



Studi Tecnologie Progetti S.p.A.
Engineering & Contractor



AIDIC – Associazione Italiana di Ingegneria Chimica

Gruppo di lavoro “Tecnologie Ambientali Sostenibili”
Presidente del GdL Ing. Carlo Gustavo Lombardi

LA RIGENERAZIONE DEGLI OLI MINERALI ESAUSTI **UN INVESTIMENTO DI SUCCESSO**

Relatore: Ing. Carlo Gustavo Lombardi

Facoltà di Ingegneria di Roma “La Sapienza”
22 Aprile 2016



USED LUBE OIL REREFINING

Used lube oil is a mixture of different types and grades of used lubricants, various contaminants and degradation products coming from motor crankcases and industry users.

Used Lube Oil is classified as toxic and hazardous waste to be properly disposed according to Art.21 of Waste Framework Directive 2008/98/EC and subject to the following requirements:

- Used Lube Oil shall be segregated and collected, not allowed to be dumped.
- Used Lube Oil shall be treated in accordance with Articles 4 (waste hierarchy) and 13 (protection of the environment and human health) of the Directive
- Used Lube Oils classified according to the specification limits of Tab.C.1.3, shall not be blended if such mixing impedes their treatment.
- Used Lube Oil treatments (Re-refining/Combustion/Thermal Incinerator) are established according to the level of contamination as per Tab. C.1.3.

USED LUBE OIL REREFINING

Tabella C1.3 – Categorie merceologiche degli oli usati

Metodo di analisi	U.M.	Oli usati rigenerabili			Oli usati per combustione	
		Scuri cod. 01	Ex. Trasf. Cod. 02	Chiari cod. 6	Scuri cod. 03	Scuri cod. 13
Contenuto in acqua (1) NOM 7-70 ASTM D 95	% peso	max 15	max 2	max 10	max 15	max 15
Densità a 15 °C (P. tal quale) NOM 42-83 ASTM D 1298 (1)	kg/L	max 0,920	max 0,895	max 0,900	max 0,980	max 0,980
Sedimenti totali (1) NOM 112/71 ASTM D 2273	% peso	max 3	max 0,5	max 0,5	max 3	max 3
Viscosità (1) NOM 46-71 ASTM D 445	°E a 50°C	min 1,8	max 2	min 2,1	--	--
PCB/PCT (1) CEI 10/19 ASTM D 4059	ppm	max 25	max 25	max 25	max 25	max 25
Cloro totale (1) NOM 98-72 ASTM D 1317	% peso	max 0,5	max 0,2	max 0,5	max 0,6	max 0,6
Zolfo (1) NOM 97-80 ASTM D 1552	% peso	max 1,5	max 1,5	max 1,5	max 1,5	max 1,5
Diluenti (1) NOM 39-90 ASTM D 322	% volume	max 5	max 3,5	max 5	--	--
Piombo + zinco (1) IRSA 64, Vol. 3, N° XX, Pag. 10	mg/kg	max 4.000	max 4.000	max 4.000	--	--
Cd+Cr+Ni+V (1) IRSA 64, Vol.3, N° XX, Pag. 10	mg/kg	max 50	max 50	max 50	max 100	max 100
Vanadio IRSA 64, Vol. 3, N° XX, Pag. 10	mg/kg	--	--	--	max 10 (4)	--
Numero di neutralizzazione (1) NOM 86-88 ASTM D 664 (2)	mg KOH/g	max 3,5	max 3,5	max 3,5	--	--
Numero di saponificazione (1) NOM 81-71 ASTM D 94 (2)	mg KOH/g	max 18	max 15	max 18	--	--
Punto d'infiammabilità (1) NOM 83-71 ASTM D 92	°C	--	--	--	min 90	min 90
Piombo (1) IRSA 64, Vol. 3, N° XX, Pag. 10	mg/kg	--	--	--	max 2.000	max 2.000
Rame (1) IRSA 64, Vol. 3, N° XX, Pag. 10	mg/kg	--	--	--	max 500	max 500
Fluoro (1) NOM 98-72 ASTM D 1317 (3)	ppm	--	--	--	tracce	tracce
Ceneri (1) NOM 12-88 ASTM D 482	% peso	--	--	--	max 1,5	max 1,5
Colore ASTM D 1500	--	--	max 8	max 8	--	--

Note:

(1) Parametri contemplati dal D.lgs.95/92 e dal Decreto Ministero Industria N° 392/1996.

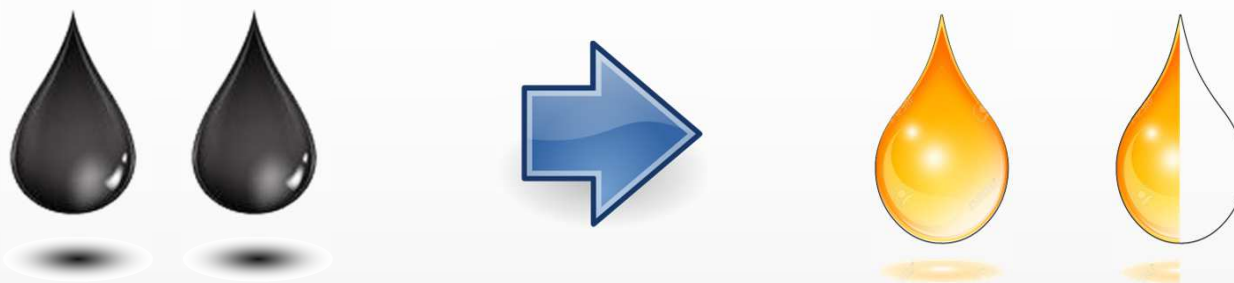
(2) Dopo perdita di riscaldamento (ASTM D 3607).

(3) Con elettrodo selettivo.

(4) Limite COOU.



2 ℓ OF USED LUBE OIL GIVE 1,5 ℓ OF RE-REFINED OIL



Re-refining of used lube oil is an economically attractive recycling method in terms of resources conservation and environment protection. It allows processing of hazardous and toxic material in a safe and effective way to recover a high quality oil product.

Used lube oil can be re-refined as many time as you like and this results in an attractive business opportunity while safeguarding the environment.

Re-refining can produce Base oils Group I, I⁺ and Group II or Heavy Marine Fuel and VGO as suitable feedstock to Refinery Units.

Used lube oil is collected at garages, maintenance shops, transportation companies and industries and the quality depends on local situation, seasonal consumption, collection source and organization.



LUBE OIL LIFE CYCLE

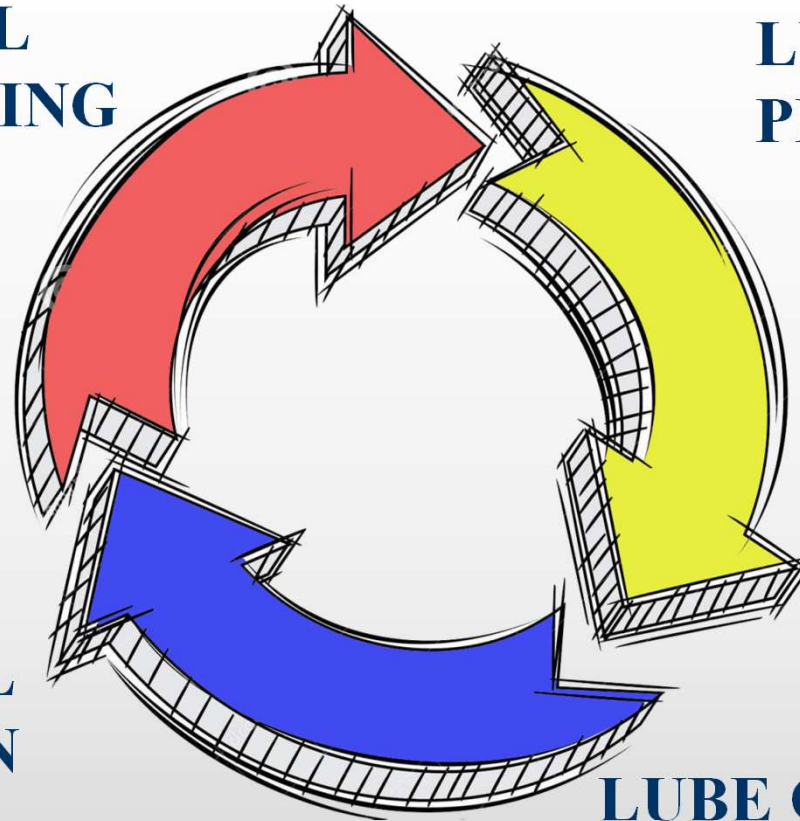
**USED OIL
REREFINING**

**LUBE OIL
PRODUCTION**

**LUBE OIL
MARKETING**

**USED LUBE OIL
COLLECTION**

LUBE OIL UTILIZATION





USED LUBE OIL CYCLE



**USED LUBE OIL
IS COLLECTED**



**SENT TO
RE-REFINING**



**TO PRODUCE BASE OILS FOR
LUBRICANTS PRODUCTION**



**REFILLING
LUBRICANT IN
THE ENGINE**





USED LUBE OIL RE-REFINING ADVANTAGES

25th
Anniversary



**ENVIRONMENT
PROTECTION**

**HIGH QUALITY
PRODUCTS AND
LESS DEPENDENCE
ON IMPORTED OIL**



**ENERGY CONSUMPTION OF
RE-REFINING IS LOWER
THAN FOR VIRGIN BASE
OIL PRODUCTION**

**RE-REFINING IS A
STRONG ECONOMIC
INCENTIVE FOR
ENVIRONMENT
PROTECTION AND
ENERGY SAVING**



7



LUBRICANTS CONSUMPTION AND USED LUBE OIL COLLECTION IN ITALY



Data of year 2014

- **383,000 t/y Lubricants consumption in Italy, of which**
 - **45.4% i.e. 174,000 t/y to Automotive Sector**
 - **54.6% i.e. 209,000 t/y to Industrial Sector**

- **Used Lube Oil vs. Lubricants consumption in Italy is about ~ 45%, i.e. 172,600 t/y of Used Lube Oil**



USED LUBE OIL REREFINING

- **More than 95% of the collected Used Lube Oil is sent to Re-refining**
- **About 5% of the Used Lube Oil is used as fuel (Cement Factory) or sent to Thermal incineration.**
- **115,000 t/y of Re-refined Lube Oil have been produced from 164,000 t/y of Used Lube Oil in 2014 by 5 Re-refining Plants in Italy.**



USED LUBE OIL RE-REFINING PLANTS IN ITALY



Company	Location	Plant Capacity (t/y)	Used Lube Oil treated (t/h) in 2014	% Capacity
Viscolube	Pieve di Fissiraga	130.000	83.000	64
Viscolube	Ceccano	84.000	42.000	50
Ramoil	Tavernanova di Castelnuovo (Na)	35.000	21.000	60
Siral	Nola	25.000	11.000	44
Siro	Corbetta (Mi)	11.000	7.000	64
		Tot. 285.000	Tot. 164.000	57,5



USED LUBE OIL COLLECTION

Collection of used lube oil is the starting point for a successful Re-refining.

