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CITY OF CAPE TOWN
ENVIRONMENTAL HEALTH SPECIALISED SERVICES
AIR QUALITY MANAGEMENT

ATMOSPHERIC EMISSION LICENCE
AS CONTEMPLATED IN SECTION 43 OF THE
NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT, 2004, (ACT NO. 39 OF 2004)

City of Cape Town
Air Quality Management
246 Voortrekker Road
Vasco 7460
P.O Box 2815
Cape Town
8000

Tel: (021) 590 5200
Fax: (021) 590 5215
Email: Ian.gildenhuys@capetown.gov.za

This Atmospheric Emission Licence issued to **Chevron Refinery, Cape Town** in terms of section 41(1) of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) ("the Act") read with Notice No 893, dated 22 November 2013, in respect of the Listed Activities described hereunder.

Category:	1: Liquid Fuel Combustion Installations
Sub-category:	**1.2: Liquid Fuel Combustion Installations**
Description:	Liquid fuels combustion installations used primarily for steam raising or electricity generation
Application:	All installations with design capacity equal to or greater than 50 MW heat input per unit, based on the lower calorific value of the fuel used

Category:	1: Liquid Fuel Combustion Installations
Sub-category:	**1.4: Gas Combustion Installations**
Description:	Gas combustion (including gas turbines burning natural gas) used primarily for steam raising or electricity generation
Application:	All installations with design capacity equal to or greater than 50 MW heat input per unit, based on the lower calorific value of the fuel used

Category:	2: Petroleum Industry, the production of gaseous and liquid fuels as well as petrochemicals from crude oil, coal, gas or biomass
Sub-category:	**2.1: Combustion Installations**
Description:	Combustion installations not used primarily for steam raising or electricity generation (furnaces and heaters)
Application:	All refinery furnaces and heaters

Category:	2: Petroleum Industry, the production of gaseous and liquid fuels as well as petrochemicals from crude oil, coal, gas or biomass
Sub-category:	**2.2: Catalytic Cracking Units**
Description:	Refinery catalytic cracking units
Application:	All installations

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Category:	2: Petroleum Industry, the production of gaseous and liquid fuels as well as petrochemicals from crude oil, coal, gas or biomass
Sub-category:	2.3: **Sulphur Recovery Unit**
Description:	Sulphur Recovery Units
Application:	All installations

Category:	2: Petroleum Industry, the production of gaseous and liquid fuels as well as petrochemicals from crude oil, coal, gas or biomass
Sub-category:	**2.4: Storage and Handling of Petroleum Products**
Application:	All permanent immobile liquid storage facilities at a single site with a combined storage capacity of greater than 1 000 cubic meters

The Atmospheric Emission Licence has been issued on the basis of information provided in the company's application and information that became available during processing of the application.

The Atmospheric Emission Licence is valid until 31 March 2019.

The reason for issuance of the current licence is a renewal.

The Atmospheric Emission Licence is issued subject to the conditions and requirements set out below which form part of the Atmospheric Emission Licence and which are binding on the holder of the Atmospheric Emission Licence ("the holder").

1. ATMOSPHERIC EMISSION LICENCE ADMINISTRATION

Name of the Licensing Authority	City of Cape Town
Atmospheric Emission Licence Number	WCCT006
Atmospheric Emission Licence Issue Date	31 March 2014
Atmospheric Emission Licence Type	Final
Review Date, not later than	31 January 2019

2. ATMOSPHERIC EMISSION LICENCE HOLDER DETAILS

Enterprise Name	Chevron Refinery, Cape Town
Trading as	Chevron South Africa (Pty) Ltd
Enterprise Registration Number (Registration Numbers if Joint Venture)	1911/001154/07
VAT registration number	4460101563
Business partner number	100239480
Registered Address	Chevron Century City 5 Century City Boulevard Century City Cape Town 7441

Postal Address	P.O. Box 13 Milnerton 7441
Telephone Number (General)	(021) 508 3911
Industry Sector	Petroleum Refining
Name of Responsible Officer	Adele Borman
Name of Emission Control Officer	Adele Borman
Telephone Number	(021) 508 3955
Fax Number	021551 1976
Email Address	Adele.borman@chevron.com
After Hours Contact Details	021 508 3405
Land Use Zoning as per Town Planning Scheme	Industrial

3. LOCATION AND EXTENT OF PLANT

Physical Address of the Premises	Plattekloof Road Milnerton 7441
Description of Site (Erf)	Physical address as above
Coordinates of Approximate Centre of Operations	North-south: - 33°50'34.5" S East-west: 18°31'43.4" E
Extent (km²)	1.825
Elevation Above Mean Sea Level (m)	19
Province	Western Cape
Metropolitan/District Municipality	City of Cape Town
Designated Priority Area	Not applicable to Cape Town

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4. GENERAL CONDITIONS

4.1. Process and ownership changes

The holder of the atmospheric emission licence must ensure that all unit processes and apparatus used for the purpose of undertaking the listed activity in question, and all appliances and mitigation measures for preventing or reducing atmospheric emissions, are at all times properly maintained and operated.

