C depending on feed specifications and regulatory objectives.

Soil or waste residence time in the primary treatment unit is variable and is function of the unit rotation speed, inclination, and depth of fill desired in the system. Typical values are 6-9 minutes.

THE ROTARY KILN DESORBER

BURNER TEST

GREE



ROTARY KILN ON THE ROAD

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5 T/HR ROTARY KILN DESORBER IN ASSBEA

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OPERATION OF CYCLONES

The evaporated organics and water, along with fine dust released by the desorption or incineration process, are carried with the Rotary Kiln exhaust gases to a Dual Cyclone Dust Removal System. The Cyclones are capable of handling the primary treatment unit exit gas and fines. They can be operated singly or in parallel depending on the dust load in the exhaust gases. Typical Cyclone exit gas temperature ranges from 150 to 300° C.



BAG HOUSE FILTER UNIT

Conditioned off-gas exits the Cyclones and is discharged to the Bag House Filter Unit. 520 filter bags, cleaned by pneumatic backpressure, remove any remaining dust in the gas. When not required due to waste type, the filters are by-passed, and the Bag House acts as a giant knock-out chamber. The high temperature fan on the Bag House produces a negative pressure throughout the primary system, and has a capacity of 60,000 to 120,000 m3/hr at 5" to 10" of static pressure.

The gas from the Bag House is discharged and transferred to the Thermal Oxidizer.

BAG HOUSE FILTER UNIT

GREEN OIL



BAG HOUSE WITH 520 FILTER UNITS

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HIGH TEMPERATURE THERMAL OXIDIZER

The gas stream output from the Bag House Filter Unit is routed into a High Temperature Thermal Oxidizer.

The Thermal Oxidizer consists of a refractory lined combustion chamber utilizing a 50 MMBTU direct kerosene fired burner with a design operating temperature of 1200° C at minimum 2 seconds retention time and 3 % excess oxygen, which reduces the organic content of the gas stream with a destructive removal efficiency (DRE) capable of reaching 99,9999%. The unit connects to an insulated crossover duct leading to the Quench and APC (Air Pollution Control) System.

GREEN OIL

HIGH TEMPERATURE THERMAL OXIDIZER

GREEN OIL

1200°C, 2 SECONDS RESIDENCE TIME HIGH TEMPERATURE OXIDIZER

AIR POLLUTION CONTROL SYSTEM (APC)

This is the most important part of the entire plant. Off gases from the Thermal Oxidizer are transferred to the Quench and then to the APC System. The Oxidizer off-gas enters a Quench and Catalytic Wet Scrubber which removes very quickly the bulk of the heat and water vapor from the gas stream, and any contaminants. Cooled and recirculated water with e.g. caustic soda as catalyst for chlorinated waste is injected into the Quench/Wet Scrubber through a series of nozzles, dropping the temperature of the vapor stream rapidly to slightly below water boiling temperature.

The resulting liquids at the bottom of the Quench and Scrubber will be pumped to the Water Cooling Tower and flow back into the Cooling Water Tanks. Any particulate that passes through the Cyclone, Bag House and Oxidizer will settle out from the water in the cooling tanks.



SMOKESTACK, SCRUBBER, QUENCH SYSTEM, OXYDIZER & CYCLONE

AIR POLLUTION CONTROL SYSTEM				
Continuous Monitoring			Limit	Typical
1.	O 2	(%)	>3	10-15
2.	CO	(mg/Nm3)*	50	10-15
3.	VOC	_‴_	10	1-2
4.	H ₂ O	_‴_	measure	
5.	Dust	_‴_	10	1-2
6.	HCI	_‴_	10	1-2
7.	Temperature (°C)		1200	1200
8,	Reside	ence Time (sec)	>2	>2
*dry gas: 11% Op 273°K: 101.3 kPa				

SCRUBBER, QUENCH, OXYDIZER, BAGHOUSE, CYCLONE, KILN, CONTROL HOUSE



GREEN OIL'S FACILITIES IN ASSBEA







Green Oil Libya

Savings Bank Building, 145 Haiti Street, Tripoli, Libya

Holds Certificate No: 50471763

and maintains a management system that has been assessed and registered by QMS Global, Inc. as conforming to the requirements of:

ISO 9001:2008 & ISO 14001:2004

The Integrated Management System is applicable to:

Provider of incineration and hazardous waste treatment services

IAF Codes: 34/24 Certificate Issue Date: June 17, 2010 Initial Certification Date June 17, 2010 Valid Until: June 17, 2013

For QMS Global:



President, QMS Global, Inc.

