Gert Sibande District Municipality

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

I, **Tsunke Daniel Hlanyane**, in my capacity as **License Officer** (hereinafter referred to as "the Licensing Authority"), in terms of section 43 of the National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004, hereinafter referred to as the "Act"), and as provided for in section 36(1) of the Act, hereby grant an Atmospheric Emission Licence to **Sasol South Africa Ltd *Secunda Synfuels Operations*** ('the Applicant)."

This Atmospheric Emission Licence is issued to **Sasol South Africa Ltd *Secunda Synfuels Operations*** in terms of section 41(1) of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) ("the Act"), in respect of Listed Activity **Category 1: Sub-category 1.1 Solid fuel Combustion Installations, Sub-category 1.4 Gas Combustion Installations; Category 2:Sub-category 2.1 Combustion Installations, Sub-category 2.2 Catalytic Cracking Units, Subcategory 2.5 Industrial Fuel Oil Recyclers; Category 3: Sub-category 3.2. Coke Production, Sub-category 3.3. Tar Processes, Sub-category 3.6 Synthetic Gas Production and Cleanup; Category 4: Subcategory 4.1 Drying and Calcining, Sub-category 4.7 Electric Arc Furnaces; Category 5: Sub-category 5.1 Storage and Handling of Ore and Coal; Category 7: Sub-category 7.1 Production and or Use in Manufacturing of Ammonia, Fluorine, Fluorine Compounds, Chlorine and Hydrogen Cyanide, Sub-category 7.2 Production of Acids and Category 8: Sub-category 8.1 Thermal Treatment of General and Hazardous Waste.**

The Atmospheric Emission Licence has been issued on the basis of information provided in the company's application dated **18 December 2018** and information that became available during processing of the application.

The Atmospheric Emission Licence is valid upon signature for a period not exceeding five (05) years from the date of issue of the licence. The reason issuance of the licence is for 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	Gert Sibande District Municipality
Atmospheric Emission Licence Number	Govan Mbeki Sasol South Africa Ltd Secunda Synfuels Operations/0016/2019/F03
Atmospheric Emission Licence Issue Date	23 April 2019
Atmospheric Emission Licence Type	Renewal
Expiry date	23 April 2024

LICENSING OFFICER

2 ATMOSPHERIC EMISSION LICENCE HOLDER DETAILS

Enterprise Name	Sasol South Africa(Pty) Ltd
Trading as	Secunda Synfuels Operations
Enterprise Registration Number (Registration Numbers if Joint Venture)	1968/013914/06
Registered Address	Sasol Place 50 Katherine Street Sandton Gauteng
Postal Address	Private Bag X1000 Secunda 2302
Telephone Number (General)	017 610 5105
Industry Sector	Petrochemical
Name of Emission Control Officer	Hannes Buys
Telephone Number	017 619 3512
Cell Phone Number	082 339 3906
Fax Number	Not Available
Email Address	Hannes.Buys@sasol.com
After Hours Contact Details	082 902 1989
Land Use Zoning as per Town Planning Scheme	Industrial Special Stand number 8488 Secunda Extension 35

3. LOCATION AND EXTENT OF PLANT

3.1. Facility Address

Physical Address of the Premises	PDP Kruger Secunda 2302
Description of Site (Erf)	Highveld Ridge Mpumalanga
Coordinates of Approximate Centre of Operations	Latitude: S26.5530 Longitude: E29.16484
Extent (km^2)	2 405 hectares
Elevation Above Mean Sea Level (m)	1 597m
Province	Mpumalanga
Metropolitan/District Municipality	Gert Sibande District Municipality
Local Municipality	Govan Mbeki Local Municipality
Designated Priority Area	Highveld Priority Area

3.2. Description of surrounding land use (within 5 km radius)

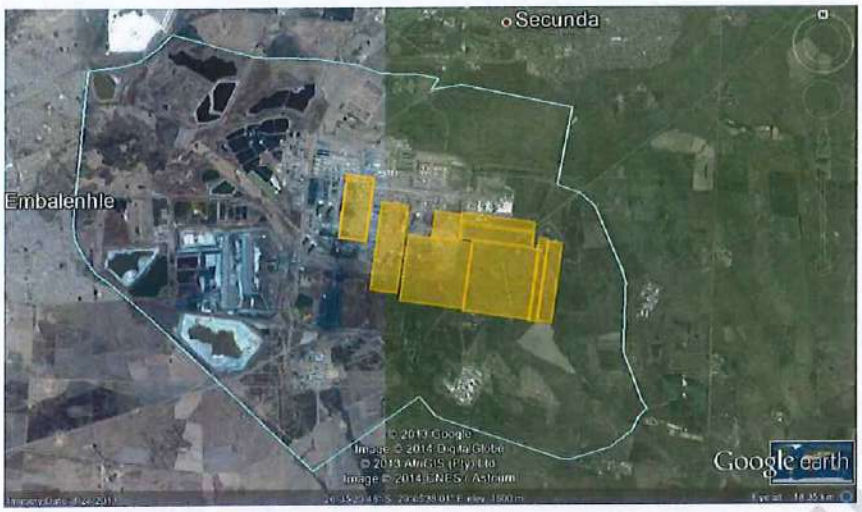


Figure 1: Google Earth Image of area surrounding the site (5km)

Figure 2: Locality map illustrating the area and activities within (5km) radius

4. GENERAL CONDITIONS

4.1. Process and ownership changes

(a) 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.

(b) No building, plant or site of works related to the listed activity or activities used by the licence holder shall be extended, altered or added to the listed activity without an environmental authorisation from the competent authority. The investigation, assessment and communication of potential impact of such an activity must follow the assessment procedure 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.

(c) Any changes in processes or production increases, by the licence holder, will require prior written approval by the licensing authority.

(d) 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.

(e)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 thirty (30) working days after the change of ownership.

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

(g) The licence holder must notify the Licensing Authority in writing and submit the closure and rehabilitation plan three (3) months prior to the decommissioning of the facility.

4.2. General duty of care

(a) 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 and Part II Section 3 of the Gert Sibande District Municipality Air Quality Management By Law No 2300 of 2014.

(b) 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 as amended.

(c) 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 as amended including Part III Section 3 of Gert Sibande District Municipal Air Quality by-laws.

4.3. Sampling and/or analysis requirements

(a) Measurement, calculation and /or sampling and analysis shall be carried out in accordance with any nationally or internationally acceptable standard in line with (Annexure A) of NEMAQA as amended.

(b) Methods other than those contained in Annexure A of NEMAQA as amended may be used with the written approval of the National Air Quality Officer.

(c) In seeking the written approval referred to in paragraph (b), an applicant must provide the National Air Quality Officer with any information that supports the equivalence of the method other than that contained in Annexure A to a method contained in Annexure A.

(d) The licence holder is responsible for quality assurance of methods and performance. Where the holder of the licence uses internal or external laboratories for sampling or analysis, only accredited laboratories by the national accreditation body shall be used. The certified copy of accreditation of the internal or external laboratory must be submitted to the license authority annually including its external audits certification.

(e) The licence holder must provide the licensing authority on request with raw data obtained during sampling and or analysis including proof of agreed methodology used to reach the final results submitted for compliance.

4.4. General requirements for licence holder

(a) 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.

(b) 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.

(c) A copy of the licence must be kept at the premises where the listed activity is undertaken. The original licence must be made available to the Environmental Management Inspector / Air Quality Officer or an authorised officer representing the licensing authority who requests to see it.

(d) The licence holder must inform, in writing, the licensing authority of any change to its details but not limited to the name of the Emission Control Officer, postal address and/or telephonic details within five (05) working days after such change has been effected.

(e) The Emission Control Officer or facility representative must attend the Highveld Priority Area Implementation Task Team or Air Quality Stakeholder Forum Meetings quarterly.

(f) The licence holder must report and submit annual emission report on the National Atmospheric Emission Inventory System (NAEIS) for the preceding year in terms of GNR 283 in Government Gazette 38633 of 02 April 2015.

(g) The facility is required to submit a definite offset implementation plan to reduce PM and SO_2 pollution in the ambient/environment. The plan must be submitted to the National Air Quality Officer and the Licensing Authority by 31 January 2020.

(h) The facility is required to submit a progress report on the implementation of offset projects. The first report must be submitted to the National Air Quality Officer and the Licensing Authority by 01 April 2020.

(i) The facility is required to submit a quartely progress report on the implementation of their compliance road map and commitments that were made in support of their postponment application. The first report must be submitted to the National Air Quality Officer and the Licensing Authority by 01 April 2020.

(j) The licence holder must hold an environmental / health consultation forum meetings with affected and interested parties bi-annually to give feedback on the impact of the facility on related matters, and must provide written prove of such consultation to the licensing authority bi-annually.

4.5. Statutory obligations

The licence holder must comply with the obligations as set out in Chapter 5 of NEMAQA (Act no. 39 of 2004) as amended, Chapter 10 and 11 of the National Health Act 61 of 2003, National Environmental Management Act 108 of 1998 as amended, National Water Act No.36 of 1998, and National Waste Management Act No. 59 of 2008 including Gert Sibande District by-laws No. 23 of 2014.

5 NATURE OF PROCESS

5.1 Process Description

5.1.1 Utilities

5.1.1.1 Steam Plant

Steam is used in various processes throughout the factory and for generating electricity. The steam plant generates steam from 17 boilers using fine coal and boiler feed water. The steam plant (units 43/243) supplies process steam for the gasification process, and drive steam for turbines at the Synthol and oxygen east plants. Make-up steam is let down to satisfy deficits on the medium pressure and low pressure factory steam headers. The balance of the steam produced is used to generate electricity. Electricity is generated by means of 10 steam driven turbine generators.

Steam plant west (unit 43) and steam plant east (unit 243) both have eight Babcock boilers, while steam plant east (unit 243) has a ninth boiler built by ICAL. Electricity is generated in turbine generator sets rated at 60 megawatts electric (MWe). There are six and four turbine generators at Steam plant west (unit 43) and Steam plant east (unit 243) respectively, resulting in combined generation capacity of 600MW. The operating philosophy of steam plant is such that the steam header pressure control is done by manipulating the boilers and turbine generator load.

5.1.1.2 Gas Turbines

Two gas turbines provide additional electricity generating capacity. Natural gas from Mozambique and methane rich gas (MRG) from the cold separation units (at gas circuit) are used as the feed streams (fuel) to the gas turbines. The electricity generated is supplied into the Eskom grid. The gas turbine power plant consists of two gas turbine generators and associated plant. The two gas turbine generator trains operate independently in parallel. The gas turbines' design generation capacity is 118 megawatts (MW). The maximum operating generation capacity from each gas turbine is approximately 104 MW during summer months and 110 – 118 MW during winter months.

The exhaust gas from the gas turbines is used to generate high pressure steam in two heat recovery steam generators (HRSGs). Each gas turbine has its own HRSG with supporting boiler feed water pre-conditioning equipment and own blow down equipment. Each HRSG produces 163 ton per hour (t/h) maximum continuous rating 40 bar (g) steam. The gas turbines can be operated as open cycle gas turbines with the HRSGs out of commission (abnormal operation). When operating in an open cycle mode the exhaust gas is released to atmosphere via a bypass stack.

5.1.2 Gas Production

5.1.2.1 Coal processing

Coal is conveyed from Sasol coal supply east and west to the coal processing units (units 01/201). The coal is conveyed into 14 bunkers on top of coal processing on each side from where the coal is screened in a primary and secondary vibrating screen. The coarse fraction (oversize material) is conveyed to coal distribution (units 02/202). These conveyer belts transfer material on incline conveyers (CV18, 19, 20, and 21) where the coal is dumped into the north and south bins of the respective east and west coal distribution plants. From the north and south bin, the coal is conveyed via the wing conveyers. Last mentioned conveyer belts service two tripper cars per conveyer where it is then used to fill the different bunkers of the gasifiers.

The undersized material from the secondary vibrating screen is transferred by means of gravity to the sieve bend screen where primary dewatering takes place. The oversize material from the sieve bend screens are transferred to a centrifuge where further dewatering takes place. The undersize of the sieve bend screens are transferred in a slurry launder to the thickener system where flocculent is added to aid in the settling of the coal particles. The underflow of the thickeners is pumped to the filter section where the slurry is dewatered by means of vacuum filtration. The filter cake is removed from the filter cloth with the aid of a compressed air cycle. The filter cake and centrifuge product combine on conveyors CV9 and

CV10 to be used as feed to the steam plant (unit 43/243). The water is recovered from the thickener to be used as spray water.

5.1.2.2 Gasification and Raw Gas Cooling

Eighty four Sasol® fixed bed dry bottom (FBDBTM) gasifiers (i.e. 42 gasifiers at each unit, 010 and 210), are used to gasify coal at a temperature of approximately [redacted] using high pressure superheated steam and oxygen. The Sasol® FBDBTM gasifiers is a commercially proven process for the conversion of coal feedstock into synthesis gas. In this process, the following streams are formed:

- Crude raw gas which is transferred to raw gas cooling unit and then to the Rectisol unit for further purification.
- Ash as a solid waste stream that is processed at the inside ash unit prior to being send to the outside ash unit for final disposal.
- Gas liquor (a water stream) is transferred to the gas liquor separation units to separate tars, oils and solids from the aqueous phase.

Wet gasification coal is sent to the coal storage bunkers at the top of each gasifier. Coal is loaded to each gasifier using batch operated coal locks. To safely open the coal lock to add a new batch of coal, the coal lock is firstly depressurised to a coal lock raw gas compressor (unit X09). The coal lock is further depressurised to local flare (flares at units 010/210). The residual coal lock raw gas is safely vented to the atmosphere via a venturi ejector system which uses air as motive fluid. Inside the gasifiers, carbonaceous fraction of coal reacts with a steam and oxygen mixture to produce crude raw gas containing hydrogen, carbon dioxide(CO_2), carbon monoxide (CO), methane, steam, as well as small concentration of hydrocarbons, tars, oils, phenols, ammonia and others.

Hot gas leaving the gasifiers at approximately 500°C is first quenched to remove solids and heavy tars and then cooled in the heat exchangers at raw gas cooling (units 011& 211) before it is sent to Rectisol for further purification. During the gasification process, mineral matter contained in coal is oxidised and ash is produced. The ash is intermittently removed from the bottom of a gasifier via an automatically operated ash lock hopper, quenched with water and sent to the inside ash unit for processing and final disposal at the outside ash unit. The gas liquor containing dissolved oil, phenols, tar acids, organic acids and ammonia, is worked-up in the gas liquor separation, Phenosolvan, ammonia recovery and biological water recovery effluent treatment plants, before it is used as make-up water to the process cooling water towers units.

During gasifier start-up, generated gases are condensed in the waste heat boiler and vented to atmosphere via the start-up vent system. Once the generated gas is oxygen free and operation is stable, the gas routing is switched from the cold vent system to the flare system. After a pressure ramp-up to normal gasifier operating pressure, and confirmation that the crude raw gas meet the desired specification, the raw gas is switched from the flare system to the raw gas header (which is routed to Rectisol via gas cooling).

5.1.2.3 Rectisol

The main function of Rectisol is to remove acid gases, such as CO_2 and hydrogen sulphide (H_2S), together with other impurities from the raw gas produced by gasification. The resulting cleaned gas, called pure gas, is the feedstock to the Synthol plant. The Rectisol process is a physical absorption process that washes the raw gas with cold methanol in order to remove CO_2, H_2S, benzene, toluene, ethyl benzene and xylene (BTEX) and other organic and inorganic compounds.

The raw gas and methanol flow counter-current through an absorption tower which comprises three sections. The resultant pure gas is routed directly to Synthol and the loaded methanol is routed to the regeneration systems. The methanol from the first tower section has water added to it and the BTEX-rich naphtha phase is removed by gravity separation in an extractor drum and sent to the tank farm. The remaining water-methanol phase is distilled to separate the methanol (which is recycled back into the system) and the water (sent to waterworks for further processing). The methanol from the second tower section is flashed to remove CO_2, H_2S and other gases and some of it is then heated to strip off any remaining gases. The methanol

from the third tower section are processed with the methanol from the second tower section. The CO_2 and H_2S -containing off gas streams are routed to the sulphur and wet sulphuric acid plants for removal of H_2S. The entire process is supported by a propylene refrigeration system.

5.1.3 Gas Circuit

5.1.3.1 Benfield

Tail gas from Synthol (gas synthesis section) passes through a knock-out drum and a filter coalescer to remove any liquid droplets from the feed gas. The gas is then heated by heat exchange with hot potassium carbonate solution and enters the absorber column. CO_2 is absorbed from the gas stream into the potassium carbonate absorption medium. The cleaned gas then passes through a knock-out drum into the diethanol amine (DEA) system, which acts as a CO_2 removal polishing unit. The sweetened gas then passes through a cryogenic separation unit called cold separation.

The rich (loaded with CO_2) potassium carbonate solution is regenerated by flashing the solution and by reboil in the regeneration column. The CO_2 and steam mixture is released to atmosphere and the lean potassium carbonate is re-circulated to the absorber column. A similar recycle and regeneration process is used in the DEA system. The CO_2 and steam stripped from the DEA solution, joins the carbonate regeneration column and is released to atmosphere. Condensate is added to both regeneration columns (carbonate and DEA) to make up for the water lost to atmosphere.

5.1.3.2 Catalyst Manufacturing and Catalyst Reduction

The catalyst manufacturing units [redacted] prepare the iron based catalyst for use in the Sasol Advanced Synthol (SAS) reactors at Synthol [redacted]

[redacted]

[redacted]

5.1.4 Refining

5.1.4.1 Tar distillation units (Units 14/214)

The purpose of this unit is to fractionate crude tar, originating from gasification, into different fractions, which is then used as feed for downstream units. These fractions (from low to high boiling point) include light naphtha, heavy naphtha, medium creosote, heavy creosote, residue oil and pitch.

5.1.4.2 Neutral oil stripper (Unit 27A)

The purpose of unit 27A is to remove the neutral oils contained in the high neutral oil depitched tar acids (HNO-DTA) feed, producing low neutral oil depitched tar acids (LNO-DTA (). Unit 27A is the final processing step in the tar acid value chain (TAVC) on the Secunda site. The LNO-DTA consists mainly of phenols, cresols and xylenols (PCXs) that are extracted from

the gas liquor stream at Phenosolvan into crude tar acids (CTA), from where the majority of pitch is removed in the primary depitchers where the distillate product HNO-DTA is sent to unit 27A.

5.1.4.3 Secondary depitcher (Unit 74)

The CTA feed stream to the primary depitcher at Phenosolvan is split into the side draw, HNO-DTA stream going to unit 27A and the phenolic pitch bottoms stream that is fed to unit 74. The purpose of the secondary depitcher is to recover the remaining PCXs from the phenolic pitch stream in secondary depitcher (SD)-DTA that is sold to Merisol USA in Houston.

5.1.4.4 Coal tar Naphtha hydrogenation (Unit 15/215)

The purpose of this unit is to hydro treat a combined feed of Rectisol naphtha from units 2/12, light naphtha and heavy naphtha from unit 14/214 to remove phenolic and nitrogen compounds. Olefin saturation and sulphur removal also takes place to produce a product acceptable for utilisation in the petrol pool. The liquid product is fed to a H_2S stripper where the sour water is removed from the product stream. The final product goes to storage to be used as blending component in petrol.

5.1.4.5 Creosote hydrogenation unit (Unit 228)

The purpose of this unit is to hydro treat heavy tar derived cuts to produce creosote naphtha and diesel. The plant receives medium creosote, heavy creosote and residue oil from units 14/214. The unit also receives medium temperature pitch (MTP), FFC, cooker gas oil and waxy oil transfer material from carbo tar (unit 39) and this is fed to the unit as a percentage of the unit 14/214's feed streams.

After the hydro treating reactors a high concentration hydrogen gas stream, hydrogen sulphide (produced) rich gas stream and sour water (produces and added) is separated from the hydrocarbon stream at various points. The hydrocarbon stream is separated into a creosote naphtha and creosote diesel stream. Due to the high naphthene and aromatic content the creosote naphtha is routed to the platformer, while the creosote diesel is a final diesel blending component.

5.1.4.6 Naphtha hydrotreater, platformer and Continuous Catalyst Regenerator CCR (Unit 30/230 and Unit 31/231)

The naphtha hydrotreater is a catalytic refining process used to saturate olefins and remove oxygenates. The feed for the naphtha hydrotreater is naphtha cut originating from Synthol light oil, distillate naphtha from the distillate hydrotreater (unit 35/235) and creosote naphtha from unit 228. After the hydro treating reactors a high concentration hydrogen gas stream, hydrogen sulphide (produced) rich gas stream and sour water (produces and added) is separated from the hydrocarbon stream at various points. The hydrocarbon stream is separated into an IP and platformer feed stream.

Platforming is a catalytic refining process employing a select catalyst to convert low quality naphtha in the presence of hydrogen, into an aromatic rich, high octane product while also yielding a hydrogen rich gas stream and a liquid petroleum gas (LPG) stream. The LPG stream is routed to unit 32/232 or to a petrol component tank depending on season. The hydrocarbon stream is routed as platformate to the petrol component tanks.

During a normal operating cycle, platforming catalyst deactivates due to excessive carbon build-up. The catalyst is continuously removed from the platforming reactors and sent to the continuous catalyst regeneration (CCR) unit, where the carbon is burnt off the catalyst restoring the activity of the catalyst. A certain amount of fines are produced in the unit and that is disposed off.

5.1.4.7 Catalytic distillation hydrotreater (Unit 78)

The unit 78 catalytic distillation (CD) hydro unit is designed to individually hydro-isomerizes C5 and C6+ hydrocarbons over a catalyst [redacted] and produce a diene-free C5 feedstock to the skeletal isomerisation unit (unit 90) and eventually the tertiary amyl methyl ether (TAME) unit. The reactions take place over a catalyst [redacted]. The C5 CD hydro product from the column's bottoms (essentially diene free) is routed to the skeletal isomerisation unit, and eventually to the CD Tame unit for TAME production. The C5 product can also be routed either to storage, directly to unit 79 or in combination of the mentioned scenarios.

5.1.4.8 CD TAME (Unit 79)

The CD TAME unit 79 converts a C5 product from the C5 CD hydro column via the skeletal isomerisation unit 90, to produce TAME. This C5 stream from unit 90 is fed to unit 79[redacted]. TAME product is recovered from the bottom of the reaction column. The distillate contains the C5 raffinate and some methanol. The methanol is extracted from the distillate stream in the methanol extraction column. The C5 raffinate [redacted] is sent to the fuel pool. Methanol is recovered from the methanol/water mixture in the methanol recovery column and recycled to the reaction section of the process.

5.1.4.9 C5 Isomerisation (Unit 90)

The C5 skeletal isomerisation unit (unit 90) produces branched iso-amylenes from the C5 olefinic feed from the C5 CD hydro unit (unit 78). The branched iso-amylenes are required as feed to the CD TAME unit (unit 79). The C5 olefinic feed is contacted with catalyst. Heavy ends of C6 and higher are removed from the reactor effluent in a depentaniser column and sent to the existing C6 storage facilities in the tank farm. Light ends of C4 and lower are removed in a debutaniser column and sent to the catalytic polymerisation unit (unit 32). The bottoms product from the debutaniser column is the C5 iso-amylene product that is sent to unit 79.

[redacted]

5.1.4.10 Vacuum distillation (Unit 34/234)

The vacuum distillation unit (unit 34/234) separates the decanted oil (DO) stream from Synthol as well as the heavy components produced in units 29/29. The products from this unit are light vacuum gas oil and heavy gas oil routed to unit 235 diesel hydro treaters and a minimum amount of heavy fuel oil routed to unit 39 carbo tar.

5.1.4.11 Distillate hydrotreater (Unit 35/235)

The purpose of this unit is hydro treating. The plant receives heavy components from stabilised light oil (SLO)/Safol unit and the lighter components from the vacuum distillation units (units 34/234). After the hydro treating reactors, a high concentration hydrogen gas stream and hydrogen sulphide (produced) rich gas stream is separated from the hydrocarbon stream at various points. The hydrocarbon stream is separated into naphtha, light diesel and a heavy stream.

The naphtha stream is sent to the naphtha hydrotreater (units 30/230), the distillate selective cracker (at unit 35) and the light diesel is sent to the diesel component tanks. The hydrogen compression system supplies high purity (99% pure) hydrogen at 56 bar to a number of refinery and chemical units. Unit 235 also receives the hydrogen used in majority of the refinery units.

5.1.4.12 Distillate selective cracker (Unit 35)

The distillate selective cracker (DSC) unit consist of two main sections - the cracking/dewaxing reactor reaction and the fractionation section. The main function of the reactor is to crack the heavy feed material into diesel range boiling material. The DSC fractionation section main purpose is to separate reactor effluent material into very light gasoline boiling range material, a heavy diesel cut and a fuel oil cut.

5.1.4.13 Light oil fractionation (Unit 29/229)

The purpose of this unit is to perform the primary fractionation for the refinery facilities. The feed to the unit is stabilised light oil (SLO) from Synthol. The unit produces a light C5/C6 stream for CD hydro unit (unit 78), a naphtha product that feeds octene and the naphtha hydro-treatment units (units30/230), a distillate stream that feeds Safol and diesel hydrotreater (unit35/235), a heavy product that feeds the vacuum distillation unit (unit34/234).

5.1.4.14 Polymer hydrotreater (Unit 32/232)

The purpose of this unit is to convert olefins, from either a heavy naphtha fraction or a distillate fraction, to the corresponding paraffin's. The feed to the unit comes from units 2/32. After the hydro treating reactors a high concentration hydrogen gas stream, hydrogen sulphide (produced) rich gas stream and sour water (produced and added) is separated from the hydrocarbon stream at various points. The hydrocarbon stream is separated into petrol and diesel component stream.

5.1.4.15 Catalytic polymerisation and LPG recovery (Unit 32 / 232)

The purpose of this unit is to produce motor fuels namely petrol, diesel and jet fuel from a stream of C3/C4. This is achieved by fusion of small olefin molecules into large olefins through polymerisation with the aid of a phosphoric acid catalyst. The olefins react in the process but butane and propane do not and go to LPG recovery. Saturated C3's and C4's are sold as LPG.

5.1.4.16 Synfuels Catalytic Cracker (Unit 293)

The Synfuels catalytic cracker (SCC) is a fluidized catalytic cracking (FCC) process, similar in configuration to a refinery FCC unit. Low molecular weight olefins and paraffin's are converted to high value products such as ethylene, propylene and high octane gasoline. [redacted]

5.1.5 Tar, Phenosolvan and Sulphur (TPS)

5.1.5.1 Gas Liquor Separation

The purpose of the gas liquor separation unit is to separate various gaseous, liquid and solid components from the gas liquor streams. Dissolved gases are removed from the gas liquor by expansion to almost atmospheric pressure. The different liquids and solids are separated in separators by means of physical methods based on settling time and different densities.

To achieve a good separation of gases, liquids and solids the following requirements have to be considered:

- The differences between the specific gravity of the water and the lighter (oil) and heavier (tar) fractions must be sufficiently great;
- Emulsions have to be avoided.

There are four types of separators, namely: primary, secondary, tertiary and oily separators. Separation takes place by gravity at controlled temperatures and atmospheric pressure. The feed to the gas liquor separation unit originates from the cooling and washing of the raw gas from coal gasification. The raw gas contains large amounts of water vapours (steam, carbonization water and coal moistures (surface water, hygroscopic moisture, decomposition water, mineral moisture)) and by-products from carbonization such as tar, oil, naphtha, phenols, chlorine, fluorine and fatty acids. It also contains dissolved gases (mostly NH_3, CO_2, and H_2) and small amounts of combustible gases and coal dust as well as inorganic salts.