Re-refining depends on collection effectiveness and used lube oil availability.

Efficient collection facilities are a necessity for Re-refining in relation to:

- Availability of used lube oil (quantity)
- Composition of used lube oil (quality)

**SUCCESS OF
RE-REFINING
DEPENDS ON THE
COLLECTION SYSTEM**

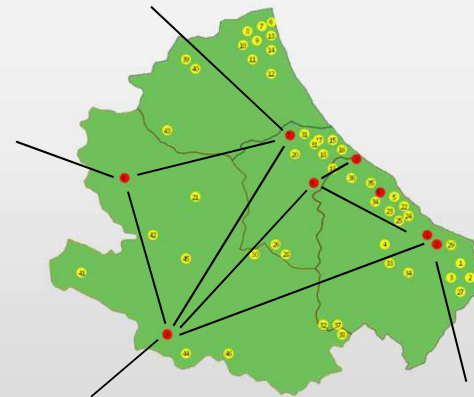




USED LUBE OIL COLLECTION STRATEGY



- Investigation on used lube oil providers
- Division of the territory in Areas and Sectors
- Storage capacity of collection centres
- Transport network and drivers formation
- Pre-selection tests
- Segregation of contaminants



USED LUBE OIL PRESELECTION TESTS

- | | |
|-----------------------------------|---------|
| ■ PCB / PCT, wt ppm | 25 max |
| ■ Cl, wt % | 0.5 max |
| ■ S, wt % | 1.5 max |
| ■ Saponification N°, mgKOH/g | 18 max |
| ■ Heavy fuel oil (drop test) pass | |
| ■ Fatty acids (lux test) | pass |





USED LUBE OIL RE-REFINING



Re-refining removes all the contaminants from used lube oil to recover base lube oil product.

During the last years many factors have obliged rerefiners to look for alternative Re-refining process, such as:

- increased use of additive packages in the formulation of lubricants and by consequence higher level of contaminants in the used oil
- increased amount of thermal degradation products due to longer mileage of the lubricants
- pollution problems related to the disposal of acid sludges and spent clay from the traditional acid/clay re-refining

Among the available today processes, STP Re-refining offers a low energy high yield operation, high quality products and absence of noxious wastes or by products.



USED LUBE OIL RE-REFINING



STP is **Pioneer** on Used Lube Oil Re-refining since 25 years.

STP has implemented several Re-refining Plants of different capacity worldwide and is continuously improving its technology to provide the latest generation Re-refining Process based on a unicum know-how.





USED LUBE OIL RE-REFINING PLANT

STP LIST OF REFERENCES

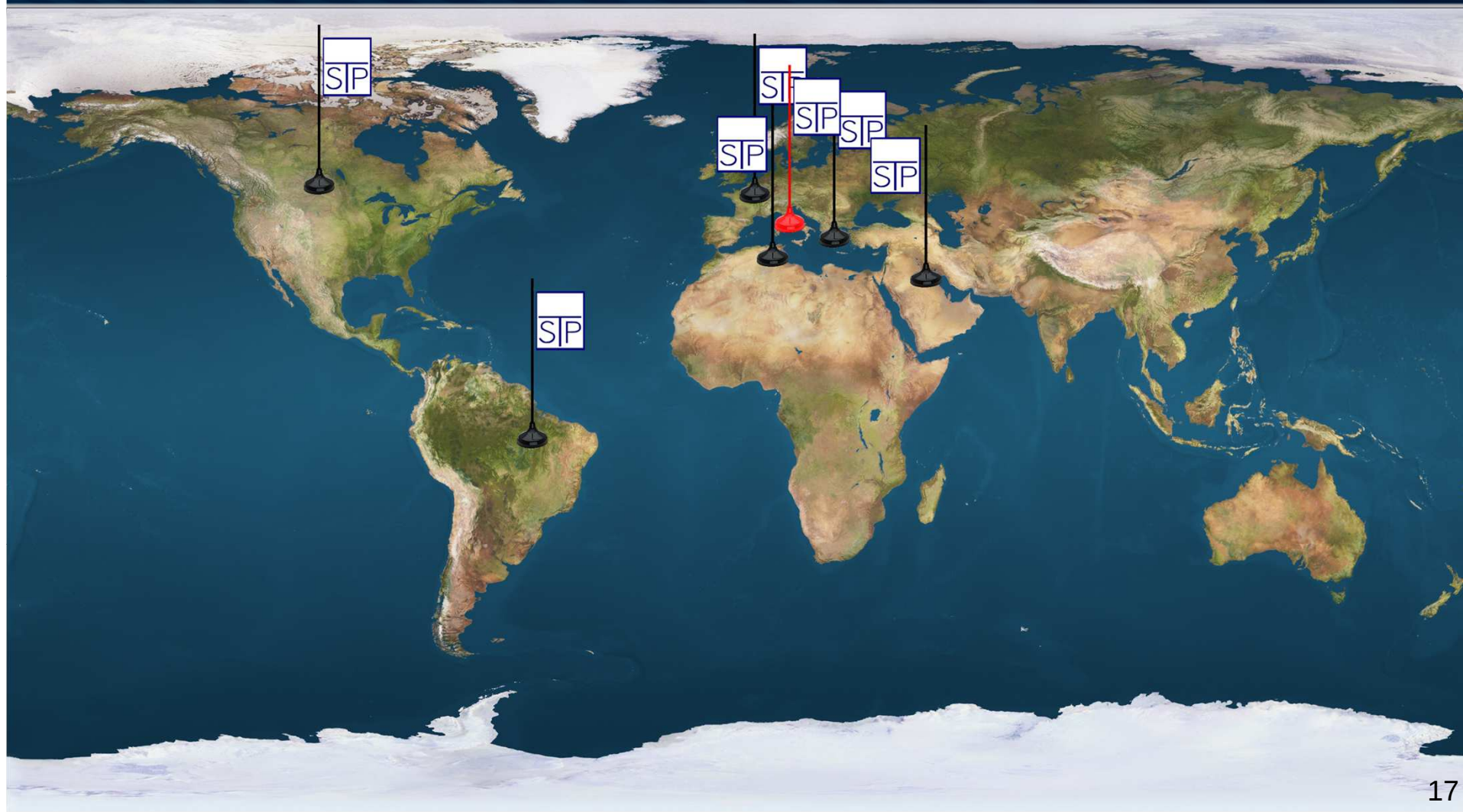


Pos.	Client	Location	Capacity TPY	Year
1	AKWA	Mohammedia, Moroc	15,000	2016
2	YUNITCO	Yanbu, Saudi Arabia	190,000	2016
3	KLOC, KSCC	Ahmadi, Kuwait	33,000	2014
4	VEOLIA ES	St. Hyacinth, Canada	60,000	2013
5	ECOIL Italia	Ferrandina, Italy	65,000	2013
6	OSILUB (TOTAL/VEOLIA)	Gonfreville L'Orcher, France	120,000	2012
7	SIRAL SpA	Nola, Italy	30,000	2008
8	KLOC KSCC	Ahmadi, Kuwait	27,000	2000
9	SOTULUB	Bizerte, Tunisia	20,000	1998
10	GRUPO LWART	Lençois Paulista, Brazil	60,000	1997
11	RAMOIL	Naples, Italy	30,000	1996
12	SOTULUB	Bizerte, Tunisia	16,000	1989
13	CYCLON HELLAS	Aspropyrgos, Greece	25,000	1985



STP USED LUBE OIL RE-REFINING MAP

25th
Anniversary



17



API DEFINITION FOR BASE OILS



Guidelines on Base Oil Quality Assurance and Base Oil Interchange classify base stocks into six **base stock groups** according to defined physical and chemical characteristics as follows:

Group I

Base stocks containing less than 90 mass percent saturates and/or greater than 0.03 mass percent sulphur and having a viscosity index greater than or equal to 80 and less than 120.

Group II

Base stocks containing greater than or equal to 90 mass percent saturates and less than or equal to 0.03 mass percent sulphur and having a viscosity index greater than or equal to 80 and less than 120.

Group III

Base stocks containing greater than or equal to 90 mass percent saturates and less than or equal to 0.03 mass percent sulphur and having a viscosity index of greater than or equal to 120.



USED LUBE OIL RE-REFINING

Group IV

Base stocks are polyalphaolefins (PAO)

Group V

All base stocks not included in Groups I, II, III, IV or VI.

Group VI

Base stocks are polyinternalolefins (PIO)

Property

Saturates Content

Viscosity Index

Sulphur Content

Test Method

ASTM D 2007

ASTM D 2270

ASTM D 2622, ASTM D 4294, ASTM D 4927, ASTM D 3120



STP RE-REFINING PROCESS

- Continuous plant operation
- High flexibility towards feedstock quality and composition
- High process yield. The lube oil recovery is more than 95% of the lubricant fraction present in the used oil.
- High separation selectivity, removal of contaminants and production of high quality base oils
- Low energy and low utility consumption
- High on-stream efficiency without corrosion, fouling, coking
- Environment safeguarding operation and no use of acid and clays
- Management of all odorous compounds to eliminate malodorous and toxic emissions
- Capital investment and operating cost highly competitive



UNIT OPERATIONS

1. DEHYDRATION

Used oil is preheated to remove water, gasoline, VOC, light contaminants (solvents, glycols, lighter organic). Water is sent to treatment and lights (gasoline) are used as substitution fuel.