This certificate remains the property of OMS Global at all times. Certificates are invalid without raised seal. Lack of fulfillment of conditions as set forth in the OMS Certification Regulations or Contract may render this certificate invalid. To check its validity visit <u>www.CMS.set</u>. This is not a legal document and cannot be used as such.

QMS Global, Inc. . Boca Raton, FL . USA





GREEN OIL LIBYA:

BIO-MICROBIAL

REMEDIATION



Bio-Microbial or Biological Treatment is used for contaminated soil under certain conditions. Typical usage is for gas stations, pipelines or tank storage facilities where light hydrocarbons have leaked into the underground, and contaminated soil as well as ground water.

Deep contamination or presence of facilities on the surface favor biological remediation. Treatment limitations are low level of contamination, light hydrocarbons, and high soil permeability (sand).

Although normally less expensive than desorption, treatment takes a long time (typically 2-3 years), and does not normally achieve as good results as desorption.

MICROBIAL TESTING AND ADAPTATION

Bacteria taken in soil samples from the site to be treated are isolated, tested, adapted and fermented in the laboratory, and then produced in large quantities on site for injection into the ground. To adapt bacteria to digest specific hydrocarbons may take 2000 to 6000 generations.



MICRO-BIOLOGICAL TREATMENT

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GREEN OIL LIBYA:

HAZARDOUS MEDICAL WASTE

TREATMENT & DISPOSAL

SYSTEM IN PREPARATION









GREEN OIL LIBYA'S 2,500 m² MEDICAL WASTE TREATMENT AND STORAGE WAREHOUSES AT ASSBEA

USED LUBRICATING OIL COLLECTION

FARIS AL KHALIJ LIBYA:

 COLLECTING USED OIL FROM GAS STATIONS, GARAGES, COMPANIES AND INDUSTRIES SINCE 1994
COLLECTING WASTE HYDROCARBONS FROM INDUSTRIES & OIL COMPANIES GREEN OIL LIBYA is a Law 5 joint company between FARIS AL KHALIJ, a Libyan company with 18 years of operational experience in the environmental field, and a specialist in collection of used and waste hydrocarbons; and GREEN OIL SA, a Greek company with almost three decades of specialized experience in collecting, transporting, transferring, treating and refining waste and used hydrocarbons, and oil-water mixtures.

NORM (NATURALLY OCCURING RADIOACTIVE MATERIALS):

GREEN ENVIRONMENT LIBYA

 > LIBYAN OIL INDUSTRY NORM SURVEY CONTRACT WITH PETROCANADA
> PREPARE NORM WASTE CLEANING, STORAGE & HANDLING FACILITIES

RECYCLING PLANTS IN LIBYA:

> RUBBER TIRES > PLASTIC > SCRAP > PAPER > WOOD > ACID BATTERIES > (GLASS)

EXPORT FOR RECYCLING:

> USED LUBE & WASTE HYDROCARBONS > DRY BATTERIES > ELECTRONIC SCRAP > NEON/MERCURY LIGHT SOURCES > PRINTER CARTRIDGES > CATALYSTS > BASED ON THE BASEL CONVENTION AND WASTE PRINCIPLES

THE EARTH IS IN YOUR HANDS

THE EARTH IS IN YOUR HANDS

PROTECT IT WELL FOR ALL OUR CHILDREN

THE EARTH IS IN YOUR HANDS

PROTECT IT WELL FOR ALL OUR CHILDREN

THANK YOU FOR ALWAYS REMEMBERING THIS

GREEN OIL LIBYA GREEN ENVIRONMENT LIBYA FARIS AL KHALIJ LIBYA

SUSTAINABLE ENVIRONMENTAL SOLUTIONS FOR HAZARDOUS WASTE

THANK YOU FOR YOUR TIME & ATTENTION