Any activity that triggers a listed Activity as prescribed in the Environmental Impact Assessment Regulations published in terms of section 24(5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended shall not be commenced, extended, altered, added to without the required Environmental Authorisation from the Competent Authority.

Any changes in processes or production increases above those stated in this Atmospheric Emission Licence, by the licence holder, will require prior approval by the licensing authority.

Any changes to the type and quantities of input materials and products, or to production equipment and treatment facilities will require prior written approval by the licensing authority.

The licence holder must, in writing, inform the licensing authority of any change of ownership of the enterprise. The licensing authority must be informed within 30 (thirty) days after the change of ownership.

The licence holder must immediately on cessation or decommissioning of the listed activity in writing, inform the licensing authority.

4.2. General duty of care

The holder of the licence must, when undertaking the listed activity, adhere to the duty of care obligations as set out in section 28 of the NEMA.

The licence holder must undertake the necessary measures to minimize or contain the atmospheric emissions. The measures are set out in section 28(3) of the NEMA.

Failure to comply with the above condition is a breach of the duty of care, and the licence holder will be subject to the sanctions set out in section 28 of the NEMA.

4.3. Sampling and/or analysis requirements

Measurement, calculation and/or sampling and analysis shall be carried out in accordance with any nationally or internationally acceptable standard. A different method may be acceptable to the licensing authority as long as it has been consulted and agreed to the satisfactory documentation necessary in confirming the equivalent test reliability, quality and equivalence of analyses.

The licence holder is responsible for quality assurance of methods and performance. Where the holder of the licence uses external laboratories for sampling or analysis, accredited laboratories shall be used.

4.4. General requirements for licence holder

The licence holder is responsible for ensuring compliance with the conditions of this licence by any person acting on his, her or its behalf, including but not limited to, an employee, agent, sub-contractor or person rendering a service to the holder of the licence.

The licence does not relieve the licence holder to comply with any other statutory requirements that may be applicable to the carrying on of the listed activity.

A copy of the licence must be kept at the premises where the listed activity is undertaken. The licence must be made available to the environmental management inspector representing the licensing authority who requests to see it.

The licence holder must inform, in writing, the licensing authority of any change to its details including the name of the emission control officer, postal address and/or telephonic details.

4.5. Statutory obligations

The licence holder must comply with the obligations as set out in Chapter 5 of the Act.

5. NATURE OF PROCESS

5.1. Process description

The Refinery processes crude oil into products, such as motor gasoline, kerosene, diesel, jet fuel, fuel oil, liquefied petroleum gas (LPG), sulphur and asphalt.

Some intermediate products are produced and used within the refinery processes. Examples of these are refinery fuel gas (RFG) and fuel oil, hydrogen, sour water and slop. Fuel gas and fuel oil is used in the process heaters and boilers, hydrogen is used in the process, and recovered slop oil and treated water from the sour water strippers are recycled back to the processes.

Raw materials used in the processes include crude oil and some blending stocks. Utilities, chemicals and catalysts are also used in refinery processes.

No.1 Crude Distillation Unit (Unit 2) and No.2 Crude Distillation Unit (Unit 60)

The Crude Distillation Units (CDUs) (Unit 2 and 60) use heat to separate the crude oil into fractions of specific boiling ranges. The lighter products volatilize at lower temperature, and are therefore recovered higher up in the Crude Column. The lighter fractions or products can undergo further processing at downstream units or in some cases can be used as blending components.

The CDUs separate products such as refinery fuel gas, naphtha, kerosene, light diesel gas oil and heavy diesel gas oil. The fuel gas is treated in the Amine Units (Units 57/66) for use as fuel gas, naphtha is fed to the Naphtha Hydrotreater (Unit 3), kerosene to either the Jet Merox (Unit 72) or the Kerosene Hydrotreater (Unit 6), and light diesel and heavy diesel is routed to the Diesel Hydrotreater (Unit 56) or the Kerosene Hydrotreater. The CDU bottoms (atmospheric residue) are sent to the Vacuum Distillation Units (Units 52 and 61) for further separation.

The No. 1 CDU is part of the original refinery that was commissioned in 1966. The No. 2 CDU was added during construction of the North Refinery, which was commissioned in 1978. Crude processed in the Refinery is shipped mostly from the Middle East, and the remainder is obtained from various sources including West and South African sources.