2. GASOIL REMOVAL

Dehydrated oil is stripped under vacuum for light gasoil removal and flash point adjustment of lube oil.

3. VACUUM DISTILLATION

Oil from gasoil stripper is sent to vacuum distillation to recover vacuum distillate oil fraction from heavier contaminants.

Vacuum distillation is carried out under high vacuum conditions, high temperature and by thin film evaporator.

Thin film evaporator achieves high selectivity and oil purification from metals, heavy polymers, carbon, dust.



FOCUS ON THIN FILM EVAPORATOR



Thin film evaporator is a vertical cylindrical shell enclosed in an heating jacket with an internal rotor distributing a thin layer of oil on the heated wall, by means of rotating blades.

By the action of rotor (electrically driven) high turbulence and back mixing occur in the thin layer of the oil film and product degradation at high temperature is avoided.

Main features of thin film evaporator are:

- short residence time in order of few seconds;
- high heat transfer rate through the film;
- efficient and regenerative cleaning of the contact surface

Cracking and fouling problems are avoided by keeping low residence time, low wall temperature and high flow turbulence.

Lube oil is recovered as distillate while heavy components, additives, metals and degradation products are concentrated in the bottom residue.

FOCUS ON THIN FILM EVAPORATOR

■ OPERATING PRINCIPLE

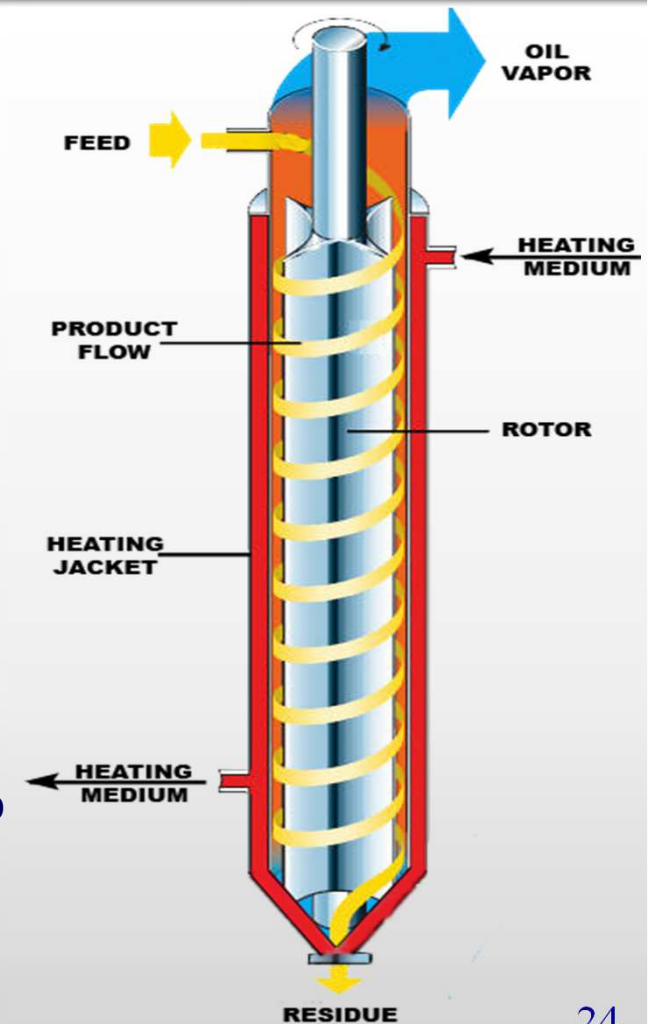
A Thin Film Evaporator consists of a cylindrical shell with internal rotor and external heating jacket

■ FEED

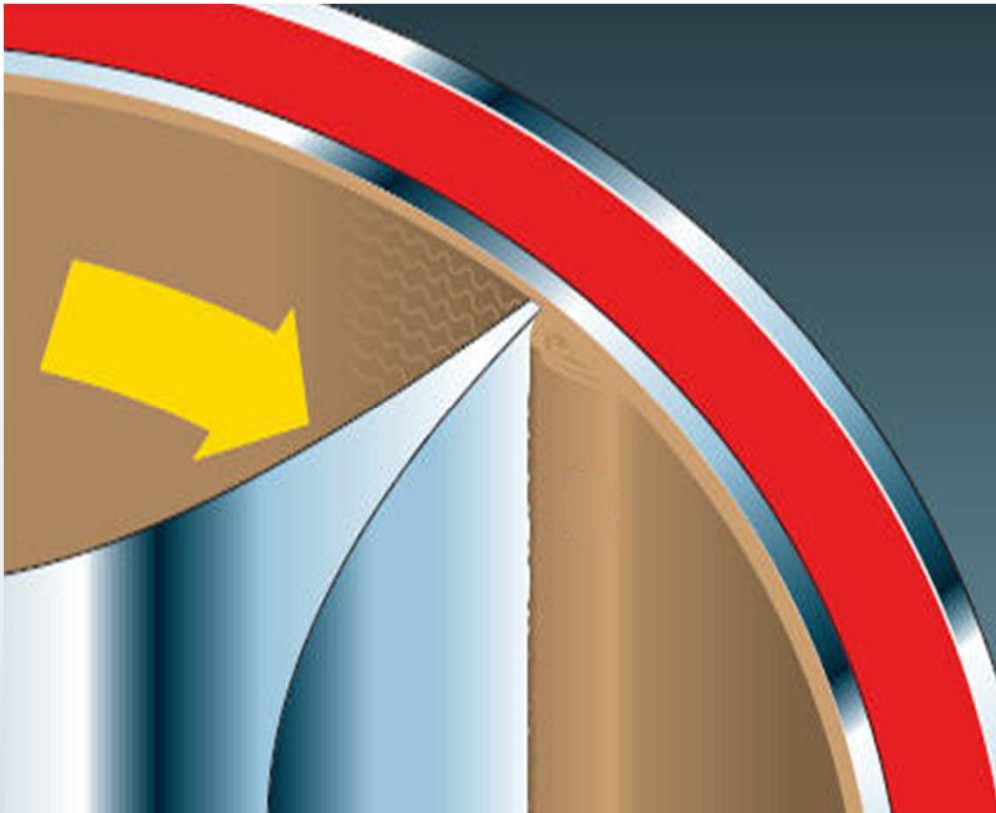
The feed is distributed by the rotor blades and spread on the heated wall to form an highly turbulent thin layer.

■ PRODUCTS

Oil fractions are evaporated and flow out up towards the top
Heavy components flow in a spiral path down to the bottom



FEATURES



- Short residence time and high turbulence in the film give high heat transfer coefficient and avoid overheating, cracking and fouling
- High evaporation rate is obtained by a simple pass
- High oil yield is achieved without degradation or polymerization of the oil
- High onstream factor and easy maintenance

UNIT OPERATIONS

4. FINISHING AND FINAL FRACTIONATION

Vacuum distillate is further finished to improve product quality.

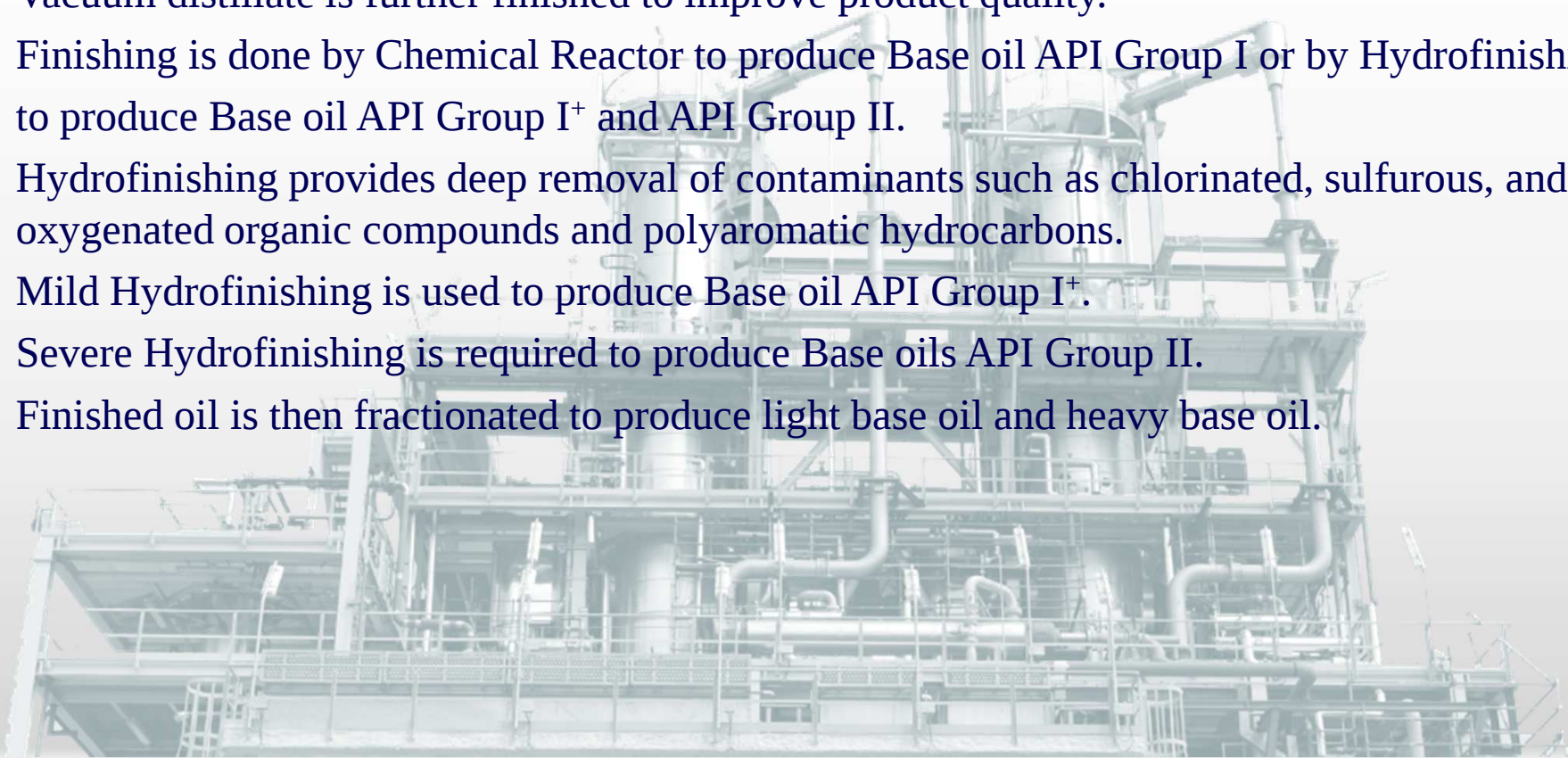
Finishing is done by Chemical Reactor to produce Base oil API Group I or by Hydrofinishing to produce Base oil API Group I⁺ and API Group II.