Feed steams originate in:

- Gasification (unit 10/210);
- Gas cooling (unit 11/211);
- Rectisol (unit 12/212);
- Phenosolvan (unit 16/216);
- Coal tar filtration (CTF);
- Refinery unit 14 and 74; and
- Carbo tar

5.1.5.2 Phenosolvan

The Phenosolvan (unit 16/216) and ammonia recovery (unit 17/217) plants are part of the gas liquor value chain. These are mainly water purification plants, whose purpose is to remove impurities such as suspended solids and oil as well as to recover pitch, phenols, organic waste, carbon dioxide (CO_2), hydrogen sulphide (H_2S) and ammonia (NH_3) from the gas liquor before pumping the stripped gas liquor to the water recovery units (unit 52/ 252) for re- use in the Secunda Synfuels factory as cooling water. Only phenols and ammonia are marketable products.

The purpose of the Phenosolvan unit is to extract depitched tar acids (DTA) and phenolic pitch from gas liquor. Gas liquor is pumped from storage tanks to sand filters (X16FT – X01 A-H) to remove any tar, oil and solid particulates. These filters are regularly back flushed [redacted]. During said backwashing of the filters, the overheads valve (X16FV-X003) will open to protect the filter from overpressure or vacuum. There is a vent connected to the top of the filters that is open to atmosphere (four (4)filter vents in total). [redacted] From here the gas liquor goes to the extraction train where phenols are removed using di-isopropyl ether (DIPE) as a solvent. The phenol rich [redacted] stream is further processed to recover the solvent and purify the phenol product. The final purification step is to remove the phenolic pitch from the crude phenol. This is done is distillation of the crude phenol stream in a vacuum distillation unit column named the depitcher (X16VL-107). A slight vacuum is maintained by an ejector system. These ejectors vent to atmosphere (one each factory).

5.1.5.3 Sulphur Recovery

The plants receive the feed-gas from Rectisol for the absorption and conversion of H_2S into saleable elementary sulphur, prior to routing the H_2S lean gas to the stack. The off-gas from sulphur plant is combined with the hot flue gas from steam plant, to assist with the buoyance, before being routed to the main stack. The H_2S in the feed-gas from Rectisol is absorbed into the sulfolin liquor by means of venturi absorbers. The sulphur recovery and steam plant processes are one integrated activity because they were designed as an integrated system concluding in the main stacks (east and west). Since the two processes are integrated and designed as one, the total emissions emanating from the integrated process are released at the main stacks (east and west)

From the absorbers the Sulfolin liquor with absorbed H_2S goes into the reaction tanks where elemental sulphur is produced. In the reaction tanks vanadium (V) is an active oxidizing agent that oxidizes HS- to elemental sulphur. During this process vanadium is reduced to inactive vanadium (IV), which needs to be re-activated. The liquor from the reaction tanks is sent to two oxidizers arranged in series.

In the oxidizers (X18DM-X012/3/4), the elementary sulphur is separated from the liquor [redacted] compressed air is bubbled through the oxidizer tanks and discharged to atmosphere via the vents located on top of the oxidizers.

In the separator, the sulphur from the oxidizers are melted into liquid sulphur and separated from water before being sent down to the sulphur pit. From the pit, the liquid sulphur is transported by road trucks to the granulation plant for filtering and formation of sulphur granules.

Recovered liquids and water from the oxidizers and separator are collected in the collecting drum, which is equipped with an air bubbling system [redacted]. The liquid from the collecting drum is re-used as sulfolin liquor for H_2S absorption. The collecting drum and lines leading from it are equipped with vents to discharge the bubbled air.

During the conversion of HS- to elemental sulphur and the re-oxidation of vanadium, salts such as NaSCN, $NaHCO_3$ and Na_2SO_4 are formed. A bleed stream from the discharge side of the circulation pump is routed to the sulphate plant to produce sodium sulphate as a by-product, thereby reducing the salt concentration of the circulation liquid.

5.1.5.4 Wet Sulphuric Acid Plant

The feed gas to wet sulphuric acid (WSA) plant is sourced from Rectisol phases 3 and 4, which are routed to a knock out drum (per phase). The outlets of the knockout drums combined before Phenosolvan off gas joins the feed header into the WSA combustor where the feed gas is burned with fuel gas and hot air to form SO_2 containing process gas.

After the combustion the process gas is cooled in a waste heat boiler. The formed process gas, after being cooled down, leaves the waste heat boiler and dilution air is introduced to ensure sufficient oxygen content before entering the SCR oxides of nitrogen NO_X converter. In the oxides of nitrogen (NO_X) converter the nitrogen oxides are removed from the process gas. The reduction of the nitrogen oxides is carried out by the injection of ammonia into the process gas and subsequently passing the gas mixture over a catalyst where the nitrogen oxides react with the ammonia and are converted to nitrogen and water vapour. From the NO_X converter the process gas is further processed in the sulphur dioxide (SO_2) converter. The SO_2 in the process gas is oxidised catalytically. The SO_2 gas reacts with O_2 to form SO_3 gas. The formed SO_3 gas reacts with the water vapour present in the process gas through exothermic hydration reaction, resulting in the formation of the sulphuric acid gas (H_2SO_4).

The process gas then enters the WSA condenser where it is further cooled by means of air in a glass tube heat exchanger, and the remaining part of the hydration reaction and the condensation of sulphuric acid take place. The produced sulphuric acid has a concentration of 96.5 wt%, with a maximum acid mist content of 20 ppm (by volume) when leaving the top of the WSA condenser.

The hot sulphuric acid product will leave the bottom of the WSA condenser. Normally, if no special precautions are taken, condensations of sulphuric acid vapour will result in a mist of very small acid droplets. These very small droplets cannot be separated from the process gas in the WSA condenser. Thus to overcome this problem four mist control units are installed. The mist control units generate a gas stream containing very small silicon particles. These silicon particles act as nuclei for the formation of larger acid droplets. By adding the particles to the process gas upstream of the condenser, the droplets formed will be large enough to be separated from the process gas in the demisters installed at the top of the WSA condenser. A mixing arrangement is installed in the duct upstream of the condenser to ensure that the silicon particles are homogeneously mixed into the process gas.

The cleaned gas leaves the top of the WSA condenser. Even though all four mist control units are well in operation, the clean gas will contain a small amount of remaining acid mist which is reduced by the wet electrostatic precipitator (WESP). The WESP consists of an empty column scrubber part; where the cleaned gas sprayed with weak acid and the precipitator where

the mist particles form a liquid film on the vertical collecting electrodes due to the strong electric field. The liquid film then runs down the electrodes to the scrubber sump and the cleaned gas proceeds to the stack where it's lead to the atmosphere.

5.1.5.5 Coker (Unit 39)

The delayed coker plant receives the so called bottom of the barrel products from upstream units to produce coke. The plant mainly operates in two different modes to produce two different types of coke. These modes are medium temperature pitch (MTP) mode and waxy oil (WO) mode.

Reactions and catalyst:

The coker plant produces green coke using a delayed coking process, which involves thermal cracking of the feedstock (pitch or waxy oil) at elevated temperatures and long residence time at specific conditions. The basic reaction that takes place is:

HC + impurities = C + impurities + vapour (H_2O & volatile material)

5.1.5.6 Calciner (Unit 75) and coker storage and handling (unit 76)

The coke Calcining unit, (unit 75) receives MTP green coke from the delayed coker unit (unit 39) and thermally upgrades the green coke to produce calcined coke which is conveyed to coke storage and handling unit 76 before being sent to the market. Unit 76 is a storage facility for final products from the calciner unit (unit 075) and distribution via rail and road trucks of different sizes, quantities and products.

5.1.5.7 Coal Tar Filtration (Unit 96/296)

CTF units (units 96/296) receive tar from gas liquor separation units (units 13/213). Solids and water is removed from the tar. The solids get trucked to the mixing plant where it is mixed with fine coal and fed to the boilers. The final tar product with an ash specification of less than 0.020 and the water specification of less than 1.50% is pumped to tank farm as feed for the tar distillation units (units 14/214). Vapours from the CTF unit are collected in a header and send to the gas liquor separation units' thermal oxidiser for destruction. Potential emissions from open systems at unit 96 will be routed to the old CTF plant stack

5.1.5.8 Feed Preparation (Unit 86)

The purpose of the feed preparation unit (unit 86) is to clean-up heavy residue streams removing primarily solids and water; the feed streams can vary depending on availability. The unit consists of two trains; Train 1 processes waxy oil (WO) related product and train 2 processes the crude tar from various sources and also serves as a CTF contingency.

Train 1 can also be utilised to process tar when there is very high tank levels from tank farm (256TK1401/2). Through the series of processes, water and solids are removed from the contaminated feed streams and made available to customers such as heating fuels and tar distillation units (units 14/214).

5.1.6 Water and Ash

5.1.6.1 Bio-sludge (Multi hearth) incinerators

Thickened waste activated sludge (WAS) generated by the biological wastewater treatment plants (units 52/252) is burned in four (4) multiple-hearth incinerators. Each unit has two (2) incinerators. Combustion in the incinerator burners is achieved by

means of fuel gas and combustion air. Cooling air is introduced to the incinerator to control the temperature of the ash cooling zone. This is to ensure that the red ash exits the incinerator at a safe temperature. Off-gas from the incinerators is scrubbed and then exits to atmosphere via the stack, red ash is collected in a bin at the bottom of the incinerator and a fine ash slurry is routed to the process water dams.

5.1.6.2 High Organic Waste (HOW) Incinerators

The HOW incinerators burn a high organic waste stream from Phenosolvan and ammonia recovery (units 17/217) and a stream from chemical work up (units 37/237). The burner is a combination burner for optional or simultaneous combustion of fuel gas and HOW. The product is atomized with steam in the burner. Fuel gas is constantly burnt since it serves as the pilot flame to ignite the HOW. Oxygen is required for combustion, therefore, a controlled quantity of combustion air is provided to the burner. Cooling air is used to control the afterburner's temperature. Warm air containing combustion gases is let out to the atmosphere through the stack.

5.1.6.3 Waste Recycling Facility (WRF)

The WRF is designed to treat waste products from various units in the Synfuels Secunda site. The wastewater entering the plant is primarily contaminated with oils, hydrocarbons, dissolved solids and suspended solids. The products from this facility include treated water, recovered oil and sludge. After treatment the water can be recycled and the sludge is mixed with contaminated soil and is then bio-piled.

The facility has a bulk liquid unloading facility, a waste water tank farm and a waste water treatment plant. The waste water tank farm handles and stores liquid waste material, while the waste water treatment plant treats the waste streams with separation, chemical and biological processes.

5.2 Listed activities

Listed Activity Number	Category of Listed Activity	Sub-category of the listed activity	Description of the Listed Activity	Application	Secunda Synfuels Processes
1.1	Combustion Installations	Solid Fuel Combustion installations	Solid fuels (excluding biomass) combustion installations used primarily for steam raising or electricity generation	All installations with the design capacity equal to or greater than 50 MW heat input, based on the lower caloric value of fuel used	Steam boilers
1.4	Combustion installations	Gas Combustion Installations	Gas combustion installations (including gas turbines burning natural gas) used primarily for steam raising or electricity generation	All installations with the design capacity equal to or greater than 50 MW heat input, based on the lower caloric value of fuel used	Gas Turbines
2.1	Petroleum Industry	Combustion installation	Combustion installation not used primarily for steam raising or electricity generation (furnaces and heaters)	All refinery furnaces, heaters and boilers with the design capacity equal to or greater than 50 MW heat input	Refinery (heaters)
2.2	Petroleum Industry	Catalytic cracking units	Refinery catalytic cracking units	All installations	Synfuels Catalytic Cracker
2.5	Petroleum Industry	Industrial Fuel Oil Recyclers	Installations used to recycle or recover oil from waste oils	Industrial fuel oil recyclers with a throughput > 5 000 ton/month	Waste Recycling Facility (wrf)
3.2	Carbonisation and coal gasification	Coke production	Coke production and by-product recovery	All installations	Calciner and coke storage and handling
3.3	Carbonization and Coal gasification	Tar processes	Processes in which tar, creosote or any other product of distillation of tar is distilled or is heated in any manufacturing process	All installations	Coker, feed preparation, refinery tar distillation units
3.6	Carbonization and Coal gasification	Synthetic gas production and clean up	The production and clean-up of a gaseous stream derived from coal gasification and includes gasification, separation and clean-up of a raw gas stream through a process that involves sulphur removal and Rectisol as well as the stripping of a liquid tar stream derived from the gasification process	All installations	Gasification Gas Liquor Separation CTF Rectisol Phenosolvan Sulphur Recovery
4.1	Metallurgical	Drying and Calcining	Drying and Calcining of mineral solids including ore	Facility with capacity of more 100	Catalyst preparation-

	Industry			tons/month product	rotary kilns
4.7	Metallurgical industry	Electric Arc Furnaces	Electric arc furnaces in the steel making industry	All installations	Catalyst preparation – electric arc furnaces
5.1	Mineral Processing, Storage and Handling	Storage and handling of ore and coal	Storage and handling of ore and coal not situated on the premises of a mine or works as defined in the Mines Health and Safety Act 29/1996	Locations designed to hold more than 100 000 tons	Coal Processing
7.1	Inorganic Chemical Industry	Production and or use in manufacturing of ammonia, fluorine, fluorine compounds, chlorine and hydrogen cyanide	Production and or use in manufacturing of ammonia, fluorine, fluorine compounds, chlorine and hydrogen cyanide and chlorine gas	All installations producing and or using more than 100 tons per annual of any of the listed compounds	Ammonia recovery
7.2	Inorganic Chemical Industry	Production of acids	The production, bulk handling and or use of hydrofluoric, hydrochloric, nitric and sulphuric acid (including oleum) in concentration exceeding 10%. Processes in which oxides of sulphur are emitted through the production of acid sulphites of alkalis or alkaline earths or through the production of liquid sulphur or sulphurous acid. Secondary production of hydrochloric acid through regeneration.	All installations producing, handling and or using more than 100 tons per annum of any of the listed compounds (excluding metallurgical processed related activities regulated under category 4)	Wet Sulphuric Acid
8.1	Thermal treatment of General and Hazardous Waste	Thermal treatment of General and Hazardous Waste	Facilities where general and hazardous waste are treated by the application of heat	All installations treating 10kg per day of waste	Bio-sludge incinerators, HOW incinerators

5.3 Unit process or processes

Unit process	Function of unit process	Batch or continuous process	Operating hours per day	No. days operation per year
Utilities				
Coal milling process	There are 4 mills per boiler. The mill grinds course coal to fine coal, known as pulverized fuel (PF). Primary air dries the coal and then transports the PF into the boiler furnace for combustion.	Continuous	24	365
De-aeration process	The boiler feed water de-aerators use low pressure steam to heat up and remove dissolved oxygen from the feed water. Oxygen causes corrosion inside the boiler tubes if it is present.	Continuous	24	365
Combustion process	The PF is combusted in the boilers and the hot flue gases are used to heat up the water in the water wall tubes, Heated water is separated in the steam-water drum and superheated for factory usage.	Continuous	24	365
Flashing process	Blow down from the steam/water and mud drum as well as drains are flashed in the blow down vessel to 4bar steam.	Continuous	24	365
Ash capture and handling process	Fly ash is separated from the flue gas using electrostatic precipitators. Coarse ash falls from the furnace into the drag chains. Ash is mixed with sluice water and sent to the ash system.	Continuous	24	365
Electricity generation process	Excess superheated steam not used in the process is used to generate electricity in turbo-generators. There are 10 turbo generators with a capacity of 60 MW.	Continuous	24	365
Fuel oil for start-up process	Fuel oil is used during start up and shutdown of boilers. Fuel oil is also used for commissioning and decommissioning of the coal Mills.	Intermittent	24	365
Gas turbine	Gas turbines generate power by combusting natural gas	Continuous	24	365
Heat recovery steam generator	Steam is generated using the hot off gas from the gas turbines.	Continuous	24	365
Gas production				
Coal processing				
Separation	Wet screening fine and course coal	Continuous	24	365
Gasification				
Gasification	• Gasification process produces crude raw gas.	Continuous	24	365

Unit process	Function of unit process	Batch or continuous process	Operating hours per day	No. days operation per year
Coal lock raw gas compression Raw gas cooling	• Coal lock raw gas compression recovers raw gas during second stage depressurization of coal lock. • Raw gas cooling.			
Rectisol				
Absorption	Washes the raw gas with methanol to remove carbon dioxide (CO_2), hydrogen sulphide (H_2S), benzene, toluene, ethyl benzene, and xylene (BTEX) and other organic and inorganic compounds	Continuous	24	365
Regeneration	Purification of methanol	Continuous	24	365
Gas Circuit				
Benfield				
Benfield	The Benfield process removes carbon dioxide from the tail gas entering the cold separation; thereby preventing freeze blockages.	Continuous	24	365
Catalyst preparation				
Catalyst manufacturing	[redacted]	Semi-batch	24	365
Catalyst reduction	The catalyst reduction system activates the catalyst before it is fed to the reactors at the Synthol units. [redacted]	Batch	24	365
Refinery				
Generic refinery unit processes				
Tank	The feed tank serves as feed reserve tank. This is for a holdup for the polymerisation of the mixed feed components and for the separation of entering water.	Continuous	24	365
Vaporiser	The vaporizer separates the light ends from the heavy ends. Saturated high pressure (HP) steam is used to vaporise the feed.	Continuous	24	365
Distillation column	The distillation column purifies hydrocarbon streams and separates hydrocarbon streams into various components.	Continuous	24	365
Catalyst distillation (CD) hydrogenation columns	CD hydrogenation columns hydro treat and separate hydrocarbons.	Continuous	24	365

Unit process	Function of unit process	Batch or continuous process	Operating hours per day	No. days operation per year
Separation and collection drums	Separation and collection drums separate streams into lighter and heavier components and.	Continuous	24	365
Hydro treating reactors	The hydro treating reactors saturate olefins and oxygenates, remove nitrogen and sulphide components and remove other impurities in the presence of hydrogen.	Continuous	24	365
Platforming reactors	The platforming reactors convert low quality naphtha in the presence of hydrogen, into an aromatic rich, high octane product.	Continuous	24	365
Unit 90 - skeletal isomerisation reactor	The skeletal isomerisation unit converts the C5 feed from the CD-hydro treating unit to iso-amylenes as feed to the CD tertiary amyl methyl ether (TAME) unit	Continuous	24	365
Catalytic polymerisation	The reactors fuse small olefin molecules into large olefins through polymerisation with the aid catalyst	Continuous	24	365
Heat exchangers	There are a large number of heat exchangers heat up, cool down, vaporise and condense the hydrocarbon streams. There is a combination of product, product exchangers (two process exchangers exchanging energy) as well as product utility exchangers.	Continuous	24	365
Air coolers	The air coolers cool down and condense hydrocarbon streams	Continuous	24	365
Ejectors	The ejectors generate a negative gauge pressure (vacuum). Many plants in the refinery utilise vacuum conditions to help with the separation of hydrocarbon streams.	Continuous	24	365
Compressors	The compressors increase and or maintain the high operating pressures of the refiner y processes. There are reciprocal, centrifugal and turbine compressors.	Continuous	24	365
Pumps	The pumps in the refinery are centrifugal, multi stage and positive displacement pumps.	Continuous	24	365
Electrical heaters	The electrically heater is normally not in operation. The heater primarily regenerates catalyst and heats up the main reactor for start-up.	Start-up and as required	24	365
Heaters	The heaters heat up hydrocarbon and gas streams	Continuous	24	365
Synfuels catalytic cracker	Low molecular weight olefins and paraffin are converted to ethylene and propylene in a catalyst. High octane gasoline is also produced.	Continuous	24	365
Catalyst fines system and waste heat boiler	The catalyst fines system recovers catalyst fines from the flue gas. The waste heat boiler cools the flue gas against boiler feed water to produce high pressure steam.	Continuous	24	365
Gas clean-up equipment	The unit (NiS reactors, DEA and caustic sections and gas dryers) removes oxygen, acid gasses and moisture from the process gas.	Continuous	24	365
Liquid dryers	The liquid dryers remove water from the C3 stream.	Continuous	24	365
Propylene refrigerant	The propylene refrigeration system is a closed-loop system providing three levels of	Continuous	24	365

Unit process	Function of unit process	Batch or continuous process	Operating hours per day	No. days operation per year
system	refrigeration.			
Tar distillation units				
Water stripper (14VL101/201; 214VL101/201)	The water stripper strips water from crude. The overhead vapours of the stripper are condensed and the water free crude tar is sent to 14/214VL102.	Continuous	24	365
Distillation column (14VL102/202; 214VL102/202)	The distillation column operates at atmospheric pressure and the superheated stripping steam is fed to the bottom section to control the temperature. The distillation tower is heated up by the tar furnace 14HT101. The overhead vapours being mainly water and light naphtha are condensed. In the distillation tower 14VL-102 heavy naphtha, medium creosote and heavy creosote are recovered as side streams of the tower.	Continuous	24	365
Reflux drum (14DM102/202; 214DM102/202)	The condensed vapours of both of both VL101 and VL102 are fed to this drum where the water is separated from the light naphtha. The water overflows into the sewer, the hydrocarbons are partly sent as reflux to 14VL101 and 14VL102, and partly routed as light naphtha product to the tank.	Continuous	24	365
Flash drum (14DM104/204; 214DM104/204)	The net bottom product of the distillation tower is withdrawn from the tar furnace (14HT101) circulation stream and sent to the flash drum 14DM104. In this drum, operating under vacuum, separation between pitch and residue oil is achieved by one stage flash evaporation.	Continuous	24	365
Heavy creosote process vessel (14DM106/206; 214DM106/206)	This vessel stores heavy creosote which is a side draw from VL102 before it is pumped to tank farm.	Continuous	24	365
Medium creosote process vessel (14DM107/207; 214DM107/207)	This vessel stores medium creosote which is a side draw from VL102 before it is pumped to tank farm.	Continuous	24	365
Heavy naphtha process vessel (14DM108/208; 214DM108/208)	This vessel stores heavy naphtha which is a side draw from VL102 before it is pumped to tank farm.	Continuous	24	365
Pitch drum (14DM109/209; 214DM109/209)	The bottoms product of 14DM104 is pitch, which passes via a barometric pipe to pitch cooler 14ES114 and to a pitch drum 14DM109, from where it is pumped to carbo tar or tank farm.	Continuous	24	365

Unit process	Function of unit process	Batch or continuous process	Operating hours per day	No. days operation per year
Residue oil drum (14DM110/210; 214DM110/210)	The top product of the flash drum 14DM104 is residue oil, which is condensed in a steam producing heat exchanger, then piped to the residue oil drum 14DM110 from where it is pumped to the battery limit.	Continuous	24	365
Heaters (14HT101/201; 214HT101/201)	These furnaces heat a high circulating bottoms product from 14VL102 to control the temperature of the column.	Continuous	24	365
Neutral oil stripper (Unit 27A)				
Neutral oil stripper (27VL101)	The neutral oil stripper removes neutral oils from high neutral oil depitched tar acids (HNO-DTA), producing low neutral oil depitched tar acids (LNO-DTA). The overhead vapour stream, containing mainly water and neutral oils, leaves the top of the column to pass through the overhead condenser system.	Continuous	24	365
Flash drum (27DM103)	This drum flashes the neutral oil from the water and the neutral oil rich stream goes to 27DM1 and the water rich stream is recycled back to the column. Temperature and pressure of this drum determines the amount of neutral oil that is flashed.	Continuous	24	365
Separators drum (27DM1)	The stream from 27DM103 that is rich in neutral oil is cooled and sent to 27DM1 for separation. This large vessel has a long retention time thus allowing the neutral oil to separate from the water and flow over the weir inside the vessel to the second compartment where it is then pumped to tank farm.	Continuous	24	365
Unit 74				
Vacuum distillation (74VL101)	This is the secondary depitcher column that flashes phenolic pitch and fractionate the stream to recover phenolic material in the side draw, without entraining catechol or any heavy ends.	Continuous	24	365
Coal tar naphtha hydrogenation				
Feed tank (15TK-101)	The feed tank serves as feed reserve tank. This is for a holdup for the polymerisation of the mixed feed components and for the separation of entering water.	Continuous	24	365
Vaporizer (15EX-101)	The vaporizer separates the light ends (naphtha) from the heavy ends (residue oil). Saturated HP steam is used to vaporise the feed.	Continuous	24	365
Residue stripper (15VL-101)	The residue stripper strips the remaining low boiling components by means of super-heated recycle gas.	Continuous	24	365
Residue oil collection	Residue oil from the residue stripper is collected in the residue oil collect drum and is	Continuous	24	365

Unit process	Function of unit process	Batch or continuous process	Operating hours per day	No. days operation per year
drum (15DM-102)	continuously pumped to tank farm.			
Pre-reactor (15RE-101)	The bottom separator of the pre-reactor retains any entrained liquid droplets, before the hydrocarbon vapour mixture enters the pre-reactor. The pre-reactor, filled with catalyst, hydrogenates components, which easily tend to polymerise.	Continuous	24	365
Main reactor (15RE-102)	Recycle gas and a hydrocarbon vapour mixture passes through the main reactor. A quench stream of cold recycle gas between the two main reactor beds prevents H_2S from reacting back to mercaptans or thiophenes and to prevent severe hydrogenation.	Continuous	24	365
HP separator (15DM-106)	Separates the raffinate from the gas.	Continuous	24	365
Medium pressure naphtha water separator (15DM-107)	The medium pressure naphtha water separator is a three phase separator, firstly to separate the gas liquid mixture and secondly to separate the organic aqueous liquid mixture. The gas/raffinate and condensate are separated under gravity, due to their density difference. The water and product is separated by a gooseneck. The entrained injection and reaction water separated in is discharged from the bottom of the separator's water compartment directly to unit 16/216 as waste water, or to the oily water sewer during upset conditions	Continuous	24	365
H_2S stripper (15VL-102)	The hydrogenated naphtha product is stripped of water, H_2S, ammonia (NH_3) and other dissolved gases. The stripping is done by means of naphtha vapour generated on the thermosiphon reboiler (15/215ES-113) tube side.	Continuous	24	365
Naphtha hydrotreater, platformer and continuous catalyst regeneration (CCR)				
Naphtha reactors system	Saturation of olefins.	Continuous	24	365
Naphtha hydro treater (NHT) charge heater	Heating of NHT reactor feed.	Continuous	24	365
Separation drums	Hydrogen, uncondensed hydrocarbons gases and water is separated from the condensed reactor products.	Continuous	24	365
Stripper System	Removing of light ends (H_2S and water).	Continuous	24	365
Stripper reboiler (fired heater)	Heating stripper bottoms.	Continuous	24	365
Splitter system	Splits between C_{10}+ and C_{10}-.	Continuous	24	365
Splitter reboiler (fired heater)	Heating splitter bottoms	Continuous	24	365
Platformer charge heater	Heating platformer reactor feed	Continuous	24	365

Unit process	Function of unit process	Batch or continuous process	Operating hours per day	No. days operation per year
Platforming reactors	Produces aromatics from paraffin and naphthene	Continuous	24	365
Continuous catalyst regeneration system	Regenerates platformer catalyst on continuous basis	Continuous	24	365
Product separator	Hydrogen (H_2) is separated from the condensed platformer product	Continuous	24	365
Debutanizer	Removes C_4- from final product	Continuous	24	365
Debutanizer reboiler (fired heater)	Heating debutanizer bottoms	Continuous	24	365
Catalytic distillation hydrotreater				
Dependaniser (78VL-101)	Splits a liquid feed stream into C5 and C6+ streams. The C6+ stream is sent to the alpha olefin plants for hexane extraction. The C5 stream is sent to 78VL-102 (CD hydro column)	Continuous	24	365
CD hydro column (78VL-102)	Hydro treats the C5 hydrocarbons of a catalyst to produce a diene-free feed to unit 90.	Continuous	24	365
CD TAME				
Primary reactor (79RE-101)	79RE-101 (Primary reactor) – The first reaction between iso-amylenes and methanol takes place in this reactor, with a conversion of at least 55%.	Continuous	24	365
Secondary reactor (79RE-103)	The second reaction between iso-amylenes and methanol takes place in this reactor, with a conversion of at least 30%.	Continuous	24	365
CD TAME column (79VL-101)	The last phase of reaction takes place in this column, with a conversion of 92%. This column also serves to separate the TAME product from the unreacted reactants.	Continuous	24	365
Methanol extraction column (79VL-102)	Uses a water stream to extract methanol from the C5 Hydrocarbons. The C5 Hydrocarbon are sent to storage, and the methanol-water stream is sent to 79VL-103.	Continuous	24	365
Methanol recovery column (79VL-103)	The water-methanol stream from 79VL-101 is split into methanol and water streams. The methanol is recycled to the front end of the process, and the water is recycled to 79VL-102 where it is used to extract the methanol.	Continuous	24	365
C5 Isomerisation				
Unit 90 - skeletal isomerisation reactor	The skeletal isomerisation unit converts the C5 feed from the CD-hydro treating unit to iso-amylenes as feed to the CD tertiary amyl methyl ether (TAME) unit	Continuous	24	365
Vacuum distillation				
Vacuum distillation	The aim is to fractionate high boing point hydrocarbons at low temperatures by lowering the pressure using decanted oil from unit 20 and the heaviest fraction from	Continuous	24	365