No 1. Vacuum Distillation Unit (Unit 52) and No. 2 Vacuum Distillation Unit (Unit 61)

The Vacuum Distillation Units (VDUs) (Units 52 and 61) further separate, by vacuum distillation, the residue from the crude units into various fractions that serve as feedstock for subsequent processing units. At lower pressures (under vacuum), the molecules volatize at lower temperature thus facilitating the separation. When the Refinery was upgraded in 1970, it included the first VDU, Plant 52 (No. 1 VDU). The No. 2 VDU was added during construction of the North Refinery in 1978.

The atmospheric residues that are processed at the VDUs result in the production of light vacuum gas oil (LVGO), heavy vacuum gas oil (HVGO) and vacuum residue. The LVGO is further processed in the Diesel Hydrotreater (Unit 56) for use as a diesel blend. The HVGO is used as feedstock for the Fluid Catalytic Cracking Unit (FCCUs). The vacuum residue is partially used as asphalt and as feedstock for the Visbreaker (Unit 5).

No. 1 Fluid Catalytic Cracking Unit (Unit 53) and No. 2 Fluid Catalytic Cracking Unit (Unit 63)

The FCCUs (Unit 53 and 63) process HVGO from the VDUs and convert the HVGO into lighter (lower molecular weight) products, such as naphtha and middle distillates. The process works by contacting the HVGO with a silica/alumina zeolite catalyst at high temperatures. During the reaction process, the catalyst is suspended in the feed products, creating a fluidized reaction. When the Refinery was upgraded in 1970, the No. 1 FCCU was commissioned. The No. 2 FCCU was added during construction of the North Refinery in 1978. In 1996, Electrostatic Precipitators (ESPs) were installed to control particulate matter emissions (catalyst fines).

The HVGO that is processed in the FCCUs produce RFG, LPG, light cat naphtha, heavy cat naphtha, light cycle gas oil and fuel oil blending products. Streams from the FCCUs are then fed into an amine scrubber, a hydrotreater or a Merox unit for desulphurization. Following desulphurization, the streams are used as gasoline, fuel oil, RFG, diesel and LPG blends.

Visbreaker (Unit 5)

The Visbreaker (Unit 5) processes vacuum residue from the VDUs (Units 52 and 61) and transforms it into lighter hydrocarbons. It was constructed in 1966. The Visbreaker employs high heat to thermally crack the heavy hydrocarbons into lighter hydrocarbons. The Visbreaker gets its name from the viscosity "breaking" that occurs when freed viscosity is reduced during processing.

In the Visbreaker process, RFG, fuel oil, naphtha and gas oil are recovered thermally from the vacuum residue. The naphtha is fed to the No. 2 FCCU, while the gas oil is routed to the Diesel Hydrotreater via the CDU and VDU for desulphurization. The RFG is sent to the Amine Units for hydrogen sulphide (H_2S) removal before being used in Refinery operations. The Visbreaker residue, which has a substantially lower viscosity than vacuum residue, is used for heavy fuel oil blending.

Naphtha Hydrotreater (Unit 3)

The Naphtha Hydrotreater or NHT (Unit 3) removes sulphur and nitrogen contaminants from the naphtha streams produced by the CDUs (Units 2 and 60). This is achieved by combining the streams with hydrogen and passing it across a catalyst bed. The NHT was first commissioned in 1966. Streams from the NHT include light straight run (LSR), heavy straight run (HSR), LPG and RFG. The LSR is further processed by the Isomerization Unit (Unit 71) for production of gasoline blend. The HSR is further processed by the Platformer (Unit 4) to produce a high-octane gasoline blend stock. During this catalytic hydrotreating process, the excess hydrogen, containing some H_2S and hydrocarbon is sent to the DEA Units (Unit 57) for desulphurization and then routed to the Diesel Hydrotreater (Plant 56). The fuel gas is MEA-treated to remove H_2S.

Isomerization Unit (Unit 71)

The Isomerization Unit or Isom (Unit 71) rearranges straight-chain hydrocarbons into branched chain molecules by applying heat and adding hydrogen in the presence of a precious metal catalyst. This rearrangement increases the octane rating of the product. The Isom Unit was commissioned in 1995 when the country introduced unleaded gasoline. Low nitrogen oxide (NO_x) burners were installed on the heater to control NO_x emissions

The Isom Unit feed stream is the LSR produced by the NHT (Unit 3). Streams from the Isom Unit include butane, RFG and a gasoline blend (isomerate).