Hydrofinishing provides deep removal of contaminants such as chlorinated, sulfurous, and oxygenated organic compounds and polyaromatic hydrocarbons.

Mild Hydrofinishing is used to produce Base oil API Group I⁺.

Severe Hydrofinishing is required to produce Base oils API Group II.

Finished oil is then fractionated to produce light base oil and heavy base oil.





STP RE-REFINING PROCESS MERITS



- ✓ Several Used Lube Oil Re-refining Plants implemented worldwide from 16,000 Ton/year to 120,000 Ton/year capacity
- ✓ Advanced vacuum system for high vacuum level stability, based on the combined use of steam ejectors and individual tubular condensers.
- ✓ High efficiency/low pressure drops structured packing in Vacuum Distillation and Final Fractionation, to reduce pressure drops and upgrade oil yield and product separation.
- ✓ Fixed blades Thin film evaporator to avoid coking and fouling.
- ✓ Special type of API pumps and instrumentation for critical services.





STP RE-REFINING PROCESS MERITS



- ✓ All pumps doubled to avoid plant shut down in case of pump failure.
- ✓ Full DCS/PLC plant automation for continuous operation.
- ✓ Indirect heating of heavy streams to prevent fouling.
- ✓ Special mechanical design for thermal flexibility, vacuum operation and fouling services.
- ✓ Use of antifouling to reduce maintenance and cleaning operation.
- ✓ Proprietary design of Base Oil Finishing for Group I, Group I⁺ and Group II





PRODUCTS CHARACTERISTICS



LIGHT GASOIL

Specific gravity at 15 °C	0.850
End point, °C	370
Viscosity, cst at 40 °C	3-5
Sulfur, wt%	0.4 (after Hydrofinishing: 50 – 100 ppm)
Colour	2.5 (after Hydrofinishing: L 0.5)
Flash point, °C	80

Gasoil can be used as substitution fuel in the Plant or as light fuel oil in industrial fired heaters and/or boilers.



PRODUCTS CHARACTERISTICS



VGO

Distillation range, °C	370 - 550
Specific gravity at 15°C	0.868
Viscosity, cst @ 40°C	25-30
Flash point, °C	210 min
Sulfur, wt%	0.25
CCR, wt%	0.1 max
TAN, mgKOH/g	0.1 max
Ashes, wt%	0.2
Metals content, wt ppm	L 10

VGO is used as feedstock to FCC or HDC Units





PRODUCTS CHARACTERISTICS

RE-REFINED BASE OILS



API GROUP I AND GROUP I⁺

Characteristics	Light Base Oil		Heavy Base Oil	
	Mild Hydrofinish Group I ⁺	Chemical Treatment Group I	Mild Hydrofinish Group I ⁺	Chemical Treatment Group I
Specific gravity at 15 °C	0.870	0.870	0.885	0.885
Viscosity, cst at 40 °C	25-32	25-32	85-95	85-95
Sulfur, wt%	0.05	0.25	0.05	0.30
CCR, wt%	L 0.01	0.05	L 0.01	0.07
Colour	L 1.0	2.0	L 1.5	2.5
TAN, mg KOH/g	L 0.01	0.03	L 0.01	0.05
Flash point, °C	220	220	260	260
Pour point, °C	-3	-3	-6	-6
Metals, ppm	absent	L 10	absent	L 10

31



PRODUCTS CHARACTERISTICS

RE-REFINED BASE OILS



API GROUP II

Characteristics

Light Base Oil

Heavy Base Oil

Specific gravity at 15 °C

0.870

0.880

Viscosity, cst at 40 °C

25-32

85-95

Viscosity Index

110

115

Sulfur, wt%

L 0.03

L 0.03

Saturates, wt%

≥90

≥90

CCR, wt%

L 0.01

L 0.01

Colour

L 0.5

L 1.0

TAN, mg KOH/g

L 0.01

L 0.01

Flash point, °C

220

260

Pour point, °C

-6

-9

Metals, ppm

absent

absent





PRODUCTS CHARACTERISTICS

RE-REFINED BASE OILS



API GROUP II

Characteristics	Light Base Oil	Heavy Base Oil
PCB, wt ppm	L 1	L 1
PCT, wt ppm	L 5	L 5
PNA, wt ppm	L 1000	L 1000
Cl, wt ppm	L 1	L 1
Cu corrosion	1a	1a
Noack , %wt	10	L 5
Saponification N°	L 0.5	L 0.5
Demulsification N°	10	10
Oxydation stability		
CCR increase, %	0.10	0.15
Viscosity ratio @ 40°C	1.09	1.1
Color stability	1.0	1.0



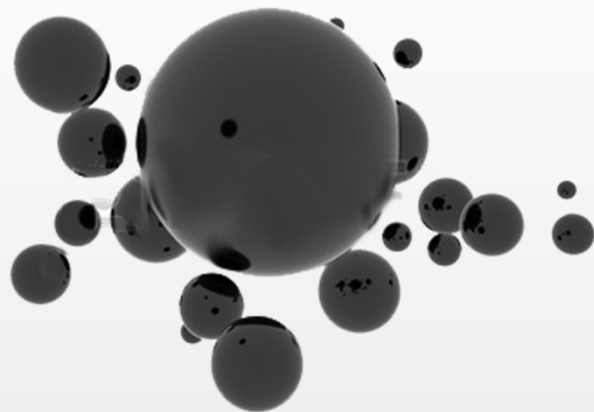


PRODUCTS CHARACTERISTICS

RE-REFINED BASE OILS



ASPHALTIC RESIDUE



Specific gravity at 15 °C 0.950 - 1.050

Viscosity, cst

at 40 °C

10,000

at 100 °C

80

Sulfated ash, wt%

3-4

Sulfur, wt%

1-2

Penetration, mm/10 at 25 °C

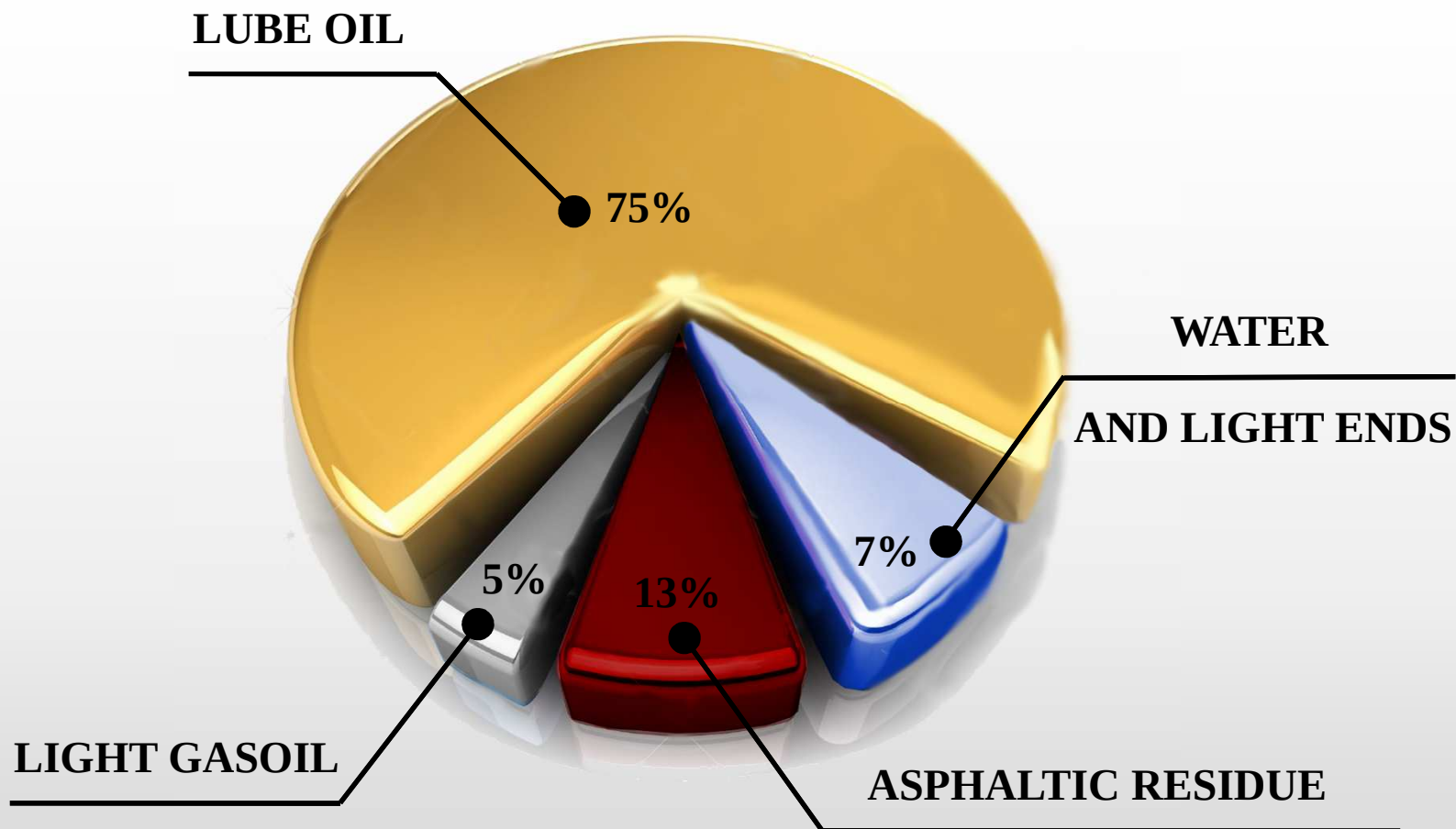
200-400

Softening point, °C

15-20

Residue contains high quantity of polymers and metals and can be used for asphalt blending, production of paving asphalt, bitumen protective covering or as fuel in the cement factories.