Unit process	Function of unit process	Batch or continuous process	Operating hours per day	No. days operation per year
	unit 29 is fractionated to a heavy and light gas oil and waxy oil.			
Distillate hydrotreater				
Distillation	The fractionation of the feed oil material into components of similar boiling range.	Continuous	24	365
Light diesel stripping	Separation of diesel (medium cut material) range boiling material from the feed stream using distillation.	Continuous	24	365
Naphtha stripping	Separation of naphtha (light material) range boiling material from the feed stream using distillation.	Continuous	24	365
Hydrogenation	The conversion of oxygenates and olefins into paraffin, the reaction is very exothermic.	Continuous	24	365
Catalyst sulphiding	This is to regulate catalyst activity	Continuous	24	365
Water removal	Removal of water from the feed oil stream in a drum operated such that water settles in the drum's water boot.	Continuous	24	365
High temperature separation	Separate a feed stream into a liquid and vapour streams in a drum at a high temperature.	Continuous	24	365
Low temperature separation	Separate a feed stream into a liquid and gas streams in a drum at a low temperature.	Continuous	24	365
Hydrogen recycle	To reuse the hydrogen rich off gases leaving the cold separation drum.	Continuous	24	365
Heating	This is to preheat feed streams and cool down product streams.	Continuous	24	365
Distillate selective cracker				
Cracking reaction system	To selectively crack high-pour point components (predominately paraffin), the reaction is not strongly exothermic.	Continuous	24	365
Distillation	Fractionation of the heavy oil material	Continuous	24	365
Vacuum distillation	Separate the heavy distillate material mainly heavy diesel.	Continuous	24	365
Heating and cooling	Preheat feed material and cool down product streams	Continuous	24	365
Water removal	Separate entrained water from feed stream	Continuous	24	365
Hot temperature separation	Separate reactor product stream into a liquid and vapour stream.	Continuous	24	365
Hydrogen recycle	Recycle the off gas rich stream separate from the reactor liquid stream	Continuous	24	365
Catalyst sulphiding	To regulate the catalyst activity	Continuous	24	365
Light oil fractionation				
Atmospheric distillation	The unit fractionates the stabilized light oil into different fractions of molecules used in	Continuous	24	365

Unit process	Function of unit process	Batch or continuous process	Operating hours per day	No. days operation per year
	downstream processes. The different fractions are C5/C6 to the CD Tame unit, naphtha to octene (and U30NHT), light diesel to Safol (and U35DHT) and a heavy fraction to unit 34.			
Polymer hydrotreater				
Polymer hydrotreater	The unit hydro treats the polymer produced in the catalytic polymerisation unit to a paraffinic petrol and diesel/jet fuel fractions.	Continuous	24	365
Catalytic polymerisation and LPG recovery				
Catalytic polymerisation	The unit produces motor fuels namely petrol, diesel and jet fuel from a stream of C3/C4 through polymerisation over a phosphoric acid catalyst.	Continuous	24	365
Liquid petroleum gas (LPG) recovery	The section recovers unreacted paraffinic C3 and C4 material for LPG production.	Continuous	24	365
Synfuels catalytic cracker (SCC)				
Pre-heat furnace	The section vaporises the low molecule olefin and paraffin feed.	Continuous	24	365
Synfuels catalytic cracker	Low molecular weight olefins and paraffin are converted to ethylene and propylene in a dilute phase reactor-riser utilizing a catalyst. High octane gasoline is also produced.	Continuous	24	365
Quench column and strippers towers	The unit removes heavy oil and separate the process gas from the gasoline phase.	Continuous	24	365
C4 and C5 CD hydro hydrogenation columns	The unit saturates olefins.	Continuous	24	365
Catalyst fines system and waste heat boiler	The unit recovers catalyst fines from the flue gas. The waste heat boiler cools the flue gas against boiler feed water to produced high pressure steam.	Continuous	24	365
Process gas compression (KC2501 – PGC)	The unit compresses the process gas.	Continuous	24	365
Gas clean-up equipment	The unit (reactors, DEA and caustic sections and gas dryers) removes oxygen, acid gasses and moisture from the process gas.	Continuous	24	365
SCC de-propanizer (VL4001)	The unit separates C4 molecules from the process gas.	Continuous	24	365
Chill train, de-methanizer and cold box	The unit cools down the process gas and remove methane.	Continuous	24	365
C2 System which can be divided into the de-	The unit separates C3 molecules from C2 molecules and separates the C2 molecules into ethane and ethylene.	Continuous	24	365

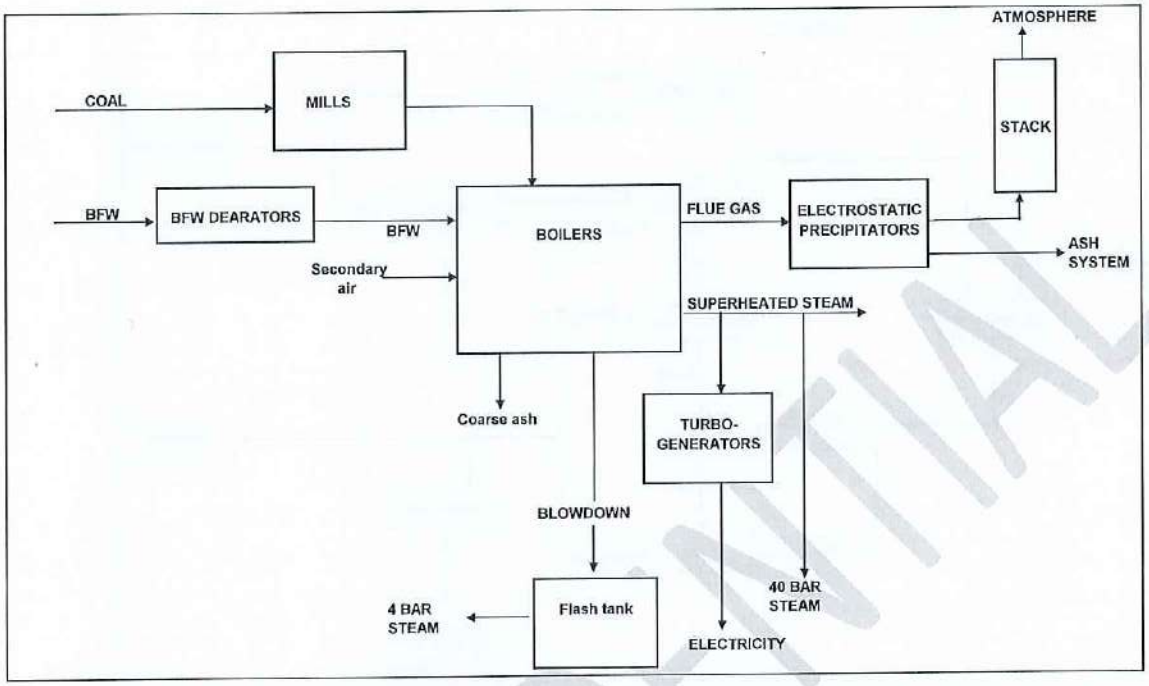
Unit process	Function of unit process	Batch or continuous process	Operating hours per day	No. days operation per year
ethanizer and C2 splitter				
Poly propylene unit (PPU) 5 which comprises of the FT de-propanizer and C3 splitter	The unit separates C3 from C4 molecules and separates the C3 molecules into propane and propylene.	Continuous	24	365
Liquid dryers	The unit removes water from the C3 stream.	Continuous	24	365
Propylene refrigerant system	The propylene refrigeration system is a closed-loop system providing three levels of refrigeration,	Continuous	24	365
Central corridor flares	A system consisting of 2 flare stacks, 2 relief headers and other associated equipment to collect and completely destroy off gases, off-specification gases and emergency venting	As required	24	365
Tar, Phenosolvan and sulphur (TPS)				
Gas liquor separation				
Gas liquor separation	The gas liquor separation units separate various gaseous, liquid and solid components from the gas liquor streams.	Continuous	24	365
Phenosolvan				
Water purification	The system filters out any oil, tar and suspected solids. Solids-free gas liquor flows to the saturation column where its pH is 9 by dissolving CO_2 rich acid gases to prepare it for the extraction process.	Continuous	24	365
The extraction process	The extraction system removes phenols from gas liquor by using di-isopropyl ether (DIPE) as a solvent.	Continuous	24	365
DIPE recovery and phenol production	The DIPE and phenols are separated through several distillation processes.	Continuous	24	365
Ammonia recovery	Recovering of ammonia from the gas liquor. The raffinate from Phenosolvan, with about 1% DIPE, is first sent to the deacidifier to remove acid gases and then to the total stripper column where ammonia, CO_2 and organics are stripped from the water stream.	Continuous	24	365
Acid gas scrubber	The system removes final traces of CO_2 from the ammonia rich vapour stream by forming ammonium bicarbonates inside two packed beds, which are washed down for reprocessing in the upstream units.	Continuous	24	365
Fractionation system	The ammonia leaving the acid gas scrubber overhead is firstly compressed prior to the	Continuous	24	365

Unit process	Function of unit process	Batch or continuous process	Operating hours per day	No. days operation per year
	fractionation process to facilitate liquefaction in the fractionators column (X17VL-105). The distillate product of the fractionators is anhydrous NH_3 and the bottoms product is an organics rich waste stream, which is routed for reprocessing. The ammonia is cooled down, expanded and the final ammonia product is sent to tank farm.			
Sulphur recovery				
Sulphur recovery	The sulphur recovery unit reduces the amount of sulphur released into the atmosphere as hydrogen sulphide (H_2S) gas by producing elemental sulphur as a saleable product.	Continuous	24	365
Wet sulphuric acid (WSA)				
Wet sulphuric acid	The wet sulphuric acid (WSA) unit reduces the amount of sulphur released into the atmosphere as hydrogen sulphide (H_2S) gas by producing sulphuric acid as a saleable product.	Continuous	24	365
Carbo tar				
Coker	The delayed coker unit receives bottom of the barrel products from upstream units to produce coke.	Continuous	24	365
Calciner	The coke Calcining process thermally upgrades green coke to calcined coke	Continuous	24	365
Coal tar filtration (CTF)	CTF removes solids and water from tar by utilising three solids removal processes and one water removal process.	Continuous / batch	24	365
Feed preparation unit (FPP, unit 86)	FPP removes solids and water from heavy residue streams by utilising solids removal and water removal processes.	Continuous except for the batch filtration processes	24	365
Unit 76	The unit consists mainly of conveyors systems combined with storage silos. Loading and weighting facilities are also on site.	Continuous	24	365
Water and Ash				
Bio-sludge (multi hearth sludge) incinerators	The system incinerates waste activated sludge generated by the biological treatment systems which treat industrial and domestic effluents respectively.	Continuous	24	365
High organic waste (HOW) incinerators	The system incinerates a high organic waste stream and a stream containing heavy ketones. Simultaneous combustion of fuel gas and the feed streams occur in the burner.	Continuous	24	365
Waste recycling facility (WRF)	The WRF is designed to treat waste products from various units in Sasol, which consists of oils, hydrocarbons, dissolved solids and suspended solids.	Continuous	24	365

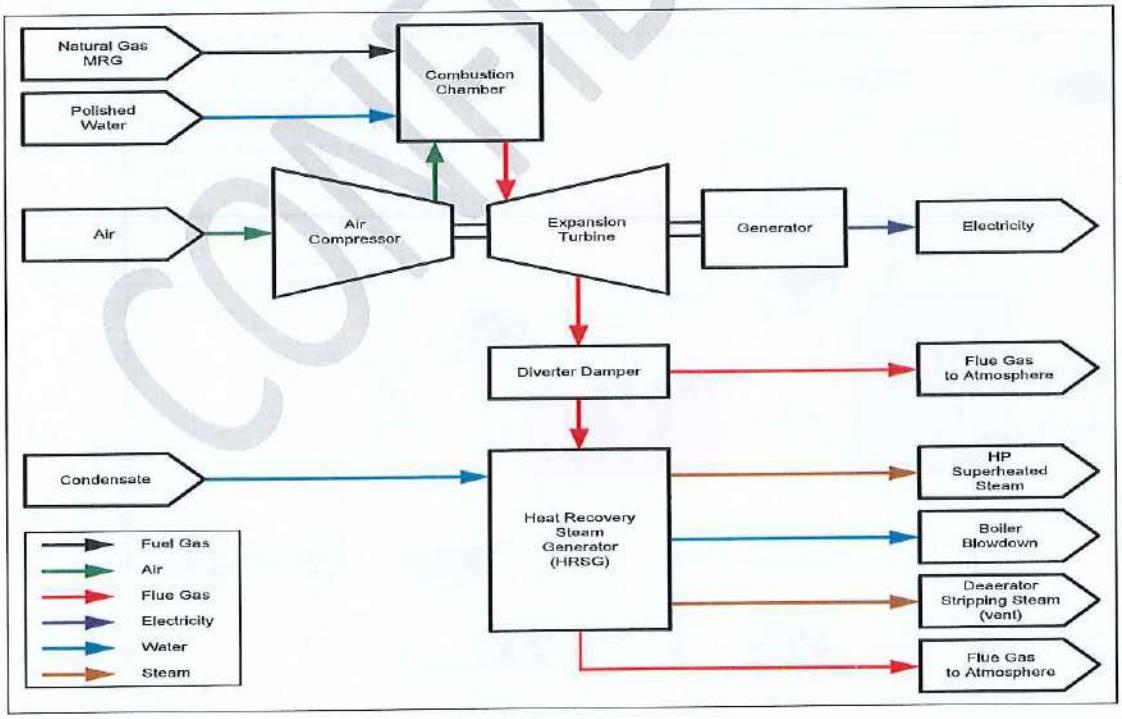
5.4 Graphical Process Information

5.4.1 Utilities

5.4.1.1 Steam Plant

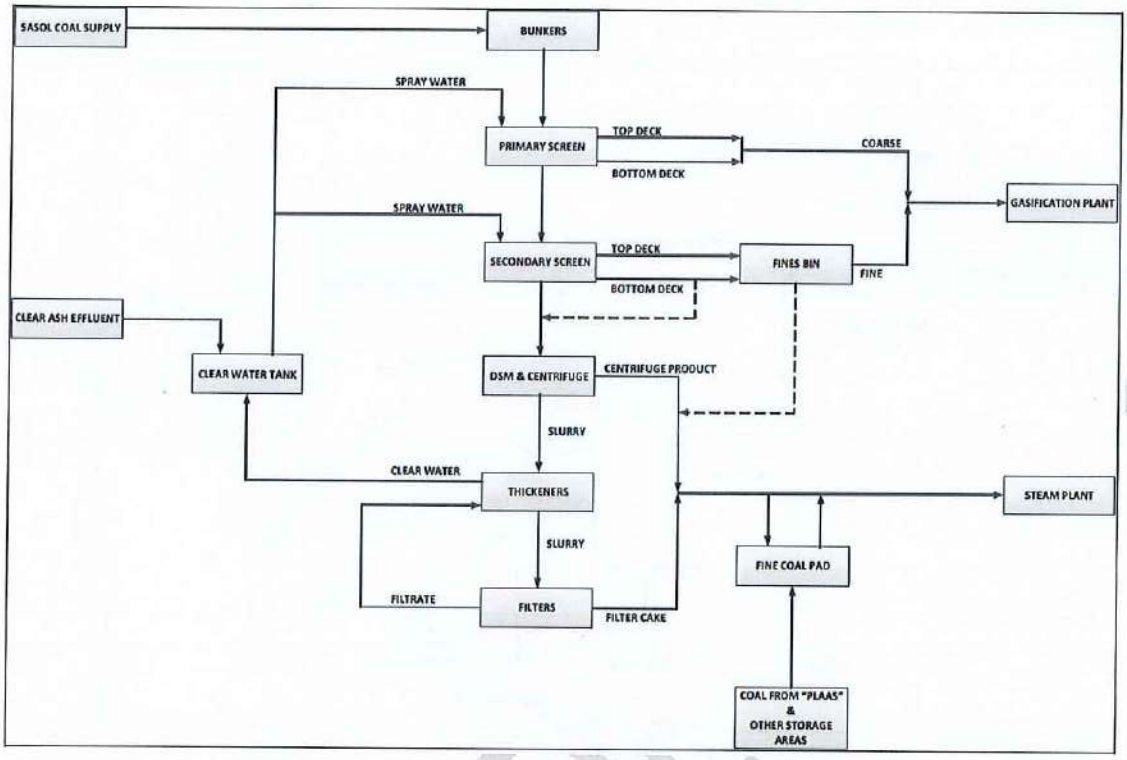


5.4.1.2 Gas Turbines

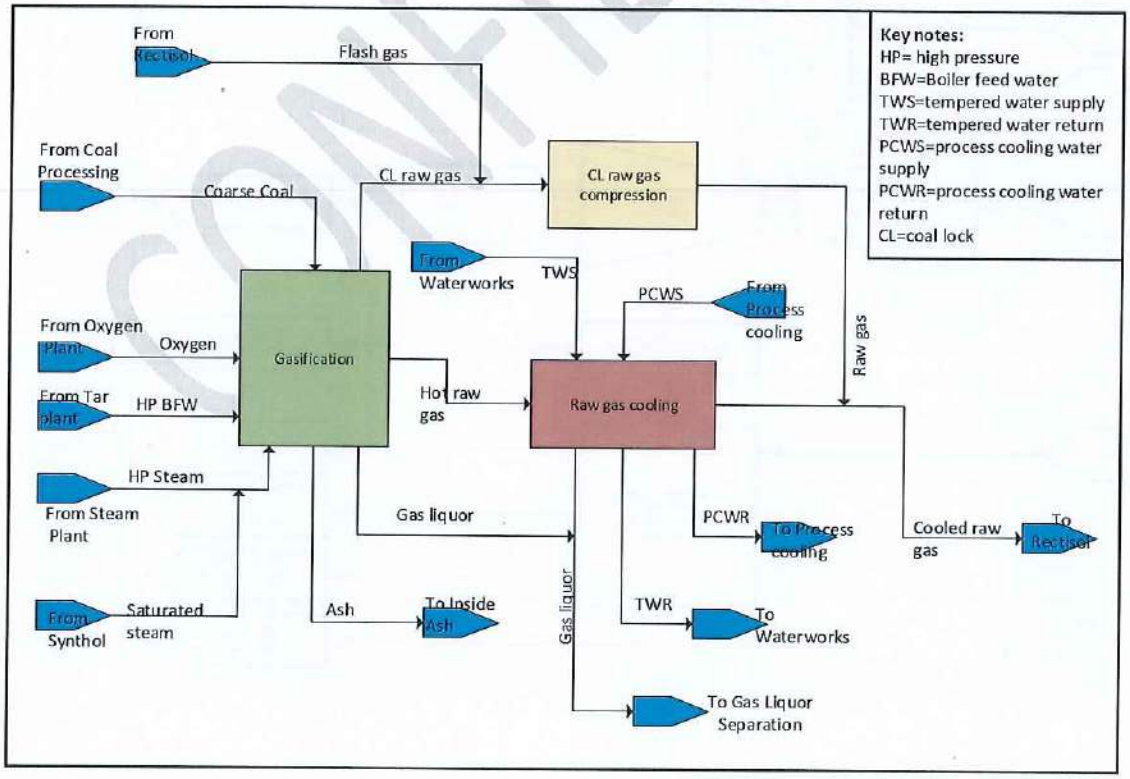


5.4.2 Gas Production

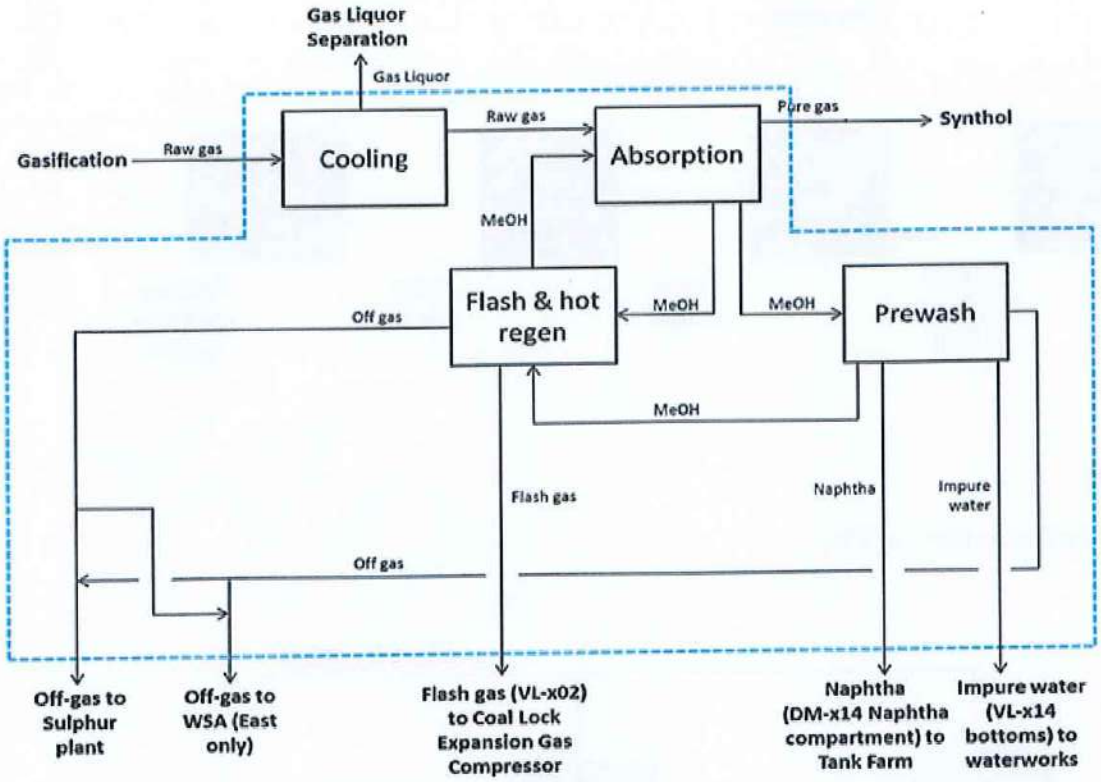
5.4.2.1 Coal Processing



5.4.2.2 Gasification, coal lock raw gad compression and Raw Gas Cooling

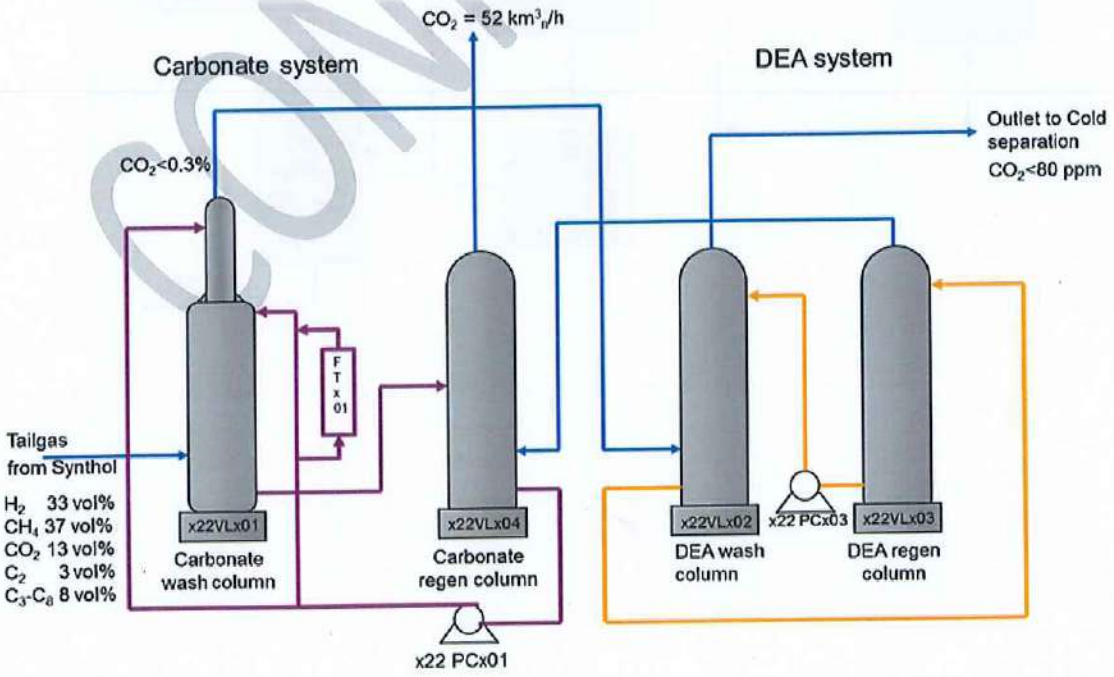


5.4.2.3 Rectisol



5.4.3 Gas Circuit

5.4.3.1 Benfield

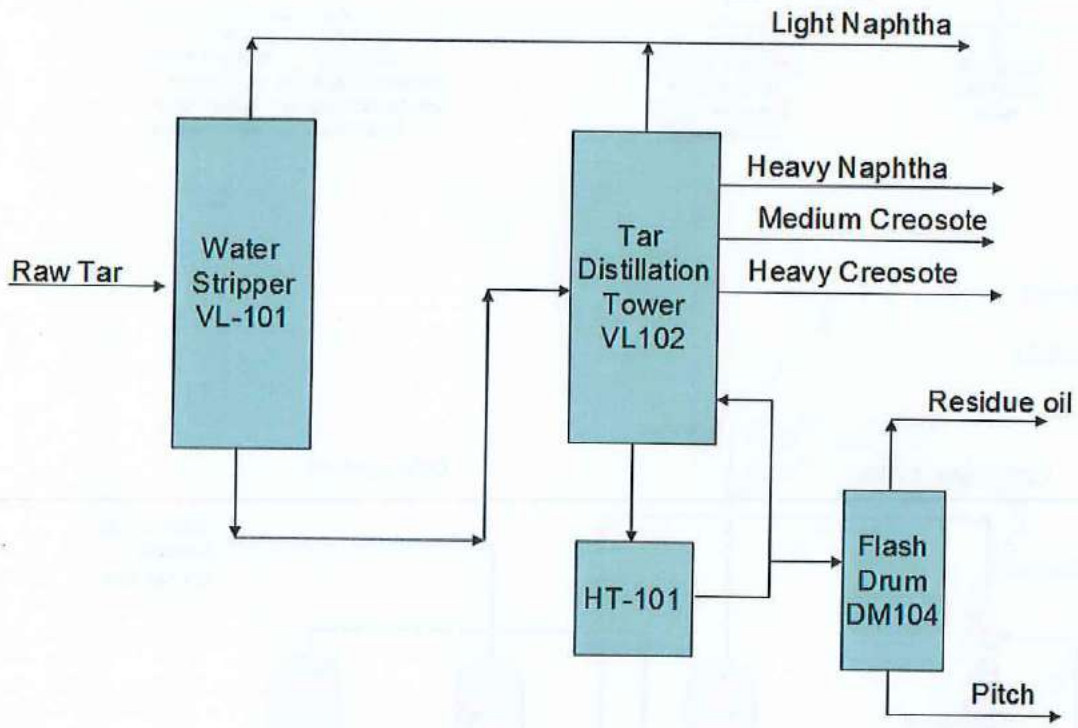


5.4.3.2 Catalyst Manufacturing and catalyst reduction

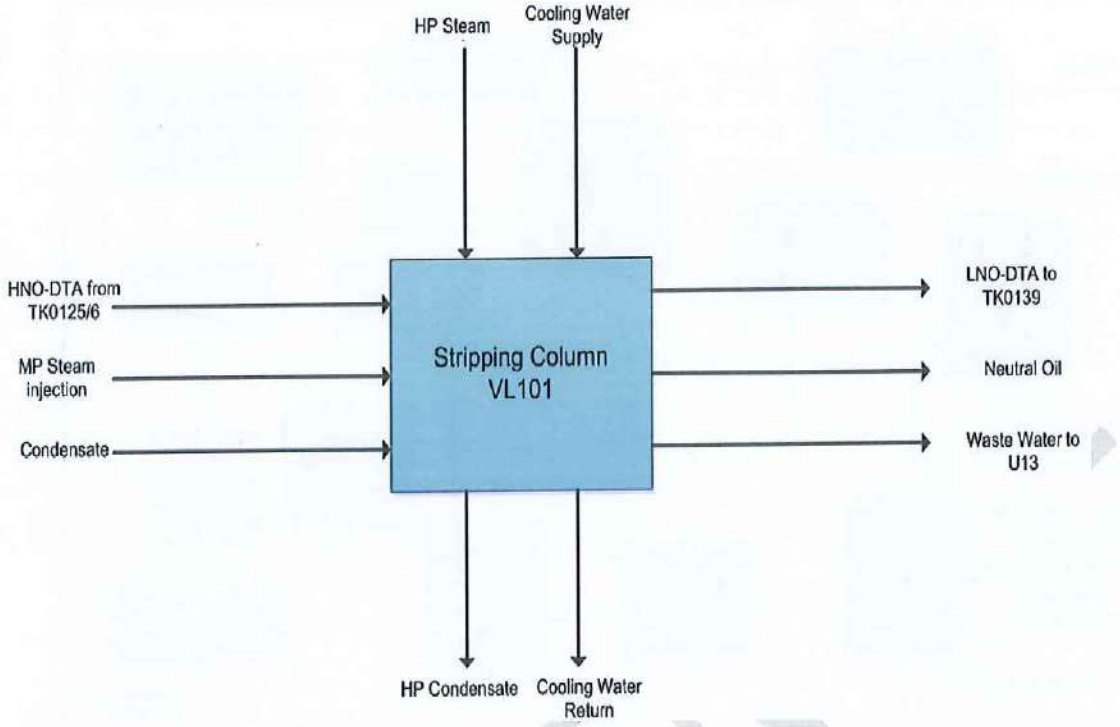
[redacted]