Platformer (Unit 4)

The Platformer (Unit 4) further processes HSR from the NHT (Unit 3) to obtain products that are more valuable. The HSR is converted by applying heat in a hydrogen environment and in the presence of a platinum catalyst. The reaction yields a product with a higher octane rating. The Platformer was first commissioned in 1966 and upgraded in the mid-1990's. Several of the Platformer processes are equipped with low NO_x burners to control NO_x emissions. At the Platformer, the catalyst must be regenerated on-site. Regeneration involves combusting excess hydrocarbons off the catalyst, so that it will continue to perform efficiently. These combustion gases are routed to the atmosphere. This regeneration occurs infrequently, taking place about once a year for about 10 days. Streams from the Platformer include platformates (used in gasoline blending), LPG, gaseous hydrocarbons and hydrogen gas. The hydrogen gas is used by the three hydrotreaters to remove sulphur and nitrogen and saturate the olefins.

Diesel Hydrotreater (Unit 56)

The Diesel Hydrotreater (DHT) (Unit 56) removes nitrogen, olefin and sulphur compounds from diesel streams produced by several processes to obtain a low sulphur diesel blend. This is achieved by combining the streams with hydrogen and passing them over a catalyst bed. The original DHT was constructed in 1970 but was upgraded as part of the Clean Fuels Project in 2005, and designed to produce low sulphur diesel fuel (0.05% wt.). Production of the low sulphur diesel fuel consumes hydrogen and produces H_2S. The RFG streams produced contain H_2S, which is subsequently removed in the MEA Unit (Unit 66). The bulk of the H_2S in the circulating hydrogen is removed by treating in the DEA Unit (Unit 57).

Kerosene Hydrotreater (Unit 6)

The Kerosene Hydrotreater (KHT) (Unit 6) removes olefins, nitrogen and sulphur compounds from light diesel streams to obtain a low sulphur diesel blend. This is achieved by combining the streams with hydrogen and passing them over a catalyst bed. The original KHT was constructed in 1966, and was originally used in diesel service. This unit can be used in blocked operation to treat kerosene for illuminating kerosene and for jet fuel production. Operations at the KHT produce H_2S. The RFG stream contains H_2S, which is subsequently removed in the MEA Unit (Unit 66). The H_2S in the circulating hydrogen is removed in the DEA Unit (Unit 57).

Jet Merox (Unit 72)

The Jet Merox (Unit 72), installed in 1966, converts mercaptans (sulphur compounds) in kerosene streams produced by the CDU's (Units 2 and 60) to obtain saleable jet fuel. This is achieved by combining the stream with caustic and air and passing it across a catalyst bed. The term "Merox" is short for mercaptan oxidation.

Monoethanolamine Unit (Unit 66)

The Monoethanolamine or MEA Unit (Unit 66) consists of a number of contactors that remove sulphur (in the form of H_2S) from individual streams of gas, including LPG produced at the FCCUs (Unit 53 and 63) and fuel gas to produce low sulphur LPG and RFG. The sulphur is removed by sending the gas through MEA strippers that "sweeten" the H_2S containing feed gas. The H_2S that is removed by the MEA Unit is sent to the Sulphur Recovery Units (SRUs) for recovery of the elemental sulphur. The "sweetened" LPG gases are further processed by the LPG Merox (Unit 55) to remove mercaptans.

Diethanolamine Unit (Unit 57)

The DEA Unit (Unit 57) removes sulphur (in the form of H_2S) from the sulphide-rich gas generated at the Naphtha, Diesel and Kerosene Hydrotreaters (Unit 3, 56 and 6) to produce low sulphur gas. The sulphur is removed by sending the hydrogen gas through diethanolamine strippers that "sweeten" the H_2S containing

hydrogen gas. The H_2S removed by the DEA Units is sent to the SRUs for recovery of the elemental sulphur SRU #1 and #2 (Unit 67).

Sulphur Recovery Unit #1 and #2 (Unit 67)

In a Claus SRU, the H_2S containing gases from the DEA Unit (Unit 57) and MEA Unit (Unit 66) pass through a high temperature, thermal conversion section where part of the H_2S is burned with a carefully controlled amount of air to yield the optimum ratio of H_2S to sulphur dioxide (SO_2) for conversion to elemental sulphur. The H_2S and SO_2 gases then pass through a catalytic conversion section where SO_2 and H_2S react in the presence of an alumina catalyst to form elemental sulphur and water vapour. As the conversion section discharges, the hot sulphur vapour is condensed and collected in a sulphur pit. Ammonia and hydrocarbons in the Claus SRU feed stream are also combusted into nitrogen, carbon dioxide and water in the reaction furnace.

Tail Gas Treating Unit (Unit 73)

The balance of the gas leaves the Claus process as a tail gas stream (SO_2) and is converted back to H_2S in the Tail Gas Treatment Unit (TGTU) or Shell Claus Off-gas Treatment (SCOT) Unit, which was installed in 2000. After amine treatment, the resulting TGTU emissions would contain very low concentrations of sulphur compounds. To minimize emissions of H_2S and other air toxics, the treated gases are combusted in the thermal incinerator such that the remaining reduced sulphur is oxidized into SO_2.