USED LUBE OIL COMPOSITION





UTILITIES SYSTEMS & OFFSITE FACILITIES TO RE-REFINING



- Electric power system
- Steam system
- Cooling water system
- Compressed air system
- Sour Water Stripper
- Waste Water Treatment
- Thermal Oil System
- Thermal Oil System
- Thermal Oxidizer
- Hydrogen Plant (in case of Group I⁺, II)
- Fire fighting system
- Flare system (in case of Group I⁺, II)
- Used oil and Products storage and loading system





UTILITIES CONSUMPTION (PER MT OF USED LUBE OIL)



Service	VGO or Base oil API Group I Production	Base oil API Group II Production
Electric power, Kwh	25	65
Cooling water, m ³	50	75
Steam, Kg	400	680
Fuel, 10 ³ Kcal (Thermal Oil System)	200	530
Chemical, Kg	7.5	-
Hydrogen, Nm ³ / Ton of distillate	(Note 1)	100

Note:

1 – Hydrogen consumption in case of Mild hydrofinishing for Group I⁺ is 35 Nm³/Ton of distillate.

OPERATION STAFF

Operating labour requirements is depending on Plant operating philosophy, site location, Plant implementation within an existing complex.

Typical labor and technical staff requirement of the Re-refining Unit is as follows:

▪ Plant Manager	1
Plant Operation:	
▪ Supervisor/Board person (1 per shift)	4
▪ Operators (2 per shift)	8
Maintenance/Workshop	
▪ Supervisors	1
▪ Workers	4
▪ Laboratory	2
Total	20



The staffing estimate is provided as a guideline and is intended for preliminary assessment.



LAND AREA REQUIREMENT

The Used Oil Re-refining Unit is a very compact facility.

Typical layout area required for a 50,000 MTPY Re-refining Unit ISBL is as follows :

Production of Base Oil API Group I
(without Hydrofinishing)

1,300 sq.mt

Production of Base Oil API Group I⁺ and II
(with Hydrofinishing)