5.4.4 Refining

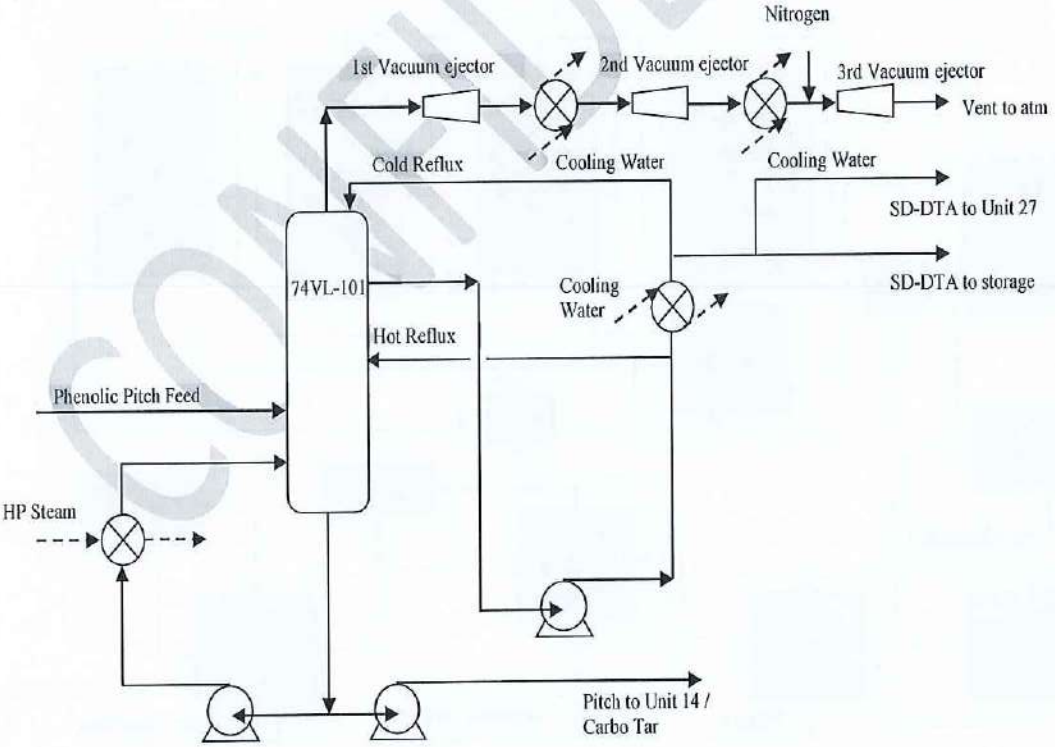
5.4.4.1 Tar Distillation (Unit 14 / 214)



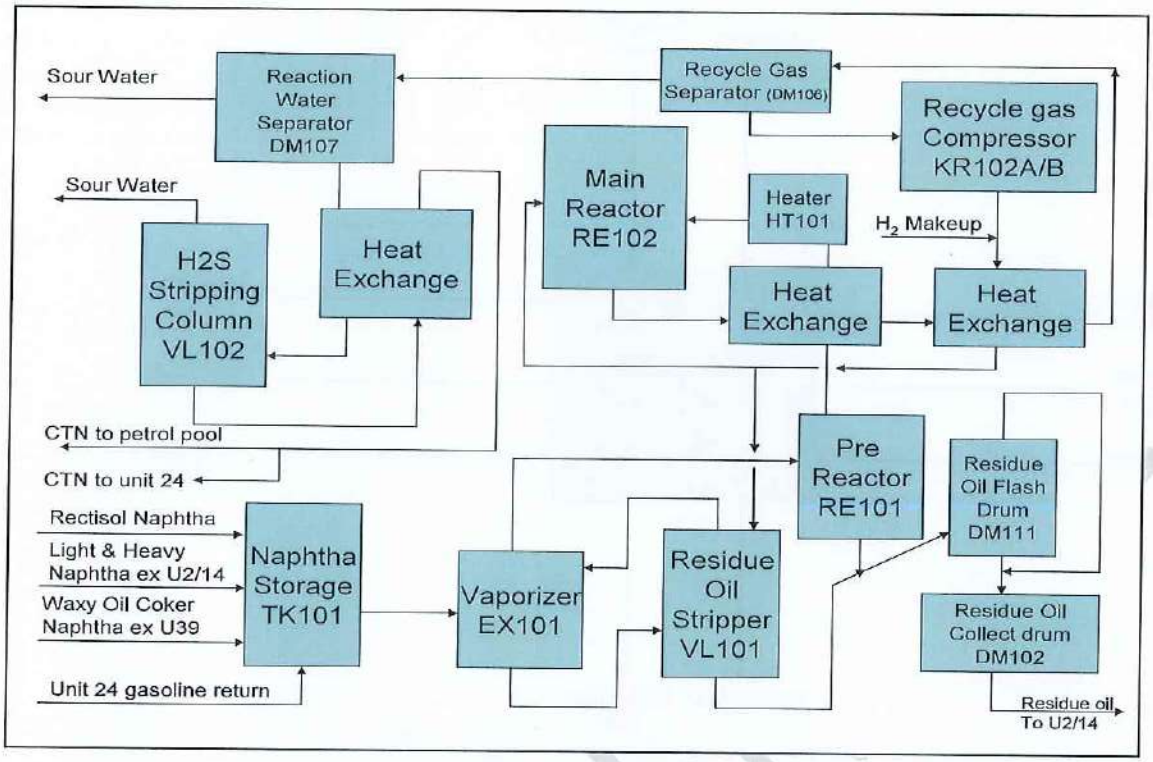
5.4.4.2 Neutral oil stripper (Unit 27A)



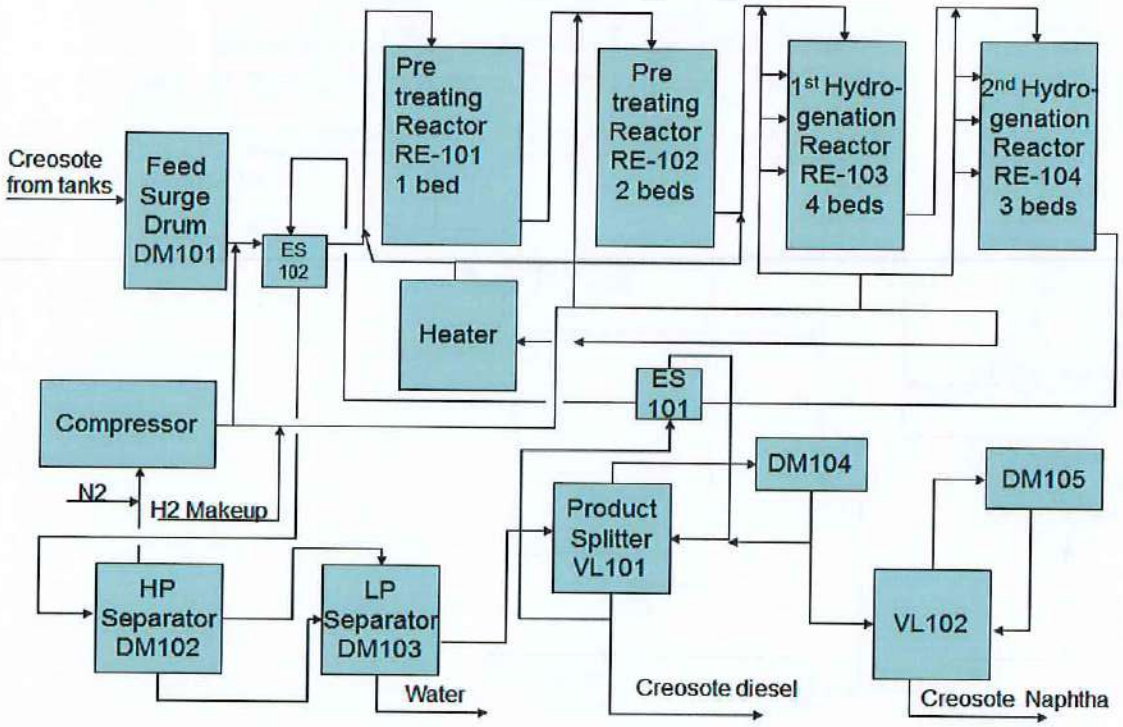
5.4.4.3 Secondary depitcher (Unit 74)



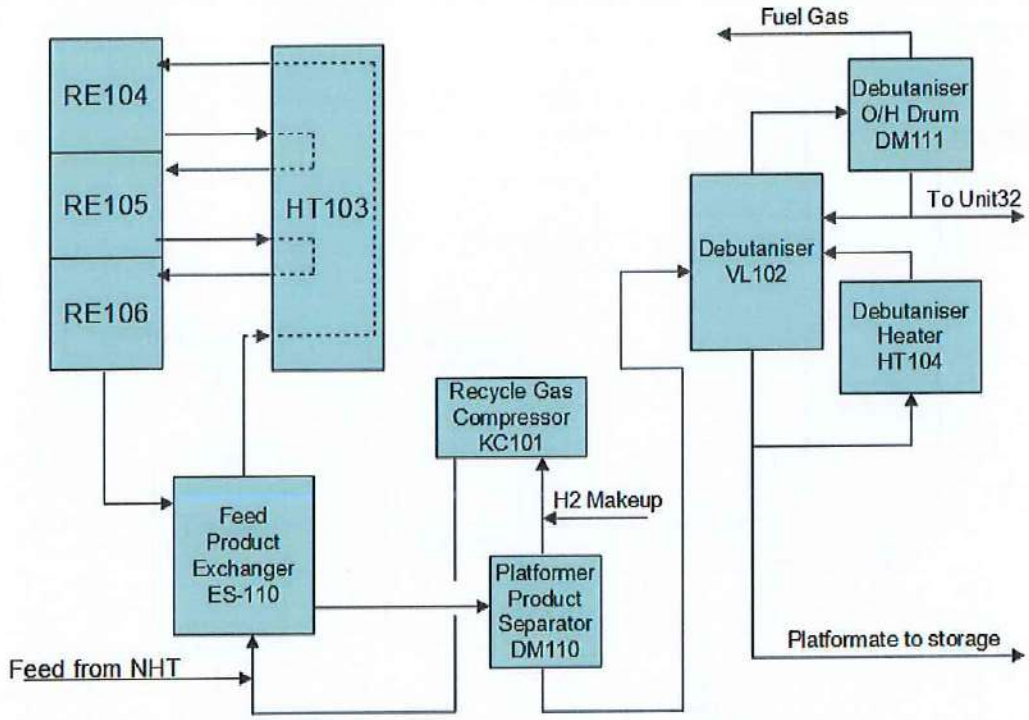
5.4.4.4 Coal Tar Naphtha Hydrogenation (Unit 15 / 215)



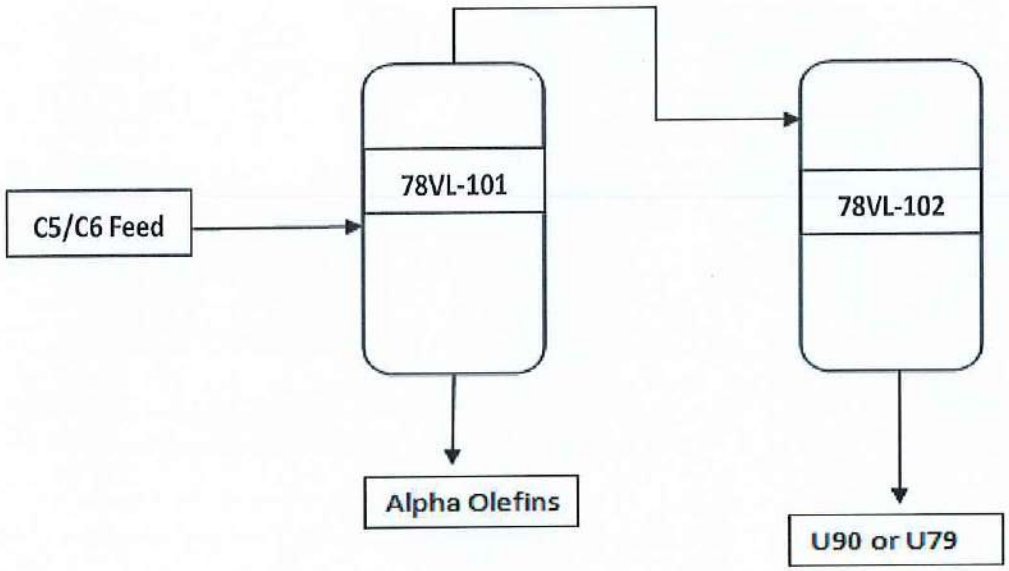
5.4.4.5 Creosote Hydrogenation (Unit 228)



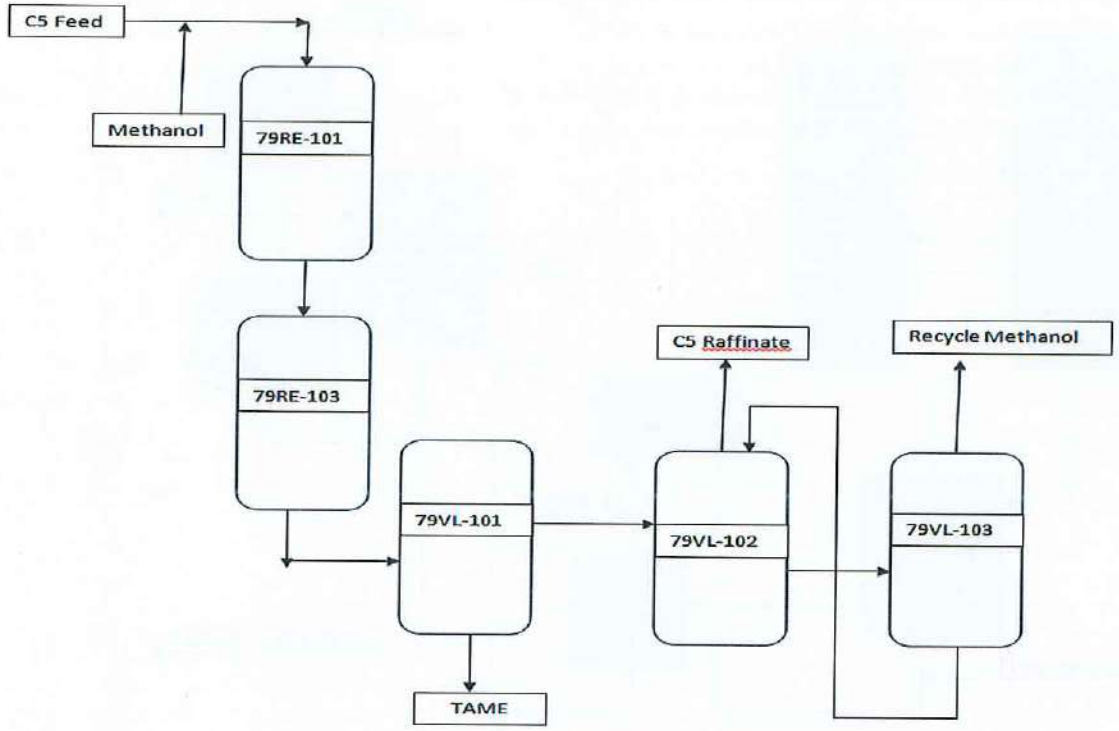
5.4.4.6 Naphtha Hydrotreater, Platformer and Continuous Catalyst Regeneration (Unit 30 / 230 & 31 / 231)



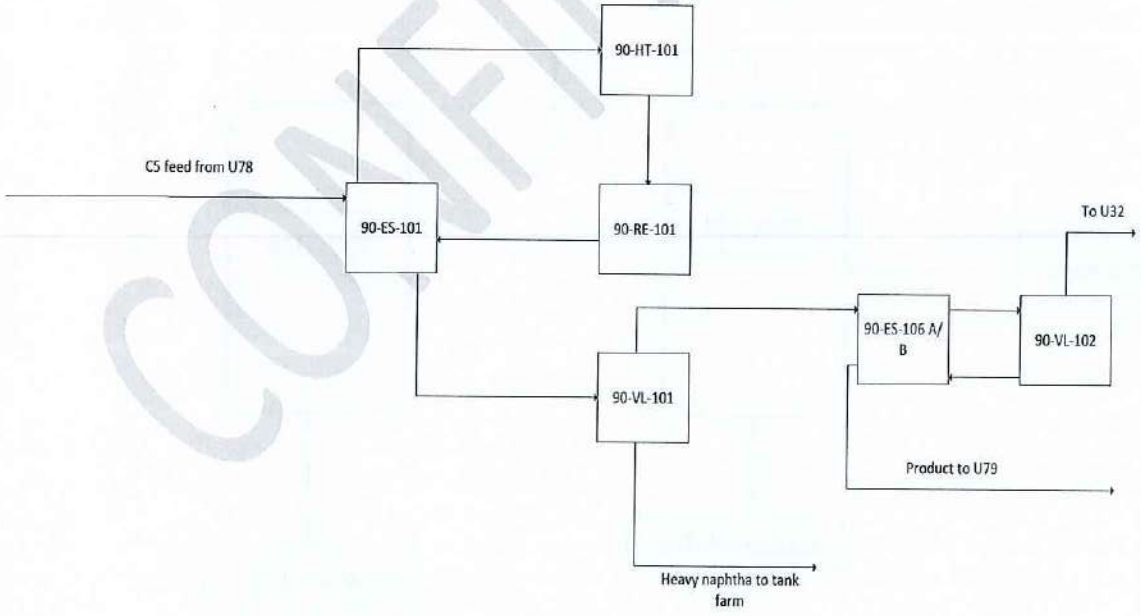
5.4.4.7 Catalytic Distillation Hydrotreater (Unit 78)



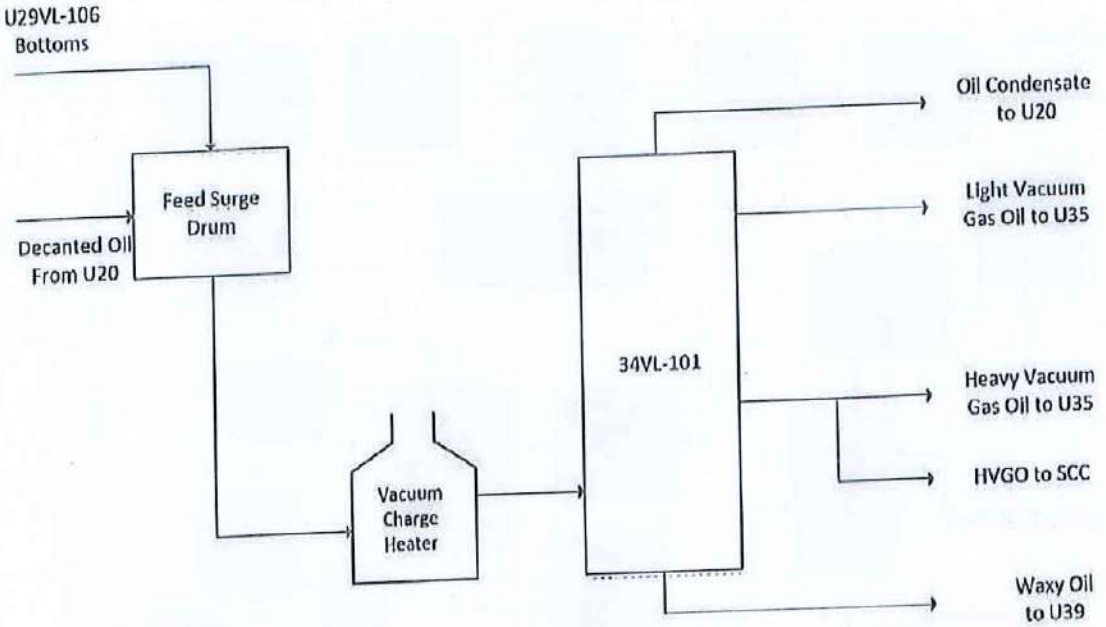
5.4.4.8 CD Tame (Unit 79)



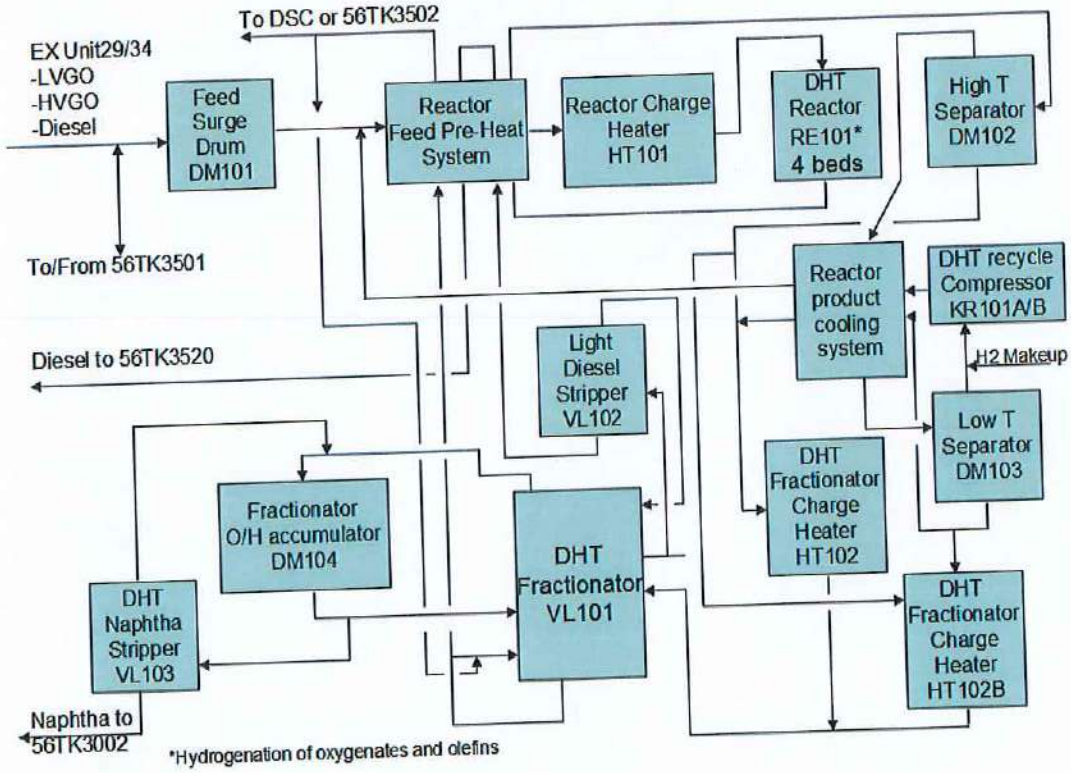
5.4.4.9 C5 skeletal Isomerisation (Unit 90)



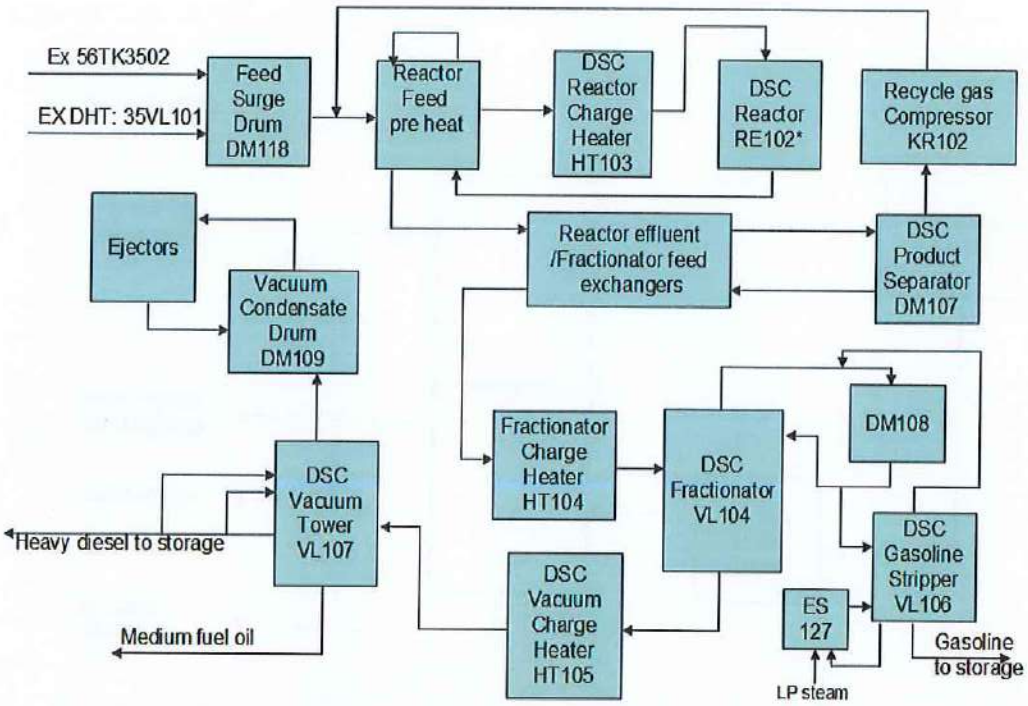
5.4.4.10 Vacuum Distillation (Unit 34/234)