Liquid Sulphur Degassing Unit

A sulphur degassing unit was installed in 2001 to remove the absorbed H_2S and poly-sulphides from the sulphur prior to the Pastillation process. This was required to eliminate H_2S release into the atmosphere during the pastillation process and when liquid sulphur is shipped by road tanker from the Refinery.

Liquid Petroleum Gases Merox (Unit 55)

LPG passes from the MEA Unit (Unit 66) to the LPG Merox (Unit 55), which removes mercaptans (sulphur compounds) from the LPG stream to obtain even lower sulphur LPG. This is achieved by extracting the mercaptans into a circulating caustic stream. The mercaptans in the caustic are then oxidized to disulphide oil in the presence of a dispersed catalyst. The disulphide oil is separated from the oil and removed. The term "Merox" is short for mercaptan oxidation. Some of the LPG is sold and some is further processed in the Catalytic Polymerisation unit into motor gasoline.

Catalytic Polymerisation Unit (Unit 70)

The Catalytic Polymerization Unit (Unit 70) takes some of the LPG from the LPG Merox (Unit 55) and processes it to produce a high octane gasoline stream. This is achieved by exposing the LPG to a phosphoric acid impregnated catalyst. The LPG that does not react is routed for sale as LPG.

Minalk Unit (Unit 64)

The Minalk Unit (Unit 64) converts mercaptans (sulphur compounds with a strong odour) present in the gasoline blends produced at the FCCUs (Units 53 and 63) into disulphide compounds, which have significantly less odour. This is achieved by passing the stream across a catalyst bed in the presence of a small amount of dilute caustic (alkalinity) and air.

Existing Flare (101F-001)

The Refinery Flare (101F-001) is a safety device that burns gas as an alternative to releasing directly into the atmosphere. Combustion of these gases destroys volatile organic compounds (VOCs) and oxidizes other compounds such as H_2S. Gases burned at the flare have several sources such as e.g. Start-up and shutdown activities of process units and equipment, relief valve leakage, process upset conditions, equipment malfunctions and routine intermittent releases of excess gases that cannot be accommodated in the Refinery heaters and boilers. Flare systems prevent serious incidents from occurring by relieving gas pressure within plants and equipment that might occur during upset conditions. The existing flare unit will be replaced by 2 new flares (see detail below) during 2013/2014 as part of the Flare Modernisation Project approved by DEA&DP (reference numbers E12/2/3/1-A2/309-0468/08 and E12/2/3/6-A2/309-0625/09).

New Elevated Flare (101F-102) and Multi Point Ground Flare (101F-103)

The existing flare system is in the process of being upgraded to include a new low pressure flare system that incorporates high risk atmospheric relief devices currently venting to atmosphere. The low pressure flare system will be routed to a new Elevated Flare (101F-102). The new elevated flare will be in the same location as the existing flare (101F-001). The existing high pressure flare system will be routed to a new Multi Point Ground Flare (101F-103), located south east of the existing flare.

Utilities Unit (Units 68 and 69)

The Utilities Units (Units 68 and 69) consist of required support processes that provide utilities such as air, raw water, cooling water, demineralised water and steam for use in the production processes. The Utilities Units consist of equipment such as Demin Plant (Unit 68), Boilers (Unit 69), Plant and Instrument Air (Unit 69), Fuel Gas (Units 16 and 69), Fuel Oil (Unit 69) and Cooling Water (Units 113 and 52)

Effluent Treatment Plant (Unit 28)

The Effluent Treatment Plant (Unit 28) treats wastewater to reduce concentrations of pollutants to levels as specified in the refinery's water license. The plant is designed to remove or reduce the concentration of ammonia, chemical oxygen demand (COD), oils, phenols, sulphide, total suspended solids (TSS) and the adjustment of pH. Treatment processing consists of oil-water separation and induced air flotation, equalization, bio-treatment and clarification and a filter press.

Tank Farm (Unit 20, 23, 106 and 107)

The Tank Farm consists of various sizes of tanks used for the storage of feedstocks, intermediate stocks and finished product. The Tank Farm consists of both fixed roof and external floating roof storage tanks. Generally external floating roof tanks, which have tight seals and excellent control of VOC emissions, are used to store the higher volatile and higher vapour pressure materials including crude oil, which is the basic feedstock for the CDUs (Units 2 and 60), intermediate materials and products, including eg. Naphtha, platformate, reformate and gasoline. Fixed roof tanks store the less volatile or lower vapour pressure materials including intermediates or finished products from the blending operations, eg. including diesel, jet fuel, kerosene and wet-slops.