2,600 sq.mt



39



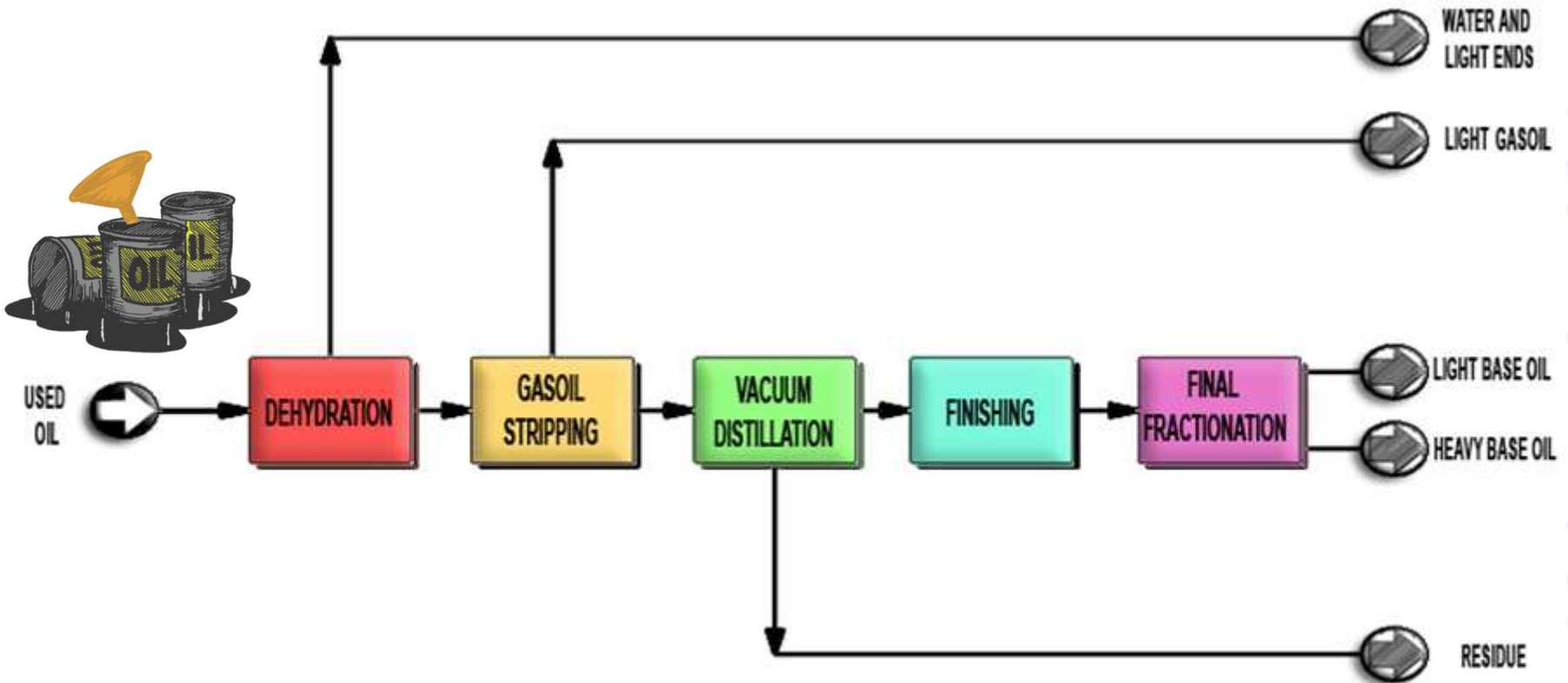
USED LUBE OIL RE-REFINING



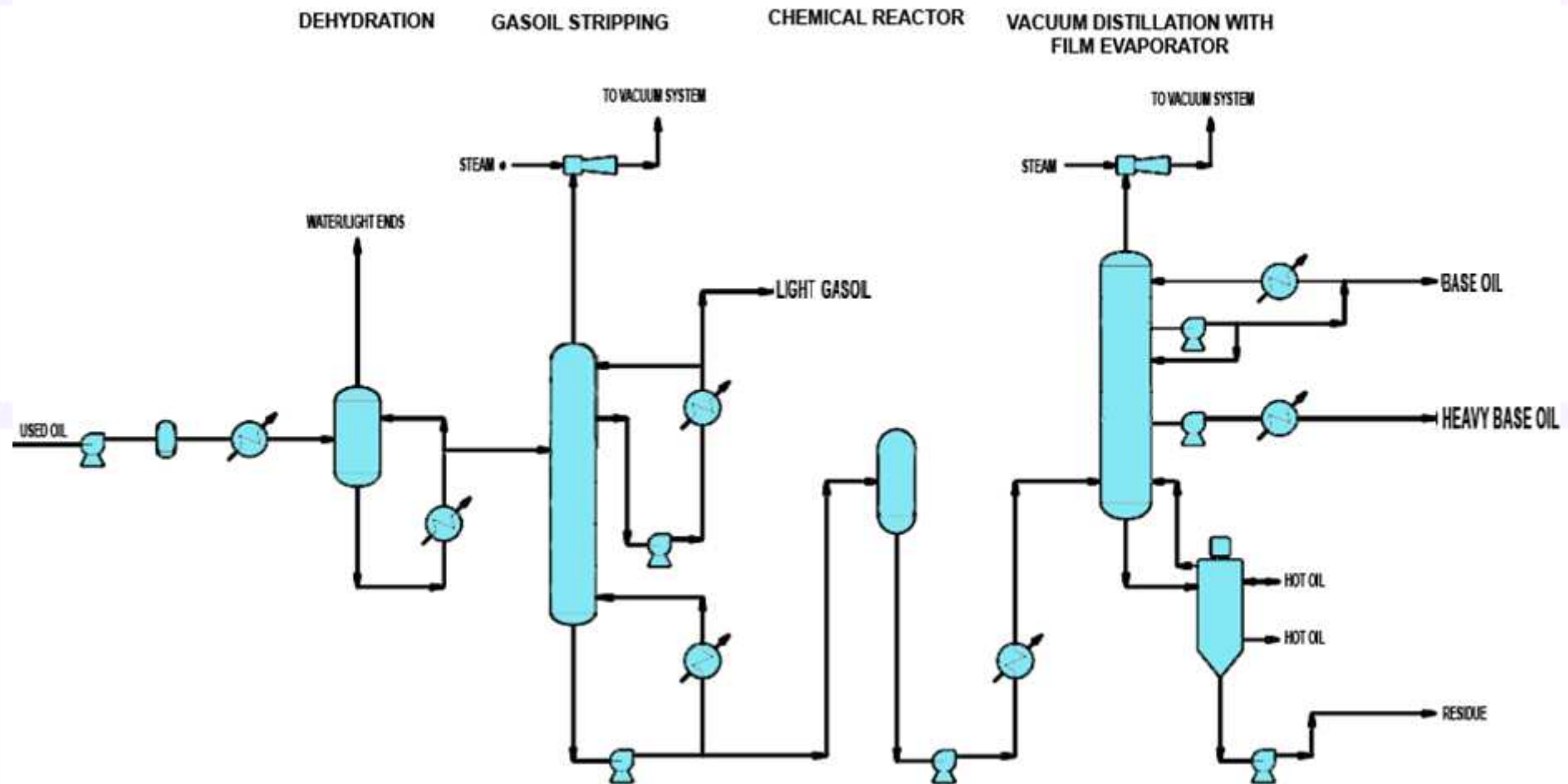
FLOW SCHEMES



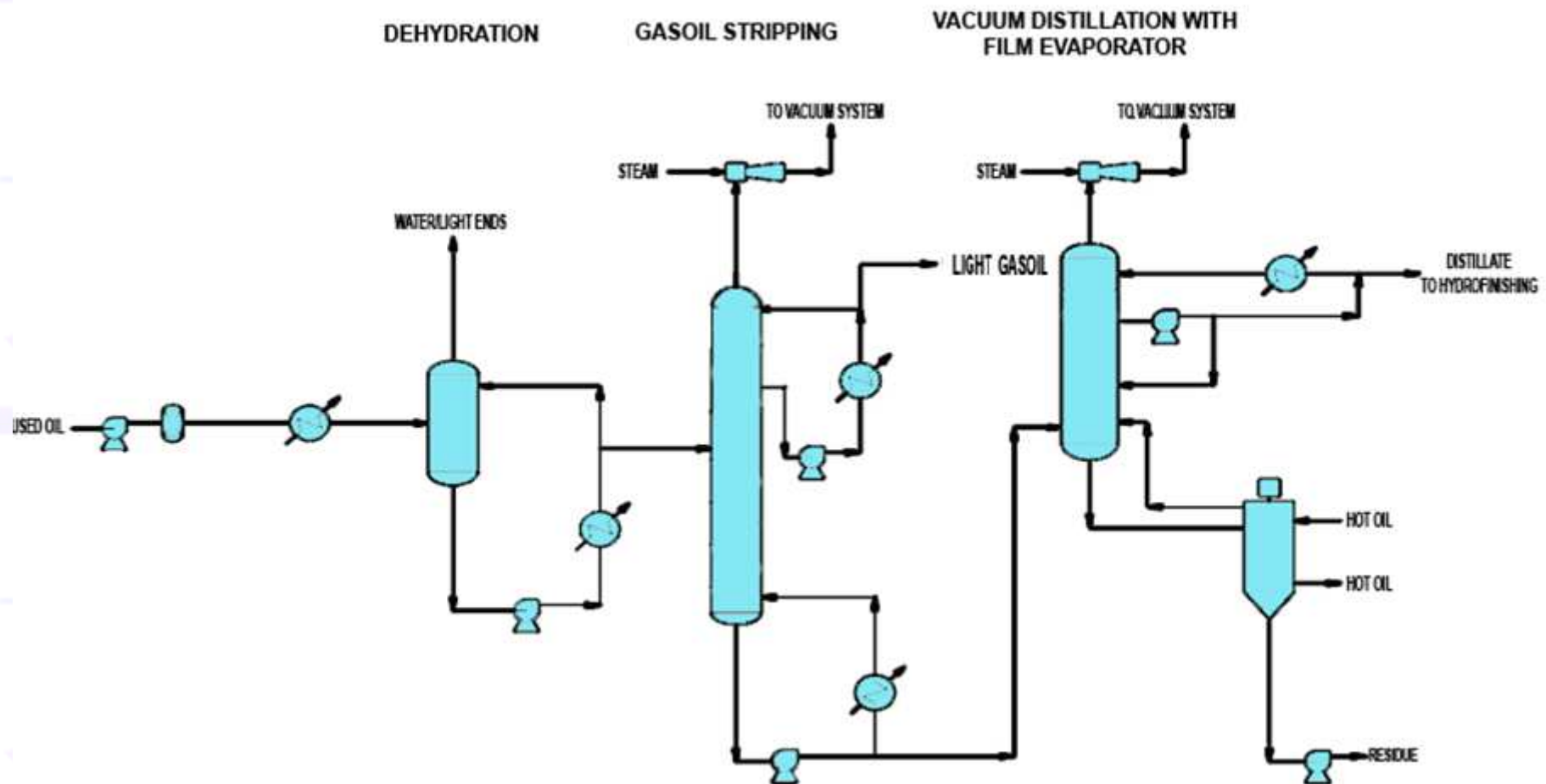
BLOCK SCHEME



PRODUCTION OF BASE OIL GROUP I

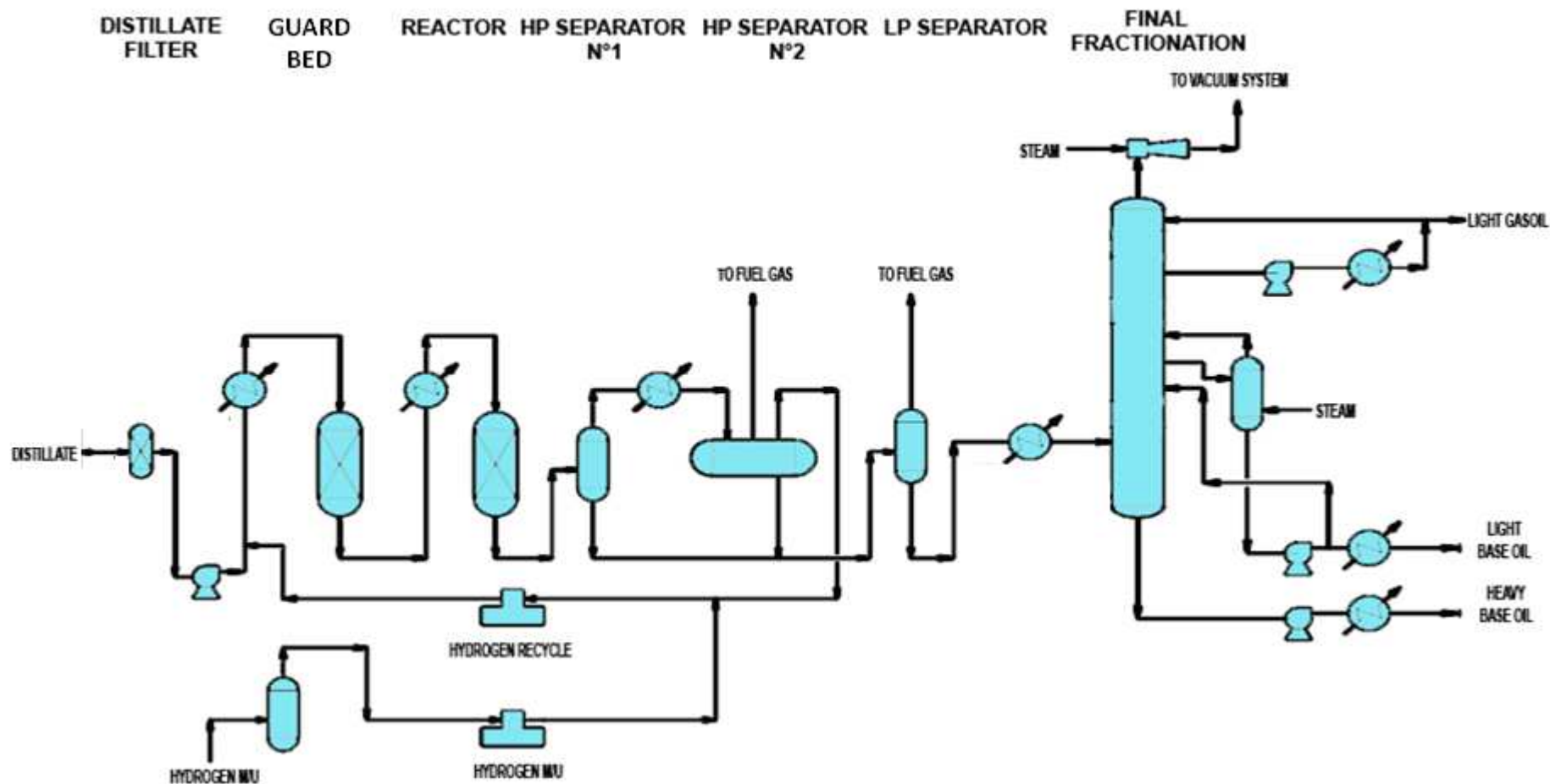


PRODUCTION OF BASE OIL API GROUP II AND API GROUP I+





PRODUCTION OF BASE OIL API GROUP II AND API GROUP I+

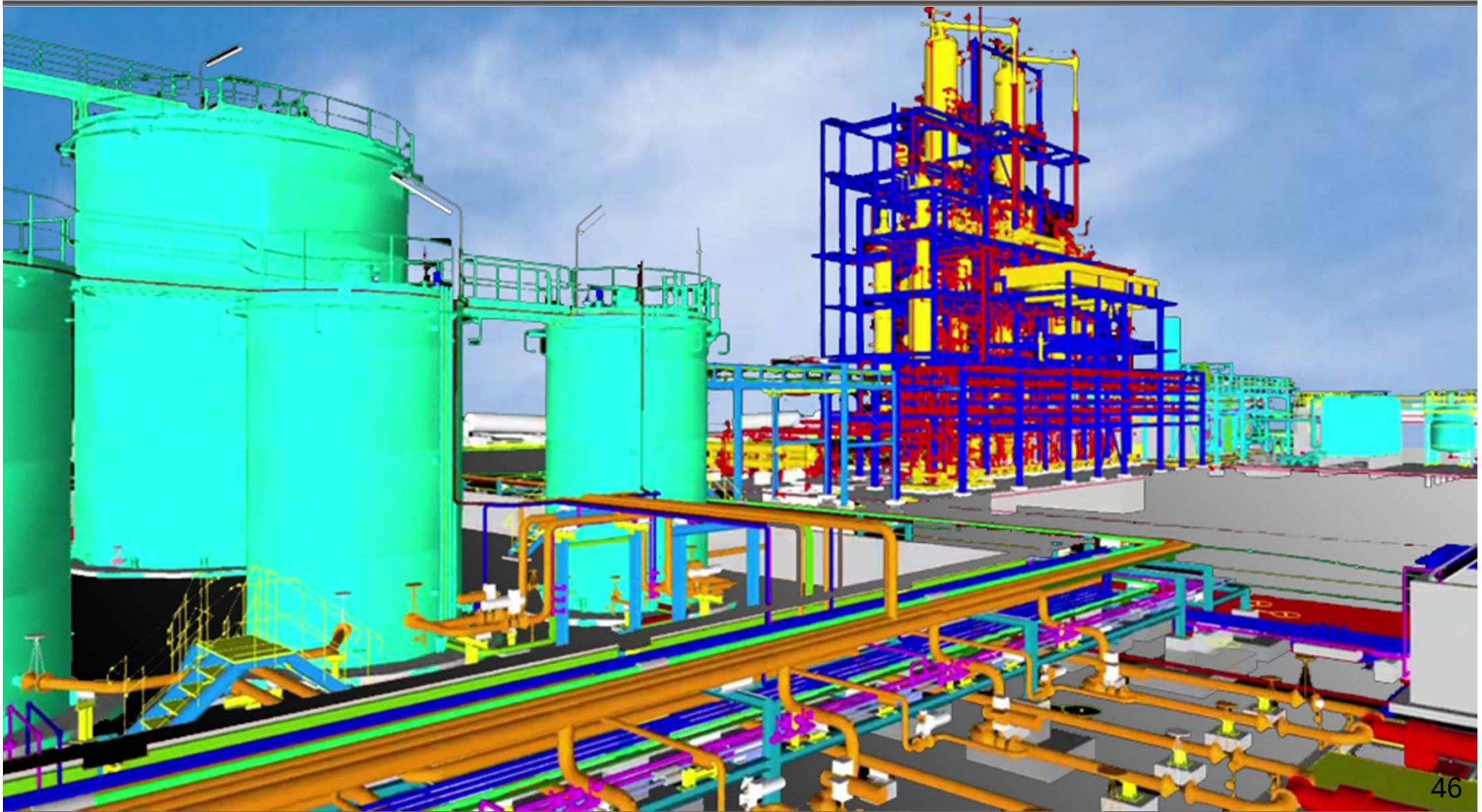


PLANT 3D MODELING





PLANT 3D MODELING



46



REFERENCE PLANT: **OSILUB**



Client: TOTAL / VEOLIA – OSILUB