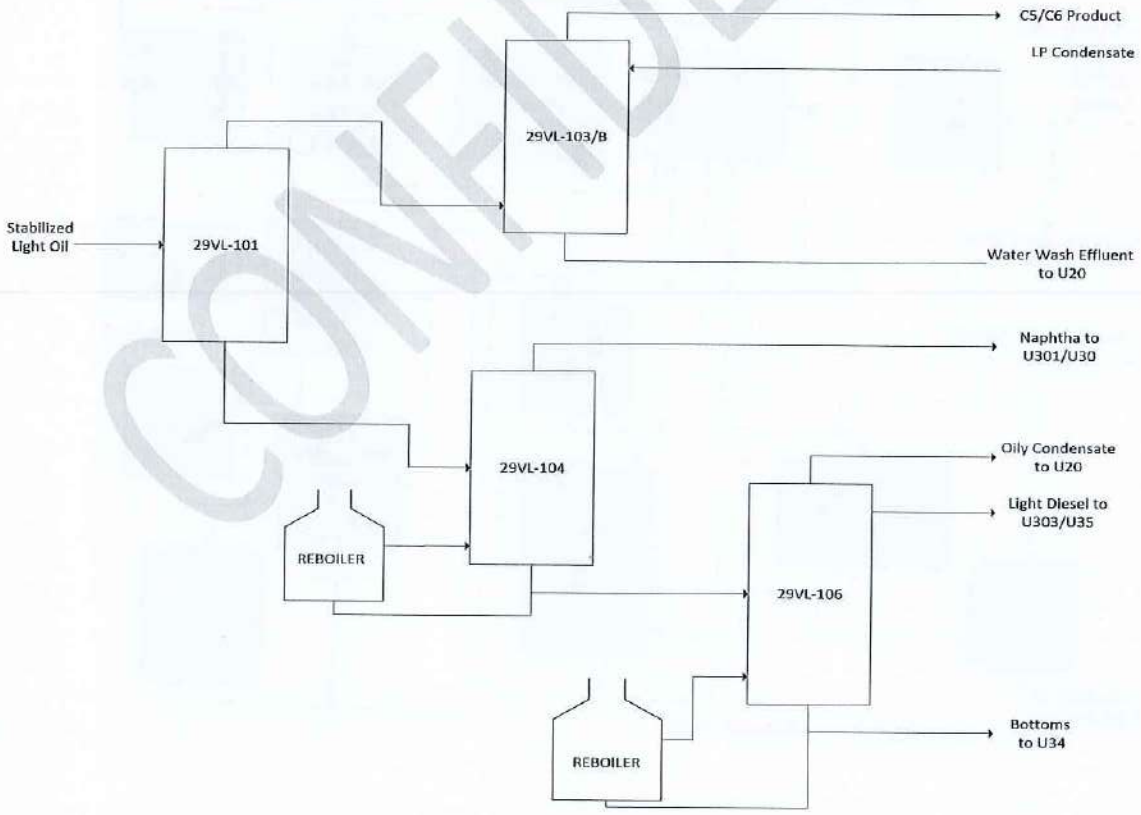
5.4.4.11 Distillate Hydrotreater (Unit 35/235)



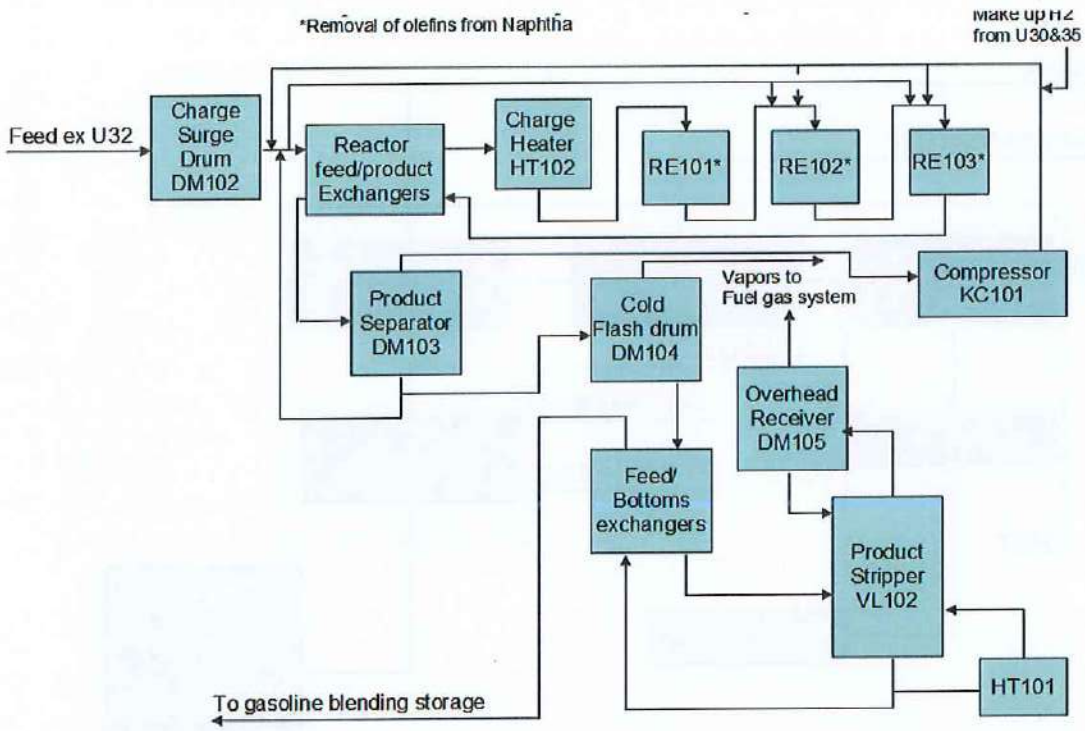
5.4.4.12 Distillate Selective Cracker (Unit 35)



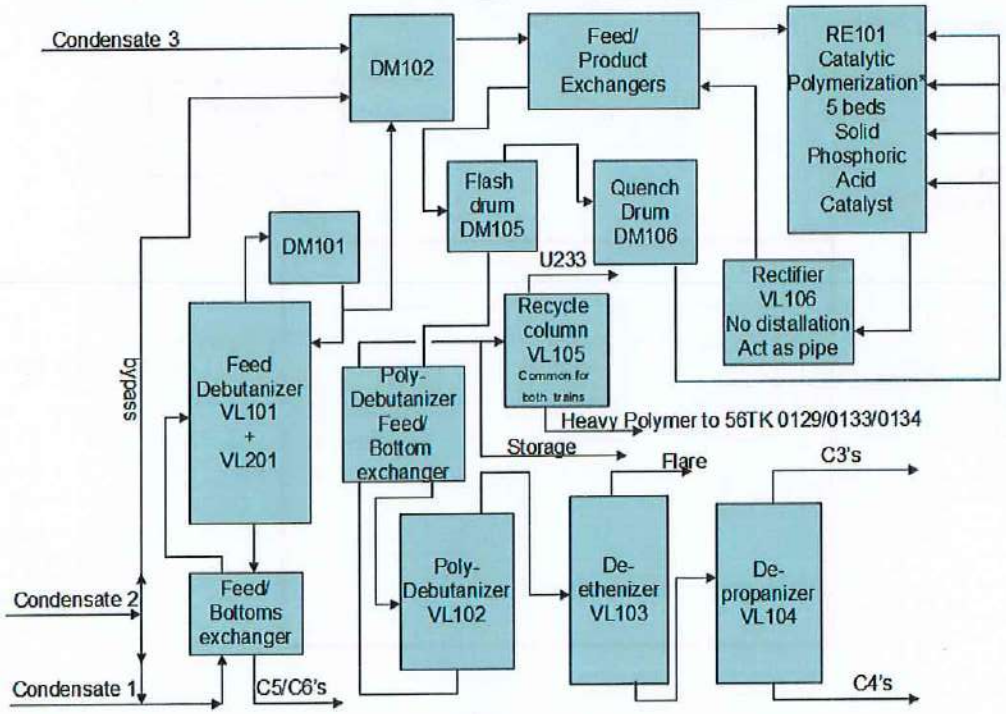
5.4.4.13 Light Oil Fractionation (Unit 29/229)



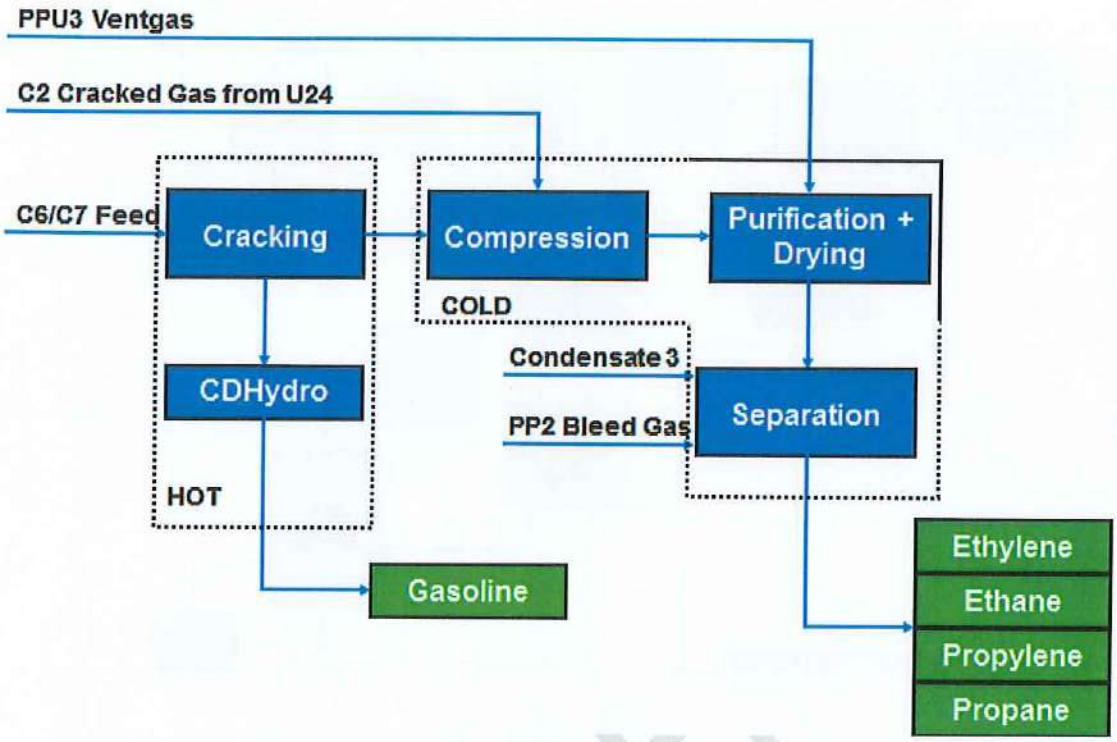
5.4.4.14 Polymer Hydrotreating (Unit 33/233)