Loading Operations (Unit 32)

Fuel products such as gasoline, diesel, kerosene and fuel oil are loaded into tanker trucks at the Tanker Truck Loading Rack (TTLR) located near the southern boundary of the Refinery. The TTLR is also used by other companies for loading tankers. A Vapour Recovery Unit (VRU) was commissioned in 2008 to recover loading emissions on gasoline and diesel TLLR's. There are also separate loading facilities on site for sulphur, LPG and asphalt. There are loading / unloading facilities at the wharf for crude oil, fuel oil, gasoline and diesel.

5.2. Listed activity or activities

List of all Listed Activities, as published in terms of Section 21 of the AQA, authorised to be conducted at the premises by the licence holder:

Listed Activity Number	Category of Listed Activity	Sub-category of the Listed Activity	Listed Activity Name	Description of the Listed Activity
1	1	1.2	Liquid Fuel Combustion Installations	Liquid fuels combustion installations used primarily for steam raising or electricity generation
2	1	1.4	Gas Combustion Installations	Gas combustion (including gas turbines burning natural gas) used primarily for steam raising or electricity generation
3	2	2.1	Combustion Installations	Combustion installations not used primarily for steam raising or electricity generation for steam raising or electricity generation (furnaces and heaters)
4	2	2.2	Catalytic Cracking Units	Refinery catalytic cracking units
5	2	2.3	Sulphur Recovery Unit	Sulphur Recovery Units
6	2	2.4	Storage and Handling of Petroleum Products	All permanent immobile liquid 'storage-facilities at a single site with a - combined storage capacity of greater than 1000 cubic meters.

5.3. Unit process or processes

List of all unit processes associated with the listed activities to be undertaken at the site of work.

Unit Process	Unit Process Function	Batch or Continuous Process
Crude Distillation Units (CDU)	Distillation of crude oil	Continuous
Vacuum Distillations Unit (VDU)	Distillation under vacuum of the CDU residue	Continuous
Fluidised Catalytic Cracking Units (FCCU)	Catalytically cracks heavy vacuum gas oil to produce lighter products	Continuous
Visbreaker Unit (VBU)	Thermally cracks vacuum residue into lighter products	Continuous
Naphtha Hydrotreating Unit (NHT)	Removal of sulphur from naphtha streams	Continuous
Isomerisation Unit	Conversion of n-paraffins to iso-paraffins for use as gasoline blending component	Continuous
Platformer Unit	(Catalytic reformer) Conversion to higher octane components	Continuous
Diesel Hydrotreater Unit (DHT)	Removal of sulphur from diesel streams	Continuous

Kerosene Hydrotreater Unit (KHT)	Removal of sulphur from kerosene streams	Continuous
Jet Merox Unit	Conversion of sulphur compounds in jet fuel	Continuous
LPG Merox Unit	Conversion of sulphur compounds in LPG	Continuous
Catalytic Condensation Units	Conversion to higher octane components	Continuous
Amine treating	Removal of H_2S in hydrocarbon gas streams for sulphur recovery in SRU	Continuous
Minalk Unit	Conversion of sulphur compounds in FCCU gasoline streams	Continuous
Sulphur Recovery Units (SRU) and Liquid Sulphur Degassing Unit	Recovery of sulphur from high H_2S streams and H_2S removal from liquid sulphur	Continuous
Sulphur Pastillation Unit	Conversion of liquid sulphur into solid pastilles	Continuous
Tailgas Treating Unit	Recovery of sulphur from SRU tailgas	Continuous
Asphalt Handling Unit	Blending and loading of asphalt	Continuous
Flares	Safety devices to combust non-recoverable gases	Continuous
Utilities	Support processes such as water treatment plant which provides demineralised water for steam production, various boilers, air compressors for plant and instrument air, open and closed water systems for condensate recovery, raw water and cooling water	Continuous
Effluent Treatment Plant	Treatment of wastewater from refinery processes, mainly removal or reduction of ammonia, COD, oils, phenols, sulphides, TSS and adjustment of pH	Continuous
Tank Farm	Storage of crude oil, intermediates and finished products and water	Continuous
Road Tanker Loading	Loading of finished products into road tankers	Batch

5.4. Hours of operations

Indicate the hours of operation of all unit processes associated with the listed activities at the site of work.