Gonfreville L'Orcher – France

Capacity: 120,000 Ton/year

Year: Completed 2012

47



REFERENCE PLANT: **OSILUB**





REFERENCE PLANT: **VEOLIA**



Client: VEOLIA ES CANADA
St. Hyacinthe, Quebec

Capacity: 60,000 Ton/year

Year: Completed 2013



REFERENCE PLANT: **VEOLIA**



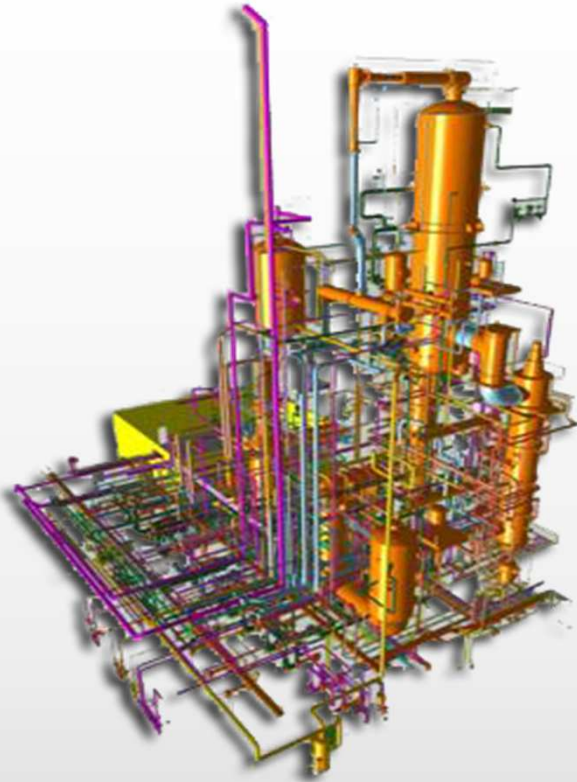
Client: VEOLIA ES CANADA
St. Hyacinthe, Quebec

Capacity: 60,000 Ton/year

Year: Completed 2013

50

REFERENCE PLANT: **KLOC**



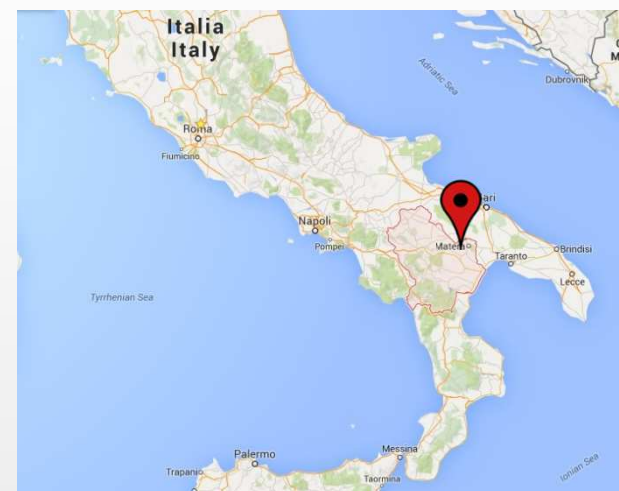
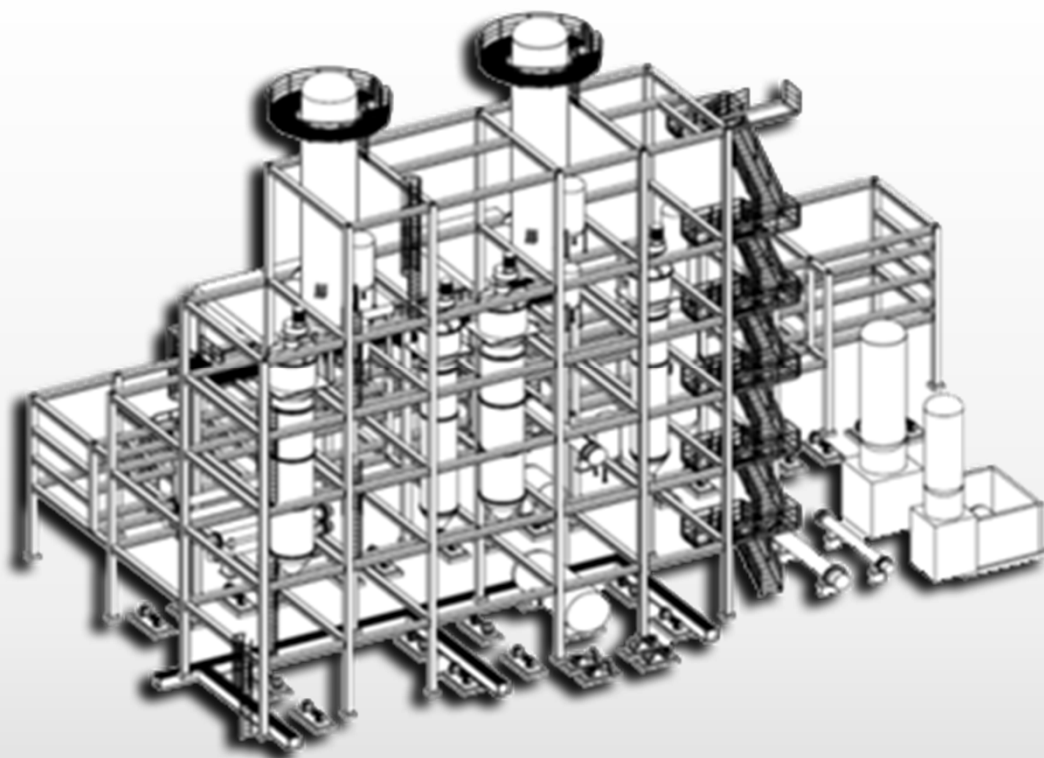
Client: KLOC KSCC
Ahmadi, Kuwait