5.4.4.15 Catalytic Polymerisation and LPG Recovery (Unit 32/232)

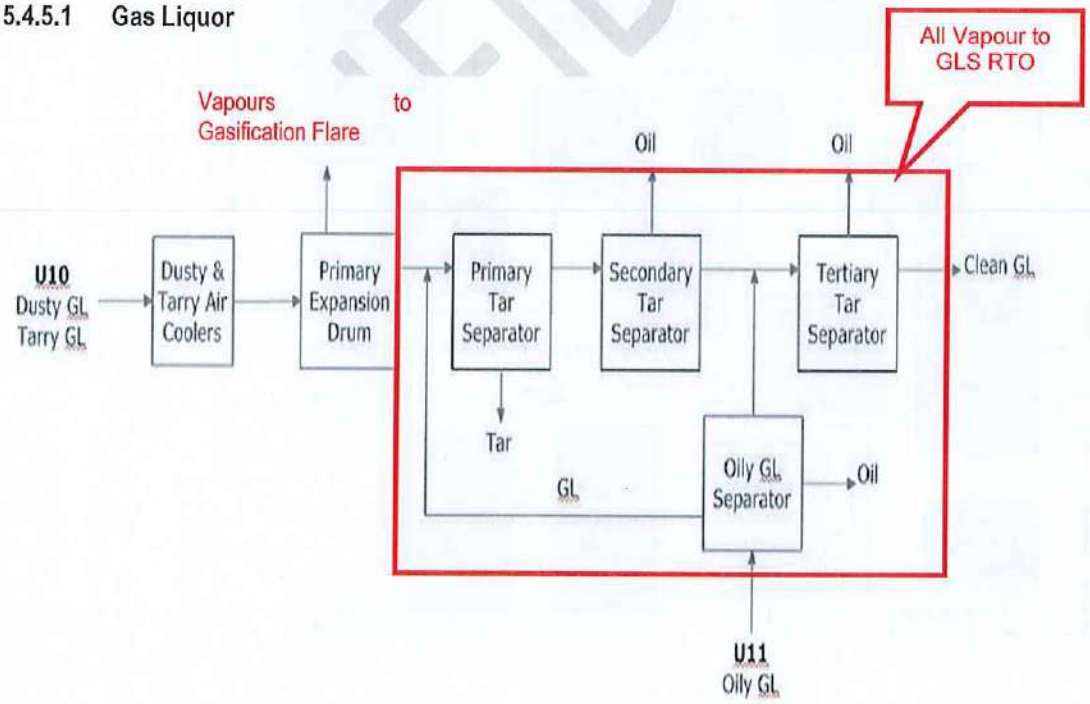


5.4.4.16 Synfuels Catalytic Cracker (Unit 293)

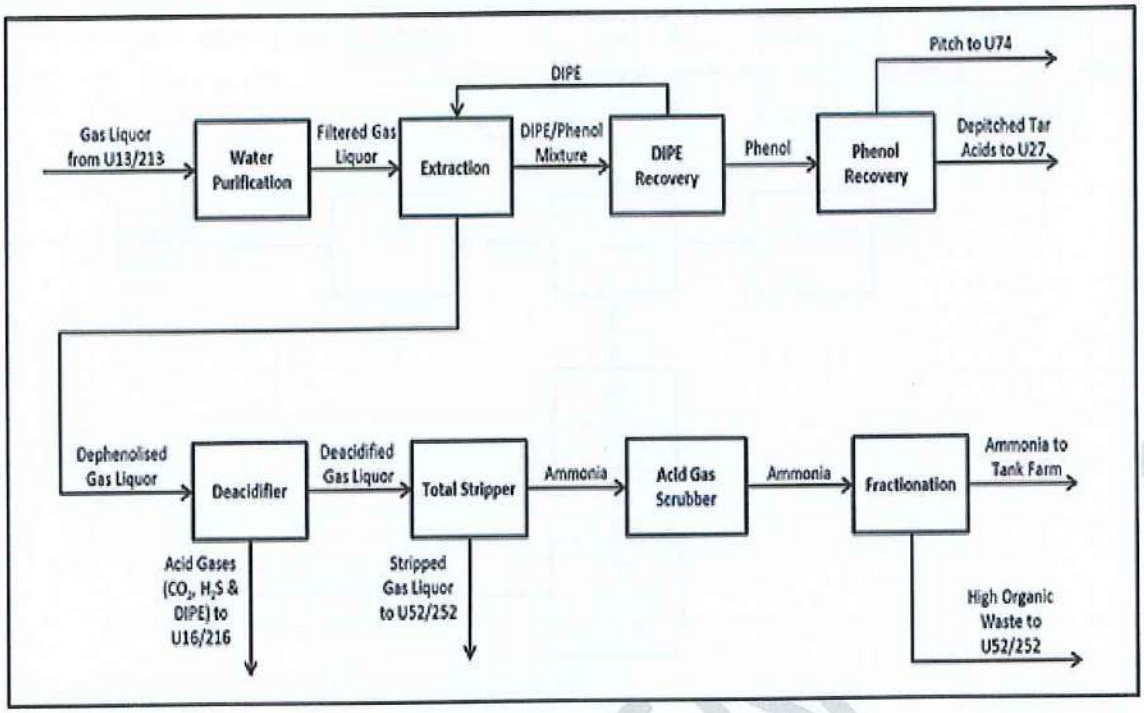


5.4.5 Tar, Phenosolvan and Sulphur (TPS)

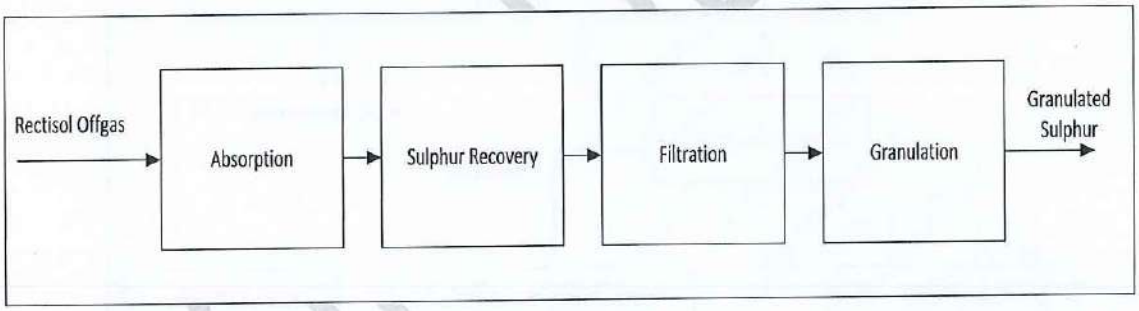
5.4.5.1 Gas Liquor



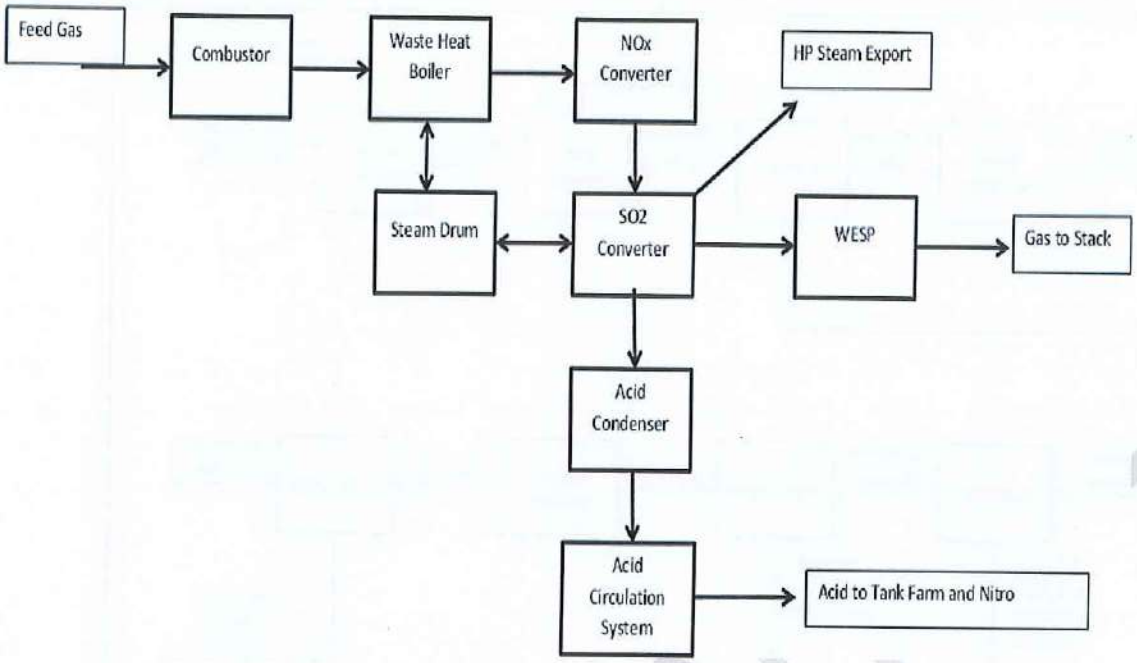
5.4.5.2 Phenosolvan



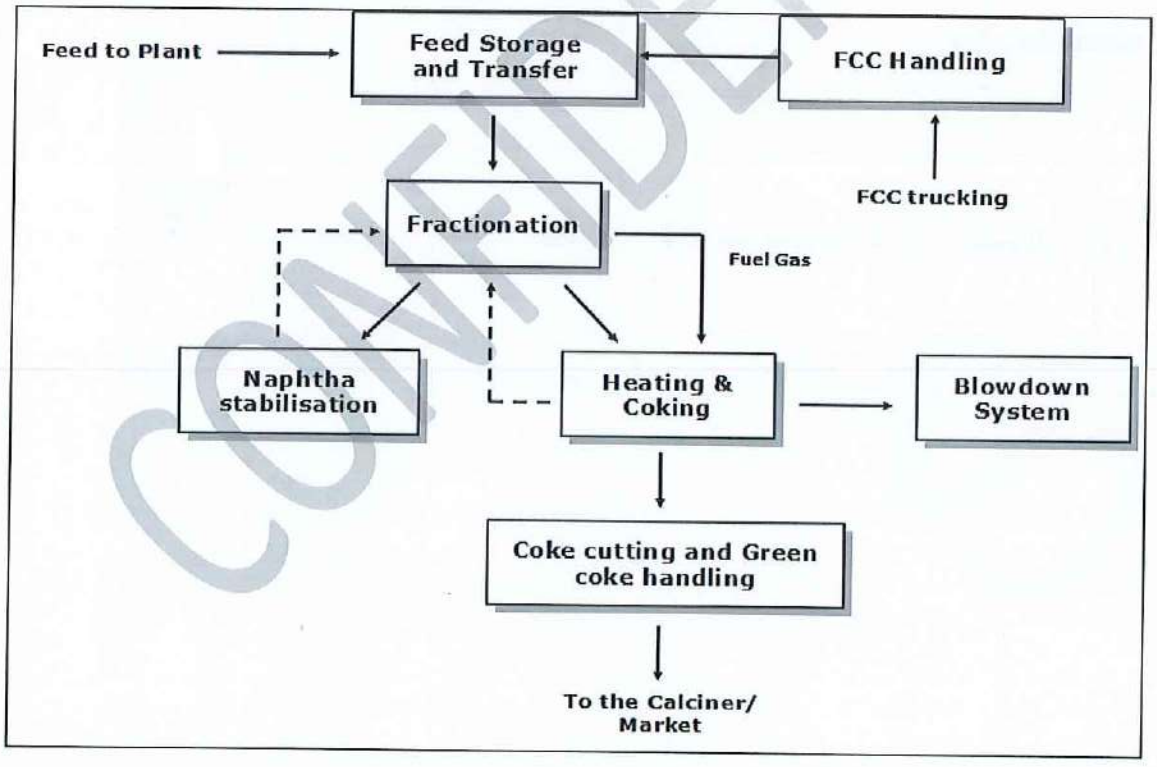
5.4.5.3 Sulphur Recovery



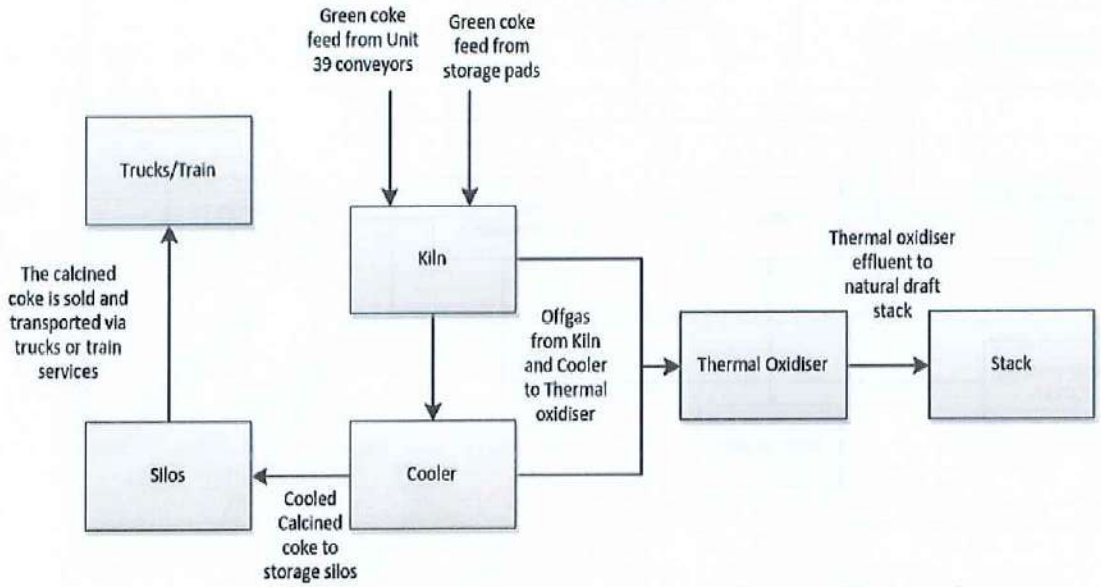
5.4.5.4 Wet Sulphuric Acid Plant



5.4.5.5 Coker (Unit 39)

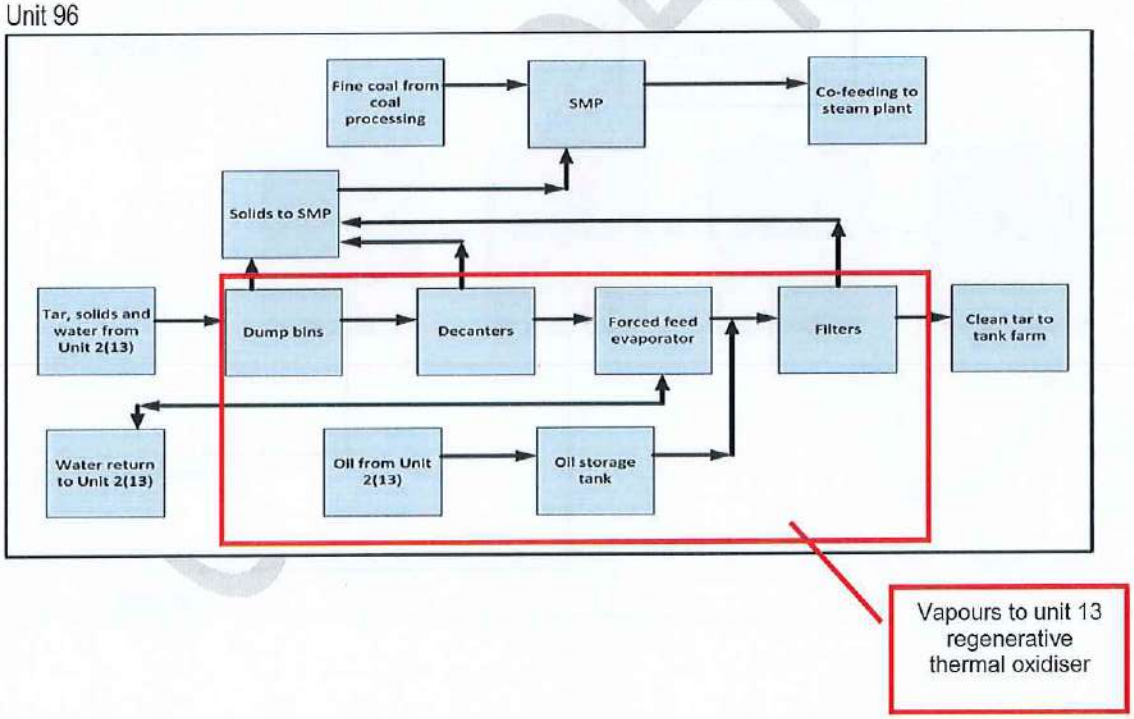


5.4.5.6 Calciner (Unit 75) and Coke Storage Handling (Unit 76)

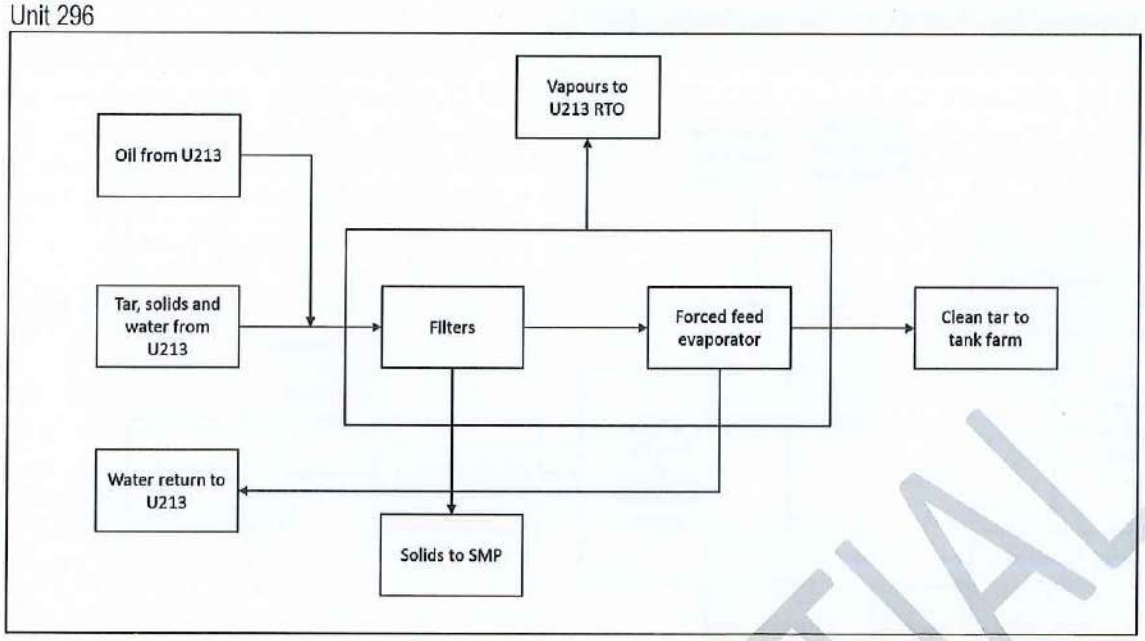


5.4.5.7 Coal Tar Filtration (Unit 96/296))

Unit 96

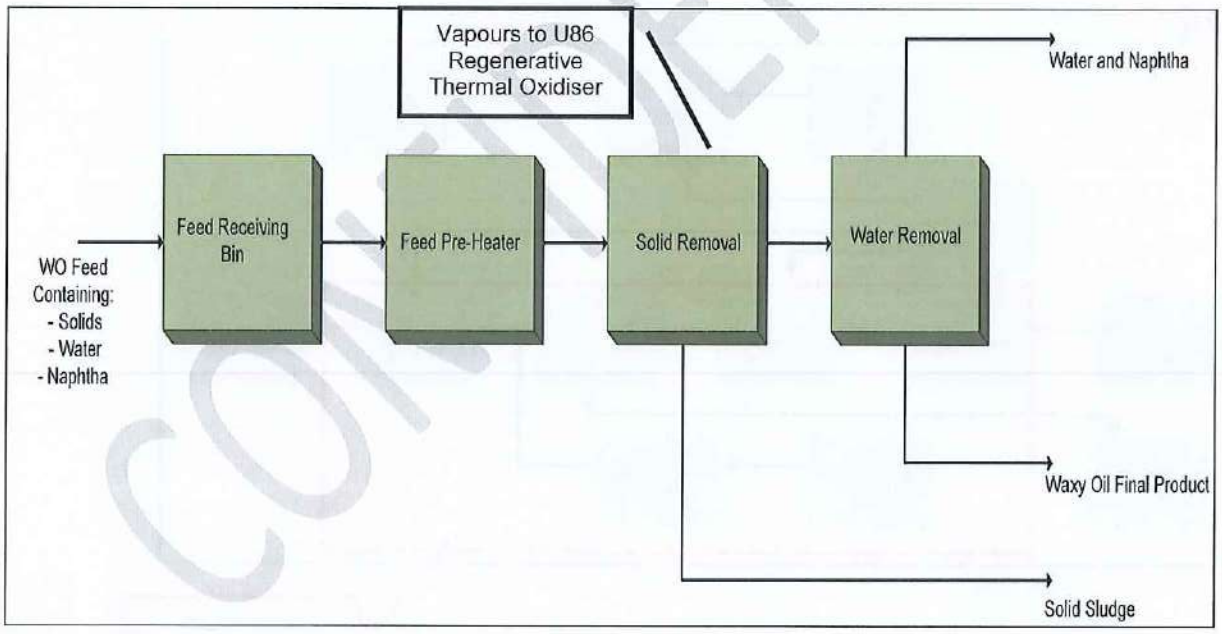


Unit 296

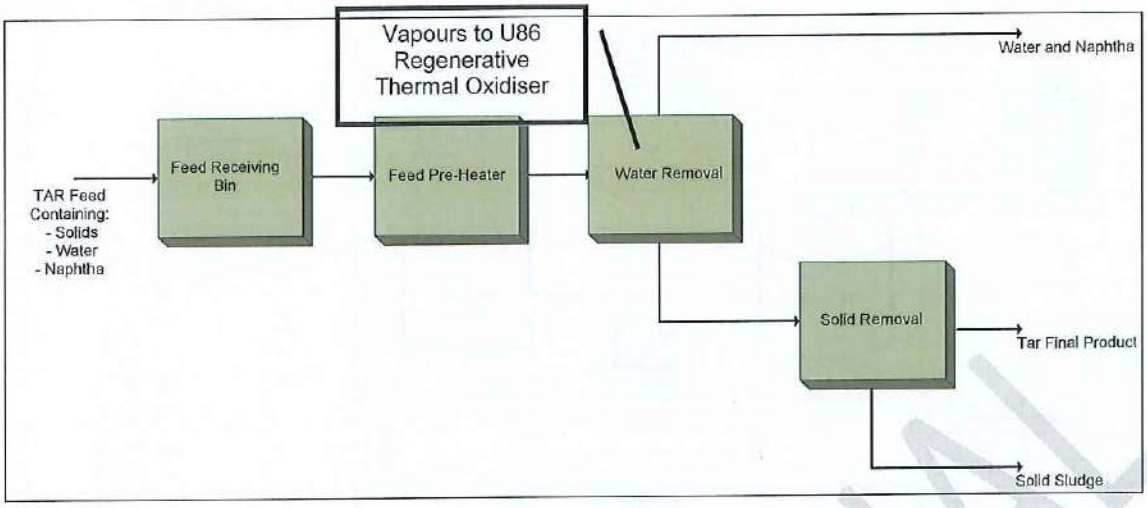


5.4.5.8 Feed Preparation Plant (Unit 86)

Train 1

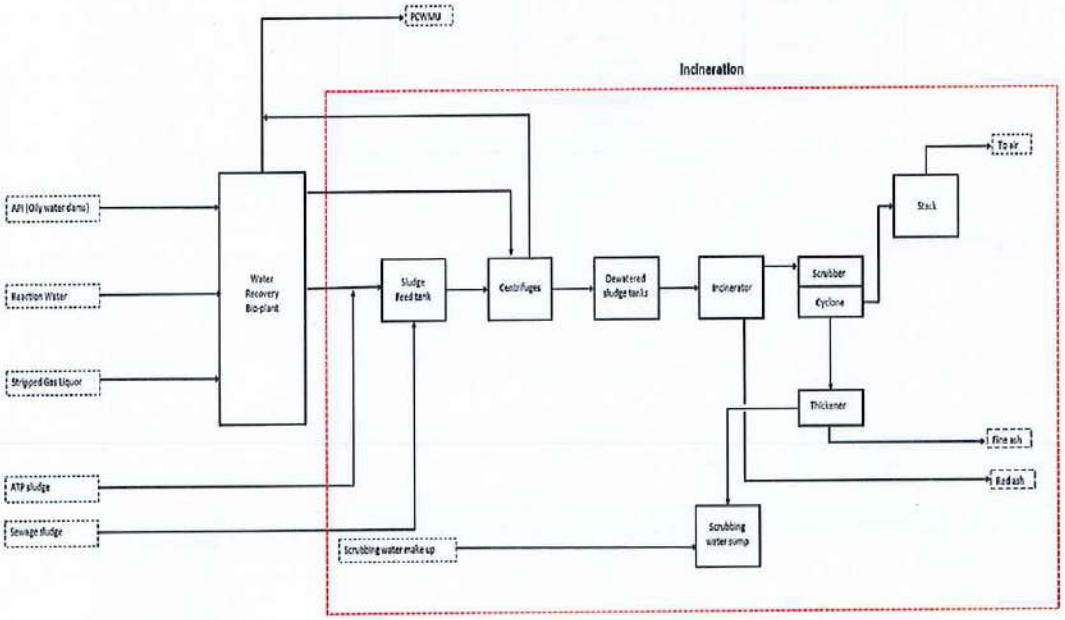


Train 2

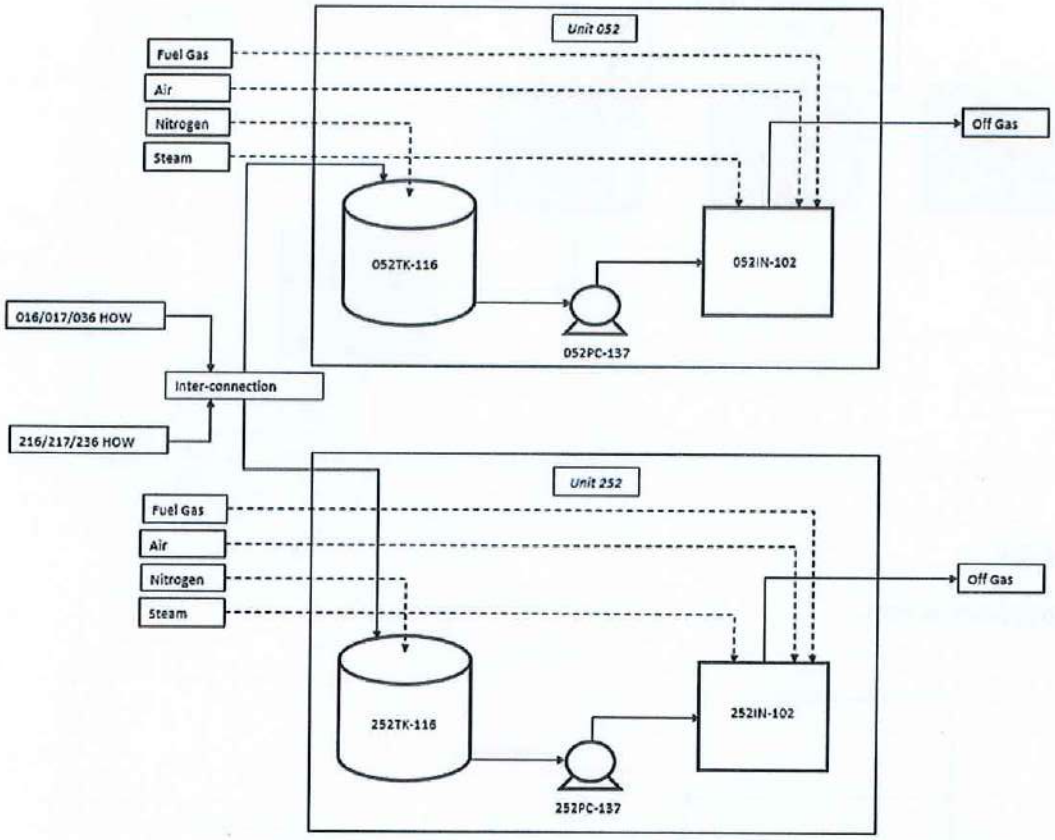


5.4.6 Water and Ash

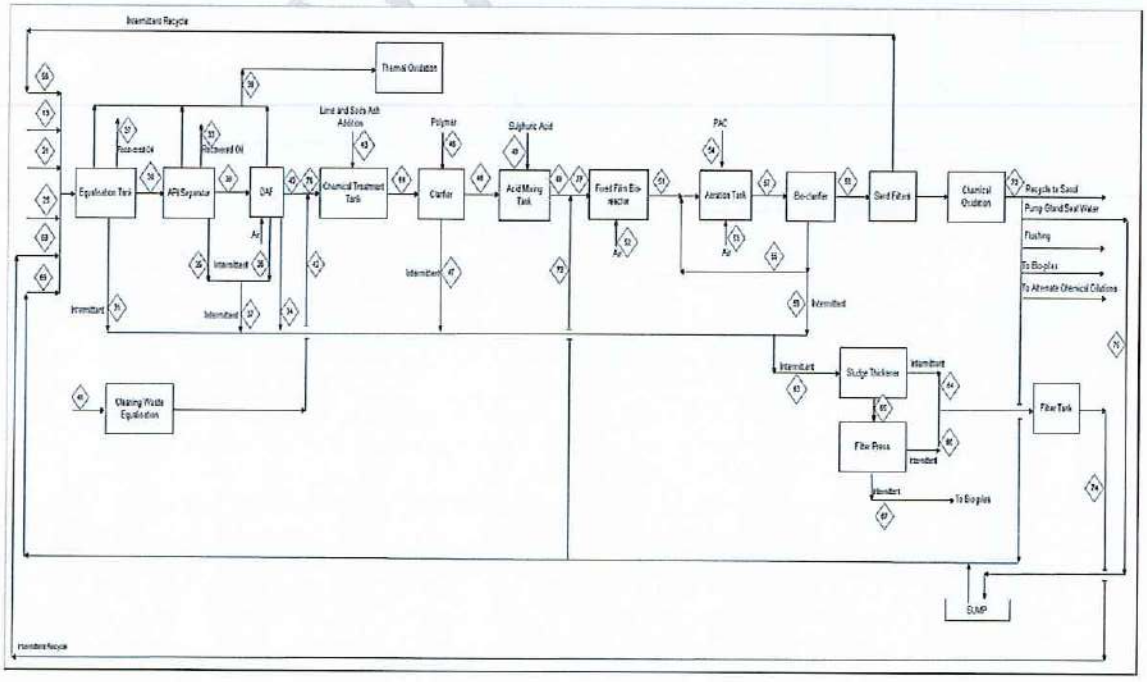
5.4.6.1 Bio sludge incinerators



5.4.6.2 How Organic Waste (HOW) Incinerators



5.4.6.3 Waste Recycling Facility



6 RAW MATERIAL AND PRODUCTS

6.1 Raw materials used

6.1.1 Utilities

Raw material type	Maximum permitted consumption rate	Units (quantity/period)	Design consumption rate	Units (quantity/period)
Utilities				
Steam Plant/Boilers				
[redacted]				
Gas turbines				
[redacted]				

6.1.2 Gas production

Raw material type	Maximum permitted consumption rate	Units (quantity/period)	Design consumption rate	Units (quantity/period)
Gas Production				
Coal Processing				
[redacted]				
Gasification, Coal lock raw gas compression and Raw Gas Cooling				
[redacted]				
Rectisol				
[redacted]				

6.1.3 Gas Circuit

Raw material type	Maximum permitted consumption rate	Units (quantity/period)	Design consumption rate	Units (quantity/period)
Gas Circuit				
Catalyst Manufacturing & Catalyst Reduction				
[redacted]				

6.1.4 Refining

Raw material type	Maximum permitted consumption rate	Units (quantity/period)	Design consumption rate	Units (quantity/period)
Refining				
Tar Distillation (Unit 14 / 214)				
[redacted]				
Unit 27A				
[redacted]				
Unit 74				
[redacted]				
Coal Tar Naphtha Hydrogenation (Unit 15 / 215)				
[redacted]				
Creosote Hydrogenation (Unit 228)				
[redacted]				
Naphtha Hydrotreater, Platformer and CCR (Unit 30/230, 31/231)				
[redacted]				
Catalytic Distillation Hydrotreater (Unit 78)				

[redacted]	
CD Tame (Unit 79)	
[redacted]	
C5 Isomerisation (Unit 90)	
[redacted]	
Vacuum Distillation (Unit 34 / 234)	
[redacted]	
Distillate Hydrotreater (Unit 35 / 235)	
[redacted]	
Distillate Selective Cracker (Unit 35DSC)	
[redacted]	
Light Oil Fractionation (Unit 29 / 229)	
[redacted]	
Polymer Hydrotreater (Unit 33 / 233)	
[redacted]	
Total Refinery	
[redacted]	
Sasol Catalytic Converter	
[redacted]	
[redacted]	6.1.5

Tar, Phenosolvan and Sulphur

Raw material type	Maximum permitted consumption rate	Units (quantity/period)	Design consumption rate	Units (quantity/period)
Tar, Phenosolvan and sulphur				
Gas Liquor Separation				
[redacted]				
Phenosolvan				
[redacted]				
Sulphur Recovery				
[redacted]				
Wet Sulphuric Acid				
[redacted]				
Carbo Tar and Coal Tar Filtration				
[redacted]				

[redacted]

6.1.6 Water and Ash

Raw material type	Maximum permitted consumption rate	Units (quantity/period)	Design consumption rate	Units (quantity/period)
Water and Ash				
Multi hearth sludge incinerator				
[redacted]				
HOW Incinerator				
[redacted]				
WRF				
[redacted]				

6.2 Production rates

6.2.1 Utilities

Product name	Production capacity permitted	Units (quantity/period)	Design production rate	Units (quantity/period)
Utilities				
Boilers				
[redacted]				
Gas Turbines				
[redacted]				

6.2.2 Gas Production

Product name	Production capacity permitted	Units (quantity/period)	Design production rate	Units (quantity/period)
Gas Production				
Coal processing				
[redacted]				
Gasification Coal lock raw gas compression and Raw Gas Cooling				
[redacted]				
Rectisol				
[redacted]				

6.3 By product

6.3.1 Gas Production

Product name	Production capacity-permitted	Units (quantity/period)	Design production rate	Units (quantity/period)
Gasification, Coal lock raw gas compression and Raw Gas Cooling				
[redacted]				

6.3.2 Gas Circuit

Product name	Production capacity permitted	Units (quantity/period)	Design production rate	Units (quantity/period)
Benfield				
[redacted]				
Catalyst Manufacturing				
[redacted]				

6.3.3 Refining

Product name	Production capacity permitted	Units (quantity/period)	Design production rate	Units (quantity/period)
Refining				
Tar Distillation (Unit 14 / 214)				
[redacted]				
Unit 27A				
[redacted]				
Unit 74				
[redacted]				
Coal Tar Naphtha Hydrogenation (Unit 15 / 215)				
[redacted]				
Creosote Hydrogenation (Unit 228)				
[redacted]				
Naphtha Hydrotreater, Platformer and CCR (Unit 30/230, 31/231)				
[redacted]				
Catalytic Distillation Hydrotreater (Unit 78)				
[redacted]				
CD Tame (Unit 79)				
[redacted]				
C5 Isomerisation (Unit 90)				
[redacted]				

[redacted]		
Vacuum Distillation (Unit 34 / 234)		
[redacted]		
Distillate Hydrotreater (Unit 35 / 235)		
[redacted]		
Distillate Selective Cracker (Unit 35DSC)		
[redacted]		
Light Oil Fractionation (Unit 29 / 229)		
[redacted]		
Catalytic polymerisation and LPG recovery (Unit 32 / 232)		
[redacted]		
Polymer Hydrotreater (Unit 33 / 233)		
[redacted]		
Sasol Catalytic Converter		
[redacted]		

[redacted]

6.3.4 Tar, Phenosolvan and Sulphur

Product name	Production capacity permitted	Units (quantity/period)	Design production rate	Units (quantity/period)
Tar, Phenosolvan and sulphur				
Gas Liquor Separation				
[redacted]				
Phenosolvan				
[redacted]				
Sulphur Recovery				
[redacted]				
Wet Sulphuric Acid				
[redacted]				
Carbo Tar and Coal Tar Filtration				
[redacted]				

[redacted]

6.3.5 Water and Ash

Product name	Production capacity-permitted	Units (quantity/period)	Design production rate	Units (quantity/period)
Water and Ash				
Bio sludge incinerator				
[redacted]				
HCW incinerator				
[redacted]				
WRF				
[redacted]				

6.4 Material used in energy sources

Energy source	Maximum permitted consumption rate	Units (quantity/period)	Design consumption rate	Units (quantity/period)	Sulphur %	Ash %
Imported electricity (Eskom)	[redacted]		[redacted]			
SSO feed to electricity (Natural Gas and Methane Rich Gas to gas turbines)						
SSO feed to steam (Fine coal to Boilers)						
Fuel gas						

6.5 Sources of atmospheric emission

6.5.1 Point Source parameters

6.5.1.1 Utilities

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip/vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m³/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
B1	West stack	26.55750	29.14993	250	230	13.6	205	2 785	1 380	24	Continuous
B2	East stack	26.56014	29.16841	301	281	14.4	205	3 133	1 380	24	Continuous
GT1	Gas Turbine stack	26.564167	29.165	40	37	5.3	200	882	2 400	24	Continuous
GT2	Gas Turbine stack	26.564167	29.164444	40	37	5.3	200	882	2 400	24	Continuous

6.5.1.2 Gas production

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m³/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
Rectisol west (B1)	Off gas to main stack west (B1)	26.55750	29.14993	250	230	13.6	205	2 785	1 380	24	Continuous
Rectisol east (B2)	Off gas to main stack east (B2)	26.56014	29.16841	301	281	14.4	205	3 133	1 380	24	Continuous
Gasification West air ejector 1	Low pressure coal lock raw gas to atmosphere	26.560119	29.154604	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 2	Low pressure coal lock raw gas to atmosphere	26.560133	29.154678	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 3	Low pressure coal lock raw gas to atmosphere	26.560137	29.154749	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 4	Low pressure coal lock raw gas to atmosphere	26.560154	29.154831	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 5	Low pressure coal lock raw gas to atmosphere	26.560155	29.154908	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 6	Low pressure coal lock raw gas to atmosphere	26.560186	29.155128	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 7	Low pressure coal lock raw gas to atmosphere	26.560190	29.155210	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification	Low pressure coal	26.560195	29.155289	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m^3/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
West air ejector 8	lock raw gas to atmosphere										
Gasification West air ejector 9	Low pressure coal lock raw gas to atmosphere	26.560201	29.155374	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 10	Low pressure coal lock raw gas to atmosphere	26.560213	29.155462	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 13	Low pressure coal lock raw gas to atmosphere	26.560388	29.154559	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 14	Low pressure coal lock raw gas to atmosphere	26.560397	29.154618	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 15	Low pressure coal lock raw gas to atmosphere	26.560405	29.154684	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 16	Low pressure coal lock raw gas to atmosphere	26.560425	29.154823	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 17	Low pressure coal lock raw gas to atmosphere	26.560431	29.154885	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 18	Low pressure coal lock raw gas to atmosphere	26.560450	29.155083	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification	Low pressure coal	26.560465	29.155180	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m³/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
West air ejector 19	lock raw gas to atmosphere										
Gasification West air ejector 20	Low pressure coal lock raw gas to atmosphere	26.560473	29.155270	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 21	Low pressure coal lock raw gas to atmosphere	26.560479	29.155337	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 22	Low pressure coal lock raw gas to atmosphere	26.560492	29.155427	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 23	Low pressure coal lock raw gas to atmosphere	26.560501	29.155531	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 25	Low pressure coal lock raw gas to atmosphere	26.560081	29.154278	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 26	Low pressure coal lock raw gas to atmosphere	26.560072	29.154199	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 27	Low pressure coal lock raw gas to atmosphere	26.560059	29.154115	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 28	Low pressure coal lock raw gas to atmosphere	26.560046	29.154039	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification	Low pressure coal	26.560044	29.153955	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m^3/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
West air ejector 29	lock raw gas to atmosphere										
Gasification West air ejector 30	Low pressure coal lock raw gas to atmosphere	26.560024	29.153748	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 31	Low pressure coal lock raw gas to atmosphere	26.560011	29.153673	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 32	Low pressure coal lock raw gas to atmosphere	26.560002	29.153595	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 33	Low pressure coal lock raw gas to atmosphere	26.559993	29.153519	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 34	Low pressure coal lock raw gas to atmosphere	26.559984	29.153437	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 35	Low pressure coal lock raw gas to atmosphere	26.559975	29.153359	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 37	Low pressure coal lock raw gas to atmosphere	26.560345	29.154208	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 38	Low pressure coal lock raw gas to atmosphere	26.560344	29.154131	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification	Low pressure coal	26.560335	29.154051	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m^3/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
West air ejector 39	lock raw gas to atmosphere										
Gasification West air ejector 40	Low pressure coal lock raw gas to atmosphere	26.560327	29.153969	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 41	Low pressure coal lock raw gas to atmosphere	26.560321	29.153902	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 42	Low pressure coal lock raw gas to atmosphere	26.560285	29.153648	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 43	Low pressure coal lock raw gas to atmosphere	26.560269	29.153568	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 44	Low pressure coal lock raw gas to atmosphere	26.560257	29.153506	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 45	Low pressure coal lock raw gas to atmosphere	26.560254	29.153442	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification West air ejector 46	Low pressure coal lock raw gas to atmosphere	26.560242	29.153362	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 1	Low pressure coal lock raw gas to atmosphere	26.562324	29.173510	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification	Low pressure coal	26.562340	29.173583	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m^3/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
East air ejector 2	lock raw gas to atmosphere										
Gasification East air ejector 3	Low pressure coal lock raw gas to atmosphere	26.562352	29.173664	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 4	Low pressure coal lock raw gas to atmosphere	26.562352	29.173754	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 5	Low pressure coal lock raw gas to atmosphere	26.562364	29.173823	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 6	Low pressure coal lock raw gas to atmosphere	26.562383	29.174409	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 7	Low pressure coal lock raw gas to atmosphere	26.562390	29.174129	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 8	Low pressure coal lock raw gas to atmosphere	26.562404	29.174208	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 9	Low pressure coal lock raw gas to atmosphere	26.562412	29.174409	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 10	Low pressure coal lock raw gas to atmosphere	26.562428	29.174297	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification	Low pressure coal	26.562601	29.173446	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m³/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
East air ejector 13	lock raw gas to atmosphere										
Gasification East air ejector 14	Low pressure coal lock raw gas to atmosphere	26.562613	29.173516	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 15	Low pressure coal lock raw gas to atmosphere	26.562614	29.173588	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 16	Low pressure coal lock raw gas to atmosphere	26.562629	29.173659	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 17	Low pressure coal lock raw gas to atmosphere	26.562636	29.173723	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 18	Low pressure coal lock raw gas to atmosphere	26.562660	29.173990	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 19	Low pressure coal lock raw gas to atmosphere	26.562678	29.174074	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 20	Low pressure coal lock raw gas to atmosphere	26.562687	29.174158	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 21	Low pressure coal lock raw gas to atmosphere	26.562692	29.174261	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification	Low pressure coal	26.562705	29.174350	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m³/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
East air ejector 22	lock raw gas to atmosphere										
Gasification East air ejector 23	Low pressure coal lock raw gas to atmosphere	26.562714	29.174440	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 25	Low pressure coal lock raw gas to atmosphere	26.562287	29.173183	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 26	Low pressure coal lock raw gas to atmosphere	26.562280	29.173099	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 27	Low pressure coal lock raw gas to atmosphere	26.562265	29.173022	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 28	Low pressure coal lock raw gas to atmosphere	26.562262	29.172940	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 29	Low pressure coal lock raw gas to atmosphere	26.562253	29.172868	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 30	Low pressure coal lock raw gas to atmosphere	26.562228	29.172661	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 31	Low pressure coal lock raw gas to atmosphere	26.562220	29.172581	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification	Low pressure coal	26.562214	29.172504	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m³/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
East air ejector 32	lock raw gas to atmosphere										
Gasification East air ejector 33	Low pressure coal lock raw gas to atmosphere	26.562202	29.172425	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 34	Low pressure coal lock raw gas to atmosphere	26.562191	29.172345	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 35	Low pressure coal lock raw gas to atmosphere	26.562175	29.172268	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 37	Low pressure coal lock raw gas to atmosphere	26.562567	29.173119	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 38	Low pressure coal lock raw gas to atmosphere	26.562555	29.173011	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 39	Low pressure coal lock raw gas to atmosphere	26.562546	29.172919	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 40	Low pressure coal lock raw gas to atmosphere	26.562530	29.172846	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 41	Low pressure coal lock raw gas to atmosphere	26.562523	29.172770	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification	Low pressure coal	26.562497	29.172531	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m³/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
East air ejector 42	lock raw gas to atmosphere										
Gasification East air ejector 43	Low pressure coal lock raw gas to atmosphere	26.562488	29.172466	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 44	Low pressure coal lock raw gas to atmosphere	26.562472	29.17276	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 45	Low pressure coal lock raw gas to atmosphere	26.562456	29.172303	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent
Gasification East air ejector 46	Low pressure coal lock raw gas to atmosphere	26.562446	29.172240	39	2	0.2	20 – 30	0.4236	1 438	5	Intermittent