Unit Process	Operating Hours	Days of Operation per Year
All Unit Processes	24-hours	365

5.5. Graphical process information

The following diagrams depict the graphical operation for the entire operation:

Figure 1: Simplified diagram with the name of each unit process showing links between all unit processes or blocks:

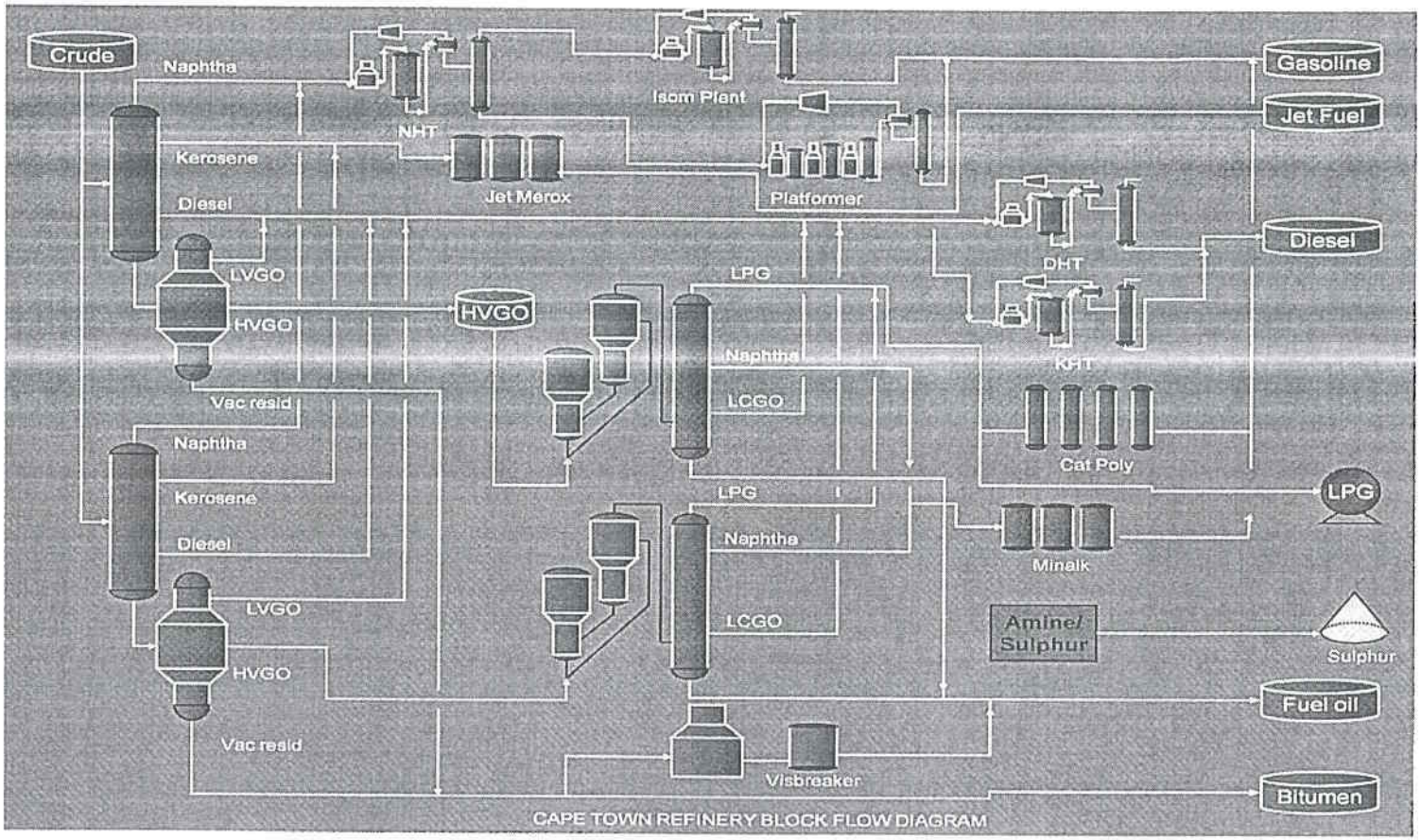

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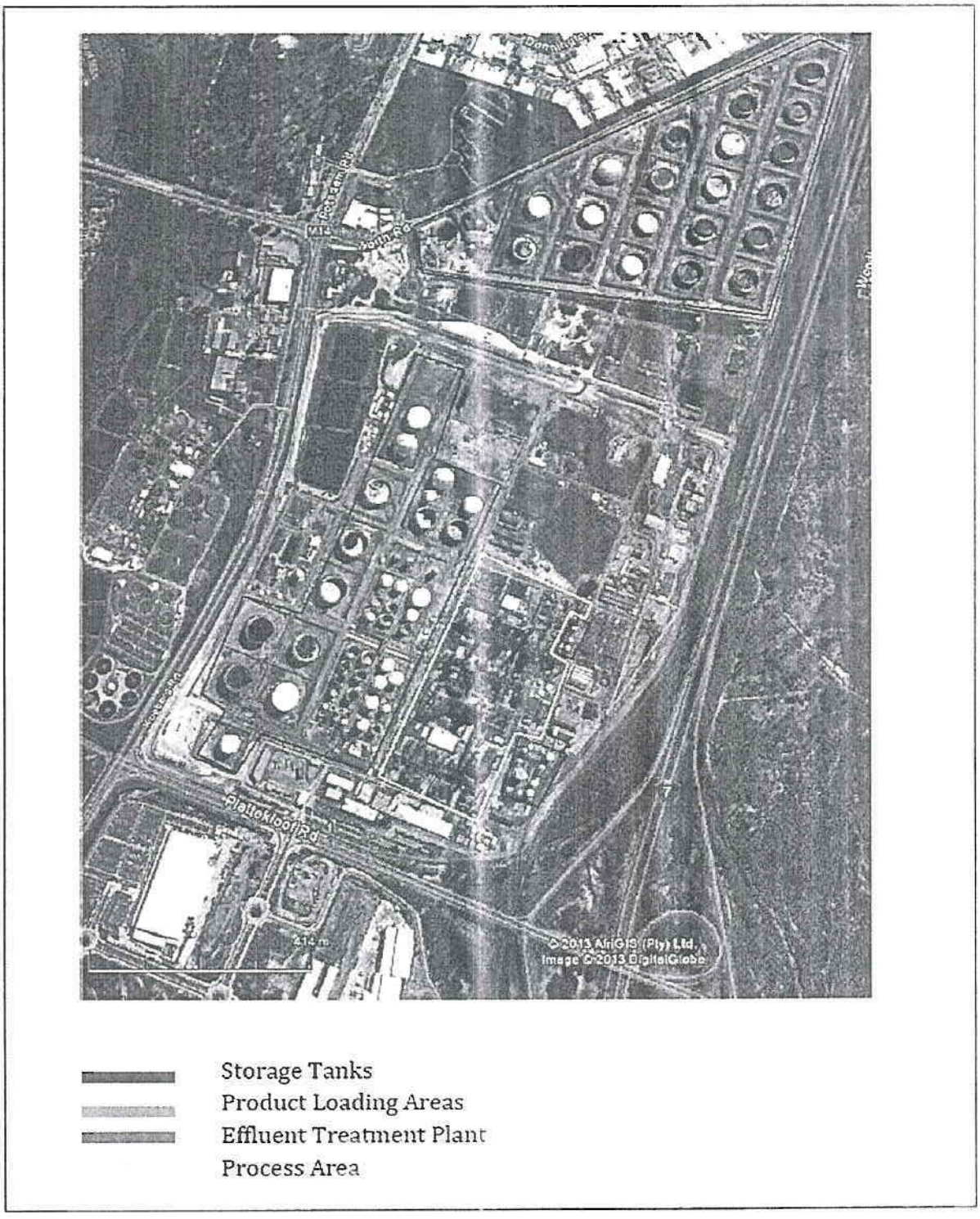
Figure 2. Geographic location of the facility



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31 March 2014

6. RAW MATERIALS AND PRODUCTS

6.1. Raw materials used

Regulated Raw Materials		
Raw Material Type	**Maximum Permitted Consumption Rate (Quantity)**	**Units (quantity/period)**
Crude oil	100 000	barrels per calendar day averaged over 365 days
	And a maximum of 115 000	barrels per stream day
Non-regulated Raw Materials		
Raw Material Type	**Maximum Permitted Consumption Rate (Quantity)**	**Units (quantity/period)**
None		

Note 1: The unit barrels per stream day [bpsd] is defined as the absolute maximum that the refinery can process in a 24 hour period where as the barrels per calendar day included in APPA certificate 307/4 is the maximum average daily throughput over 365 days.

6.2. Production rates

Product Name	Maximum Permitted Production Capacity (Quantity)	Units (quantity/period)
Mogas 95 LRP	**The sum of production volumes stated in table above will be less than or equal to the raw material input volume plus 15% i.e.** **Total production capacity ~ 132 250 bpsd for a crude input of 115 000 bpsd.**	
Mogas 91		
Mogas 95 UL		
Jet Fuel		
Diesel		
Illuminating Kerosene		
Fuel Oil		
Asphalt		
Fractionator Bottoms		
LPG		
Sulphur		

6.3. Materials used in energy sources

Materials for Energy Source	Actual Consumption Rate (Quantity)	Units (quantity/period)	Materials Characteristics
Fuel Oil	7.0	m3/hour	Liquid fuel
Fuel Gas	21 000	Nm3/hour	Gaseous fuel

NOTE: Energy consumption is variable based on refinery configuration and operations underway at the time. Consumption rates supplied in **Table 6.3** are an annual average and therefore do not constitute a maximum rate.