Capacity: 33,000 Ton/year

Year: In progress



REFERENCE PLANT: ECOIL



Client: ECOIL ITALIA
Ferrandina, Italy

Capacity: 65,000 Ton/year

Year: In progress



REFERENCE PLANT: **SIRAL**



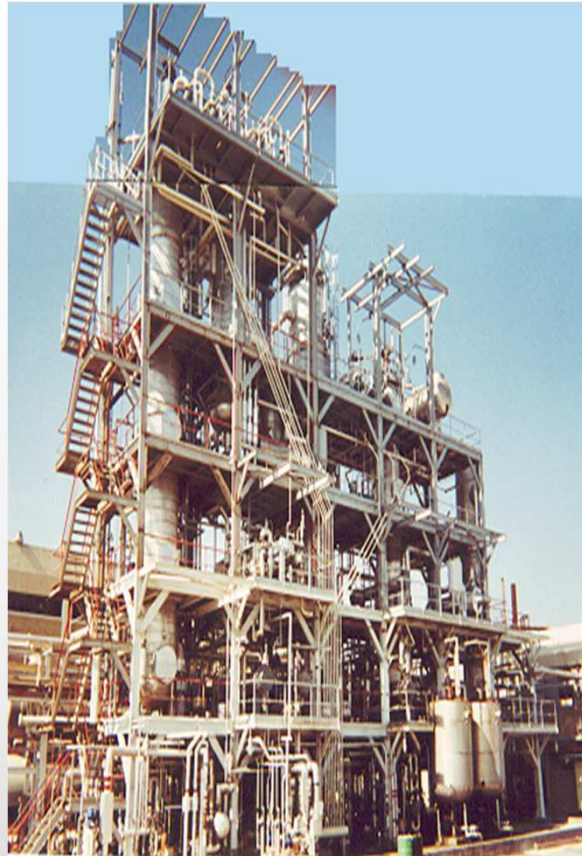
Client: SIRAL SpA
Nola, Italy

Capacity: 30,000 ton/year

Year: Completed 2007

53

REFERENCE PLANT: **KLOC**



Client: KLOC Kuwait Lube Oil Company
Ahmadi, Kuwait

Capacity: 27,000 Ton/year

Year: Completed 2000



REFERENCE PLANT: **SOTULUB**



Client: SOTULUB Société Tunisienne de Lubrifiants
Bizerte, Tunisia

Capacity: 20,000 Ton/year

Year: Completed 1999

55



REFERENCE PLANT: **LWART**



Client: GRUPO LWART
Lencois Paulista, Brazil

Capacity: 60,000 Ton/year

Year: Completed 1998



REFERENCE PLANT: **RAMOIL**



Client: RAMOIL
Naples, Italy

Capacity: 30,000 Ton/year

Year: Completed 1996



REFERENCE PLANT: **SOTULUB**



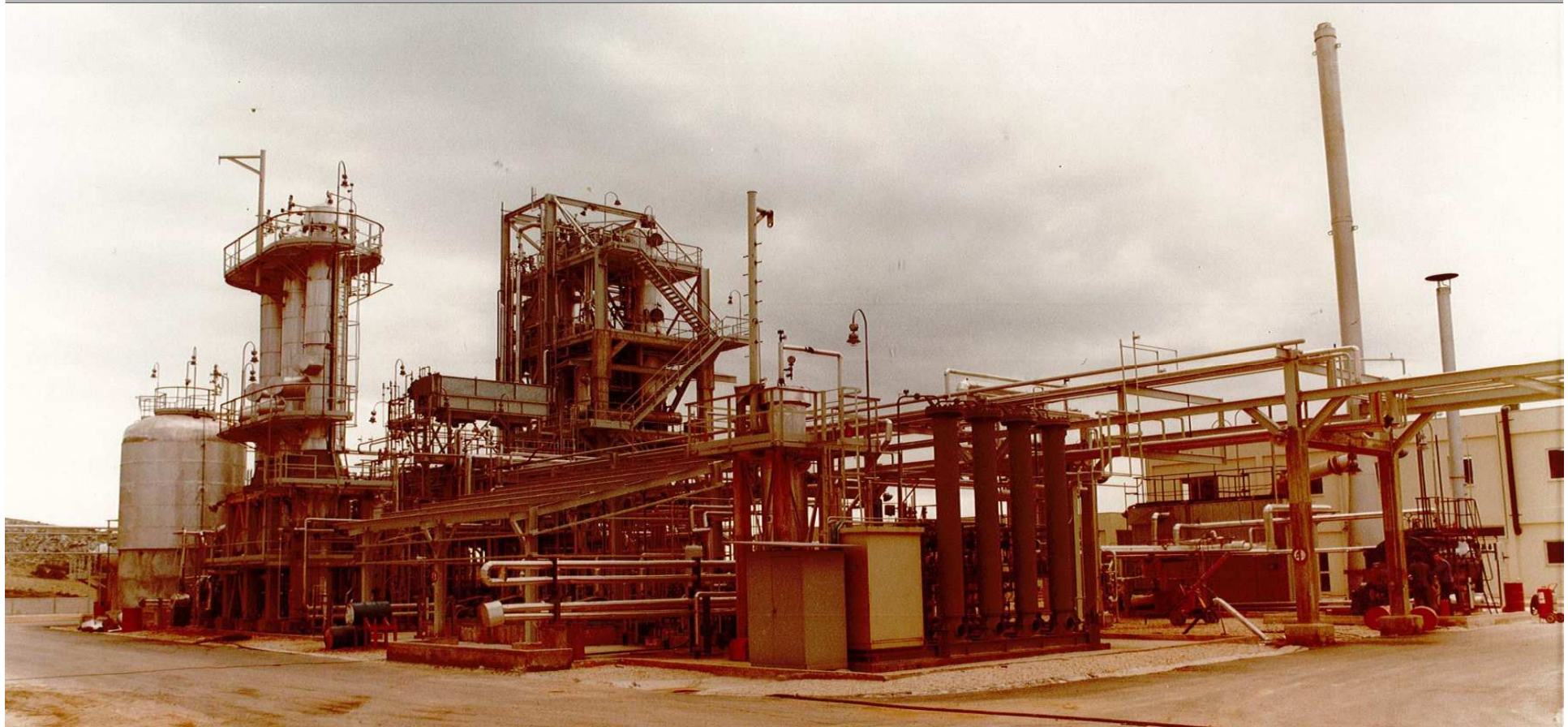
Client: SOTULUB Société Tunisienne de Lubrifiants
Bizerte Tunisie

Capacity: 16,000 Ton/year

Year: Completed 1989



REFERENCE PLANT: **EKVE**



Client: CYCLON Hellas
Aspropyrgos, Greece

Capacity: 25,000 Ton/year

Year: Completed 1985

59



STP PUBLICATIONS

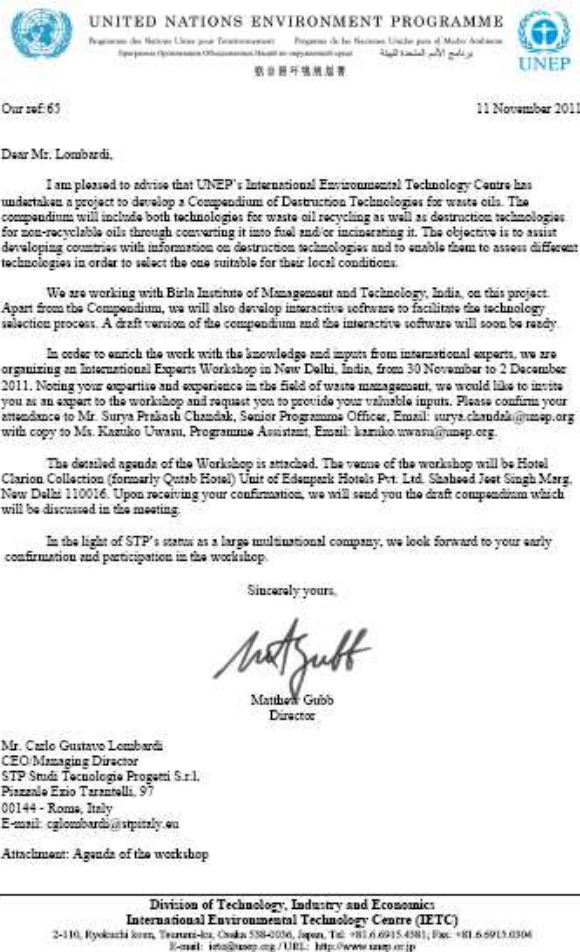


STP Publications and Conference presentations on Used Lube Oil Re-refining:

- ❑ *A Project case: the 120,000 Ton/year OSILUB Re-refining Plant, 3rd CIS Base Oils, Lubricants & Fuels Annual Conference, Moscow, Russia, May 2015.*
- ❑ *A successful waste management investment, UNEP-BIMTECH International Expert's Workshop on Destruction Technologies for Waste Oils, New Delhi, India, November 2011.*
- ❑ *A re-refining eco-friendly technology, Indian Institute of Petroleum (IIP) Workshop on Used Oil Recycling, Dehradun, India, November 1999.*
- ❑ *Modification of existing re-refining units and realization of new modular units, NORA Conference and Trade Show, Palm Springs, USA, November 1999*
- ❑ *The hidden asset, Fifth Conference on Spent Lube Oil Re-refining, Las Vegas, USA, September 1982.*
- ❑ *The used lube oil: a resource not to underevaluate, Chemical Industries Magazine, Italy, February 1982.*



PARTICIPATION TO UNITED NATIONS ENVIRONMENT PROGRAMME





UNEP INTERNATIONAL EXPERT'S WORKSHOP, NEW DELHI - INDIA



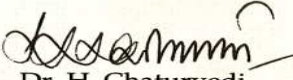
UNITED NATIONS ENVIRONMENT PROGRAMME
UNEP-DTIE-IETC

In collaboration with
Birla Institute of Management Technology (BIMTECH)

International Experts' Workshop on Destruction Technologies for Waste Oils

Certificate of Participation

This is to certify that Mr./Ms. Carla Gustavo Lombardi has participated in International Workshop of experts for reviewing the draft manuscript of "Destruction Technologies for Waste Oils" held in New Delhi – India, during 30th Nov. 2011 to 2nd December 2011 in India, and has contributed in modifying the document. The workshop was organized by the United Nations Environment Programme UNEP-DTIE-IETC in collaboration with Birla Institute of Management Technology, Greater Noida – India.


Dr. H. Chaturvedi
Director, BIMTECH



STP attendance to NORA Conference at Palm Springs (USA)



National Oil Recyclers Association

12429 Cedar Road • Suite 26 • Cleveland, Ohio 44106-3172 • (216)791-7316 • Fax (216)791-6047
Kathryn McWilliams - Executive Director
E-Mail Address: NatOilRA@aol.com
www.noraoil.com

February 7, 2000

Carlo Lombardi
STP Studi Tecnici Procedure
Via D Snasotta 100
Rome, Italy 00147

Dear Lombardi:

The National Oil Recyclers Association's 1999 Conference and Trade Show in Palm Springs was a success in part because of fine presentations such as yours. Each Conference we orchestrate is built on the efforts of many individuals and I'd like you to know that your contribution was appreciated.

The Conference was well attended with over 300 people taking part in the meetings, presentations and activities. And, indications are that your presentation was received quite well.

On behalf of the Conference Planning Committee, the attendees and myself, thank you for your participation. We hope you had an enjoyable experience and trust you will consider submitting a presentation proposal for the 2000 Conference.

Sincerely,

Teresa S. Molnar
Program Coordinator

/ter



1999 LIQUID RECYCLING CONFERENCE AND TRADE SHOW PALM SPRINGS – November 10 – 13, 1999

MODIFICATION OF EXISTING REREFINING UNITS AND REALIZATION OF NEW MODULAR UNITS

Mr. Carlo G. Lombardi
Chief Executive Officer

S.T.P. - STUDIES TECHNOLOGIES PROJECTS S.r.l. – Rome, Italy



STP attendance to 3rd CIS Base Oils, Lube & Fuels Annual Conference



**CIS BASE OILS,
LUBRICANTS & FUELS**
III Annual Conference

26 - 28 May 2015
Moscow, Russia

13:30 III USED OILS RE-REFINING TECHNOLOGIES

- Overview of used oils collection and re-refining projects in Russia and the CIS

VLADIMIR SPIRKIN, *Professor, Academician*, **GUBKIN RUSSIAN STATE UNIVERSITY OF OIL AND GAS**

- Used oil and oil sludge recycling

BORISS NIGROVSKY, *Sales Manager CIS*, **FLUID SOLUTIONS**

- Waste oil treatment. A question of strategy

LUIS BERTRAND, *Vice President*, **SWEET GAZOIL**

- STP project in France: The OSILUB plant is one of the largest re-refining plant in the world

CARLO GUSTAVO LOMBARDI, *CEO / Managing Director*, **S.T.P. STUDI TECNOLOGIE PROGETTI**



Thank you for your attention