6.5.1.3 Gas Circuit

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m³/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
Catalyst Manufacturing											
CM1	West kiln stack	26.55496	29.15655	36	12	0.9	180	9	900	24	Semi-batch
CM2	West arc furnace stack	26.55509	29.15655	25	2	1.5	100	9.4	312	24	Semi-batch
CM3	East A kiln stack	26.55735	29.17548	36	12	0.9	180	9	900	24	Semi-batch

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m³/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
CM4	East arc furnace stack	26.55773	29.17531	25	12	1.5	100	19	624	24	Semi-Batch
CM5	East B kiln stack	26.55692	29.17537	36	12	0.9	180	9	900	24	Semi-batch

6.5.1.4 Refining

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m³/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
Tar Distillation											
R1 (14HT101)	Tar distillation reboiler stack outlet	26.549167	29.183056	51.876	46.876	0.894	440	2.05	196.2	24	Continuous
R2 (14HT201)	Tar distillation reboiler stack outlet	26.549167	29.150833	51.876	46.876	0.894	440	2.05	196.2	24	Continuous
R3 (214HT101)	Tar distillation reboiler stack outlet	26.549167	29.134167	51.876	46.876	0.894	440	2.05	196.2	24	Continuous
R4 (214HT201)	Tar distillation reboiler stack outlet	26.549167	29.1175	51.876	46.876	0.894	440	2.05	196.2	24	Continuous
R21 (U14/214 RTOs)	RTOs stack	26.54815	29.1495	20	15	2.3	0	0	0	24	Continuous
Creosote Hydrogenation											

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m³/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
R5 (228HT101)	Heater stack outlet	26.919722	29.282778	41.274	36.274	0.914	318	2.56	234	24	Continuous
Naphtha hydrotreater, platformer and continuous catalyst regeneration (CCR)											
R6 (30HT101)	NHT charge heater stack outlet	26.550278	29.149722	51.876	46.876	1.22	298	1.73	88.8	24	Continuous
R7 (30HT102)	Stripper reboiler heater stack outlet	26.550278	29.149722	38.4	33.4	0.99	304	3.2	249.6	24	Continuous
R8 (30HT103)	Platformer charge heater stack outlet	26.550278	29.149722	51.7	46.7	2.362	177	10.48	143.4	24	Continuous
R9 (30HT104)	Debutanizer Reboiler heater stack outlet	26.550278	29.149722	43.0	38.0	1.28	360	2.3	107.4	24	Continuous
R10 (30HT105)	Splitter Reboiler heater stack outlet	26.550278	29.149722	38.4	33.4	0.99	313	1.9	148.2	24	Continuous
R11 (230HT101)	NHT charge heater stack outlet	26.924167	29.282778	51.9	46.9	1.22	298	2.7	138	24	Continuous
R12 (230HT102)	Stripper reboiler stack outlet	26.923611	29.282778	38.4	33.4	0.99	304	2.38	185.4	24	Continuous
R13 (230HT103)	Platformer charge heater stack outlet	26.922222	29.283056	51.7	46.7	2.362	177	11.33	155.4	24	Continuous
R14	Debutanizer	26.923056	29.283056	43.0	38.0	1.28	360	0.92	47.4	24	Continuous

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m³/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
(230HT104)	reboiler stack outlet										
R15 (230HT105)	Splitter reboiler stack outlet	26.923611	29.283056	38.4	33.4	0.99	313	1.97	154.2	24	Continuous
Vacuum Distillation											
R17 (34HT101)	Vacuum heater stack outlet	-26.550745	29.150056	32.0	27.0	1.27	321	2.98	141	24	Continuous
R18 (234HT101)	Vacuum heater stack outlet	26.553001	29.169047	32.0	27.0	1.27	321	2.98	141	24	Continuous
Distillate Hydrotreater											
R19 (35HT101)	Reactor charge heater stack outlet	26.3825	29.143056	41.3	36.3	0.99	299	2.18	115.0	24	Continuous
R20 (35HT102)	Fractionators charge heater stack outlet	26.3825	29.143056	44.2	39.2	1.350	345	3.10	105.6	24	Continuous
R22 (235HT101)	Reactor charge heater stack outlet	26.551661	29.168978	41.3	36.3	1.308	299	1.89	78.6	24	Continuous
R23 (235HT102)	Fractionators charge heater stack outlet	26.551661	29.168978	44.2	39.2	1.35	310	3.51	147	24	Continuous
Distillate Selective Cracker											
R24 (35HT103)	Reactor charge heater stack outlet	26.3825	29.143056	31.4	26.4	0.87	388	0.97	97.8	24	Continuous

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m³/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
R25 (35HT104)	Fractionators charge heater stack outlet	26.3825	29.143056	35.0	30.0	0.99	221	0.87	67.8	24	Continuous
R26 (35HT105)	Vacuum charge heater stack outlet	26.3825	29.143056	31.0	26.0	0.684	340	1.03	169.2	24	Continuous
Light Oil Fractionation											
R27 (29HT101)	Light oil splitter reboiler stack outlet	26.550833	29.150556	48.0	43	1.808	280	5.93	138.6	24	Continuous
R28 (29HT102)	Diesel splitter reboiler stack outlet	26.551389	29.151111	42.6	37.6	1.200	267	3.81	202.2	24	Continuous
R29 (229HT101)	Light oil splitter reboiler stack outlet	26.552853	29.169484	47.7	42.7	1.727	367	10.04	256.8	24	Continuous
Polymer Hydrotreating											
R30 (33HT101)	Stripper reboiler stack outlet	26.551111	29.149722	34.9	29.9	1.53	393	2.1	194	24	Continuous
R31 (33HT102)	Charge heater stack outlet	26.550833	29.149722	38.68	33.68	1.4	279	1.56055	143	24	Continuous
R32 (33HT105)	Splitter reboiler stack outlet	26.550833	29.149722	46	41	1.37	389	3.3	387	24	Continuous
R33 (233HT101)	Splitter reboiler stack outlet	26.925556	29.2825	34.9	29.9	1.53	393	2.1	194	24	Continuous
R34 (233HT102)	Charge heater stack outlet	26.925556	29.2825	38.68	33.68	1.4	279	1.5	143	24	Continuous

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m³/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
R35 (233HT105)	Splitter reboiler stack outlet	26.925556	29.2825	46	41	1.37	389	3.3	387	24	Continuous
Catalytic Polymerisation and LPG recovery											
R36 (32HT101)	Poly debutanizer reboiler stack outlet	26.550556	29.150278	37.2	32.2	1.24	344	2.3	311	24	Continuous
R37 (32HT201)	Poly debutanizer reboiler stack outlet	26.551667	29.150278	37.2	32.2	1.24	358	2.2	302	24	Continuous
R38 (32HT102)	Recycle column reboiler stack outlet	26.551667	29.150278	51.5	46.5	2.13	369	7.2	338	24	Continuous
R39 (232HT101)	Poly debutanizer reboiler stack outlet	26.928056	29.281667	37.2	32.2	1.24	344	2.3	311	24	Continuous
R40 (232HT201)	Poly debutanizer reboiler stack outlet	26.928056	29.281667	37.2	32.2	1.24	358	2.2	302	24	Continuous
R41 (232HT102)	Recycle column reboiler stack outlet	26.928056	29.281667	51.5	46.5	2.13	369	7.2	338	24	Continuous
R16 (90HT101 / 90HT151)	Reactor feed heater / regenerator furnace stack outlet	26.5492	29.15203	60.0	55.5	1.45	298	5.7	209	24	Continuous
Synfuels catalytic cracker (SCC)											

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m^3/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
SCC1 stack	Main stack	26.55599	29.16390	80	76	1.067	232	82	5502	24	Continuous

6.5.1.5 Tar, Phenosolvan and sulphur

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m^3/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
Phenosolvan											
P1	Ammonia vent line at west stack	26.55750	29.14993	250	230	0.6	33	0.0083	6.84	Intermittent	
P2	Ammonia vent line at east stack	26.56014	29.16841	301	281	0.6	31	0.0083	6.84	Intermittent	
PAR west depitcher	Depitcher (016VL-107) ejector system vents	26.55558	29.15107	17.1	2.5	0.102	Unknown	Unknown	Unknown	8410 hrs/a	Continuous
PAR east depitcher	Depitcher (216VL-107) ejector system vents	26.55786	29.16993	17.1	2.5	0.102	Unknown	Unknown	Unknown	8410 hts/a	Continuous
PAR phase 1 filter vent	016FT-101 vents (filter vents during back wash operations)	26.55567	29.14975	10.1	2.5	0.152	Unknown	Unknown	Unknown	Unknown	Batch
PAR phase 2 filters Vent	016FT-401 vents (filter vents during back wash operations)	26.55637	29.14963	10.1	2.5	0.152	Unknown	Unknown	Unknown	Unknown	Batch

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m^3/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
PAR phase 3 filter Vent	216FT-101 vents (filter vents during back wash operations)	26.55789	29.16863	10.1	2.5	0.152	Unknown	Unknown	Unknown	Unknown	Batch
PAR phase 4 filter vent	216FT-401 vents (filter vents during back wash operations)	26.55861	29.16855	10.1	2.5	0.152	Unknown	Unknown	Unknown	Unknown	Batch
PAR phase 1 saturation column vent	016VL-101 Vent	26.55559	29.15047	33.4	10	0.152	45	0.216	540	8410hrs/a	Continuous
PAR phase 2 saturation column vent	016VL-401 Vent	26.55629	29.15039	33.4	10	0.152	45	0.216	540	8410hrs/a	Continuous
PAR phase 3 saturation column vent	216VL-101 Vent	26.55779	29.16938	33.4	10	0.152	45	0.216	540	8410hrs/a	Continuous
PAR phase 4 saturation column vent	216VL-401 Vent	26.55851	29.16928	33.4	10	0.152	45	0.216	540	8410hrs/a	Continuous
Wet sulphuric acid (WSA)											
WSA1	WSA stack	26.559278	29.167642	75	65	2.75	41	57.4	584	24	Continuous
Sulphur Recovery											

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m³/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
018DM-102-ME1	018DM-102 Oxidizer Vent	26.557195	29.151358	18.88	15.38	0.4	40	11	87.5	24	Continuous
018DM-102-ME2	018DM-102 Oxidizer Vent	26.557219	29.151539	18.88	15.38	0.4	40	11	87.5	24	Continuous
018DM-102-ME3	018DM-102 Oxidizer Vent	26.557301	29.151531	18.88	15.38	0.4	40	11	87.5	24	Continuous
018DM-102-ME4	018DM-102 Oxidizer Vent	26.557277	29.151349	18.88	15.38	0.4	40	11	87.5	24	Continuous
018DM-104-ME1	018DM-104 Oxidizer Vent	26.557139	29.150834	18.88	15.38	0.4	40	11	87.5	24	Continuous
018DM-104-ME2	018DM-104 Oxidizer Vent	26.557155	29.151015	18.88	15.38	0.4	40	11	87.5	24	Continuous
018DM-104-ME3	018DM-104 Oxidizer Vent	26.557234	29.150996	18.88	15.38	0.4	40	11	87.5	24	Continuous
018DM-104-ME4	018DM-104 Oxidizer Vent	26.557234	29.150996	18.88	15.38	0.4	40	11	87.5	24	Continuous
018DM-203-ME1	018DM-203 Oxidizer Vent	26.557534	29.151047	18.88	15.38	0.4	40	11	87.5	24	Continuous
018DM-203-ME2	018DM-203 Oxidizer Vent	26.557555	29.151222	18.88	15.38	0.4	40	11	87.5	24	Continuous
018DM-203-ME3	018DM-203 Oxidizer Vent	26.557634	29.151209	18.88	15.38	0.4	40	11	87.5	24	Continuous
018DM-203-ME4	018DM-203 Oxidizer Vent	26.557604	29.151030	18.88	15.38	0.4	40	11	87.5	24	Continuous
018DM-204-ME1	018DM-204 Oxidizer Vent	26.557501	29.150768	18.88	15.38	0.4	40	11	87.5	24	Continuous
018DM-204-ME2	018DM-204 Oxidizer Vent	26.557522	29.150953	18.88	15.38	0.4	40	11	87.5	24	Continuous
018DM-204-ME3	018DM-204 Oxidizer Vent	26.557597	29.150939	18.88	15.38	0.4	40	11	87.5	24	Continuous

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m³/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
018DM-204-ME4	018DM-204 Oxidizer Vent	26.557578	29.150754	18.88	15.38	0.4	40	11	87.5	24	Continuous
218DM-103-ME1	218DM-103 Oxidizer Vent	26.559289	29.170042	18.88	15.38	0.4	40	11	87.5	24	Continuous
218DM-103-ME2	218DM-103 Oxidizer Vent	26.559301	29.170158	18.88	15.38	0.4	40	11	87.5	24	Continuous
218DM-103-ME3	218DM-103 Oxidizer Vent	26.559397	29.170149	18.88	15.38	0.4	40	11	87.5	24	Continuous
218DM-103-ME4	218DM-103 Oxidizer Vent	26.559392	29.170009	18.88	15.38	0.4	40	11	87.5	24	Continuous
218DM-104-ME1	218DM-104 Oxidizer Vent	26.559244	29.169773	18.88	15.38	0.4	40	11	87.5	24	Continuous
218DM-104-ME2	218DM-104 Oxidizer Vent	26.559263	29.169899	18.88	15.38	0.4	40	11	87.5	24	Continuous
218DM-104-ME3	218DM-104 Oxidizer Vent	26.559373	29.169886	18.88	15.38	0.4	40	11	87.5	24	Continuous
218DM-104-ME4	218DM-104 Oxidizer Vent	26.559356	29.169771	18.88	15.38	0.4	40	11	87.5	24	Continuous
218DM-203-ME1	218DM-203 Oxidizer Vent	26.559660	29.169981	18.88	15.38	0.4	40	11	87.5	24	Continuous
218DM-203-ME2	218DM-203 Oxidizer Vent	26.559662	29.170107	18.88	15.38	0.4	40	11	87.5	24	Continuous
218DM-203-ME3	218DM-203 Oxidizer Vent	26.559773	29.170087	18.88	15.38	0.4	40	11	87.5	24	Continuous
218DM-203-ME4	218DM-203 Oxidizer Vent	26.559754	29.169968	18.88	15.38	0.4	40	11	87.5	24	Continuous
218DM-204-ME1	218DM-204 Oxidizer Vent	26.559621	29.169716	18.88	15.38	0.4	40	11	87.5	24	Continuous
218DM-204-ME2	218DM-204 Oxidizer Vent	26.559634	29.169844	18.88	15.38	0.4	40	11	87.5	24	Continuous

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m^3/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
218DM-204-ME3	218DM-204 Oxidizer Vent	26.559738	29.169822	18.88	15.38	0.4	40	11	87.5	24	Continuous
218DM-204-ME4	218DM-204 Oxidizer Vent	26.559723	29.169705	18.88	15.38	0.4	40	11	87.5	24	Continuous
Gas liquor separation (GLS), coal tar filtration (CTF) and tar processes											
GLS1 (U13 RTOs)	RTO stack	26.55892	29.1541	20	15	2.3	Unknown	Unknown	Unknown	24	Continuous
GLS2 (U213 RTOs)	RTO stack	26.56039	29.1725	20	Unknown	2.3	Unknown	Unknown	Unknown	24	Continuous
FPP1 (U86 RTO)	RTO stack	26.54824	29.14865	6	Unknown	1.12	Unknown	Unknown	Unknown	24	Continuous
CTF stack	CTF stack	26.55892	29.1541	20	15	0.7	Unknown	Unknown	Unknown	24	Continuous
39HT101	39HT101	26.549931	29.148514	54	Unknown	1.3	Unknown	Unknown	Unknown	24	Continuous
39HT102A & B	39HT102A & B	26.549895	29.148501	54	Unknown	1.5	Unknown	Unknown	Unknown	24	Continuous
Calciner stack	Calciner stack	26.55	29.15	77	Unknown	4.2	Unknown	Unknown	Unknown	24	Continuous

6.5.1.6 Water and Ash

Point source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Height above nearby building (m)	Diameter at stack tip / vent exit (m)	Gas exit temperature (°C)	Gas volumetric flow (m³/s)	Gas exit velocity (m/min)	Emission hours	Type of emission (continuous / batch / intermittent)
Bio-sludge (multi hearth sludge) incinerators											
WA1 (52WK-2102)	Stack	26.54617	29.14220	30	10	1.2	65	23 (19-30)	906 (653 – 1 300)	24	Continuous
WA2 (52WK-2202)	Stack	26.54598	29.14155	30	10	1.2	64	29 (23-30)	1116 (815 – 1 306)	24	Continuous
WA3 (252WK-2102)	Stack	26.54096	29.14283	30	10	1.2	64	29 (23-35)	1110 (821 – 1 518)	24	Continuous
WA4 (252WK-2202)	Stack	26.54111	29.14226	30	10	1.2	51	29 (23-35)	1146 (805 -1 511)	24	Continuous
High organic waste (HOW) incinerators											
HOW1 (052CI-101)	Stack	26.5481	29.14257	15	7	1.8	409	52 (45-59)	1 038 (821 -1 307)	24	Continuous
HOW2 (252CI-101)	Stack	26.54320	29.14331	15	7	1.8	328	50 (41 -55)	1 008 (745 -1 228)	24	Continuous
Waste recycling facility (WRF)											
WRF	WRF stack	26.55089	29.14340	20	15	1.25	815	1940	0.44	24	Intermittent

6.5.2 Area source parameters

6.5.2.1 Gas production area source parameters

Area Source Code	Source Name	Source Description	Latitude (decimal degrees) of SW corner	Longitude (decimal degrees) of SW corner	Height of Release Above Ground (m)	Length of Area (m)	Width of Area (m)	Emission Hours	Type of Emission (Continuous/ batch / Intermittent)
Gas Production									
CP1	East Coal storage	Coal stockpile	26.56543	29.17492	0	454	276	24	Intermittent
CP2	West Coal storage	Coal stockpile	26.56306	29.15638	0	432	357	24	Intermittent

6.5.2.2 Gas Circuit

None

6.5.2.3 Refining

Area source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Length of Area (m))	Width of Area (m)	Emission hours	Type of emission (continuous / batch / intermittent)
15TK101	Coal tar naphtha, unit 15 feed tank	26.549000	29.151166	7.5	N/A	N/A	24	Continuous
215TK101	Coal tar naphtha	26.925556	29.2825	7.2	N/A	N/A	24	Intermittent
Synfuels Catalytic Cracker (SCC)								
SCC2 (TK 1001)	Slurry storage tank – N_2 blanketing	26.55599	29.16390	11	N/A	N/A	24	Intermittent
SCC3 (TK 1002)	Fuel oil storage tank – N_2 blanketing	26.55599	29.16390	11	N/A	N/A	24	Intermittent
SCC4 (TK 1003)	Fuel oil make–up tank – N_2 blanketing	26.55599	29.16390	7	N/A	N/A	24	Intermittent
SCC5 (TK 3201)	DEA storage tank – N_2 blanketing	26.55599	29.16390	9	N/A	N/A	24	Intermittent

Area source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Length of Area (m))	Width of Area (m)	Emission hours	Type of emission (continuous / batch / intermittent)
SCC6 (TK 3202)	Slop oil tank – N_2 blanketing	26.55599	29.16390	5.7	)N/A	N/A	24	Intermittent
SCC7 (TK 3401)	Caustic storage tank – N_2 blanketing	26.55599	29.16390	5.5	N/A	N/A	24	Intermittent
SCC8 (TK 3402)	Spent caustic tank – N_2 blanketing	26.55599	29.16390	5.5	N/A	N/A	24	Intermittent

6.5.2.4 Tar, Phenosolvan and sulphur

Area source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Length of Area (m)	Width of Area (m)	Emission hours	Type of emission (continuous / batch / intermittent)
Gas liquor separation (GLS), coal tar filtration (CTF) and tar processes								
FPP3 (86TK203)	Storage and mixing tank	26,54882	29,14697	18	N/A	N/A	24	Batch
FPP4 (86TK204)	Storage and mixing tank	26,54876	29,14697	18	N/A	N/A	24	Batch
CT1 (39TK101)	Waxy oil 30 tank	26,54887	29,14830	10	N/A	N/A	24	Continuous
CT 2 (39TK102)	Waxy oil 30 tank	26,54896	29,14816	10	N/A	N/A	24	Continuous
CT3 (39TK103)	Pitch tank	26,54899	29,14762	10	N/A	N/A	24	Continuous
CT4 (39TK104)	Pitch tank	26,54887	29,14746	10	N/A	N/A	24	Continuous
CT5 (39TK105)	Pitch tank	26,54875	29,14714	10	N/A	N/A	24	Continuous
CT6 (39TK112)	FCC slurry tank	26,54887	29,14746	10	N/A	N/A	24	Continuous
CT7 (39TK113)	FCC slurry tank	26,54875	29,14714	10	N/A	N/A	24	Continuous
CT8 (39TK114)	FCC slurry tank	26.54904	29.14720	10	N/A	N/A	24	Continuous
CT9 (39TK115)	FCC slurry tank	26.54907	29.14731	10	N/A	N/A	24	Continuous
CT10	Fuel oil 10 tank	26.54870	29.14711	8	N/A	N/A	24	Continuous

Area source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Length of Area (m)	Width of Area (m)	Emission hours	Type of emission (continuous / batch / intermittent)
(39TK201)								
CT11 (39TK202)	Low sulphur heavy fuel oil tank	26.54877	29.14711	8	N/A	N/A	24	Continuous
CT12 (39TK203)	Low sulphur heavy fuel oil tank	26.54884	29.14709	8	N/A	N/A	24	Continuous
CT13 (39TK204)	Heavy tar oil tank	26.54891	29.14709	8	N/A	N/A	24	Continuous

6.5.2.5 Water and Ash

Area source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Length of Area (m)	Width of Area (m)	Emission hours	Type of emission (continuous / batch / intermittent)
Waste Recycling Facility								
TK2005	Phenosolvan oily waste tank	26.550943	29.143427	20	N/A	N/A	24	Intermittent
TK2011	Oily waste tank	26.550943	29.143427	20	N/A	N/A	24	Intermittent
TK2012	Solvent oily waste tank	26.550943	29.143427	20	N/A	N/A	24	Intermittent
TK2002	Phenolic waste tank	26.550943	29.143427	20	N/A	N/A	24	Intermittent
TK2004	Phenolic waste tank	26.550943	29.143427	20	N/A	N/A	24	Intermittent
TK2006	Organic waste tank	26.550943	29.143427	20	N/A	N/A	24	Intermittent
TK2003	Flare knockout water tank	26.550943	29.143427	20	N/A	N/A	24	Intermittent

Area source code	Source name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of release above ground (m)	Length of Area (m)	Width of Area (m)	Emission hours	Type of emission (continuous / batch / intermittent)
TK2016	Quarantine waste tank	26.550943	29.143427	20	N/A	N/A	24	Intermittent
TK2009	Recovered oil tank	26.550943	29.143427	20	N/A	N/A	24	Intermittent
TK2512	APS storage tank	26.550943	29.143427	20	N/A	N/A	24	Intermittent
TK2501	Hydrocarbon equalization	26.550943	29.143427	20	N/A	N/A	24	Intermittent
TK2505	API separator	26.550943	29.143427	20	N/A	N/A	24	Intermittent
TK2510	Recovered oil storage tank	26.550943	29.143427	20	N/A	N/A	24	Intermittent

7 APPLIANCES AND MEASURES TO PREVENT AIR POLLUTION

7.1 Appliances and control measures

Associated Source Code	Appliances			Abatement Equipment Control Technology							
	Appliance / Process Equipment Number	Appliance Serial Number	Appliance Type / Description	Abatement Equipment Technology Name and Model	Abatement Equipment Technology Manufacture Date	Commission Date	Date of Significant Modification / Upgrade	Technology Type	Design Capacity	Minimum Control Efficiency (%)	Minimum Utilisation (%)
B1 & B2	43/243FTX 01	None	Electrostatic Precipitators	Not available	Lurgi x 16 Lodge-Cottrell x 1	1977-1983 1987	2010	Wire / Plate ESP's	PM<200mg/Nm^3	Not available	> 95%
CM3	U204 Kiln A (204DC-	None	Stainless Steel Filter	Not available	Not available	Unknown	2008	Filtration	16500 m^3_n/hr	Not available	80%

	101A-D1-D4)		elements								
CM4	U204 Arc furnace (204DC-141A-D)	None	Filter cloths	Not available	Not available	Unknown	2017	Filtration	Unknown	Not available	80%
CM5	U204 Kiln B (204DC-101B-D1-D4)	None	Stainless steel filter element	Not available	Not available	2000	2008	Filtration	16500 m^3_n/hr	Not available	80%
CM2	U04 Arc furnace (04DC-141A-D)	None	Filter cloths	Not available	Not available	Unknown	Unknown	Filtration	Unknown	Not available	80%
CM1	U04 Kiln (004DC-101-D1-D4)	None	Stainless steel filter element	Not available	Not available	2000	2011	Filtration	16 500 m^3_n/hr	Not available	80%
WA1, WA2, WA3, WA4	052WK-2101 052WK-2201 252WK-2101 252WK-2201	None	Wet Scrubber	Not available	1978	1978	None	Solid / Gas Separation	9,7 m^3	Not available	96%
WSA1	518ME-1003	None	Wet Electrostatic precipitator	Not available	2007	2009	None	Electrostatic precipitator	183 446 Nm^3/h	75%	98%

WSA1	518RE-1001	None	DeNOx converter	Reactor	2007	2009	None	None	183 516 Nm^3/h	63%	98%
FPP 1 (U86 RTO)	Regenerative thermal oxidizer 086HT-0001)	None	Regenerative thermal oxide	Not available	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
GLS 1(U13 RTO's)	Regenerative thermal oxidizer 013HT-101/013HT-401	None	Regenerative thermal oxide	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
GLS 2(U213 RTO's)	Regenerative thermal oxidizer 213HT-101/213HT-401	None	Regenerative thermal oxide	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
R21 (U14/214 RTO's)	Regenerative thermal oxidizer 014HT-102/214HT-102	None	Regenerative thermal oxide	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
SCC 1 stack	SCC multistage cyclone	None	SCC multistage cyclone	Three stage cyclone	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

7.2 Point Source – maximum emission rates (under normal working conditions)

Utilities

Point Source Code	Pollutant Name	Maximum Release Rate		Average Period	Duration of Emissions
		(mg/Nm³) under normal conditions of 10% O_2, 273 Kelvin and 101,3-kPa	Complaince Timeframe		
B1 (West Stack)	Particulate matter (PM)	120 100	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	3500 2000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x	1100 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
B2 (East Stack)	Particulate matter (PM)	120 100	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	3500 2000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x	1100 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

Point Source Code	Pollution Name	Maximum Release Rate		Average Period	Duration of Emission
		(mg/Nm³) under normal conditions of 15% O_2, 273 Kelvin and 101,3-kPa	Complaince Timeframe		
GT1 (Gas Turbines Stack)	Particulate matter (PM)	10 10	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	500 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

	NO_x	300 50	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
GT2 (Gas Turbines Stack)	Particulate matter (PM)	10 10	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	500 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x	300 50	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

Gas Production (3.6)

Point Source Code	Pollutant Name	Maximum Release Rate		Average Period	Duration of Emissions
		(mg/Nm³) under normal conditions of 273 Kelvin and 101.3 kPa	Date to be Achieved By		
Rectisol **East** (Off gas to main stack)	H_2S	8400 3500	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	H_2S measured as S	13.5t/hr (combined with west)	Immediately	Daily	Continuous
	Total VOC's	300 130	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	3500 500	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

Point Source Code	Pollutant Name	Maximum Release Rate		Average Period	Duration of Emissions
		(mg/Nm³) under normal conditions of 273 Kelvin and 101.3 kPa	Date to be Achieved By		
Rectisol **West** (Off gas to main stack)	H_2S	8400 3500	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

	H_2S measured as S	13.5t/hr (combined with east)	Immediately	Daily	Continuous
	Total VOC's	300 130	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	3500 500	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

Gas Circuit (4.1 and 4.7)

Point Source Code	Pollutant Name	Maximum Release Rate		Average Period	Duration of Emissions
		(mg/Nm³) under normal conditions of 273 Kelvin and 101.3 kPa	Date to be Achieved By		
CM1 (West Kiln Stack) (4.1)	Particulate matter (PM)	100 50	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1000 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1200 500	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
CM2 (West Arc Furnace stack) (4.7)	Particulate matter (PM)	100 30	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	500 500	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	500 500	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
CM3 (East Kiln A Stack) (4.1)	Particulate matter (PM)	100 50	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1000 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1200 500	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
CM4 (East Arc Furnace stack)	Particulate matter (PM)	100 30	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

(4.7)	SO_2	500 500	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	500 500	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
CM5 (East Kiln B Stack) (4.1)	Particulate matter (PM)	100 50	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1000 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1200 500	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

Refining (2.1)

Point Source Code	Pollutant Name	Maximum Release Rate		Average Period	Duration of Emissions
		(mg/Nm³) under normal conditions of 273K, 101,3-kPa , 10% Oxygen and dry gas	Date to be Achieved By		
Tar Distillation					
R1 (14HT101) Tar distillation reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R2 (14HT201) Tar distillation reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R3 (214HT101) Tar distillation reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R4 (214HT201) Tar distillation reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R21 (U14/214) RTOs Stack	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
Creosote Hydrogenation					
R5 (228HT101) Heater Stack Outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
Naphtha Hydrotreater, Platformer And Continuous Catalyst Regeneration (CRR)					
R6 (30HT101) NHT charge heater stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R7 (30HT102) Stripper reboiler heater stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R8 (30HT103)	Particulate matter (PM)	120	1 April 2015 to 31 March 2020	Daily	Continuous

Platformer charge heater stack outlet		70	1 April 2020 to 31 March 2025		
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R9 (30HT104) Debutanizer reboiler heater stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R10 (30HT105) Splitter reboiler heater stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R11 (230HT101) NHT charge heater stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R12 (230HT102) Stripper reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R13 (230HT103) Platformer charge heater stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

R14 (230HT104) Debutanizer reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R15 (230HT105) Splitter reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R16 (90HT101/90HT151)	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
Vacuum Distillation					
R17 (34HT101) Vacuum heater stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R18 (234HT101) Vacuum heater stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
Distillate Hydrotreater					
R19 (35HT101)	Particulate matter (PM)	120	1 April 2015 to 31 March 2020	Daily	Continuous

Reactor charge heater stack outlet		70	1 April 2020 to 31 March 2025		
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R20 (35HT102) Fractionators charge heater stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R22 (235HT101) Reactor charge heater stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R23 (235HT102) Fractionators charge heater stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
Distillate Selective Cracker					
R24(35HT103) Reactor charge heater stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R25(35HT104) Fractionators charge heater stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R26(35HT105) Vacuum charge heater stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
Light Oil Fractionation					
R27 (29HT101) Light oil splitter reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R28 (29HT102) Diesel splitter reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R29 (229HT101) Light oil splitter reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
Polymer Hydrotreating					
R30(33HT101) Stripper reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

R31(33HT102) Charge heater stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R32(33HT105) Splitter reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R33(233HT101) Splitter reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R34(233HT102) Charge heater stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R35(233HT105) Splitter reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
Catalytic Polymerisation and LPG Recovery					
R36 (32HT101) Poly debutanizer reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R37 (32HT201) Poly debutanizer reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R38 (32HT102) Recycle column reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R39 (232HT101) Poly debutanizer reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R40 (232HT201) Poly debutanizer reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
R41 (232HT102) Recycle column reboiler stack outlet	Particulate matter (PM)	120 70	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	1700 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	1700 1000	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

Point Source Code	Pollutant Name	Maximum Release Rate (mg/Nm³)expressed as on a daily average under normal conditions of 273K, 101,3-kPa 10% Oxygen and dry gas	Complained timeframe	Average Period	Duration of Emissions
Synfuels Catalytic Cracker (SCC)					
SCC 1, Stack	Particulate matter (PM)	330 300	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x as (NO_2)	550 400	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	3000 1500	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

Point Source Code	Pollutant Name	Maximum Release Rate (mg/Nm³) expressed as on a daily average under normal conditions of 273K, 101,3-kPa.	Date to be Achieved By	Average Period	Duration of Emissions
Wet Sulphuric Acid Plant					
WSA1 Wet Sulphuric Acids Stack	SO_2	2800 350	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_3	100 25	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x	2000 350	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

Point Source Code	Pollutant Name	Maximum Release Rate		Average Period	Duration of Emissions
		(mg/Nm³) expressed as on a daily average under normal conditions of 273K, 101,3kPa	Date to be Achieved By		
Phenosolvan					
PAR saturation column vents west (phase 1 and 2)	TVOC's	58000 130	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
PAR saturation column vents west (phase 1 and 2)	TVOC's	58000 130	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

Point Source Code	Pollutant Name	Maximum Release Rate		Average Period	Duration of Emissions
		(mg/Nm³) under normal conditions of 273K, 101,3-kPa.	Date to be Achieved By		
Tar (sources in tar value chain 1)					
R21 (U14/2 14 RTO's stack) FPP1 (U86 RTO's) GLS1 (U13 RTO's GLS2 (U213 RTO's)	TVOC's	250 130	1 April 2015 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

Point Source Code	Pollutant Name	Maximum Release Rate		Average Period	Duration of Emissions
		mg/Nm³ expressed as on a daily average under normal conditions of 273K, 101,3-kPa, 10% O_2 and dry gas	Date to be Achieved By		
Water and Ash -Bio-sludge (multi hearth sludge) incinerators					
WA1 (052WK-2102)	Particulate matter (PM)	400 800	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	CO	4310 4310	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	210 210	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x expressed as NO_2	630 630	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	HCl	23 20	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	HF	20 20	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Pb+As+Sb+Cr+Co+Cu+Mn+Ni+V	2.6 8	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Hg	1 2.5	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Cd+Tl	0.12 0.12	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	TOC	1500 3675	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

	NH_3	52 100	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Dioxins and furans (PCDD/PCDF)	0.3 (ng I-TEQ/Nm^3) under normal conditions of 10% O_2, 273K and 101.3kPa	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
WA2 (052WK-2202)	Particulate matter (PM)	400 800	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	CO	4310 4310	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	210 210	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x expressed as NO_2	630 630	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	HCl	23 20	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	HF	20 20	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Pb+As+Sb+Cr+Co+Cu+Mn+Ni+V	2.6 8	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Hg	1 2.5	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Cd+Tl	0.12 0.12	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	TOC	1500 3675	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NH_3	52 100	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

	Dioxins and furans (PCDD/PCDF)	0.3 (ng I-TEQ/Nm³) under normal conditions of 10% O_2, 273K and 101.3kPa	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
WA3 (252WK-2102)	Particulate matter (PM)	400 800	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	CO	4310 4310	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	210 210	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x expressed as NO_2	630 630	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	HCl	23 20	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	HF	20 20	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Pb+As+Sb+Cr+Co+Cu+Mn+Ni+V	2.6 8	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Hg	1 2.5	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Cd+Tl	0.12 0.12	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	TOC	1500 3675	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NH_3	52 100	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Dioxins and furans (PCDD/PCDF)	0.3 (ng I-TEQ/Nm³) under normal conditions of 10% O_2, 273K and 101.3kPa	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

WA4 (252WK-2202)	Particulate matter (PM)	400 800	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	CO	4310 4310	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	210 210	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x expressed as NO_2	630 630	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	HCl	23 20	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	HF	20 20	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Pb+As+Sb+Cr+Co+Cu+Mn+Ni+V	2.6 8	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Hg	1 2.5	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Cd+Tl	0.12 0.12	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	TOC	1500 3675	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NH_3	52 100	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Dioxins and furans (PCDD/PCDF)	0.3 (ng I-TEQ/Nm^3) under normal conditions of 10% O_2, 273K and 101.3kPa	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

Point Source Code	Pollutant Name	Maximum Release Rate		Average Period	Duration of Emissions
		mg/Nm³ expressed as on a daily average under normal conditions of 273K, 101,3-kPa, 10% O_2 and dry gas	Date to be Achieved By		
Water and Ash -High Organic Waste Incinerators					
HOW1 (052CI-101)	Particulate matter (PM)	900 900	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	CO	1300 1300	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	400 400	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x expressed as NO_2	3800 4000	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	HCl	55 50	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	HF	3 3	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Pb+As+Sb+Cr+Co+Cu+Mn+Ni+V	21 21	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Hg	0.27 0.43	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Cd+Tl	0.12 0.12	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	TOC	38 113	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NH_3	12	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

		13			
	Dioxins and furans (PCDD/PCDF)	4.2 (ng I-TEQ/Nm^3) under normal conditions of 10% O_2, 273K and 101.3kPa	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Exit gas temperature	Less than 400°C Less than 200°C	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
HOW2 (252CI-101)	Particulate matter (PM)	900 900	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	CO	1300 1300	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	400 400	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NO_x expressed as NO_2	3800 4000	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	HCl	55 50	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	HF	3 3	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Pb+As+Sb+Cr+Co+Cu+Mn+Ni+V	21 21	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Hg	0.27 0.43	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Cd+Tl	0.12 0.12	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	TOC	38 113	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	NH_3	12	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

		13			
	Dioxins and furans (PCDD/PCDF)	4.2 (ng I-TEQ/Nm³) under normal conditions of 10% O_2, 273K and 101.3kPa	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	Exit gas temperature	Less than 400°C Less than 200°C	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
Point Source Code	**Pollutant Name**	**Maximum Release Rate**			**Duration of Emissions**
		mg/Nm³ under normal conditions of 273 Kelvin and 101.3kPa	**Date to be Achieved By**	**Average Period**	
WRF (2.5)	CO	250 130	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	SO_2	3500 500	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous
	TVOC's from vapour recovery/destruction units	90 40	1 April 2018 to 31 March 2020 1 April 2020 to 31 March 2025	Daily	Continuous

7.3 Point source – maximum emission rates (under start-up, maintenance and shut-down conditions)

Point Source Code	Pollutant Name	Maximum Release Rate		Averaging Period	Maximum Gas Volumetric Flow (m³/hr)	Maximum Gas Exit Velocity (m/s)	Emission Hours	Maximum Permitted Duration of Emissions
		(mg/Nm³)	Date to be Achieved By					
All Point Source Code	All Point Source Pollutant	N/A	N/A	N/A	N/A	N/A	N/A	Within 48 hours after commissioning of plant or equipment

Should normal start-up, maintenance, upset and shut-down conditions exceed a period of 48 hours, Section 30 of the National Environmental Management, 1998 (Act No. 107 of 1998), shall apply unless otherwise specified by the Licensing Authority.

7.4 Point source – emission monitoring and reporting requirements

Point Source code	Emission Sampling / Monitoring Method	Sampling Frequency	Sampling Duration	Parameters to be Measured	Parameters to be Reported	Reporting Frequency	Conditions under which Monitoring could be Stopped
B1 & B2	In line with Annexure A of NEMAQA, No. 37054 Government Gazette 22 November 2013, as amended	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013 Parameters must be reported per flue stack i.e. 03 for East and 04 for West	In line with No. 37054 Government Gazette 22 November 2013. Submit report on or before the 12th of every month.	Only on written authorisation by the Licensing Authority
GT1 &GT2	In line with Annexure A of NEMAQA, No. 37054 Government Gazette 22 November 2013, as amended	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013. Submit report on or before the 12th of every month.	Only on written authorisation by the Licensing Authority
Rectisol East & West	In line with Annexure A of NEMAQA, No. 37054 Government Gazette 22 November 2013, as amended	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013. Submit report on or before the 12th of every month.	Only on written authorisation by the Licensing Authority
CM1,2,3,4,5	In line with Annexure A of NEMAQA, No. 37054 Government Gazette 22 November 2013, as amended	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013. Submit report on or before the 12th of every month.	Only on written authorisation by the Licensing Authority
R1,2,3,4and 5	In line with Annexure A of NEMAQA, No.	In line with No. 37054	In line with No. 37054	In line with No. 37054	In line with No. 37054	In line with No. 37054 Government Gazette 22	Only on written authorisation by the

Point Source code	Emission Sampling / Monitoring Method	Sampling Frequency	Sampling Duration	Parameters to be Measured	Parameters to be Reported	Reporting Frequency	Conditions under which Monitoring could be Stopped
	37054 Government Gazette 22 November 2013, as amended	Government Gazette 22 November 2013	Government Gazette 22 November 2013	Government Gazette 22 November 2013	Government Gazette 22 November 2013	November 2013. Submit report on or before the 12th of every month.	Licensing Authority
R6.7,8,9,10,11, 12,13,14 and 15	In line with Annexure A of NEMAQA, No. 37054 Government Gazette 22 November 2013, as amended	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013. Submit report on or before the 12th of every month.	Only on written authorisation by the Licensing Authority
R17,18,19,20,2 1,22 and 23	In line with Annexure A of NEMAQA, No. 37054 Government Gazette 22 November 2013, as amended	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013. Submit report on or before the 12th of every month.	Only on written authorisation by the Licensing Authority
R 24,25,and 26	In line with Annexure A of NEMAQA, No. 37054 Government Gazette 22 November 2013, as amended	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013. Submit report on or before the 12th of every month.	Only on written authorisation by the Licensing Authority
R 27,28 and 29	In line with Annexure A of NEMAQA, No. 37054 Government Gazette 22 November 2013, as amended	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013. Submit report on or before the 12th of every month.	Only on written authorisation by the Licensing Authority
R30,31,32,33, 34 and 35	In line with Annexure A of NEMAQA, No. 37054 Government Gazette	In line with No. 37054 Government Gazette 22	In line with No. 37054 Government Gazette 22	In line with No. 37054 Government Gazette 22	In line with No. 37054 Government Gazette 22	In line with No. 37054 Government Gazette 22 November 2013. Submit report on or before the 12th	Only on written authorisation by the Licensing Authority

Point Source code	Emission Sampling / Monitoring Method	Sampling Frequency	Sampling Duration	Parameters to be Measured	Parameters to be Reported	Reporting Frequency	Conditions under which Monitoring could be Stopped
	22 November 2013, as amended	November 2013	November 2013	November 2013	November 2013	of every month.	
R36,37,38,39, 40 and 41	In line with Annexure A of NEMAQA, No. 37054 Government Gazette 22 November 2013, as amended	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013. Submit report on or before the 12th of every month.	Only on written authorisation by the Licensing Authority
SCC 1	In line with Annexure A of NEMAQA, No. 37054 Government Gazette 22 November 2013, as amended	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013. Submit report on or before the 12th of every month.	Only on written authorisation by the Licensing Authority
WSA1	In line with Annexure A of NEMAQA, No. 37054 Government Gazette 22 November 2013, as amended	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013. Submit report on or before the 12th of every month.	Only on written authorisation by the Licensing Authority
*WA 1,2,3 and 4	In line with Annexure A of NEMAQA, No. 37054 Government Gazette 22 November 2013, as amended	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	Only on written authorisation by the Licensing Authority
**HOW 1 & 2 Note 2	In line with Annexure A of NEMAQA, No. 37054 Government Gazette 22 November 2013, as amended	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	Only on written authorisation by the Licensing Authority

Point Source code	Emission Sampling / Monitoring Method	Sampling Frequency	Sampling Duration	Parameters to be Measured	Parameters to be Reported	Reporting Frequency	Conditions under which Monitoring could be Stopped
WRF	In line with Annexure A of NEMAQA, No. 37054 Government Gazette 22 November 2013, as amended	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	In line with No. 37054 Government Gazette 22 November 2013	Only on written authorisation by the Licensing Authority

*Only WA1 fitted with a continuous monitoring system (online analyser). Sasol must continue with the application of periodic third party sampling on the bio-sludge incinerators up until completion of the abatement project by end of 2020/ 2021 financial year. Measurement results must be recorded, processed and presented in a quarterly emissions monitoring report for particulate matter and gaseous substances. Quarterly reports to be submitted before or on the 12th of the month following the previous quarter to the Licensing Authority.

**Only HOW2 fitted with a continuous monitoring system (online analyser). Sasol must continue with the application of periodic third party sampling on the HOW incinerators up until completion of the abatement project by end of 2020/ 2021 financial year. Measurement results must be recorded, processed and presented in a quarterly emissions monitoring report for particulate matter and gaseous substances. Quarterly reports to be submitted before or on the12th of the month following the previous quarter to the Licensing Authority.

*** Monthly averaging where continous online monitoring is done

7.5 Area source – management and mitigation measures

Area and/or Line Source Code	Area and/or Line Source Description	Description of Specific Measures	Timeframe for Achieving Required Control Efficiency	Method of Monitoring Measures Effectiveness	Contingency Measures
CP1	Coal stock pile	NEM: AQA 39 of 2004; National Dust Control Regulations.	Immediately	ASTM D1739	In line with approved EMP, Dust Management Plan and Secunda Synfuels Operations operational manuals
CP2	Coal stock pile	NEM: AQA 39 of 2004; National Dust Control Regulations.	Immediately	ASTM D1739	In line with approved EMP, Dust Management Plan and Secunda Synfuels Operations operational manuals

Storage tanks (sub-category 2.4)	Storage tanks	A detail plan to manage VOC's and schedule for the retrofit of tanks to be provided to the Department of Environmental Affairs, Forestry and Fisheries and the Licensing Authority. Emissions are to be incorporated into the site fugitive emissions monitoring plan during this period	01 April 2015 to 31 March 2020 and 1 April 2020 to 31 March 2025	Quartely reports to Licensing Authority on implementation of retrofit schedule and against the submitted site fugitive emissions monitoring plan	In line with Sasol approved site fugitive emissions monitoring plan including the schedule for the retrofit as provided to the Authorities
Tar value chain phase 1	Different sources in gas liquor separation, Coal Tar filtration, tar Distillation units and Feed preparation plant of varying nature	To be included in the site fugitive emissions monitoring plan	In line with Sasol approved site fugitive emissions monitoring plan including the schedule for the retrofit as provided to the Authorities	To be agreed between the licence holder and the licensing authority	In line with Sasol approved site fugitive emissions monitoring plan including the schedule for the retrofit as provided to the Authorities
Tar value chain phase 2	Synfuels and refinery unit tanks 15TK 101/ 215TK101/ 39TK103/ 39TK104/ 39TK 105	To be included in the site fugitive emissions monitoring plan	In line with Sasol approved site fugitive emissions monitoring plan including the schedule for the retrofit as provided to the Authorities	To be agreed between the licence holder and the licensing authority	In line with Sasol approved site fugitive emissions monitoring plan including the schedule for the retrofit as provided to the Authorities

LICENSING OFFICER

7.6 Routine reporting and record-keeping

7.6.1 Complaints register

The licence holder must maintain a complaints register at its premises, and such register must be made available for inspections. The complaints register must include the following information on the complainant, namely, the name, physical address, telephone number, date and the time when the complaint was registered. The register should also provide space for noise, dust and offensive odours complaints.

Furthermore, the licence holder is to investigate and quarterly, report to the licensing authority in a summarised format on the total number of complaints logged. The complaints must be reported in the following format with each component indicated as may be necessary:

a) Source code / name;

b) Root cause analysis;

c) Calculation of impacts / emissions associated with incidents and dispersion modelling of pollutants, where applicable;

d) Measures implemented or to be implemented to prevent recurrence; and

e) Date by which measure will be implemented.

The licensing authority must also be provided with a copy of the complaints register. The record of a complaint must be kept for at least 5 (five) years after the complaint was made.

7.6.2 Emergency Incidents

The licence holder must keep record of all plant failure or emergency incidents including section 30 and submit to the licence authority quarterly a report detailing the following:

a) Type of plant and summary description of the equipment

b) Reasons for failure or cause

c) Previous occurrence on the same plant and number of times similar incident occurred

d) Mitigation instituted to prevent similar occurrence

e) Any breach of internal standard operating procedure

f) Number of times similar incident occurred

7.6.3 Annual reporting

The licence holder must complete and submit to the licensing authority an annual report after the facility annual financial year, the report must include information for the year under review (i.e. annual year end of the company). The report must be submitted to the licensing authority not later than sixty (60) days after the end of each reporting period. The annual report must include, amongst others the following:

(a) NEM: AQA Section 21 pollutant emissions trend for listed activity;

(b) External compliance audit report (s);

(c) Major upgrades projects (i.e. abatement equipment or process equipment);

(d) Greenhouse gas emissions annual report in line with the National Greenhouse Gas Emission Reporting Regulations No. 40762 Government Gazette 03 April 2017;

(e) Action taken to address complains received;

7.7. Investigation

Nr.	MES Category	Investigation activity	Purpose	Completion date
1	3.6	Additional / new stacks - Gasification ejector vents	To monitor the 5 (of the 84) ejector vents with sampling ports to establish an emissions baseline. Subsequent to emissions baseline, engage licensing authority on baseline findings to finalise emissions and reporting requirements.	Eighteen (18) months after date of issue of licence.
2	3.6	Additional / new stacks - Phenosolvan depitcher and filter vents	To investigate the feasibility of installing sampling ports and do baseline emissions monitoring if sampling ports can be installed. If not, investigate a suitable emissions estimation method to finalise emissions and reporting requirements.	Eighteen (18) months after date of issue of licence.
3	3.6	Additional / new stacks - Coal tar filtration (CTF) stack	To establish an emissions baseline. Subsequent to emissions baseline, engage licensing authority on baseline findings to finalise emissions and reporting requirements.	Eighteen (18) months after date of issue of licence.
4	3.3	Additional / new stacks – fired heaters stacks (39HT101 39HT102A&B)	To establish an emissions baseline. Subsequent to emissions baseline, engage licensing authority on baseline findings to finalise emissions and reporting requirements.	Twelve (12) months after date of issue of licence.
5	3.2	Additional / new stacks - Calciner stack	To establish an emissions baseline. Subsequent to emissions baseline, engage licensing authority on baseline findings.	Twelve (12) months after date of issue of licence.
6	4.1	Control device - catalyst manufacturing dust collectors	To measure or establish the efficiency of the abatement equipment, on baseline findings to finalise emissions and reporting requirements authority.	Twelve (12) months after date of issue of licence.
7	3.3	Control device – unit 86 regenerative thermal oxidiser (RTO)	To measure or establish the efficiency and on-line availability of the abatement equipment with additional sources added, as well as with more responsive process safety controls. To finalise emissions and reporting requirements	Eighteen (18) months after date of issue of licence.
8	3.3	Control device – unit 13 RTOs	To measure or establish the efficiency and on-line availability of the abatement equipment, with additional sources added, as well as with more responsive process safety controls. To finalise emissions and reporting requirements	Eighteen (18) months after date of issue of licence.
9	3.3	Control device – unit 213 RTOs	To measure or establish the efficiency and on-line availability of the	Eighteen (18) months after date

(f) Annual report on implementation of Highveld Priority Air Quality Management Plan and offset program / projects; and

(g) Compliance status to statutory obligation (4.5) including any other issued authorisations.

The holder of the licence must keep a copy of the annual report for a period of at least 5 (five) years.

			abatement equipment, incorporating all known potential upset scenarios and a more responsive process safety control system. to finalise emissions and reporting requirements	of issue of licence.
10	3.3	Control device – unit 14 and 214 RTOs	To measure or establish the efficiency and on-line availability of the abatement equipment, incorporating all known potential upset scenarios and a more responsive process safety control system. To finalise emissions and reporting requirements	Two (2) years after date of issue of licence.
11	8.1	Control device - water recovery (bio-sludge incinerators) wet scrubbers	To measure or establish the efficiency of the abatement equipment.	One (1) year after date of issue of licence.
14	2.1	Stacks: Refining heaters	To monitor one refining heater (of total) that will be installed with an Isokinetics sampling port in the September 2019 shutdown. Sasol requests that this one heater be baseline after the shutdown to determine efficient and suitable emissions measurement and monitoring method for all heaters. Subsequent to the baseline, engage licensing to finalise emissions send reporting requirements	Eighteen (18) months after date of issue of licence.
15	2.5	Waste recycling facility (WRF)	To monitor and establish baseline against newly approved subcategory 2.5. Subsequent to emissions baseline, engage licensing authority on baseline findings to finalise emissions and reporting requirements	Eighteen (18) months after date of issue of licence
16	Unknown information	Unknown information	All unknown information on all tables above must be submitted to the Licensning Authority	12 months from the date of issue

8 DISPOSAL OF WASTE AND EFFLUENT ARISING FROM ABATEMENT EQUIPMENT CONTROL TECHNOLOGY

Source Code / Name	Waste / Effluent Type	Hazardous Components Present	Method of Disposal
B1 & B2	Ash	Alkaline dust containing heavy metal trace elements, as well as silica and quartz	In line with the requirements of NEMA and the SEMA
CM1, CM3 & CM5	Catalyst Dust	Magnetite	In line with the requirements of NEMA and the SEMA
WA1, WA2, WA3, WA4	Ash	Heavy metal trace elements	In line with the requirements of NEMA and the SEMA
WSA1	Weak sulphuric acid, spent catalyst	Sulphuric acid, vanadium based catalyst	In line with the requirements of NEMA and the SEMA

9. PENALTIES FOR NON-COMPLIANCE WITH LICENCE AND STATUTORY CONDITIONS AND OR REQUIREMENTS

Failure to comply with the any of the above condition and requirements in terms of Chapter 7 Section 51 including Chapter 8Section 53 - 55 of NEMAQA (Act no. 39 of 2004 is a breach of the Licence conditions, and the Licence holder will be subject to the sanctions set out in Chapter 7 Section 52 of NEMAQA (Act no. 39 of 2004), Chapter 10, Section 89 of the National Health Act 61 of 2003,Chapter 7 Section 28,32,33 and 34 of the National Environmental Management Act 108 of 1998, Chapter 16, section 151 of the National Water Act, and Chapter 7 section 68 of the National Waste Management Act, including any penalties contained in the By-laws.

10. APPEAL OF LICENCE

10.1 The Licence Holder must notify every registered interested and affected party, in writing and within ten (10) days, of receiving the District's decision.

10.2 The notification referred to in 10.1. must –

10.2.1 Inform the registered interested and affected parties of the appeal procedure provided for in Chapter 7 Part 3 Section 62 of Municipal Systems Act (Act 32 of 2000), as amended;

10.2.2 Advise the interested and affected parties that a copy of the Atmospheric Emission Licence and reasons for the decision will be furnished on request;

10.2.3 An appeal against the decision must be lodged in terms of Chapter 7 Part 3 Section 62 of Municipal Systems Act (Act 32 of 2000), from the date of issue of this Atmospheric Emission Licence, with:

Municipal Manager,
PO Box 1748,
Ermelo
2350

Fax No. 017-811 1207;

LICENSING OFFICER

and

10.3. Specify the date on which the Atmosphere Emission Licence was issued.

11. REVIEW OF ATMOSPHERIC EMISSION LICENCE

In terms of -chapter 5 (44) (45) (46) (47) NEMAQA (Act No. 39 of 2004), Atmospheric Emission Licence is valid for 5 years from date of first issue of the Atmospheric Emission Licence. The licence will be reviewed within five (05) years from date of issue, after which it will or will not be amended.